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ABSTRACT

Donald Trump's election and his nomination of Scott Pruitt, a climate skeptic, to lead the Environmental Protection Agency drastically downshifted expectations on US climate-change policy. We study firms' stock-price reactions and institutional investors' portfolio adjustments after these events. As expected, carbon-intensive firms benefited. Should not companies with responsible strategies on climate change have lost value, since they were paying for actions that were now less urgent? In fact, investors actually rewarded such firms. The premium the firms received resulted, at least in part, from the move into climate-responsible stocks by long-horizon investors presumably expecting a post-Trump rebound to green policy.

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1 Introduction

Anecdotal and survey evidence suggests that a growing number of investors attend to environmental concerns, and climate change in particular, in their investment decisions (see, e.g., Krueger, Sautner, and Starks 2019). If the marginal investor incorporates factors related to climate change in his decision-making, then that will hurt the share price for less climate-conscious companies, and will nudge them toward more climate-sensitive business practices (Heinkel, Kraus, and Zechner, 2001). If so, market forces will help to promote the transition to a low-carbon economy. However, there is scant evidence whether, and if so how strongly, the marginal investor values firms' climate-related performance. That valuation will depend on a mix of personal preferences and investors' assessments of how government regulations will change and how firms will adapt.

This paper provides clear evidence that firms' climate-related performance does affect their stock market valuations. It shows this by exploiting (a) the price reactions of US stocks and (b) the changes in the portfolios of institutional investors to the 2016 climate policy shock. Two salient events comprised this shock: the election of Donald Trump on November 8, 2016 and the nomination of Scott Pruitt to head the Environmental Protection Agency (EPA) on December 7, 2016. Pruitt's selection reinforced beliefs about Trump's determination to dismantle or severely curb environmental protection rules and plans in place at the time. As for (a), as surely was expected, carbon-intensive firms benefited. (The analysis controls for firms' differential exposure to other expected policy changes following the election, such as in tax and trade policy.) However, strikingly, investors also rewarded companies demonstrating climate responsibility, that is, future-oriented, strategic activities geared towards the transition to a low-carbon economy. Why did this occur? Result (b) suggests an answer: Long-term institutional investors moved into climate-responsible stocks, presumably anticipating higher future demand by pro-environment investors and/or a regulatory boomerang effect leading to stiffer climate policies following the Trump Presidency.

The shift in climate policy that began at the end of 2016 provides a rare opportunity to study the impact of corporate climate performance on firm values and investor choices due to three important factors. First, although climate policy had arguably slowly been making progress up to the election, Trump's victory threatened to reverse that slow progress.[1] Second, the election outcome was largely unexpected.[2] Third, Trump followed through on his stated policy preferences when he appointed Scott Pruitt, a climate change skeptic, to head the EPA (and later by indeed withdrawing from the Paris Agreement and replacing the Clean Power Plan with the Affordable Power Plan).

Firms differ with respect to both *current* environmental footprint (say greenhouse gas emissions) and with respect to climate responsibility, i.e., their *future*-oriented climate strategies and voluntary initiatives to take actions that foster the transition to a low-carbon economy. This distinction gives rise to differentiated hypotheses.

One would expect firms currently making extensive use of fossil fuels and other "dirty" companies to have benefited from the election outcome relative to firms in cleaner industries. However, the impact of climate responsibility reflects two opposing forces. On the one

[1]While Clinton had made fighting climate change a priority (see, e.g., Business Insider, "Where Hillary Clinton and Donald Trump stand on climate change", October 5, 2016), Trump vowed throughout the electoral campaign to dismantle a large part of the Obama-era environmental protection and climate policy, inter alia by scrapping the Clean Power Plan (CPP) and withdrawing the US from the 2016 United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement.

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

hand, the drastic decrease in short-term regulatory risks and costs associated with a Trump presidency should benefit firms with relatively weak climate strategies. On the other hand, the expected environmental hostility of the Trump Administration should lead to increased demand for climate-responsible firms by (i) pro-environmental investors committed to the transition to a low-carbon economy, and/or (ii) long-term investors expecting such firms to do better in the long run due to stronger future demand by pro-environmental investors or stiffer climate regulation post-Trump. Which of these two effects will dominate is an empirical question.

Our study follows firms comprising the Russell 3000 index. We measure current emissions using *Carbon intensity*, defined as the firm's annual greenhouse gases (GHG) emissions divided by its market value of equity (or sales). Efforts focused on curbing future emissions are represented by *Climate responsibility*, namely the extent to which a firm has undertaken voluntary initiatives to manage the risks and opportunities inherent to the transition to a low-carbon economy. *Climate responsibility* reflects firms' adoption of emission reduction targets and investment plans to curb future emissions (for example by improving energy efficiency or switching to renewable energy sources). It also reflects the choices of financial companies to limit exposure to carbon-intensive assets in their loan and investment portfolios. Importantly, it does not comprise measures taken by firms merely to manage climate-related physical risks, such as protecting key assets against rising sea levels or stronger hurricanes.

We obtain data on firms' carbon emissions and climate responsibility from two leading providers of ESG (Environmental, Social and Governance) data: MSCI KLD and Vigeo Eiris. *Carbon intensity* and *Climate responsibility* are only weakly correlated. This confirms that they capture different aspects of firms' climate-related performance.

We begin by studying stock-price reactions. As discussed in Section 2, the Trump election and the Pruitt appointment have clear advantages and disadvantages relating to the strength of the surprise and the focus on environmental topics, and analyzing both provides a comprehensive picture. The analysis controls for other factors including taxes and trade exposure (Wagner, Zeckhauser, and Ziegler, 2018).

The 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 as investor expectations shifted towards a loosening of climate policy.

Our main surprising result regarding stock-price reactions is that after both the election and the Pruitt appointment, investors also rewarded companies demonstrating more responsible climate strategies. The effect is economically significant. For example, firms with an advanced climate responsibility designation from MSCI KLD -- about 11% of our sample -- earned a 81 (72) basis points higher cumulative CAPM-adjusted (Fama-French-adjusted) return by the end of the fifth trading day after the election. From the election through year-end 2016, this differential increased to 225 (157) basis points. Similar findings emerge when using the Vigeo Eiris climate responsibility measure, and when we extend our analysis to the medium run through the end of December 2017.

In the second part of the paper, we analyze how different types of institutional investors adjusted their portfolio holdings.[3] This analysis can shed light on *why* climate-responsible

[3]As of 2017, institutional investors held around 78% of the total market capitalization of the Russell 3000

firms outperformed their peers following the 2016 climate policy shock. As indicated above, at least two forces could contribute to that out-performance. The first is that increased concerns for global warming may have made pro-environmental investors more willing to accept a lower rate of return in exchange for the ‘‘warm glow’’ (Andreoni, 1989) received from investing in such firms, and the simultaneous avoidance of the ‘‘cold shiver’’ of holding climate-irresponsible firms.[4] We call this the *Current Preferences* hypothesis.

The second possible explanation is that investors reward climate-responsible firms today because they expect them to do better in the long-run due to some combination of two reasons: 1. They anticipate that future investors will receive an increased warm glow from holding such firms in the wake of the Administration, both in response to its tactics and because environmental conditions have worsened. 2. A boomerang effect leading to substantial tightening in governmental climate regulation after the Trump Administration departs office, due to intensified attitudes or worse environmental conditions. We call this the *Future Expectations* hypothesis. (In fact, recent survey results indicate that since Trump was elected, Americans became increasingly concerned about climate change.[5] In mid-2019, a boomerang in climate regulation appears possible. The Green New Deal, supported by multiple progressive candidates for the Democratic nomination in 2020, is an extreme exemplar.)

The data reveal striking differences among institutional investors, differences that speak to these two hypotheses. Longer-term investors shifted more strongly than others towards climate-responsible firms. This suggests that the observed out-performance of climate-

index (see Pensions and Investments, ‘‘80% of equity market cap held by institutions’’, April 25, 2017).

[4]Andreoni (1995) juxtaposed ‘‘warm glow’’ and ‘‘cold prickle’’. Some investors -- such as many leading universities that have refused to commit not to hold energy firms -- may feel that appropriate diversification requires that they hold some firms in dirty industries. Selecting the relatively climate-responsible firms within those industries may help to reduce any cold shiver.

[5]See Yale, ‘‘Americans are Increasingly ‘Alarmed’ About Global Warming’’, February 12, 2019.

responsible firms can be at least partially attributed to the Future Expectations explanation: Long-horizon investors appear to have reacted by looking beyond Trump's Presidency, and anticipating investor demand for climate-responsible firms to increase and climate regulation to become more stringent than would have otherwise been the case.[6] The Current Preferences hypothesis would predict a strengthening of pro-environmental preferences given the shock associated with the Trump Presidency. However, contrary to this hypothesis, investors with large holdings of climate-responsible firms before the election reduced them afterwards. Overall, these findings show that institutional investors value firms' climate responsibility choices for strategic reasons.

Two central contributions emerge from our analysis. First, it provides evidence that corporate environmental responsibility affects firm values and investors' portfolio decisions. By contrast with regulatory changes considered in the extant literature, the policy shock it analyzes is not the continuation of a trend towards tighter environmental regulation, but a largely unexpected shift towards a *rollback* in regulation. This unique feature makes it an attractive natural experiment that mitigates concerns, looming large in the literature, that observed effects are not causal but merely the continuation of pre-existing trends. Moreover, the existing literature on corporate social responsibility (CSR) relies predominantly on stock-price reactions.[7] Going beyond this mode of analysis, we also provide evidence

[6]This result also rejects the idea that investors might have rewarded climate-responsible firms because of the prospects of the roll-back of their (expensive) climate strategies. As climate responsibility was rewarded by long-horizon investors and not by short-horizon ones, the price reaction does not result from an expectation of lower costs in the short run, but rather from higher expected benefits in the long run.

[7]For example, Krueger (2015b) documents negative stock-price reactions to negative firm-specific CSR events. Flammer (2015) uses a regression discontinuity design (exploiting differences between firms that narrowly pass or fail to pass shareholder resolutions regarding CSR) and finds that the adoption of CSR proposals leads to positive stock-price reactions. Yet other research focuses on the role of disclosure rules. For example, Krueger (2015a) finds that UK firms most heavily affected by new greenhouse gas emissions reporting regulations benefited the most. See Amel-Zadeh (2018) for a survey of the literature on shareholder value effects of CSR.

of the actual portfolio changes that institutional investors undertake. This allows us to identify one of the drivers of the observed changes in prices for climate-responsible firms. A number of recent studies highlight the role of institutional investor horizon and tastes on ESG investing decisions (Dyck, Lins, Roth, and Wagner, 2019, Fernando, Sharfman, and Uysal, 2017, Gibson and Krueger, 2017, Hwang, Titman, and Wang, 2017, Krueger, Sautner, and Starks, 2019, and Starks, Venkat, and Zhu, 2017). Our results show that long-term institutional investors are more likely to benefit from climate-responsible firms' ability to better cope with the tightening in regulation that will likely follow the Trump era.

Second, the paper contributes to the fast-growing literature exploring the interconnections between climate change and financial markets. Recent studies in this area include Addoum, Ng, and Ortiz-Bobea (2019a,b), Andersson, Bolton, and Samama (2016), Baldauf, Garlappi, and Yannelis (2019), Bernstein, Gustafson, and Lewis (2019), Choi, Gao, and Jiang (2019), Hong, Li, and Xu (2019), and Ilhan, Sautner, and Vilkov (2019). Our paper complements this new strand of research by showing that investor rewards to climate-responsible firms strongly depend on the regulatory environment on climate change expected in the long run. The interaction of regulation and CSR features prominently in the conceptual and theoretical CSR literature. For example, Bénabou and Tirole (2010) and Kitzmueller and Shimshack (2012) note that CSR can respond to government failures to control negative externalities, and can serve to overcome firms' short-term bias by allowing them to take a long-term perspective and maximize intertemporal profits. Under both views, corporate environmental responsibility should be particularly valuable when environmental regulation fails. Our paper shows that financial markets support this type of long-term orientation by firms, and that long-term investors are driving this effect.

2 Sample and empirical strategy

We employ two complementary empirical strategies. First, Sections 3, 4, and 5 investigate the stock-price response to the 2016 climate policy shock, represented by the Trump victory and the Pruitt appointment, and the relative performance of climate-responsible firms through the end of 2017. In Section 6, we then analyze institutional investor portfolio changes to assess different explanations for the observed stock-price reactions. (The empirical strategy for that analysis is laid out in Section 6.)

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

Throughout the 2016 electoral campaign, Donald Trump and Hillary Clinton expressed diametrically opposed 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 undertake a radical U-turn on environmental regulation so as to promote economic well-being. Most notably, he expressed an intention to dismantle the Clean Power Plan and exit the Paris Agreement.

Trump's surprising victory was followed by a few weeks when the President Elect's intentions to follow through on his various promises, including those related to the environment, remained inconclusive. To illustrate, during an interview with *The New York Times* on November 23, 2016, asked the question "*Are you going to take America out of the world's lead of confronting climate change?*", Trump replied "*I'm looking at it very closely. I'll tell*

[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*" (from Clinton's 2016 electoral campaign site).

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.* [...]"[9] A month later, these equivocal statements were followed by Trump's appointment of Scott Pruitt to head the EPA. That appointment clearly indicated that he was committed to a harsh scale back on environmental policies.[10] The nomination of a climate skeptic to lead the institution responsible for upholding and implementing federal environmental laws marked a real turning point in the US policy towards climate change.[11]

Trump's election and Pruitt's nomination each has advantages and disadvantages for identifying the impact of firms' climate-related performance on their value. The pluses and minuses of the two events as identifiers cut in opposite directions; hence, 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 a mélange of dimensions, many far removed from environmental policy. Pruitt's nomination has the advantage of being solely focused on environmental issues, with particular salience with respect to climate change policy. Its main disadvantage is that although the date was not known in advance, it was only a moderate surprise. Though Pruitt was one of five candidates the media rumored for the appointment, none strong on the environment, he was the candidate most hostile to climate regulation. And he was an announced skeptic on human activity being the cause of global warming.[12] We next describe the main firm-related

[9]The full transcript of the interview is available at `https://www.nytimes.com/2016/11/23/us/politics/trump-new-york-times-interview-transcript.html?_r=0`.

[10]The New York Times, "Trump Picks Scott Pruitt, Climate Change Denialist, to Lead E.P.A.", December 7, 2016.

[11]See Glicksman (2017) for an early assessment of the fate of environmental regulations in the Trump Era. As the Attorney General of Oklahoma, Pruitt undertook legal actions against the EPA to oppose a series of environmental regulations.

[12]The Hill, "Five potential Trump EPA picks", December 4, 2016.

variables of interest to our study and our data set.

2.1 Measures of climate-related performance

2.1.1 Climate responsibility

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

Data on corporate climate-related strategies was 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., Galema, Plantinga, and Scholtens, 2008, Hong and Kostovetsky, 2012, Krueger, 2015b, and 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 firms' climate performance. The first, the strength indicator ‘‘Env-str-d'', equals 1 for firms demonstrating best practices on the management of risks of increased costs linked to carbon pricing or regulatory caps, and 0 otherwise.[13] The second, the weakness indicator ‘‘Env-con-f'', equals 1 for firms involved in serious

[13]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.

controversies related to their climate change and energy-related policies and initiatives, and 0 otherwise.[14] For 2016, these two indicators as well as the accounting information required to compute our control variables are available for 1,801 Russell 3000 firms. (The required accounting information is described in detail in Section 2.2 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, Sharfman, and Uysal, 2017). By contrast with other ESG variables, very few firms were assessed to have a serious weakness on climate responsibility. As a consequence, in our sample *Climate responsibility (kld)* in fact is a binary indicator variable.

Our second source of data on firms' climate-related performance is Vigeo Eiris. Vigeo Eiris evaluates firms in six ESG areas (environment, human rights, human resources, business behaviour, community involvement, and corporate governance). Vigeo Eiris scores have also been used in various academic contributions on sustainable finance and CSR. (See, e.g., Ferrell, Liang, and Renneboog, 2016 and Liang and Renneboog, 2017.)

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 measure identifying companies who could reduce their carbon footprint in the future, reduce portfolio

[14] 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.

exposure to carbon risk and exploit market opportunities presented by the regulatory and market environment to mitigate climate change. The assessment is based on the evaluation of firms' climate-related performance in terms of policies adopted, measures implemented, evolution of key performance indicators, and stakeholder feedbacks. The resulting scores range from 0 to 100. For 2016, this variable is available for 766 Russell 3000 firms. We also define a binary indicator *Climate responsibility leader*, which equals 1 for firms in the top quartile of the *Climate responsibility (ve)* scores, and 0 otherwise. This definition is intended to mirror the KLD "strength" measure.

Importantly, both MSCI KLD and Vigeo Eiris choose to cover firms based on index membership; coverage in no way reflects CSR performance.[15] Moreover, both providers' climate responsibility measures reflect firms' efforts to curb future emissions, not the measures they may have taken to manage physical climate-related risks.

2.1.2 Carbon intensity

Vigeo Eiris also provides information on firms' total absolute yearly Scope 1 and Scope 2 greenhouse gases (GHG) emissions in kilotons of CO2 equivalents in 2015.[16] These carbon emission data are based on information filed through the "Carbon Disclosure Project" (CDP).[17] When self-reported data are not available, Vigeo Eiris estimates the carbon emissions

[15] In particular, as of 2016, the MSCI KLD database covers the MSCI USA Investable Market Index (IMI), with indicatively 2,400 constituents. Vigeo Eiris uses different indexes, including primarily the Stoxx Global 1800 (hence, US firms part of the STOXX North America 600).

[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.

[17] CDP is a non-governmental organization submitting annual questionnaire surveys on carbon emissions to the world's largest firms on behalf of large institutional investors.

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 766 companies.[18] We normalize the 2015 total emission data by the market value of equity in the same year and denote the resulting 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). Very similar results obtain when GHG emissions were scaled by total sales or total assets. *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.[19] However, it only provides limited information on a firm's strategic positioning on climate change.

2.1.3 Descriptive statistics of *Climate responsibility* and *Carbon intensity*

Table 1 summarizes the climate-related variables our analyses employ. Table 2 reports the number of firms above and below the medians of *Climate responsibility (ve)* and *Carbon intensity* in the Vigeo Eiris sample. This analysis shows that these two variables are reasonably independent of each other, confirming that they capture different dimensions of a firm's climate performance.

[18]The carbon emission data are self-reported for 340 companies and estimated for 426 companies.

[19]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, etc.) may be particularly relevant for climate-conscious investors. While we keep financial companies in our sample, analysis available on request shows that our results hold even when they are excluded.

Table 1: Summary of climate-related variables

Variable name	Source	Short description
Climate responsibility (kld)	MSCI KLD	Climate strength (*Env-str-d*) minus Climate weakness (*Env-con-f*) *Env-str-d*: Management of the risks of increased costs linked to carbon pricing or regulatory caps on climate change (0 or 1). *Env-con-f*: Severity of controversies related to a firm's climate and energy-related policies and initiatives (0 or 1).
Climate responsibility (ve)	Vigeo Eiris	Strategic approach to climate change risks and opportunities (Energy Transition), absolute score from 0 to 100.
Climate responsibility leader (ve)	Vigeo Eiris	Dummy variable equal to 1 for firms in the top quartile of Climate responsibility (ve) (corresponding to a score equal to or above 30), and 0 otherwise.
Carbon intensity	Vigeo Eiris / Compustat	Scope 1 and 2 GHG emissions in kt of CO2 equivalents (ktCO2eq) divided by market value of equity in billion USD.

Table 2: Sample composition by firm characteristics, Vigeo Eiris

	Carbon intensity		
Climate responsibility (ve)	Below or equal median	Above median	Total
Below or equal median	184	204	388
Above median	199	179	378
Total	383	383	766

Note: This 2 by 2 matrix shows the number of firms with *Climate responsibility (ve)* and *Carbon intensity* below or equal to the median and above the median.

Table A1 in the Supplementary Appendix reports correlations among various climate-related variables. Our two main variables of interest -- *Climate responsibility (kld)* and *Climate responsibility (ve)* -- are strongly positively correlated (0.56, $p < 0.01$). Nevertheless, the fact that the correlation is well below 1 reflects the difference in structure between the two indicators (one is binary, the other continuous), and the different methodological approaches between 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 firms' managerial efforts to improve their climate performance. These differences across indicators help to cross-validate our findings.

Climate responsibility (kld) is modestly negatively correlated with *Carbon intensity* (−0.09), but sufficiently so to be statistically significant. The correlation between *Climate responsibility (ve)* and *Carbon intensity*, though still slightly negative, is insignificant (−0.03).

Table 3 shows the descriptive statistics of the climate-related variables by Fama-French 12-industry classification.[20] The table reveals sizable variation in firms' climate-related performance within industries, and not merely across industries.

2.2 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.[21]

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.[22] From Bloomberg (and Compustat geographical segments data), we collect the percentage of revenues from foreign sources. This allows us to control for the fact that firms producing tradable goods

[20] 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.

[21] 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, 558 and 227 companies for which calendar year 2016 data are used.

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

Table 3: Descriptive statistics of climate-related firm characteristics

Panel A: MSCI KLD sample

	Climate responsibility (kld)	
	N	mean
Consumer non-durable	96	0.30
Consumer durable	45	0.09
Manufacturing	206	0.13
Energy	70	0.06
Chemicals	59	0.22
Business equipment	335	0.11
Telecom	55	0.09
Utilities	73	0.23
Wholesale	223	0.10
Healthcare	226	0.08
Finance	449	0.06
Other	233	0.08
Total	2,070	0.11

Panel B: Vigeo Eiris sample

	Climate responsibility (ve)						Carbon intensity				
	N	p25	mean	p50	p75	sd	p25	mean	p50	p75	sd
Consumer non-durable	46	11.00	24.63	26.00	33.00	16.08	0.01	0.08	0.02	0.06	0.15
Consumer durable	14	14.00	18.86	21.00	27.00	11.27	0.06	0.22	0.10	0.19	0.29
Manufacturing	62	9.00	21.84	23.50	33.00	15.00	0.02	0.87	0.11	0.49	2.06
Energy	42	5.00	15.33	14.00	20.00	12.33	0.26	1.25	0.56	1.34	1.73
Chemicals	29	18.00	30.14	31.00	43.00	17.95	0.02	0.80	0.12	0.85	1.88
Business equipment	126	0.00	15.68	12.00	26.00	15.96	0.01	0.10	0.02	0.05	0.36
Telecom	21	0.00	19.90	0.00	42.00	25.87	0.01	0.11	0.03	0.04	0.33
Utilities	52	21.00	27.19	27.50	35.50	12.57	0.37	3.58	2.02	3.48	5.88
Wholesale	67	1.00	16.55	16.00	28.00	13.75	0.02	0.79	0.05	0.11	5.63
Healthcare	62	0.00	14.89	5.50	28.00	19.91	0.00	0.09	0.01	0.06	0.24
Finance	159	4.00	16.43	11.00	27.00	15.22	0.00	0.02	0.01	0.03	0.04
Other	86	0.00	18.40	16.50	27.00	16.69	0.02	0.78	0.24	0.76	1.50
Total	766	4.00	18.67	16.00	31.00	16.41	0.01	0.61	0.04	0.22	2.60

Note: This table shows the descriptive statistics of climate-related variables provided by MSCI KLD (Panel A) and Vigeo Eiris (Panel B), by Fama-French 12-industry classification. The samples consist of 2,070 (Panel A) and 766 (Panel B) Russell 3000 constituents as of November 8, 2016 for which information on standard control variables (log market cap, revenue growth, profitability, and market leverage) is available. *Climate responsibility (kld)* is a three-valued measure computed as firms' MSCI KLD climate strength (env-str-d, 0 or 1) minus climate concern (env-con-f, 0 or 1) indicators for 2016. *Climate responsibility (ve)* denotes the Vigeo Eiris Energy Transition score (from 0 to 100) for 2016. It measures a firm's strategic approach to climate change. *Carbon intensity* is defined as the firm's kilotons of CO2 emission equivalents (total Scope 1 and 2) in 2015 normalized by the market value of equity (in USD billions).

(particularly in manufacturing) are both more likely to be affected by trade policy and to have environmental impact.

Table 4 provides descriptive statistics of accounting information for our three samples: The sample including all 2,677 Russell 3000 constituent companies for which standard accounting characteristics are available (Panel A); the sub-sample of 2,070 firms for which the two MSCI KLD indicators of interest are available (Panel B); and finally the sub-sample of 766 issuers covered by Vigeo Eiris (Panel C).

After including the cash ETR, the MSCI KLD sample reduces to 1,801 firms and the Vigeo Eiris sample to 671 firms, representing respectively about 88% and 78% of total US market capitalization. The share of foreign revenues is not always available for these companies. To avoid reducing the sample sizes further, we replace missing values of the share of foreign revenues with 0 and include a dummy variable equal to 1 (and 0 elsewhere) to absorb the effect of this adjustment in our empirical specifications. This treatment is employed for 355 out of 1,801 firms in the MSCI KLD sample, and 95 out of 671 firms in the Vigeo Eiris sample.

Interestingly, little of the variability in climate responsibility choices is explained by traditional firm characteristics. Regressing our climate responsibility measures on industry dummies and other control variables yields some significant coefficients (in line with the correlation levels in Table A1 in the Supplementary Appendix). However, the adjusted R-squared values are quite low (0.26 for *Climate responsibility (kld)*, and 0.29 for *Climate responsibility (ve)*).

Table 4: Descriptive statistics of firm characteristics

Panel A: Russell 3000 sample

	N	min	p25	mean	p50	p75	max	sd
Log market cap	2,677	3.75	6.24	7.49	7.34	8.45	13.31	1.60
Revenue growth	2,677	-100.00	-3.50	19.11	4.52	15.67	3,380.13	149.88
Profitability	2,677	-240.24	0.14	1.28	3.26	8.78	133.64	19.34
Market leverage	2,677	0.00	0.06	0.26	0.23	0.40	3.02	0.25
Cash ETR	2,286	0.00	7.35	20.04	20.29	29.18	99.54	15.06
Percent foreign revenues	1,763	0.00	0.00	24.24	14.16	43.24	100.00	27.43

Panel B: MSCI KLD sample

	N	min	p25	mean	p50	p75	max	sd
Climate responsibility (kld)	2,070	0.00	0.00	0.11	0.00	0.00	1.00	0.31
Log market cap	2,070	4.99	6.76	7.89	7.69	8.73	13.31	1.45
Revenue growth	2,070	-100.00	-3.66	15.06	4.15	13.76	3,380.13	137.35
Profitability	2,070	-153.27	0.73	2.95	4.15	9.74	133.64	17.23
Market leverage	2,070	0.00	0.07	0.27	0.24	0.40	3.02	0.24
Cash ETR	1,801	0.00	10.08	21.10	21.43	29.73	99.54	14.75
Percent foreign revenues	1,446	0.00	0.00	25.44	18.77	44.70	100.00	26.57

Panel C: Vigeo Eiris sample

	N	min	p25	mean	p50	p75	max	sd
Climate responsibility (ve)	766	0.00	4.00	18.67	16.00	31.00	78.00	16.41
Carbon intensity	766	0.00	0.01	0.61	0.04	0.22	46.20	2.60
Log market cap	766	5.46	8.40	9.25	9.21	10.09	13.31	1.31
Revenue growth	766	-100.00	-5.26	3.39	2.10	8.67	273.03	26.25
Profitability	766	-149.80	1.22	4.49	4.93	10.66	49.23	15.59
Market leverage	766	0.00	0.20	0.33	0.32	0.45	1.37	0.20
Cash ETR	671	0.00	9.93	20.28	20.19	28.49	93.40	13.98
Percent foreign revenues	576	0.00	0.68	31.03	28.31	50.83	100.00	27.32

Note: This table shows descriptive statistics of firm characteristics of the three samples used in the study. Panel A refers to the sample including Russell 3000 constituents as of November 8, 2016 for which standard controls (log market cap, revenue growth, profitability, and market leverage) are all available. Panel B includes the sample for which MSCI KLD climate-related indicators are available for 2016. Finally, Panel C includes the sample covered by Vigeo Eiris as of 2016. In the full Russell 3000 sample (Panel A), accounting data refer to fiscal year 2015 for 1,973 companies and to fiscal year 2016 for 704 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.

2.3 Stock returns

We obtain daily stock-return data from October 1, 2015 through December 29, 2017 on all US common stocks (with the exception of 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 to the 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 one year of daily data, and are then used to compute the abnormal returns for the following quarter.[23] For instance, abnormal returns for the last quarter of 2016 (the quarter of the election) are based on betas estimated from daily returns from October 1, 2015 through September 30, 2016. Similarly, the abnormal returns for the first quarter of 2017 are based on betas estimated from daily returns throughout 2016.

To obtain CAPM-adjusted returns, we first estimate each stock's market beta from an 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.

Throughout the paper, all returns are reported in percentage points. Descriptive statistics are reported in Table 5. For space reasons, we show data only for the MSCI KLD sample.

[23]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.

Table 5: Descriptive statistics - Stock returns

	N	min	p25	mean	p50	p75	max	sd
Raw returns								
Election (Nov 9, 2016)	2,070	-31.26	0.43	2.98	2.62	5.08	43.13	4.78
Cumulative 3-Day	2,070	-31.59	1.20	6.43	6.07	11.38	116.06	8.61
Cumulative 5-Day	2,070	-54.33	2.06	8.16	7.74	13.40	130.78	9.71
Cumulative 10-Day	2,070	-50.00	3.66	10.45	9.85	16.58	124.28	10.59
Pruitt Nomination (Dec 7, 2016)	2,070	-15.33	0.09	0.99	1.18	2.06	18.75	2.34
Cumulative 3-Day	2,070	-22.05	0.89	2.59	2.53	4.24	49.43	3.92
Cumulative 5-Day	2,070	-86.02	-0.03	1.73	1.89	3.92	50.58	4.97
Cumulative 10-Day	2,070	-86.68	-0.57	2.15	2.28	4.97	89.40	6.88
Cumulative Nov 9, 2016-Dec 30, 2016	2,070	-85.18	2.55	12.25	10.52	21.01	130.24	16.09
Cumulative Nov 9, 2016-Dec 29, 2017	1,962	-90.43	6.10	30.88	26.71	48.76	670.62	50.42
CAPM-adjusted returns								
Election (Nov 9, 2016)	2,070	-33.99	-1.18	1.21	0.91	3.23	42.01	4.58
Cumulative 3-Day	2,070	-34.92	-1.19	3.97	3.62	8.78	106.47	8.20
Cumulative 5-Day	2,070	-56.12	-1.31	4.36	4.11	9.35	114.96	8.93
Cumulative 10-Day	2,070	-52.78	-1.22	4.81	4.24	10.48	101.68	9.53
Pruitt Nomination (Dec 7, 2016)	2,070	-17.91	-1.42	-0.53	-0.23	0.79	17.30	2.49
Cumulative 3-Day	2,070	-25.53	-1.61	0.04	0.27	1.93	44.70	4.00
Cumulative 5-Day	2,070	-86.18	-3.26	-1.14	-0.76	1.24	45.11	5.10
Cumulative 10-Day	2,070	-86.85	-3.61	-0.83	-0.57	2.25	83.74	6.87
Cumulative Nov 9, 2016-Dec 30, 2016	2,070	-86.23	-3.59	4.51	3.55	12.17	113.92	14.49
Cumulative Nov 9, 2016-Dec 29, 2017	1,962	-94.66	-23.38	-6.47	-6.47	8.03	391.17	33.21
Fama-French-adjusted returns								
Election (Nov 9, 2016)	2,070	-37.17	-2.31	-0.18	-0.36	1.64	42.07	4.55
Cumulative 3-Day	2,070	-42.69	-4.27	-0.51	-0.19	4.04	93.41	8.18
Cumulative 5-Day	2,070	-54.28	-4.61	-0.31	-0.04	4.47	107.78	9.08
Cumulative 10-Day	2,070	-51.47	-5.28	-0.73	-0.33	4.65	90.08	9.66
Pruitt Nomination (Dec 7, 2016)	2,070	-15.88	-0.92	0.01	0.13	1.14	18.15	2.31
Cumulative 3-Day	2,070	-28.06	-1.71	-0.12	0.11	1.86	44.75	4.04
Cumulative 5-Day	2,070	-84.73	-2.17	-0.09	0.04	2.13	48.00	4.94
Cumulative 10-Day	2,070	-85.50	-3.30	-0.44	-0.21	2.64	85.98	6.89
Cumulative Nov 9, 2016-Dec 30, 2016	2,070	-82.59	-8.35	-1.03	-0.30	7.05	110.29	14.51
Cumulative Nov 9, 2016-Dec 29, 2017	1,962	-91.96	-20.33	-1.62	-2.37	13.15	443.73	36.35
Average factor loadings								
Market	2,070	0.12	0.82	1.06	1.01	1.25	4.21	0.38
Size	2,070	-0.85	0.25	0.79	0.69	1.21	4.53	0.78
Value	2,070	-3.12	-0.23	0.21	0.15	0.58	6.83	0.89

Note: This table reports descriptive statistics of stock returns for firms in the MSCI KLD sample, expressed in percentage points. We consider raw returns, abnormal returns calculated with respect to the CAPM, and abnormal returns calculated employing the Fama-French three-factor model. To obtain CAPM-adjusted returns, we first estimate each stock's market beta from an 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. Similarly, Fama-French-adjusted returns are computed as the stock's excess return minus the sum of its factor exposures times the factor returns, where the factor exposures are estimated using daily market excess returns, size, and value factor returns using one year of data.

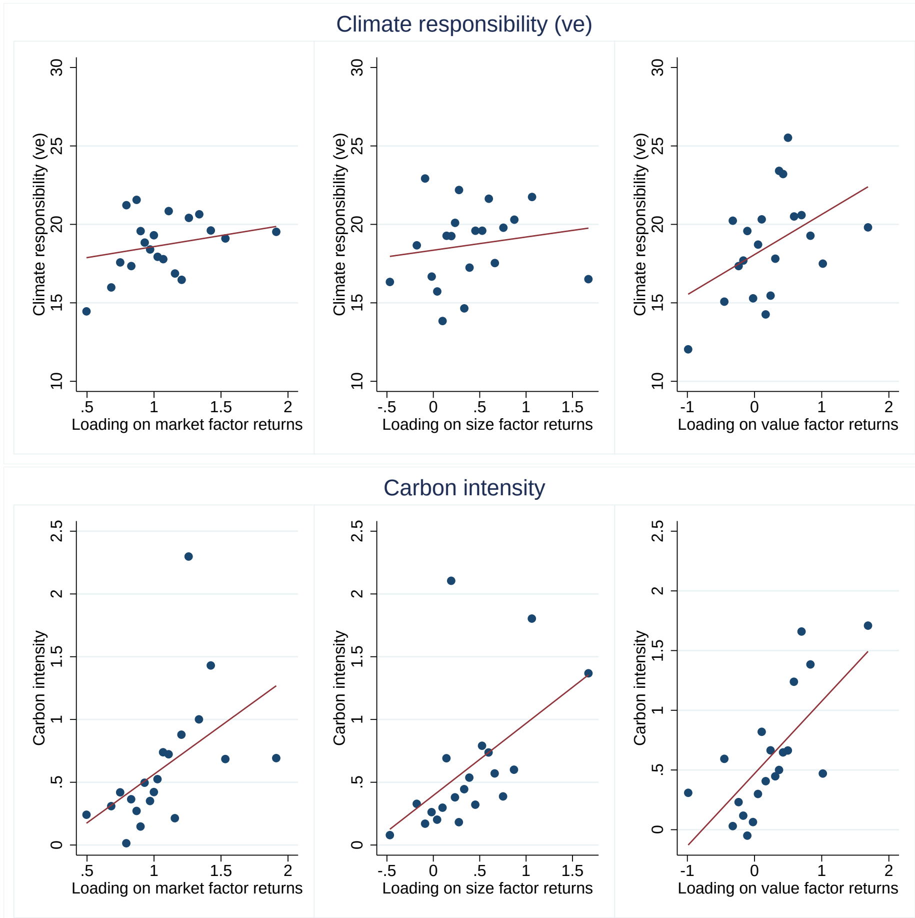
Before embarking on the empirical analysis, it is useful to reflect on the relative advantages in our setting of using raw returns, CAPM-adjusted returns, or Fama-French-adjusted returns. Conceptually, the purpose of using adjusted returns is to eliminate the impact of factors that are unrelated to the effects being investigated.

To illustrate, small stocks outperformed large stocks and value stocks outperformed growth stocks after the election. However, this out-performance could itself be driven by the new administration's expected policies. Indeed, in their analysis of the effect of expected changes in tax policy after the election, Wagner, Zeckhauser, and Ziegler (2018) find that firms with high loadings on the size and value factors have higher ETRs on average. They then note that to the extent that the size and value returns are themselves driven by expected changes in tax policy, regressions using Fama-French-adjusted returns will tend to understate the impact of taxes on stock returns. Similar effects could obviously arise if the climate-related variables correlate significantly with some of the Fama-French factor loadings.

Figure 1 indicates that firms graded higher on *Climate responsibility (ve)* on average load more highly on the value factor. This relation is statistically significant ($p < 0.01$). However, *Climate responsibility (ve)* appears to be uncorrelated with either the market or the size factor loadings. Similar results hold with *Climate responsibility (kld)* (though in this case, the relation with value factor loadings only reaches significance at the 10% level). Figure 1 also reveals that in the Vigeo Eiris sample, firms with higher *Carbon intensity* have, on average, higher loading on the market, value and size factors (controlling for sector and firm characteristics). Each of these three relations is statistically significant ($p < 0.01$).

Due to these differences in factor exposures, differences in the magnitude of the effects that we document across alternative sets of returns are to be expected. In what follows, we

Figure 1. Climate-related variables against Fama-French factor loadings



Note: Binned scatter plots of loadings on (from left to right) Fama-French market, size, and value factor returns against firm *Climate responsibility (ve)* (upper graphs) and *Carbon intensity* for the firms in the Vigeo Eiris sample. The plots control for Fama-French 12-industry fixed effects and firm characteristics (log market cap, percentage revenue growth, profitability, and market leverage). The factor loadings are computed by regressing firms' daily excess returns on the daily market excess returns, size, and value factor returns (from Ken French's website) from October 1, 2015 through September 30, 2016.

use CAPM-adjusted returns 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, and the differences in the magnitude of the coefficients across sets of returns are in line with what one would expect based on the relation between the climate variables and the factor exposures.

3 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 US emissions.[24]

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 (maroon bars) and cumulative abnormal returns through year-end 2016 (light grey bars) are regressed on Fama-French 30-industry dummies and firm characteristics (log market cap, revenue growth, profitability, and market leverage) using the full Russell 3000 sample (2,677 firms). The coefficients are reported in descending order by the abnormal returns on the first post-election day.

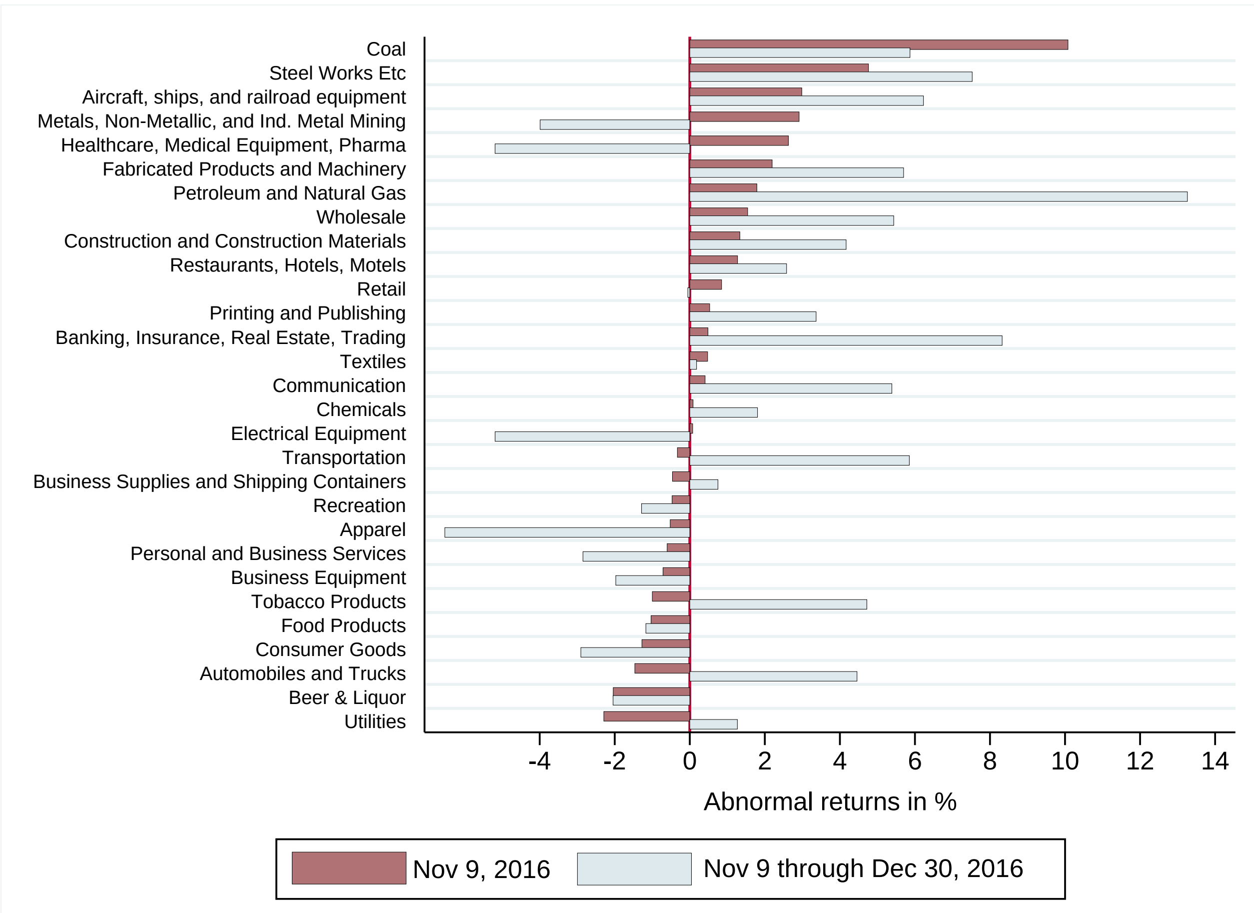
Adjusting for the market's overall move, the stocks of "dirty" industries performed very well on the day after the election. In particular, investors immediately turned the coal, steel, metals, and petroleum and natural gas industries into notable relative winners. Shifts in investor expectations about 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. 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

[24] 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 US economy. Detailed information on the 2016 emissions of the top emitting industries is available at `https://www.epa.gov/ghgreporting/ghgrp-industrial-profiles`.

the election. Presumably, utilities suffered because investors rotated 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. Abnormal returns after the election by Fama-French 30-industry classification



Note: This figure plots the industry coefficients when regressing CAPM-adjusted returns on the day after the election (maroon bars) and through year-end 2016 (light grey bars) on Fama-French 30-industry dummies and firm characteristics (log market cap, revenue growth, profitability, and market leverage). The sample includes the 2,677 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 2 also reveals that the cumulative abnormal returns from the election through year-end 2016 differed substantially from the immediate market reaction. In particular, investors appear to have been initially too optimistic about the prospects for the coal[25] and metal industries under Trump.[26] 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.

As mentioned above, industry reactions also reflected shifts in investor expectations about policy areas quite apart from climate change. Healthcare, medical equipment, and pharmaceuticals lost dramatically through year-end (a consequence of the expectation that Obamacare would be dismantled, or at least significantly altered), as did textile and apparel firms (reflecting their dependence on imports, which Trump had vowed to strongly discourage). Business supplies and shipping containers also lost, presumably reflecting Trump's tough stance on trade. Finally, financial companies gained due to the prospect of softened regulation in that sector.

Overall, the simple descriptive results illustrated by Figure 2 strongly suggest that Trump's election represented good news for high-emissions sectors. However, heterogeneity among firms within the same industry is typically as large as it is across industries, both in terms of abnormal returns and efforts to mitigate climate change. For instance, as Table 3 indicates, the energy sector comprises both firms trying to pro-actively 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

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

[26]This result is consistent with the analysis in Addoum and Kumar (2016). They provide evidence that political sentiment following a change of the presidential party can give rise to temporary mispricing in certain party-sensitive sectors, through a shift of demand by politically-sensitive investors that arbitrageurs cannot immediately compensate. The pattern of the stock-price reactions of the coal, mining, and metals industries (which, not surprisingly, they classify as "Republican sectors") may well have been due to a similar effect.

abnormal return on the day after the election of firms in that sector was 2.22 percentage points, the spread around that value was great. The 25th percentile was −0.15 percentage points and the 75th percentile was 2.93 percentage points.

The next section capitalizes on this heterogeneity across firms to investigate how their climate responsibility affected their stock prices after the 2016 policy shock.

4 Within industry stock-price reactions

4.1 Main results

As discussed in Section 2, our main empirical strategy investigates the cross-sectional variation of returns following two market-wide events, the Trump victory and the Pruitt appointment. Given the potential cross-sectional correlation of stock returns, conventional t-statistics, which posit independently distributed errors, could be biased upwards (Fama and French, 2000). To avoid this problem, we test the statistical significance of coefficients from the cross-sectional regressions using adjusted t-statistics based on the empirical distribution of coefficient estimates, following the approach of Cohn, Gillan, and Hartzell (2016). Specifically, we calculate the adjusted t-statistics as follows. First, we run the cross-sectional regression using daily (abnormal) returns over a non-event period ranging from October 1, 2015 through September 30, 2016.[27] Then we run the same cross-sectional regression using event period returns. The adjusted t-statistic is computed by subtracting the mean time-series coefficients over the non-event period from the estimated event coefficients, and then dividing this

[27]Betas over this non-event period are estimated using one year of daily stock-return data going back up to October 1, 2014, and are then used to compute the abnormal returns for the following quarter.

difference by the standard deviation of the time-series coefficients over the non-event period. When using cumulative (abnormal) returns, we combine returns in the non-event period in order to estimate comparable coefficients. Our findings hold as well when using conventional t-statistics. Differences in statistical significance are minor.

Turning to the analysis, Table 6 shows the results of regressions of individual stock CAPM-adjusted returns on firms' *Climate responsibility (kld)* following our two key events: Trump's 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 4.2.3. 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]

Interestingly, firms displaying a high level of climate responsibility enjoyed a 43 basis points higher abnormal return on the first trading day after the election. Their cumulative abnormal returns grew strongly by the third day, reaching 145 basis points, and remain positive, although not quite statistically significant through the 10th trading day after the election. At that point firms with strong climate responsibility were still 62 basis points ahead of otherwise similar stocks. Companies at the forefront of climate responsibility benefited further following the nomination of Scott Pruitt, securing an additional 102 basis points higher abnormal return after 10 trading days from December 7, 2016.

The coefficients on the control variables 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. We also

[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 shows that the results continue to hold with Fama-French 30-industry fixed effects.

observe that market leverage has 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.

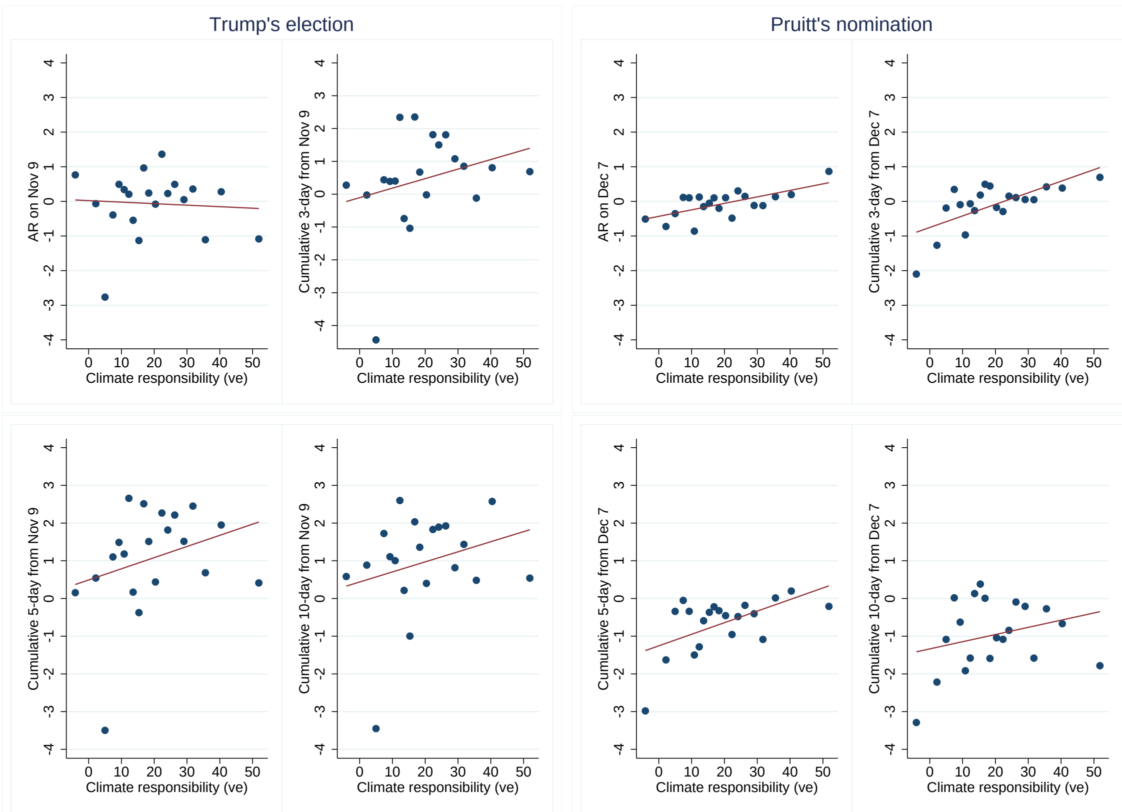
Table 6: Climate responsibility and stock returns, MSCI KLD sample

	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)	0.435**	1.445***	0.806**	0.623	0.239	0.564**	0.748**	1.018**
	(2.55)	(4.83)	(2.31)	(1.46)	(1.44)	(1.99)	(2.16)	(2.15)
Cash ETR	0.004	0.031***	0.035***	0.046**	0.004	0.009	0.018	0.036*
	(0.71)	(3.23)	(2.72)	(2.31)	(0.82)	(1.05)	(1.45)	(1.88)
Foreign revenues	-0.015***	-0.033***	-0.035***	-0.032	0.001	0.011	0.021	0.013
	(-2.67)	(-3.48)	(-2.90)	(-1.55)	(0.12)	(0.99)	(1.48)	(0.62)
Foreign revenues missing	-0.429***	-0.572**	-0.202	0.056	-0.089	-0.194	-0.577*	-0.659
	(-2.91)	(-2.36)	(-0.61)	(0.19)	(-0.59)	(-0.77)	(-1.81)	(-1.21)
Market leverage	-1.861***	-4.718***	-4.536***	-4.414**	0.583	0.342	0.042	-0.114
	(-3.34)	(-4.58)	(-3.49)	(-2.22)	(1.05)	(0.33)	(0.04)	(-0.06)
Log market cap	-0.592***	-1.873***	-1.662***	-2.196***	0.109	-0.463*	-0.193	-0.514
	(-3.62)	(-6.75)	(-4.81)	(-4.45)	(0.65)	(-1.70)	(-0.58)	(-1.15)
Percent revenue growth	0.001	0.002	0.002	-0.001	-0.001*	-0.003*	-0.003	-0.002
	(0.67)	(0.95)	(1.08)	(-0.61)	(-1.72)	(-1.74)	(-1.46)	(-0.73)
Profitability	-0.024	-0.046*	-0.056	-0.011	0.027*	0.036	0.048	0.046
	(-1.62)	(-1.66)	(-1.54)	(-0.08)	(1.88)	(1.38)	(1.40)	(0.88)
Observations	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801
R-squared	0.140	0.282	0.238	0.250	0.249	0.120	0.118	0.087
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows 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 355 firms with missing 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 Trump's 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. Adjusted t-statistics in parentheses, calculated from the empirical time-series distribution of returns on trading days between October 1, 2015 and September 30, 2016. *** p<0.01, ** p<0.05, * p<0.1.

Figure 3 uses binned scatter plots to show the stock-price effect of climate responsibility when using the Vigeo Eiris sample. As can be seen, with this measure, too, we find that investors reacted positively to greater levels of climate responsibility both after Trump's election (left panels) and after Pruitt's nomination (right panels). This is contrary to what naïve intuition might suggest.

Figure 3. Scatter plots of CAPM-adjusted returns against *Climate responsibility (ve)*



Note: Binned scatter plots of CAPM-adjusted abnormal returns against *Climate responsibility (ve)* following Trump's election (left panels) and Pruitt's nomination (right panels). All graphs control for Fama-French 12-industry fixed effects, *Carbon intensity* and control variables (cash ETR, foreign revenues, log market cap, revenue growth, profitability, and market leverage).

These binned scatter plots are derived from the regression results presented in Panel A of Table 7. Specifically, Panel A of Table 7 reports the results of regressions of CAPM-adjusted stock returns on firm *Climate responsibility (ve)*, *Carbon intensity*, and control variables (cash ETR, share of foreign revenues, log market cap, revenue growth, profitability, and market leverage). The coefficients of the control variables, available on request, are in line with those discussed above.

The point estimate on *Climate responsibility (ve)* on the first day is slightly negative, but becomes positive and statistically significant after three days. Firms with better strategic positioning on climate change also experienced higher returns after Pruitt's nomination as well. The effect is economically important: A one standard deviation higher *Climate responsibility (ve)* is associated with a 0.54 percentage point (16.41*0.033) increase in three-day cumulative CAPM-adjusted returns after Pruitt's nomination, about a seventh of a standard deviation of those returns.

When comparing the results in Table 6 with those in Panel A of Table 7, 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 to separate out good performers (about 11% of firms). To better compare the results with the two samples, Panel B of Table 7 reports the regression results of the usual specification using the binary variable *Climate responsibility leader (ve)*, equal to 1 for firms in the top quartile of *Climate responsibility (ve)* and 0 otherwise. (We use the top quartile given the smaller size of the Vigeo Eiris sample.) This approach allows us to better isolate the returns of firms with more advanced climate strategies relative to other companies.

Table 7: Climate responsibility and stock returns, Vigeo Eiris sample

Panel A: *Climate responsibility (ve)* and *Carbon intensity*

		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 (ve)	-0.004	0.029***	0.030**	0.027	0.019***	0.033***	0.031**	0.019
	(-0.69)	(3.04)	(2.27)	(1.17)	(3.11)	(3.49)	(2.35)	(0.84)
Carbon intensity	0.202***	0.098	0.115	0.125	-0.011	0.014	-0.027	0.005
	(4.72)	(1.29)	(1.21)	(0.71)	(-0.26)	(0.17)	(-0.29)	(-0.02)
Observations	671	671	671	671	669	669	669	669
R-squared	0.168	0.255	0.296	0.269	0.268	0.152	0.186	0.135

Panel B: *Climate responsibility leader (ve)* and *Carbon intensity*

Climate responsibility leader (ve)	0.276	1.436***	1.248***	1.284**	0.420**	0.749**	0.775**	0.678
	(1.57)	(4.87)	(3.44)	(2.02)	(2.35)	(2.59)	(2.18)	(1.10)
Carbon intensity	0.202***	0.097	0.113	0.124	-0.012	0.012	-0.028	0.004
	(4.73)	(1.27)	(1.19)	(0.70)	(-0.28)	(0.14)	(-0.31)	(-0.03)
Observations	671	671	671	671	669	669	669	669
R-squared	0.169	0.259	0.298	0.272	0.257	0.137	0.179	0.136

Panel C: *Climate responsibility (ve)* and *Carbon intensity (trimmed)*

Climate responsibility (ve)	-0.005	0.029***	0.029**	0.026	0.019***	0.032***	0.030**	0.018
	(-0.85)	(3.02)	(2.26)	(1.15)	(3.13)	(3.39)	(2.33)	(0.77)
Carbon intensity (trimmed)	0.625***	0.646**	0.745*	1.301*	0.023	0.117	-0.069	0.478
	(3.39)	(2.02)	(1.89)	(1.84)	(0.14)	(0.39)	(-0.13)	(0.71)
Observations	664	664	664	664	663	663	663	663
R-squared	0.163	0.250	0.295	0.278	0.269	0.150	0.180	0.140

Panel D: *Climate responsibility leader (ve)* and *Carbon intensity (trimmed)*

Climate responsibility leader (ve)	0.268	1.481***	1.300**	1.377**	0.418**	0.694**	0.719**	0.605
	(1.51)	(4.98)	(3.60)	(2.17)	(2.33)	(2.38)	(2.04)	(0.98)
Carbon intensity (trimmed)	0.620***	0.640**	0.741*	1.295*	0.025	0.121	-0.066	0.478
	(3.37)	(2.00)	(1.88)	(1.83)	(0.15)	(0.40)	(-0.12)	(0.71)
Observations	664	664	664	664	663	663	663	663
R-squared	0.163	0.254	0.297	0.281	0.257	0.135	0.173	0.140

Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Panel A reports the results of 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. Regressions in Panel B replace *Climate responsibility (ve)* with a dummy variable equal to 1 for firms in the top quartile of *Climate responsibility (ve)* and zero otherwise. In Panels C and D, *Carbon intensity* is trimmed at the 99th percentile. For 95 firms with missing foreign revenue data we apply a dummy variable adjustment to preserve the sample size. Table 6 describes the columns. Adjusted t-statistics in parentheses, calculated from the empirical time-series distribution of returns on trading days between October 1, 2015 and September 30, 2016. *** p<0.01, ** p< 0.05, * p<0.1.

As can be seen, a high level of *Climate responsibility (ve)* is associated with a 144 basis points higher cumulative abnormal return at the end of the third trading day after the election, similarly to what 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. The effect becomes insignificant by day 10 after that event, though the economic size is similar to that after 5 days.

Consider now the effects of *Carbon intensity.* The literature suggests that firms more exposed to the (actual or potential) compliance costs of climate regulation incur a penalty (e.g., Matsumura, Prakash, and Vera-Muñoz, 2014). Column (1) of Panel A and Panel B in Table 7 indicates that, on the first day after the election, companies with higher carbon intensities gained relative to those less carbon-intensive. This result reflects the common narrative, including anecdotal accounts in the press, that on the first day after the election investors reacted by boosting the prices of large GHG emitters.[29] However, on the second day after the election, the market seems to have already partially re-assessed Trump's positive influence on these companies (not shown), and by the third day, the effect fell to only half the size (and statistically insignificant). As can be seen in Columns (5) to (8), stock-price movements after Pruitt's nomination are unrelated to *Carbon intensity.* This suggests that this nomination didn't affect investors' policy expectations on carbon pricing or regulatory caps on emissions. Very similar results obtain when GHG emissions were scaled by total sales or total assets.

A potential concern with the analysis so far is that *Carbon intensity* is highly skewed,

[29]The Washington Post, "Trump victory batters solar and wind stocks, bolsters coal shares", November 9, 2016.

which could bias the results. Therefore, in Panels C and D, we re-run the regressions trimming *Carbon intensity* at the 99th percentile. With this specification, the statistically significant effect of carbon intensities on abnormal returns persists beyond the first post-election day.

In sum, our results in this first part of the study suggest two quite disparate components to investor perceptions of firms' climate-related performance. On the one hand, highly carbon-intensive industries and companies benefited from the policy shock due to anticipated relief from regulatory impositions during the Trump years. On the other hand, firms with more forward-thinking climate policies and strategies were rewarded by investors. Section 6 investigates the possible explanations for these striking findings about climate responsibility.

4.2 Robustness

This subsection investigates the robustness of the stock-price reaction results in three domains: Controlling for industry fixed effects at a finer level of classification, controlling for corporate governance, and using alternative measures of stock returns.

4.2.1 Controlling for a finer industry classification

Our regressions thus far have controlled for industry-level return differentials using the Fama-French 12-industry classification. This classification appropriately preserves the variability of climate-related measures when using the relatively small Vigeo Eiris sample.

For consistency, we adopted the same methodological approach employing the larger MSCI KLD sample. That larger sample permits a finer industry classification, as a robustness check. Table A2 in the Supplementary Appendix presents the results for the MSCI KLD sample controlling for Fama-French 30-industry fixed effects. We observe minor differences compared to our baseline results in Table 6. Specifically, the coefficients on *Climate responsibility (kld)* are now more strongly significant in the immediate post-election period and slightly reduced in magnitude following Pruitt's nomination.

4.2.2 Controlling for corporate governance

One concern with our findings could be that the out-performance of climate-responsible firms could be driven by their higher score on corporate governance more generally. For example, it is conceivable that investors believe that environmental deregulation would go hand-in-hand with deregulation in the financial realm as well. Positing that such regulation, on net, benefits investors, better-governed firms would get a relative benefit from the broad theme of Trump's election and Pruitt's nomination. We re-run the analysis controlling for corporate governance.

We conduct this analysis using three alternative measures of governance. First, we compute a measure of governance based on the MSCI KLD database, as follows: For each firm, we divide the number of governance strengths by its possible maximum value, and we then subtract the number of governance concerns divided by its possible maximum value. The resulting measure, Corporate governance (kld), ranges from -1 to +1. We use information on governance as of year-end 2013, the latest available data on the MSCI KLD database. Second, we use firms' institutional ownership, a corporate governance proxy extensively used in the literature (e.g., Chung and Zhang, 2011). We compute this measure using WRDS SEC Analytics Suite data as the percentage of firms' common stocks held by institutional investors at the end of Q3-2016. Third, we use the corporate governance score provided by Vigeo Eiris (ranging from 0 to 100).

The results in Table A3 in the Supplementary Appendix reveal that our main results hold after controlling for each of these three measures of firms' corporate governance performance.

4.2.3 Alternative sets of returns

We replicate our analysis using two alternative sets of returns: Raw returns and Fama-French-adjusted returns. Table A4 in the Supplementary Appendix shows the results of this robustness check.

The effects of the factor loadings are intuitive. As previously shown in Figure 1, in the Vigeo Eiris sample firms with higher *Climate responsibility (ve)* have, on average, higher loadings on the value factor (after controlling for sector and firm characteristics). The data reflects this correlation: Although the climate-responsibility coefficients when using raw returns (Panel B.1) are extremely close to those obtained with CAPM-adjusted returns, they are slightly reduced when using Fama-French-adjusted returns (Panel B.2). However, the statistical and economic importance of *Climate responsibility (ve)* is quite similar across the three sets of returns. Similarly, in unreported results we confirm that *Climate responsibility leader (ve)* is significant immediately after the election when using either raw or Fama-French-adjusted returns, much as in Table 7 Panel B.

Similar effects arise in the case of *Carbon intensity*. When using Fama-French-adjusted returns, the coefficient on *Carbon intensity* is somewhat smaller than with CAPM-adjusted returns. This result again emerges because *Carbon intensity* is also positively correlated ($p < 0.01$) with the value and size factors. This implies that, if we utilize returns net of their size and value factor components, the coefficients on *Carbon intensity* capture the general out-performance of value (versus growth) stocks after the election. Conversely, when using raw returns, the coefficients on *Carbon intensity* are slightly larger in magnitude than those obtained with CAPM-adjusted returns, reflecting the positive correlation of this variable with the market beta.

Overall, the coefficients on climate responsibility differ little from those obtained with CAPM-adjusted returns. In short, our main results are robust to the use of returns in any of the three traditional forms.

5 Long-run stock returns and Trump's popularity

The analyses above considered the short-run stock-price reactions to the Trump election and the Pruitt nomination. This section extends the analysis to the longer run.

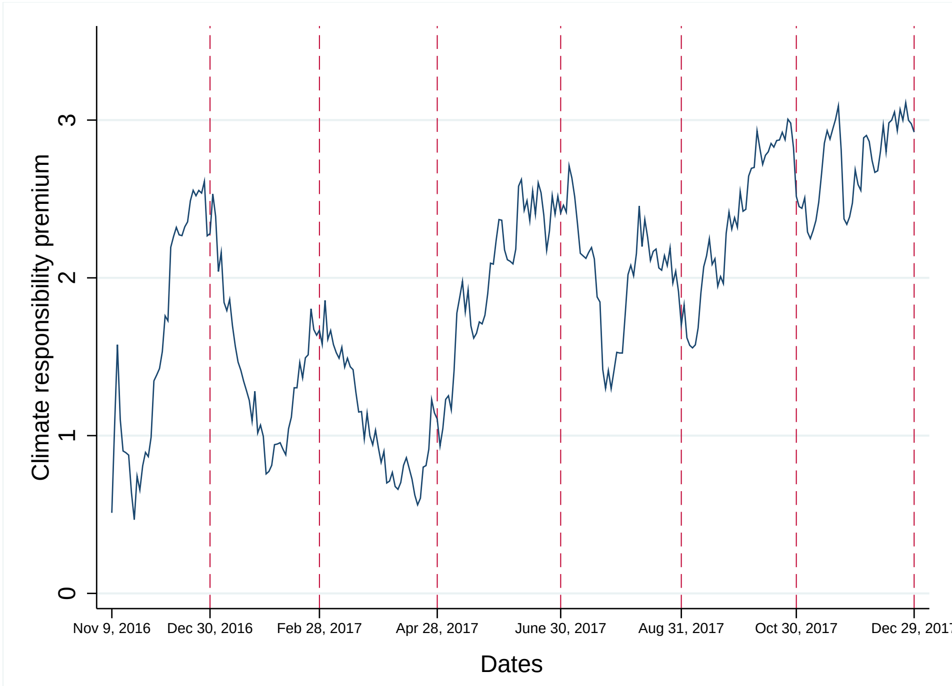
Figure 4 illustrates the evolution of the pricing of firms' climate strategies from Trump's election through December 29, 2017. Specifically, for each day, the figure shows the coefficient on *Climate responsibility (kld)* when using the cumulative abnormal returns through that day as the dependent variable, and including our usual battery of controls.

The figure shows that firms with advanced climate strategies gained significantly through the brief period to the end of 2016, with the climate responsibility premium climbing to 225 basis points on a CAPM-adjusted basis by December 31.[30] Other firms caught up in the first months of 2017. Later in the year, however, the stock-price premium on climate responsibility regained its quite strong economic magnitude, reaching nearly 300 basis points by year-end 2017.[31]

[30] On a Fama-French-adjusted basis, the cumulative abnormal return is 157 basis points. For both sets of returns, the coefficient on climate responsibility from a regression of cumulative abnormal returns from Trump's election through the end of 2016 on firms' climate responsibility (and control variables) is highly significant.

[31] At the end of 2017, more than one year after the election, the coefficient on *Climate responsibility (kld)*

Figure 4. Pricing of climate strategy over the long run



Note: This figure shows the evolution of the coefficients on *Climate responsibility (kld)* from the Trump election through the end of December 2017. The regressions use the MSCI KLD sample comprising 1,801 firms at the beginning of the sample period. The coefficients for each day are obtained by regressing cumulative CAPM-adjusted abnormal returns from Trump's election through that day on *Climate responsibility (kld)*, controls (cash ETR, foreign revenues, market leverage, log market cap, revenue growth, and profitability), and Fama-French 12-industry fixed effects.

The figure also reveals that the pricing of advanced climate strategies during the first year after Trump's election varied greatly.[32] To understand this variability, we investigate

is economically important (2.78), but is not statistically significant ($p = 0.16$). Of course, it gets increasingly difficult to obtain a significant effect over such a long event window.

[32]We investigate two additional events as well. First, on Wednesday January 4, 2017, then President-elect Trump nominated Jay Clayton to chair the Securities and Exchange Commission (SEC). While obviously not a key climate-change event, it is noteworthy that Clayton was considered a strong advocate of corporate climate-related disclosure. (See MarketWatch, "Trump's SEC pick pushed clients to say more about climate-change risks", January 5, 2017.) His nomination may have partially bucked the trend of Trump's deregulatory push on climate policy, casting doubts on the SEC's abandonment of its enforcement actions in the field of corporate climate-related disclosure and risk management. To the extent that investors favored firms with strong climate change strategies in the face of anticipated regulatory failure, Clayton's nomination may account in part for the reversal of the premium for climate-responsible firms observed at the beginning of 2017. Second, on June 1, 2017, Trump announced his decision to withdraw the US from the Paris Agreement. In an unreported analysis, we examine the short-term stock-price reaction around this event in more detail; no statistically significant effect of climate strategies emerges. The lack of strong price responses may be because Trump's move on the Paris Agreement, despite the huge media coverage and public outrage that

Table 8: The climate responsibility premium and Trump's popularity

Dependent variable:	Daily CAPM-adjusted returns	
Climate responsibility (kld)	0.007	0.007
	(0.77)	(0.74)
Climate responsibility (kld) × Trump's approval rating	0.025***	0.025***
	(3.34)	(3.41)
Observations	413,549	413,549
R-squared	0.022	0.022
Constant and controls	Yes	Yes
FF12 industry FE	Yes	Yes
Day fixed effects	Yes	Yes
S.e. clustered at firm-level	Yes	Yes
S.e. clustered at day-level	No	Yes

Note: This table shows results of panel regressions of individual stock daily CAPM-adjusted returns on *Climate responsibility (kld)*, the interaction of *Climate responsibility (kld)* and Trump's daily approval rating, and control variables (cash ETR, share of foreign revenues, market leverage, log market cap, revenue growth, and profitability). Approval ratings are obtained from the pollster Rasmussen Reports and are standardized to have mean zero and unit standard deviation. The sample includes 235 trading days (from January 23, 2017 through December 29, 2017, excluding 4 trading days for which the ratings are not available) and 1,801 firms at the beginning of the period. All regressions include Fama-French 12-industry and day fixed effects. T-statistics based on standard errors clustered at the firm level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

the relation between the price effect of climate responsibility and Trump's popularity from the Inauguration through year-end 2017. Such popularity might indicate Trump's ability to secure legislation that lowers environmental standards, and the probability that he serves the first full term. We obtain Trump's daily approval ratings from the poll firm Rasmussen Reports and we standardize them to have mean zero and unit standard deviation. These ratings are available starting with the Inauguration.

Table 8 reports panel regression results of daily CAPM-adjusted returns for firms in the KLD sample from January 23, 2017 (the trading day after Trump's Inauguration) through December 29, 2017 on *Climate responsibility (kld)*, the interaction of climate responsibility with Trump's approval ratings, and our usual battery of controls. The coefficients on the

followed, was widely anticipated.

interaction term show that Trump's popularity related positively to the effect of climate responsibility on stock prices.

Overall, we interpret these findings as providing additional evidence in support of our main result, namely that following the 2016 climate policy shock, investors put a premium on corporate climate responsibility.

6 Institutional investor portfolio changes

6.1 What is the source of the climate responsibility premium?

In Sections 4 and 5 we documented that climate-responsible firms outperformed otherwise similar peers after the 2016 climate policy shock, both in the short and in the longer run. There are at least two possible explanations for this observed out-performance.

The first is that investors value corporate climate responsibility on the basis of personal social preferences (e.g., Riedl and Smeets, 2017), the flip side of investors' penalizing firms that promote vice, such as alcohol, tobacco, and gaming (e.g., Hong and Kacperczyk, 2009). Socially concerned investors may be more willing to reward firms showing good behavior when current public policies are at odds with their values (even if this means accepting a lower return as a consequence). In other words, pro-environmental investors may have increased their concern about climate change after Trump's election, and hence became willing to pay more for the "warm glow" effect (Andreoni, 1989) of investing in climate-conscious firms or avoid suffering the cold shiver of buying irresponsible firms. We call this investor reaction based on climate preferences the *Current Preferences* hypothesis. Opinion polls by Gallup and by Yale University indicate that the percentages of Americans concerned, or even alarmed, about global warming increased significantly after Trump's election.[33]

The second possible explanation is that investors paid up for climate-responsible firms for strategic reasons; they expected them to perform better in the long-run, for either or both of two future-focused reasons.

First, investors may foresee that pro-environmental investors will reap a warmer warm glow, hence pay more, for climate-responsible firms. Second, investors may expect a *boomerang effect* where direct government climate regulation post-Trump becomes more stringent than it would have been had Trump never been elected. Three factors may give rise to stronger climate preferences and stricter policies post-Trump: the increased severity of the problem of global warming, the time lost addressing it, and as a reaction against the prior Administration's purposefully lax policies. Interestingly, although we first developed these conjectures in 2018, as we write in March 2019, it does appear as if climate regulation is already preparing to regain strength should Trump be gone after the 2020 Presidential election. In February 2019, several prominent Democratic candidates for the 2020 Presidential nomination supported a resolution in Congress for the development of a "Green New Deal", a policy plan aspiring, among other things, to power the U.S. economy with 100% renewable energy within 10 years.[34] Even a pale version of the Green New Deal, if adopted, would make climate regulation

[33] In a Gallup poll of March 2017, 45% of Americans declared to worry "a great deal" about global warming, up from 37% in March 2016. According to Gallup, this heightened concern about climate change can be motivated to some extent by the anxiety about President Trump's environmental stance, and the greater sense of urgency about the issue perceived by climate-conscious citizens. See Gallup, "Global Warming Concern at Three-Decade High in U.S.", March 14, 2017. The December 2018 Yale Program on Climate Change Communication 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". See Yale, "Americans are Increasingly 'Alarmed' About Global Warming", February 12, 2019.

[34] See Financial Times, "The week in energy: A Green New Deal", January 12, 2019.

dramatically tighter than it was under the Obama Administration, or would have been under a Clinton Administration. As a result, the competitive advantages of climate-responsible firms would increase over what they were before the 2016 election and above what they were expected to be had Clinton won power. Investors might well have anticipated this policy scenario, and hence rewarded climate responsibility already after the election. We call such investor reactions based on strategic reasoning the *Future Expectations* hypothesis.

6.2 Empirical strategy

To test these hypotheses, we investigate how different groups of 13F institutional investors[35] adjusted their holdings after the 2016 climate policy shock. Specifically, we analyze the differential trading behavior of these large institutional investors with respect to two specific characteristics: Their prior exposure to climate-responsible firms and their revealed investment horizons. The Current Preferences explanation predicts a shift towards climate-responsible firms by investors whose climate preferences are strong; prime candidates would be investors with higher prior exposure to climate-responsible firms. The Future Expectations explanation predicts a more significant shift towards climate-responsible firms by longer-horizon investors.

We obtain quarterly institutional ownership data from the WRDS SEC Analytics Suite. We match the 13F institutional holdings with the share prices and number of shares outstanding (adjusted for stock splits) at the end of each quarter from CRSP, as well as with the

[35]Section 13(f) of the Securities Exchange Act of 1934 (Pub.L. 73-291) requires investment managers that exercise investment discretion over USD 100 million or more of "Section 13(f) securities" (in general, US publicly traded equity securities) to report their holdings to the Securities and Exchange Commission (SEC) at the end of each calendar quarter. The reporting form that need to be filed by these institutions -- which comprise pension funds, endowments, insurance companies, bank trusts, mutual funds, hedge funds, and independent advisors -- is Form 13F (hence the name "13F investors"). For more information see `https://www.sec.gov/divisions/investment/13ffaq.htm`.

climate-related variables from MSCI KLD and Vigeo Eiris. We clean the 13F data following the methodology outlined in Ben-David, Franzoni, Moussawi, and Sedunov (2018). We have data on 3,934 distinct investors as of September 30, 2016 (Q3-2016).

We use institutional investors' portfolio turnover to proxy for their investment horizons, the approach used, for instance, in Froot, Scharfstein, and Stein, 1992, Gaspar, Massa, and Matos, 2005, and Cella, Ellul, and Giannetti, 2013. The rationale here is that short-horizon investors tend to adjust their portfolios more frequently than do patient investors. We calculate the portfolio turnover for investor i in quarter q according to the widely-used churn ratio formulated by Gaspar, Massa, and Matos (2005). Thus,

$$\text{Portfolio turnover}_{i,q} = \frac{\sum_{j \in S} \mid N_{j,i,q}P_{j,q} - N_{j,i,q-1}P_{j,q-1} - N_{j,i,q-1}\Delta P_{j,q} \mid}{\frac{\sum_{j \in S} N_{j,i,q}P_{j,q} + N_{j,i,q-1}P_{j,q-1}}{2}},$$

where S denotes the set of firms held by investor i, and $P_{j,q}$ and $N_{j,i,q}$ are the price and number of shares of stock j held by institution i in quarter q.[36] For each investor i, we measure the investment horizon as the average portfolio turnover over the period ranging from Q1-2015 to Q3-2016 (using all quarters with available data), and denote it $Portfolio\ turnover_i$.[37] Using the average portfolio turnover over several quarters minimizes the influence of a single quarter in the calculation (e.g., Gaspar, Massa, and Matos, 2005). Considering portfolio turnovers through September 30, 2016 (Q3-2016) ensures that our measure of investment horizon is not related to the Trump presidency.

Following Gibson and Krueger (2017) and Starks, Venkat, and Zhu (2017), we use

[36] Our analysis is robust to an alternative calculation of portfolio turnover, following Carhart (1997). That calculation looks at the minimum value between the total sales and the total buys in a given quarter, divided by the average asset value of the portfolio between the end of the previous quarter and the end of the current one.

[37] Varying the number of quarters used to calculated the average turnover does not affect our results.

investors' quarterly 13F filings to measure their exposure to climate-responsible firms. Specifically, for each investor-quarter combination, we calculate the average of the climate-related characteristics (*Climate responsibility (kld)*, *Climate responsibility (ve)*, and *Carbon intensity*) of the firms in the investor's portfolio using the portfolio weights. We denote the resulting investor-level values by *Portfolio CR (kld)*, *Portfolio CR (ve)*, and *Portfolio CO2*.

For each investor i and quarter q from Q4-2016 through Q4-2017, we then compute the difference between the portfolio's actual climate responsibility and what the portfolio climate responsibility level would have been had the investor kept his holdings unchanged from Q3-2016. That difference is:

$$\Delta \textit{Portfolio CR (kld)}_{i,q} = \sum_{j \in S} (w_{j,i,q} - \hat{w}_{j,i,q}) \cdot \textit{Climate responsibility (kld)}_j,$$

where S denotes the set of firms held by investor i, $w_{j,i,q}$ denotes the weight of stock j in investor i's portfolio in quarter q, and $\hat{w}_{j,i,q}$ represents the corresponding weight based on Q3-2016 holdings and adjusting for price changes through quarter q. In other words, $(w_{j,i,q} - \hat{w}_{j,i,q})$ captures the change of the weight of company j resulting from investor i's trading from September 30, 2016 through the end of quarter q. Importantly, this measure takes account of the effect of price changes, which may mechanically impact the climate responsibility of investors' portfolios due to the observed out-performance of high climate-responsible firms (documented in previous sections).[38]

Panel A of Table 9 describes the characteristics of institutional investors' portfolios as

[38] Our results also hold without adjusting for price changes, namely by simply comparing the portfolio's climate responsibility levels before and after the policy shock. We also ensure that our findings hold when computing the portfolio climate responsibility after orthogonalizing by other firm characteristics, such as size and taxes.

of Q3-2016, while Panel B shows the correlations between variables. Even before the 2016 election, investors with longer investment horizons (low turnovers) tended to hold portfolios with higher average climate responsibility levels and lower average carbon intensities. These results accord with those of Gibson and Krueger (2017) and of Starks, Venkat, and Zhu (2017).

6.3 Results

Investors with different characteristics adjusted the climate responsibility of their portfolios differentially following the 2016 climate policy shock, as shown in Table 10. For comparison, column (1) reports the results for the quarter preceding the election. Interestingly, long-horizon investors reacted to the election by actively moving towards climate-responsible firms, after controlling for their prior exposure to climate responsibility. For instance, a one standard deviation higher long-term orientation (i.e., lower portfolio turnover) is associated with an increase of 8.7% of one standard deviation of Δ*Portfolio CR (kld)* at Q4-2016. This effect strengthens in subsequent quarters through the end of 2017. Importantly, this effect is not statistically significant in the quarter before Trump's election (see Column 1).

The coefficients on investors' prior exposure to climate-responsible firms, *Portfolio CR (kld)*, are negative and highly statistically significant for all quarters under review. This suggests that investors who already had relatively large holdings in climate-responsible firms before the election did not exert the buying pressures that led to the increased climate responsibility premium observed after Trump's election. The persistence of interest that the Current Preferences hypothesis would predict is soundly rejected. Instead, the out-

Table 9: Descriptive statistics of institutional investor characteristics

Panel A: Characteristics of institutional investor portfolios

	N	p25	mean	p50	p75	sd
Number of stocks	3,937	21.00	185.73	61.00	150.00	387.75
Portfolio turnover	3,877	0.07	0.24	0.14	0.31	0.26
Portfolio size	3,937	156.61	5,334.50	363.85	1,229.24	46,423.67
Portfolio CR (kld)	3,899	0.19	0.36	0.40	0.53	0.22
Portfolio CR (ve)	3,751	22.64	27.22	29.67	33.47	9.25
Portfolio CO2	3,751	0.06	0.27	0.12	0.24	0.72
Δ Portfolio CR (kld) Q3-2016	3,820	-0.01	0.00	0.00	0.01	0.08
Δ Portfolio CR (kld) Q4-2016	3,692	-0.01	-0.00	0.00	0.01	0.08

Panel B: Correlation between portfolio characteristics

	1	2	3	4	5
1. Number of stocks					
2. Portfolio turnover	-0.03				
	(3,877)				
3. Portfolio size	0.43*	-0.05*			
	(3,937)	(3,877)			
4. Portfolio CR (kld)	0.12*	-0.27*	0.02		
	(3,899)	(3,846)	(3,899)		
5. Portfolio CR (ve)	0.10*	-0.31*	0.02	0.74*	
	(3,751)	(3,714)	(3,751)	(3,743)	
6. Portfolio CO2	-0.02	0.08*	-0.01	-0.17*	-0.16*
	(3,751)	(3,714)	(3,751)	(3,751)	(3,743)

Note: This table shows the descriptive statistics of 13F institutional investors' portfolio characteristics as of September 30, 2016 (Panel A) and their correlations (Panel B). *Number of stocks* is the number of individual firms held by the investor, while *Portfolio size* is the total value of declared stock holdings in million USD. *Portfolio turnover* is measured as the mean quarterly portfolio turnover rates (defined as in Gaspar, Massa, and Matos, 2005) over the period from Q1-2015 to Q3-2016, using all quarters with available data. *Portfolio CR (kld)*, *Portfolio CR (ve)* and *Portfolio CO2* are the weighted average climate-related characteristics (respectively *Climate responsibility (kld)*, *Climate responsibility (ve)* and *Carbon intensity*) of the firms present in the investor's portfolio as of Q3-2016.

Table 10: Empirical Tests of Current Preferences and Future Expectations hypotheses

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Δ*Portfolio CR (kld)*					
			Cumulative from Q3-2016 through			
End of quarter:	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017
Portfolio turnover	-0.013	-0.027***	-0.036***	-0.062***	-0.071***	-0.080***
	(-1.19)	(-3.07)	(-4.29)	(-6.98)	(-7.53)	(-7.48)
Portfolio CR (kld) Q2-2016	-0.071***					
	(-7.50)					
Portfolio CR (kld) Q3-2016		-0.076***	-0.103***	-0.124***	-0.135***	-0.166***
		(-8.57)	(-10.85)	(-10.25)	(-11.28)	(-12.46)
Observations	3,820	3,692	3,612	3,557	3,511	3,426
R-squared	0.037	0.043	0.062	0.074	0.078	0.095

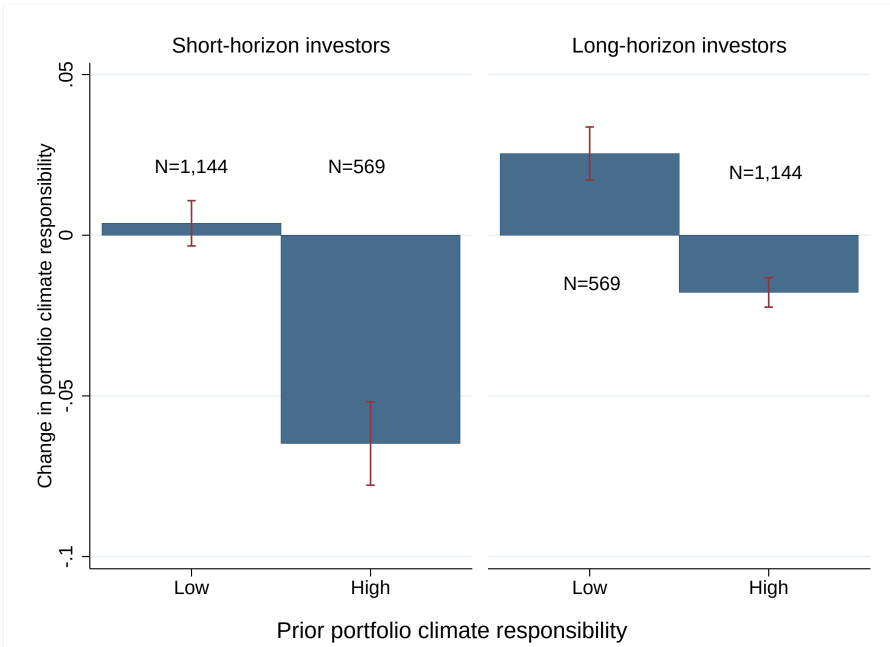
Note: This table shows results of OLS regressions of changes in institutional investors' portfolio *Climate responsibility (kld)* on their investment horizons and prior portfolio *Climate responsibility (kld)* levels. The changes in portfolio Climate responsibilities are adjusted for the evolution of the underlying stock prices. Column 1 refers to the change from Q2-2016 to Q3-2016 (non-event quarter) and column 2 refers to the change from Q3-2016 to Q4-2016 (event quarter); columns 3-6 refer to the cumulative changes observed at the end of subsequent quarters through Q4-2017. The samples include institutional investment managers with 13F holdings data continuously available on WRDS SEC Analytics Suite from Q2-2016 through the end of the quarter under analysis. *Portfolio CR (kld)* is the weighted average *Climate responsibility (kld)* of the firms present in each investor's portfolio as of Q2-2016 (column 1) or Q3-2016 (columns 2-6). Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

performance of climate-responsible firms can be at least partially attributed to increased portfolio demand by long-horizon investors who prior to the election did not have relatively large holdings of climate-responsible firms.

Figure 5 shows the mean cumulated changes in portfolio climate responsibility from Q3-2016 through Q4-2017 for four groups of institutional investors formed based on the turnover and the climate responsibility of their portfolios as of Q3-2016. On each dimension, they are broken into categories above and below the median.

As can be seen, the investors that significantly increased their holdings in high climate-responsible firms were those with a long-term investment horizon and no strong pre-election tilt towards these companies. Long-horizon investors with a strong prior exposure to climate-responsible firms, in fact, reduced their holdings in these companies, but they did so significantly less than did short-horizon investors with high holdings (reflecting the regression results shown in Table 10).

Figure 5. Different institutional investors reacted differently



Note: This figure shows the mean changes in portfolio *Climate responsibility (kld)* from the end of Q3-2016 through the end of Q4-2017 for four groups of institutional investors formed based on the turnover and the climate responsibility of their portfolios as of Q3-2016. On each dimension, they were broken into categories above and below the median. The sample includes 3,426 investment managers with 13F holdings data continuously available on WRDS SEC Analytics Suite from Q3-2016 through the end of Q4-2017.

Overall, the results in this section support the idea that long-term institutional investors value corporate climate responsibility for strategic reasons, and that the climate responsibility premium observed after Trump's election can be at least partially attributed to the Future Expectations explanation. In other words, long-horizon investors reacted to Trump's election by anticipating investor demand for climate-responsible firms would increase in the non-immediate future, and/or that there would be a potential boomerang to tighter regulation post-Trump.

7 Conclusion

With Donald Trump's surprise election, expectations about environmental policy took a punch on the chin. Stock prices responded to the anticipation of laxer regulation. Companies in carbon-intensive industries -- e.g., coal, steel works, metals, petroleum and natural gas -- enjoyed a short-run bump in price, as conventional theory would predict.

Our primary analysis focuses more finely within industries. What should happen to firms taking greater climate responsibility? If regulation were to be bumped in a less stringent direction for the long term, with no other long-term consequences, climate-responsible firms would be wasting monies on unrewarded good behavior. Climate responsibility would be penalized.

In fact, however, climate responsibility was rewarded. We evaluate two possible hypotheses that could explain that reward. The first, the *Current Preferences* hypothesis, is that pro-environment investors, facing hostile rhetoric and the prospect of climate policy profligacy, experienced a greater warm glow from holding climate-responsible stocks than they would have received had Clinton been elected, and they paid for this increased benefit. The second, the *Future Expectations* hypothesis, is that strategic investors, despite receiving no consumption-style benefits from holding climate-responsible stocks, expected those stocks to perform better in the long run. They might have projected that post-Trump, stirred by the climate hostility of prior years and the deteriorated environment, pro-environmental investors would be receiving a more intense warm glow from owning climate-responsible firms. Heightened government action, due to a regulatory boomerang once Trump had departed office, would be an alternative and possibly complementary factor increasing the future value of climate-responsible firms.[39]

To test these two hypotheses, we analyze how institutional investors adjusted their portfolios after the election. Investors that already held relatively large amounts of climate-responsible firms before the election, those whom we might initially have thought of as warm glow investors, in fact tilted their portfolios not toward, but rather away from such stocks afterwards. These were prime candidates for engaging in behavior in support of the Current Preferences hypothesis. Their behavior soundly rejects that hypothesis. By contrast, investors with a long-term orientation -- those most likely to buy climate-responsible stocks for strategic purposes -- were net purchasers of climate-responsible stocks. Their behavior helps to explain the boost in price those stocks experienced shortly after the Trump election, despite the more hostile environment for climate policy. This finding is precisely the prediction of the Future Expectations hypothesis.

Importantly, we do not reach the Pollyannaish conclusion that market forces can fully substitute for formal regulation to correct for climate externalities. They cannot. The net effect of the 2016 climate policy shock on prospects for containing climate change may well be strongly negative. However, that dark climate cloud does have a moderate silver lining. While some observers assert that financial markets put a premium on short-termist thinking,

[39]Recent practitioner opinions indeed suggest a ‘‘galvanizing’’ effect of Trump’s climate policy on socially responsible investments (see, e.g., Financial Advisor, ‘‘As Trump Rolls Back Regulations, ESG Investing Is Poised To Soar’’, April 3, 2017). For instance, in August 2017, Morningstar reported that the use of ESG data on its platform for asset managers, advisory firms, and independent wealth managers had ‘‘quadrupled since Trump’s January inauguration’’ (Morningstar, ‘‘President Trump Drives Investors to ESG’’, August 9, 2017). Similarly, in November 2018, the CEO of the US Sustainable Investment Forum (SIF) stated that the unprecedented growth in sustainable investing observed in the U.S. between 2016 and 2018 can be partially attributed to the reaction of investors to Trump’s climate policy (see Barron’s, ‘‘Sustainable Investing Assets Hit USD 12 Trillion -- Thanks to Donald Trump’’, November 1, 2018). There is also anecdotal evidence of an increased activism by US investors on environmental issues following Trump’s election. For instance, at the 2017 annual general meeting of Exxon Mobil, 62% of shareholders backed a resolution demanding more transparency on climate-related matters despite the opposition of the board (a similar resolution in 2016 only received 38% support from shareholders).

our analysis identifies a significant group of investors who raise the value of firms taking a long-term perspective. In this instance, they value firms' making climate-responsible choices as preparation for a more climate-conscious future.

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Supplementary Appendix

Table A1: Correlations between variables

Variables	1	2	3	4	5	6	7	8
1 Climate responsibility (kld)								
2 Climate responsibility (ve)	0.56***							
	(707)							
3 Carbon intensity	-0.09**	-0.03						
	(705)	(766)						
4 Log market cap	0.48***	0.50***	-0.15***					
	(2,070)	(766)	(766)					
5 Profitability	0.10***	0.13***	-0.08**	0.24***				
	(2,070)	(766)	(766)	(2,677)				
6 Revenue growth	-0.04	-0.15***	-0.06*	-0.08***	-0.10***			
	(2,070)	(766)	(766)	(2,677)	(2,677)			
7 Market leverage	0.07***	-0.04	0.07**	0.14***	-0.00	-0.01		
	(2,070)	(766)	(766)	(2,677)	(2,677)	(2,677)		
8 Cash ETR	-0.02	-0.02	-0.04	0.02	0.25***	-0.12***	-0.13***	
	(1,801)	(671)	(671)	(2,286)	(2,286)	(2,286)	(2,286)	
9 Foreign revenues	0.14***	0.18***	-0.05	0.18***	0.04*	-0.06***	-0.04*	0.13***
	(1,643)	(641)	(641)	(2,048)	(2,048)	(2,048)	(2,048)	(1,763)

Note: Correlations between variables. Number of observations in parentheses. *** p<0.01, ** p< 0.05, * p<0.1.

Table A2: Stock returns and *Climate responsibility (kld)*, controlling for Fama-French 30 industries

	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)	0.511***	1.577***	0.903**	0.743*	0.235	0.584**	0.704**	0.881*
	(2.95)	(5.44)	(2.71)	(1.61)	(1.40)	(2.11)	(2.16)	(1.85)
Observations	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801
R-squared	0.159	0.297	0.258	0.267	0.265	0.136	0.134	0.108
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF30 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports the results of OLS regressions of CAPM-adjusted returns on *Climate responsibility (kld)* and control variables (cash ETR, foreign revenues, log market cap, revenue growth, profitability, and market leverage). All models include Fama-French 30-industry fixed effects. Table 6 describes the columns. Adjusted t-statistics in parentheses, calculated from the empirical time-series distribution of returns on trading days between October 1, 2015 and September 30, 2016. *** $p<0.01$, ** $p< 0.05$, * $p<0.1$.

Table A3: Climate responsibility and corporate governance

Panel A: Corporate Governance score, MSCI KLD

	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)	0.324*	1.436***	0.775**	0.635	0.346**	0.739***	0.870**	1.102**
	(1.95)	(5.03)	(2.19)	(1.54)	(2.07)	(2.69)	(2.42)	(2.37)
Corporate governance (kld)	0.696*	0.130	0.613	-0.121	-0.187	0.315	0.399	0.491
	(1.71)	(0.20)	(0.72)	(-0.04)	(-0.45)	(0.47)	(0.47)	(0.38)
Observations	1,487	1,487	1,487	1,487	1,487	1,487	1,487	1,487
R-squared	0.161	0.322	0.270	0.292	0.220	0.108	0.108	0.070
Panel B: Share of institutional ownership								
Climate responsibility (kld)	0.348**	1.476***	0.877***	0.653*	0.268*	0.662**	0.847***	1.091***
	(2.21)	(5.26)	(2.74)	(1.85)	(1.73)	(2.49)	(2.66)	(2.72)
Institutional ownership	-1.292**	-1.562	-0.018	-1.066	-0.137	0.250	-0.127	-0.126
	(-2.27)	(-1.48)	(0.27)	(-0.12)	(-0.14)	(0.48)	(0.18)	(0.35)
Observations	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605
R-squared	0.148	0.291	0.239	0.249	0.255	0.126	0.122	0.092
Panel C: Corporate Governance score, Vigeo Eiris								
Climate responsibility leader (ve)	0.216	1.164***	0.895**	0.810	0.301*	0.612**	0.688**	0.576
	(1.30)	(4.29)	(2.76)	(1.49)	(1.80)	(2.30)	(2.15)	(1.08)
Corporate governance (ve)	0.008	0.044**	0.056**	0.082***	0.024**	0.028	0.017	0.023
	(0.76)	(2.46)	(2.52)	(2.71)	(2.25)	(1.57)	(0.84)	(0.83)
Observations	654	654	654	654	653	653	653	653
R-squared	0.161	0.270	0.309	0.284	0.273	0.144	0.180	0.143
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows results of OLS regressions of our main models when controlling for firms' corporate governance performance. Panel A shows the results when using the corporate governance score from the MSCI KLD database. (We use information on governance as of year-end 2013, the latest available data on the MSCI KLD database.) Panel B shows the results when including the share of firms' institutional ownership as of Q3-2016, based on WRDS SEC Analytics Suite data. Finally, Panel C shows the results when using the 2016 corporate governance score provided by Vigeo-Eiris. All models include control variables (cash ETR, foreign revenues, market leverage, log market cap, revenue growth, and profitability) and Fama-French 12-industry fixed effects. Table 6 describes the columns. Adjusted t-statistics in parentheses, calculated from the empirical time-series distribution of returns on trading days between October 1, 2015 and September 30, 2016. *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Results with alternative sets of returns

Panel A: MSCI KLD sample

	Trump's election				Pruitt's nomination			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Cumulative				Cumulative		
Days:	Nov 9	3 days	5 days	10 days	Dec 7	3 days	5 days	10 days
Panel A.1								
Dependent variable:	Raw returns							
Climate responsibility (kld)	0.380**	1.394***	0.712**	0.487	0.191	0.497*	0.677**	0.947**
	(2.00)	(4.48)	(2.13)	(1.12)	(1.23)	(1.72)	(1.97)	(1.99)
R-squared	0.164	0.292	0.252	0.264	0.209	0.100	0.093	0.067
Panel A.2								
Dependent variable:	Fama-French-adjusted returns							
Climate responsibility (kld)	0.431***	1.422***	0.722**	0.542	0.185	0.490*	0.661**	0.927**
	(2.58)	(4.88)	(2.36)	(1.38)	(1.11)	(1.79)	(2.20)	(2.09)
R-squared	0.088	0.191	0.185	0.162	0.162	0.099	0.084	0.079
Observations	1,801	1,801	1,801	1,801	1,801	1,801	1,801	1,801
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Vigeo Eiris sample

Panel B.1								
Dependent variable:	Raw returns							
Climate responsibility (ve)	-0.005	0.029***	0.030**	0.027	0.018***	0.033***	0.030**	0.018
	(-0.69)	(3.04)	(2.27)	(1.17)	(3.11)	(3.49)	(2.35)	(0.84)
Carbon intensity	0.226***	0.130	0.166	0.205	0.009	0.048	0.011	0.045
	(4.72)	(1.29)	(1.21)	(0.71)	(-0.26)	(0.17)	(-0.29)	(-0.02)
R-squared	0.190	0.266	0.311	0.293	0.228	0.134	0.149	0.091
Panel B.2								
Dependent variable:	Fama-French-adjusted returns							
Climate responsibility (ve)	-0.007	0.022**	0.019**	0.015	0.017***	0.030***	0.029**	0.016
	(-1.03)	(2.29)	(2.23)	(0.63)	(2.86)	(3.09)	(2.31)	(0.68)
Carbon intensity	0.149***	-0.060	-0.082	-0.098	-0.009	-0.016	-0.017	-0.010
	(3.71)	(-0.84)	(-0.92)	(-0.78)	(-0.21)	(-0.22)	(-0.28)	(-0.11)
R-squared	0.154	0.313	0.326	0.308	0.200	0.196	0.130	0.146
Observations	671	671	671	671	669	669	669	669
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows results of OLS regressions of our main models when using raw and Fama-French-adjusted returns as dependent variables. Panel A shows the results for the MSCI KLD sample. Panel B shows those for the Vigeo Eiris sample. Panels A.1 and B.1 report results for raw returns, while Panels A.2 and B.2 present them for Fama-French-adjusted returns. In addition to the climate-related variables, all models include firm characteristics (cash ETR, foreign revenues, log market cap, revenue growth, profitability, and market leverage), and Fama-French 12-industry fixed-effects. Table 6 describes the columns. Adjusted t-statistics in parentheses, calculated from the empirical time-series distribution of returns on trading days between October 1, 2015 and September 30, 2016. *** p<0.01, ** p<0.05, * p<0.1.