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ORIGINAL PAPER

Shareholder Activism on Climate Change: Evolution, Determinants, and Consequences

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Abstract
We study 944 shareholder proposals submitted to 343 U.S. firms on climate change issues during 2009–2022. We use logistic and two-stage regression to estimate the propensity for a firm to be targeted or subjected to a vote at the annual general meeting and, for voted proposals, the determinants of that vote. We also examine whether climate-related proposals affect investor returns and how they relate to firms' future environmental performance and greenhouse gas emissions. Compared to a matched sample, we first find that activists target larger, more carbon-intensive, and less R&D-active firms. Second, voting likelihood is higher for firms with repeated and operations-related proposals and lower pre-proposal environmental ratings. By contrast, disclosure-related proposals are likelier to be negotiated and withdrawn. Third, repeated and operations-related proposals receive higher votes in favor, whereas votes on carbon-intensive firms do not. Fourth, building on the theory that investors act as if they distinguish among the different shareholder proposals based on the expected cost to the firm, we find evidence to support this idea. We find that investors respond negatively to ex-ante costlier proposals, such as those that relate to emissions reduction and target carbon-intensive firms. Fifth, targets' future environmental performance rating is almost twenty percent higher after a proposal than before compared to the matched sample, whereas emissions do not budge appreciably.

Keywords Climate action · Shareholder proposals · Ethical shareholders · Market response

JEL Classification G14 · G15 · G23 · G34 · Q54

Introduction

Shareholders express their concerns about how firms manage and disclose the effects of climate change in many ways, including the use of shareholder proposals, direct engagement, and proxy advocacy. Attracting perhaps the most attention is the increasing number of proposals submitted to firms by ethical shareholders who may be willing to sacrifice higher returns for engagement on climate strategies and disclosure demands. Evidencing this attention, climate and sustainability-related shareholder proposals submitted in 2022 rose by 4.3 percent (and 43.5 percent in 2021) over the prior

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year to an all-time high in 2022 of 196 (As You Sow, 2022). Also acting ethically, some institutional investors (Doidge et al., 2019) and large asset owners such as Blackrock, Vanguard, and State Street (Christie, 2021) engage firms directly and publish their criteria for supporting climate-related proposals (Fink, 2020; Vanguard, 2020). Considerable research ("Literature review and hypothesis development" section) indicates that shareholder activism in general, and shareholder proxy voting in particular, can be an effective way to engage firms on climate change.

In this paper, we use climate-related shareholder proposals as a proxy for shareholder activism to examine the evolution, determinants, and consequences of shareholder proposals on climate change. While some studies examine the evolution of shareholder proposals more generally (Michelon & Rodrigue, 2015; Monks et al., 2004; O'Rourke, 2003) by studying the determinants of firms targeted (Acharya et al., 2021; Dimson et al., 2015; Rehbein et al., 2004) and the outcomes from shareholder proposals on environmental, social, and governance (ESG) issues (Barko et al., 2021; Brochet et al., 2018; Byrd & Cooperman, 2014; Dimson et al., 2015; Flammer, 2015; Flammer et al., 2021), none to our knowledge adopts an exclusive focus on climate-related proposals, differentiating in particular between operations- and disclosure-related proposals and other key proposal characteristics. Our focus on climate change activism matters for two reasons. First, it is the highest profile and, arguably, the most pressing contemporary environmental issue. How firms balance economic and environmental concerns is, therefore, a critical ethical issue for firms and stakeholders (Dahlmann et al., 2019). Second, compared to effects on biodiversity, firms' contribution to climate change is increasingly measurable (e.g., via their carbon footprint) despite the measures being imperfect (Döring et al., 2023; Nguyen et al., 2021). Measurement matters given firms' use of substantive and symbolic disclosures in response to shareholder pressure (Dahlmann et al., 2019; Du, 2015). The climate change setting allows us to examine if there is "walking of the talk" following shareholder proposals.

Given concerns about what ESG metrics represent (Berg et al., 2022), our focus on climate change proposals also provides a more precise setting where the expected cost and impact of resolutions by ethical investors can be analyzed, particularly when we distinguish between operations- and disclosure-related proposals. On the one hand, an operations-related proposal (e.g., adopt a science-based strategy to reduce future emissions; align project financing to net zero goals) in theory affects the decision-making of the firm and, in the absence of internal information unavailable to outsiders, could be viewed as costly and ill-conceived by better informed firm managers if implemented, although this may not be the view of ethical shareholders willing to accept lower returns (Baker et al., 2022; Hong & Shore, 2023). On the other hand, volunteering information to outsiders already available to firm managers (e.g., disclose information on planned capital expenditures to enable shareholders to assess progress on net zero goals; report publicly on methane emissions) should be theoretically less costly to the firm, as the firm already has the information, and may even enhance firm value through the effects of transparency (Dhaliwal et al., 2011; Griffin & Sun, 2013; Matsumura et al., 2014). Our study is also timely because the activism landscape has changed in recent years due to concerns about the influence of concentrated ownership (Azar et al., 2021; Goranova & Ryan, 2013).

We investigate five questions: (i) What factors indicate whether a firm is targeted with a climate-related proposal? (ii) What factors explain whether a climate-related proposal proceeds to a vote? (iii) What determines the voting percentage of a climate-related proposal? (iv) Do climate-related proposals have different impacts on firm value depending on the net cost to the firm? (v) What is the association between climate-related proposals and changes in future environmental performance and emissions?

Answers to these questions are important because of their impacts on investors, firms, and regulators.[1] The effectiveness of climate-related proposals is also important for monitoring firms' progress in meeting global emission reduction targets (Schopohl, 2017; Sikavica et al., 2018). We expect answers to these open questions will help advance the underlying theory and evidence of what drives firms' responses to shareholder proposals based on the expected net cost to the firm upon their implementation.

To address these questions, we examine a sample of 944 shareholder proposals on climate change submitted to 343 U.S. firms during 2009–2022. Where appropriate, we benchmark the characteristics of and outcomes associated with the targeted (i.e., treated) firms with a propensity score matched set of control firms. We access the shareholder proposals from the Ceres Climate and Sustainability Shareholder Resolutions dataset (Ceres, 2022). To enhance this dataset, we hand-categorize and classify these proposals into different types such as operations- and disclosure-related proposals. Operations-related proposals call for decision-making by the firm to respond to the physical, transition, and liability risks of climate change and the opportunities created by accelerating climate change. Disclosure-related proposals are those that focus on greater transparency, such as the disclosure

[1] Studies of investor impact include Byrd and Cooperman (2014), Covington et al. (2016), Denes et al. (2017), Dimson et al. (2015), Flammer et al. (2021), Larcker et al. (2015), Rubach and Sebora (2009), Gantchev and Giannetti (2020), and Michelon and Rodrigue (2015). Studies of firm impact include Baloria et al. (2019), Clark and Crawford (2011), Flammer (2015), and McPhillips (2020). Studies of regulatory impact include Carney (2015), Byrd and Cooperman (2014), and Glac (2014).

of emissions, science-based targets, and other measures of environmental performance.[2]

This distinction is important and forms a conceptual foundation for our empirical tests because the costs, risks, and payoffs of implementing the two proposal types may differ. For example, the implementation of a credible plan to reduce emissions to meet a science-based target could require substantial investment by the firm that otherwise might not be best for firm value maximization, yet could be preferred by ethical shareholders willing to accept lower returns to address the negative externality. Such lower returns as a result of the additional costs from certain proposal types that affect operations could also be significant to an ethical investor. As such, our distinction between operations- and disclosure-related proposals may also identify those that are financially more or less material (Bauer et al., 2022).

By contrast, resolutions calling for additional disclosure on emissions and other environmental indicators or science-based targets can promote transparency and, thus, have significantly positive impacts on firm value from a lower cost of external capital (Dhaliwal et al., 2011), although there still could be negative impacts if the disclosures are mainly symbolic (Dahlmann et al., 2019; Pope & Wæraas, 2016) or reveal proprietary information valuable to rivals (Hollindale et al., 2022). Our dataset also enables detailed coverage of firms' proposals from 2009 to 2022. This timelier interval compared to previous studies (Barko et al., 2021; Doidge et al., 2019; Flammer et al., 2021; Naaraayanan et al., 2021) may better capture recent trends in the mix of proposals (e.g., more related to operations and fewer related to disclosure).

We split our results into those related to the patterns/determinants of the resolutions (research questions i, ii, and iii) and those related to the consequences of the resolutions (research questions iv and v). Concerning the former, and based on models to estimate the propensity for a firm to be targeted or subjected to a vote, and, for voted proposals, the determinants of the vote, we document three key findings. (i) Of the two major types of climate proposal—operations- and disclosure-related proposals—the former are likelier to receive a vote. Disclosure-related proposals, which have a higher propensity to reach a negotiated solution, are likelier to be withdrawn. (ii) For both proposal types, the chances of receiving a vote increase for repeated proposals and whether the proposal relates to emissions reduction or targets a carbon-intensive firm. (iii) The voting percentages in favor are also higher for operations-related proposals, repeated proposals, and whether the proposal relates to emissions reduction, but not for carbon-intensive firms. In addition, proposals supported by ethically minded UNPRI[3]-aligned investors receive higher voting percentages, whereas firms with more media attention have lower voting percentages.

Our second set of results can be summarized as follows. (i) Investors differentiate among the proposal types. In particular, they view as costlier to the firm, as evidenced by multivariate tests of lower excess returns around the date of the proxy filing, proposals with more media attention, those that are withdrawn, and thus have more chance of a negotiated solution, and those that call for a reduction in emissions. Investors respond positively to UNPRI-signatory supported proposals. These results support our conceptual view that investors distinguish between proposal types conditional on the expected net cost to the firm. (ii) Using an outside data provider's environmental rating to proxy for environmental performance and Scope 1 and 2 emissions as our outcome measures, targets' environmental rating improves from 1 year before to 2 years after the proposal by 19.48 percent compared to a benchmark sample of firms without climate proposals. Emissions drop insignificantly, however, by 1.01 percent. Thus, while the likelihood of a vote and the voting percentages in favor are higher for operations-related proposals, repeated proposals, and whether the proposal relates to emissions reduction, and because these proposal types are costlier to implement as reflected in negative investor returns, the overall longer-term effect is an increase in firms' environmental rating with no appreciable drop in emissions.

Whether an increase in environmental performance rating reflects virtue signaling or constructive change is an open question, however. On the one hand, an environmental performance rating increase without a corresponding decrease in emissions could suggest the former. On the other hand, investors' negative reaction or lack of positive reaction to operations-related proposals, repeated proposals, and whether the proposal relates to emissions reduction could be consistent with constructive change indicating ethical shareholders' expectation of higher future costs and willingness to accept lower returns as a consequence of the constructive change. Alternatively, investors' negative market reaction could also be built on the assumption that firms virtue signal on environmental performance to give the appearance of implementation of the proposals, which some investors interpret in a negative light. We delve further into these distinctions in the results section of the paper.

Our findings contribute to the literature in several directions. First, we advance a deeper understanding of

[2] Our distinction directed at climate-related proposals relates to similar distinctions in the literature. Dimson et al. (2015) categorize ESG shareholder engagements as "raising awareness" and"request for change." Barko et al. (2021) classify ESG proposals on whether the objective implies "reorganization" or promotes "transparency." Bauer et al. (2022) distinguish between proposals with "material" and "immaterial" effects. While our research method differs, these similar classifications should aid a reader in contrasting our findings with these other studies.

[3] United Nations Principles for Responsible Investment.

the patterns and consequences of shareholder proposals exclusively on climate change, especially by distinguishing between operations- and disclosure-related proposals, single-vote versus repeated-vote proposals, and emission reduction proposals versus the others. Second, while our finding that shareholder persistence generates more votes in favor and more media attention, our evidence also indicates that the efforts of ethical shareholders to promote climate action may not always create firm value. We indicate this with short window tests around the DEF14a filing date, which generate negative excess stock returns. While tying these results together into a single theory is a challenge (Goranova & Ryan, 2013), the common thread emerging is best viewed in terms of net cost to the firm, which we view as multidimensional, depending on the determinants and decisions imposed or expected to be imposed on the firm by a shareholder proposal (see our discussion of H1 in "Literature review and hypothesis development" section). Thus, we interpret our results as relating mainly to differences in the expected cost to the firm of implementing the different kinds of proposals, such as operations- versus disclosure-related proposals or large institution-supported proposals versus others. Our predictions and test results are also largely consistent with recent studies finding that ethical investors accept lower returns when firms incorporate (or are reasonably expected to incorporate) the negative externalities of climate change into their operations (Baker et al., 2022; Hong & Shore, 2023). Nonetheless, the negative stock price effects we observe could, relatedly, also reflect the agency costs of stakeholder capitalism (Christie, 2021; Goranova & Ryan, 2013). Such costs arise from conflicts between ethical shareholders and firm value maximizing managers and among large institutional shareholders versus other shareholders and from the political costs of supporting science-based targets set by international agreements.[4] Third, we contribute to the literature on socially responsible investment (SRI). The higher votes received and the positive excess returns for UNPRI proposals suggest that SRI investors frame their investment decisions to include ethical considerations. SRI investors may also improve the overall quality of corporate conduct (Sethi, 2005), for example, by monitoring greenwashing (Mateo-Márquez et al., 2022).

We also extend the literature on shareholder engagement by documenting across industry and time the growing phenomenon of climate-related proposals and by spotlighting the importance of an operations- versus disclosure-related classification of these proposals. For example, our results agree with Barko et al. (2021) and Flammer et al. (2021) that activism generally improves firms' environmental performance rating. Our results, however, differ from Barko et al. (2021) and Flammer et al. (2021) on the response of investors to shareholder proposals, which they find as positive for shareholder proposals in general but based on different samples and methods. Barko et al. (2021) find positive market-adjusted investor returns over the one-to-two-year engagement period of a proposal (20 months on average) for both reorganization (similar to operations-related) and environmental disclosure proposals but do not test for differences in the proposal types compared to matched control firms.[5] Similarly, Flammer et al. (2021) find higher market-to-book ratios for U.S. firms that disclose versus do not disclose climate change risks after being targeted by a climate-related proposal. Such changes are also not benchmarked to a control sample. Neither study, however, examines the potential for investors to respond differently to the different types of proposals conditional on the costs they might impose on the firm, which is the basis for our theory of investor response (H1). Additionally, neither study conducts a short window event study around the first news of a shareholder proposal being eligible for a vote, namely, the date of publication of firms' DEF14a filing. Supporting this approach, a short window event study of daily excess return differences around an identifiable event is generally considered a tighter design to identify investors' response to new information (Ang & Zhang, 2004).[6]

Our results also have implications for practice by suggesting that shareholder proposals can be an effective mechanism to elicit greater attention to and disclosure of firm-level climate action and climate-related risks so that the climate-related risks and opportunities are more efficiently priced by the markets. That said, our results also remind us that shareholder climate proposals exhibit much variation, and that firms and investors appear to treat them differently as if they respond to cost considerations (in line with H1). Thus, they may help explain why some targeted firms embrace certain shareholder proposals and others do not, and why some shareholders withdraw their proposals and cast their vote with management, who may also realize outcomes that further the firm's sustainability and climate change goals.

[4] Other theoretical frameworks used to explain shareholder activism include voluntary disclosure theory (Flammer et al., 2021) and institutional change and social movement theory (Reid and Toffel 2009).

[5] The Barko et al. (2021) results could stem from a different data-generating process, however. Their sample is different from ours, representing 847 completed E, S, and G proposals by a single activist (a large EU asset manager) involving 660 different companies in the three major domiciles of North America, Europe including the U.K., and the Asia–Pacific region. Their results could thus be more reflective of what we might find for UNPRI-aligned engagements to the extent that a single large EU asset manager could behave similarly to a UNPRI-aligned asset manager. For example, the mean assets under management for UNPRI-aligned firms in Kim and Yoon (2023) is $128 billion versus $250 billion in Barko et al. (2021).

[6] Long-run event studies that show positive or negative returns also require an explanation of their persistence.

Our paper proceeds as follows. "Literature review and hypothesis development" section discusses the literature and hypothesis development. "Filing process, sample, and data" section describes the filing process, sample, and data. "Method" section outlines the method. "Results" and "Additional tests" sections summarize the results and additional analyses, respectively. "Conclusion" section concludes.

Literature Review and Hypothesis Development

The literature on shareholder activism spans several themes, including studies of shareholder engagement based on proxy filings, direct engagement by large institutional investors, pension funds, and activist hedge funds, and actions taken in the corporate control market such as proxy fights and corporate reorganizations. While corporate control market transactions and hedge fund advocacy generally produce positive returns for shareholders, shareholder engagements based on proxy filings mostly produce mixed or insignificant returns. For example, based on 73 studies on shareholder activism in general covering data periods from 1962 to 2014, Denes et al. (2017) report that shareholder engagement actions based on proxy filings produce negligible annualized returns (0.6% on the average), whereas the annualized returns in response to engagement actions based on takeovers are substantial (15.31%). Similarly, Gillan and Starks (1998) find no significant excess returns around the date of information release on shareholder proposals in general in a proxy statement, whether the date of assumed information release is the mailing date of proxies, the annual meeting date, or the Wall Street Journal announcement date. Results vary, however, within these averages. For example, the well-known activism of CalPERS pension fund in the 1980s and 1990s produced on average small positive returns for firms that announced the adoption of its recommendations and small negative returns for firms that did not (Smith, 1996).

Rather than focus on all shareholder proposals, some more recent studies focus on CSR/ESG-related proposals only. Dimson et al. (2015) find a positive (negative) investor response over the year following successful (unsuccessful) ESG proposals. Cao et al. (2019) find that peer firms experience negative returns when a focal firm adopts CSR practices triggered by a successful shareholder vote. Flammer et al. (2021) find an increase in share price when climate-related activism induces firms to disclose more. Barko et al. (2021) find positive stock returns in the year following the year of engagement for most proposal categories, including successful and unsuccessful engagements and reorganization and transparency proposals. Contrariwise, Naaraayanan et al. (2021) find near zero stock returns around the date the New York Controller's Office targeted a set of firms on ESG matters, although an event study around a single date can pose serious estimation challenges due to contemporaneous confounding variables (Campbell et al., 1997).

Overall, the prevailing message of this more recent research is that CSR/ESG- or climate-related proposals improve firm value such that activism by ethical shareholders and firm value can be seen as mutually compatible. The idea that ethical shareholder activism and firm value maximization work well together is not without controversy, however. One view contends that if ethical shareholder activism were to remedy managerial deficiencies such as high agency costs from defective governance then financial and ethical motives could go hand in hand (Goranova & Ryan, 2013). This view would, thus, be consistent with the aforementioned studies showing positive returns. Alternatively, if ethical shareholder activism on climate-related issues relates more to pressuring firms to internalize costly negative climate-related externalities not part of their optimal operating, investment, and disclosure policies, financial motives and ethical motives may not be mutually compatible. In addition, some managers concerned about their reputation may be receptive to an ill-conceived proposal that does not add firm value or is in the best interests of the proposal sponsors (Gantchev & Giannetti, 2020).

Recent evidence (Baker et al., 2022; Barber et al., 2021; Hong & Shore, 2023) also supports this second view, consistent with the theory that ethical investors are willing to pay a higher price for ESG firms by accepting lower financial returns in place of the non-pecuniary benefits of an ESG firm achieving social and environmental goals. As further evidence, after reviewing a wide range of finance literature of whether a paper supports a financial or non-pecuniary answer to the research question, Hong and Shore (2023) find that 79.3 percent of the papers examined support the non-pecuniary hypothesis.

We, therefore, base our hypothesis on the effects of climate-related shareholder proposals on this second view. Specifically, we assume that if firms operate efficiently to maximize returns for shareholders, a shareholder proposal whose expected outcomes if implemented would be costly and uncertain for the firm should adversely impact firm value and produce negative returns for shareholders.[7] To test this prediction, we partition the climate-related proposals in different ways attributing to a particular partition a higher or lower likelihood that the proposal type imposes costs on the firm if implemented. In particular, we predict that firm managers will view the following proposal types as costlier to implement based on the higher likelihood that if implemented they would require a change in the operating and investment activities of the firm: Operations-related versus disclosure-related proposals; proposals targeting high carbon-intensive firms versus low carbon-intensive firms;

[7] The tests in Gantchev and Giannetti (2020) also rely on this idea.

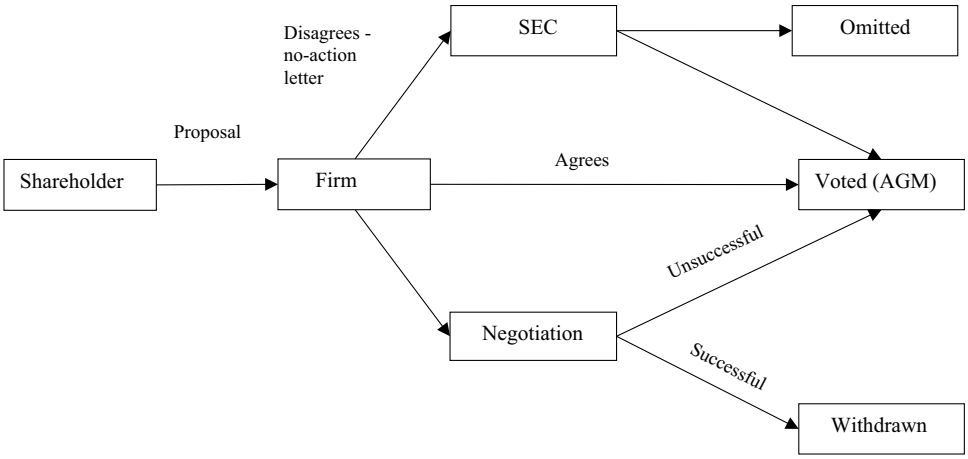

Fig. 1 The proxy statement filing process and the possible outcomes

proposals for emissions reduction versus other proposals; withdrawn (and likely negotiated) proposals versus other proposals; and proposals targeting media-intensive firms versus other firms. Accordingly, we state our main hypothesis as follows:

H1: That costlier climate-related proposals generate negative returns for investors around the first news of a proposal in the proxy statement versus the alternative that less costly proposals generate less negative or positive returns.

For the other partitions, the expected cost to implement is less clear, such as repeated proposals and proposals that almost pass, as they could reflect a greater mix of costly (e.g., emissions reduction) and arguably beneficial (e.g., additional public disclosure) proposals. While the non-rejection of the null hypothesis—that there is no difference between the two proposal types—would be consistent with the view that the proposals are not costly, non-rejection could also be consistent with the first view that investors expect positive outcomes from a proposal type consistent with favorable outcomes such as lower agency costs and improved governance and transparency.

Filing Process, Sample, and Data

The Proxy Statement Filing Process

Securities and Exchange Commission (SEC) Rule 14a-8 (SEC, 2020) requires firms to include in their proxy statement (DEF14a) shareholder proposals for voting at the annual general meeting (AGM) unless the shareholder has not complied with the procedural requirements or the proposal meets the SEC's criteria for exclusion. To be eligible to include a proposal in a firm's proxy statement, shareholders must meet certain requirements. They must have continuously held one percent of the firm's outstanding stock or $2,000 in market value for at least one calendar year. In addition, there are some proposal-specific requirements. For example, proposals must be submitted at least 120 days before the proxy materials are mailed to the shareholders as part of a DEF14a filing and cannot exceed 500 words in length. Each shareholder can submit only one proposal per meeting (Byrd & Cooperman, 2014).

As depicted in Fig. 1, after a shareholder submits a proposal, three outcomes are possible, which we denote as omitted, voted at the AGM, and withdrawn (Bauer et al., 2015; Ertimur et al., 2010). First, if the firm disagrees with the shareholder proposal it can send a letter to the SEC including the reasons to exclude the proposal from its proxy materials. SEC Rule 14a-8 (SEC, 2020) specifies the conditions for the omission of a shareholder proposal from a DEF14a filing. Firms can rely on several reasons to appeal to the SEC for the omission of a proposal (Schopohl, 2017). The four most common are (i) the inclusion of a false or misleading statement, (ii) the proposal's irrelevance (i.e., the proposal is based on issues that account for less than five percent of the total assets related to the firm's ordinary business operations), (iii) duplication (i.e., another shareholder has filed a similar proposal), and (iv) the targeted firm has already addressed the issue (SEC, 2017). Accordingly, once the SEC receives a no-action request, it evaluates the shareholder proposal and the reasons for exclusion and informs the firm and the filing shareholder of its view on the request by issuing a "no-action" letter. If the proposal does not meet the regulatory requirements to be included in the firm's DEF14a filing, it will be omitted and, therefore, not disclosed in the firm's proxy materials.

Second, if the SEC does not agree to exclude the proposal or if the firm agrees to include the proposal in its proxy materials, it will proceed to a vote at the AGM. That is, the shareholder proposal is disclosed in the DEF14a as eligible for voting. We note that an engaged firm is legally

entitled not to implement a shareholder proposal, even if it receives more than 50 percent of the votes at the AGM (Ertimur et al., 2010; Flammer, 2015; Michelon & Rodrigue, 2015).

Third, when negotiations ensue after the proposal is included in the proxy statement, the firm must file an amended DEFA14a if the proposal has been withdrawn by the shareholder (again, see Fig. 1). However, if negotiations are successful before the proxy filing, the firm is not obliged to communicate the withdrawal. Because this process is private, it is difficult to know the date of withdrawn proposals. Contrariwise, if the negotiation is unsuccessful and the proposal meets all regulatory requirements to be included in the proxy statement, it will proceed as outlined in Fig. 1 to a vote at the AGM (Bauer et al., 2015; Clark & Crawford, 2011).

While this process yields two dates, namely, the proxy statement filing date and the AGM date, the first formal news to the market arrives in the DEF14a when investors and the public learn that the firm has agreed that a proposal is eligible for a vote (Gillan & Starks, 2007). Knowing the details, investors can then form expectations of the relevant attributes of a proposal, such as whether it will pass, be withdrawn and negotiated, and if passed how it might initiate climate action, such as a reduction in emissions or an increase in climate-related disclosure, and whether such actions are ex-ante costly or beneficial for firm value. Nonetheless, investors may still receive some new information at the later AGM date, such as actual knowledge that a proposal is withdrawn, but this relates mostly to outcomes that have already been anticipated based on earlier expectations, which would be largely unbiased assuming market efficiency, which is a maintained hypothesis for an event study despite puzzling anomalies and evidence of exploitable mispricing (Ball, 1994).

Panel A of Appendix Table 9 illustrates the submission timeline of a 2017 proposal to Exxon Mobil Corporation indicating a shareholder proposal date (before December 15, 2016), a no-action letter date (in January 2017), the proxy filing date (as of April 13, 2017), and the AGM date (as of May 31, 2007). Exxon Mobil filed its 10-K report as of February 22, 2017.

Sample Selection and Data

The Ceres sample comprises 944 shareholder proposals submitted to 343 U.S. firms on climate change issues during 2009–2022. The Ceres dataset reports the three possible outcomes, namely, *Omitted*, *Voted at the AGM*, and *Withdrawn*. Of our total sample, 400 proposals receive a vote (*Voted at the AGM*), 88 proposals are omitted (*Omitted*), and 456 proposals are withdrawn (*Withdrawn*).[8]

Because shareholder proposals eligible for a vote must be included in firms' proxy statements, we use Direct EDGAR to collect the dates for our event study of market response. In addition to the shareholder proposal data, we gather firm-level data as follows: (i) financial statements from the Compustat/CRSP merged Fundamentals Annual file, (ii) corporate governance data from Refinitiv, (iii) media attention from RavenPack, (iv) environmental performance ratings from Bloomberg, and (v) daily stock returns from CRSP. We merge these data with the Ceres dataset using PERMNO, CIK, ISIN, and firm name. We checked the merge manually. For some tests, we extract additional data such as whether the firm-year covers a Republican or Democratic presidential period or whether the shareholder represents a UNPRI-aligned institutional investor.

Non-Targeted Firms

For control firms, we select a matched sample alike in financial characteristics other than having been targeted by a climate proposal. We start with the Compustat universe other than treated firms and propensity score match these firms to control firms based on size (log of total revenues), year, and industry group (two-digit GICS (Global Industry Classification Standard)). We then apply the nearest-neighbor-matching method with replacement (Semenova, 2023; Shipman et al., 2017). As such, the same control firm serves as the closest match firm for one or more targeted/treated firms. Thus, each treated firm has the characteristics of a matched control firm equal to the mean characteristics of its year-industry-size matched portfolio.

Operations- Versus Disclosure-Related Proposals

To recognize a key distinction between the climate proposals, namely, whether they relate to decision-making by the firm (operations-related) or additional public disclosure (disclosure-related), which could affect the voting, market response, and effect of a proposal on future outcomes, we read each proposal to identify the shareholder's request. We identify disclosure-related proposals as those that focus on the disclosure of environmental information, for example, they could relate to a response to the CDP questionnaire, the disclosure of emissions (Scope 1 and 2 emissions, primarily), or a request to disclose science-based targets. By

[8] Twenty proposals were originally classified by Ceres as "filed" (2), "empty" (7), and "no vote" (11). We reclassified them as withdrawn because they were not voted on (since they were not included in a proxy statement) and not omitted (as they were not incorporated in a no-action letter).

contrast, operations-related proposals call for more substantive actions, for example, proposals that press the firm to address the short- and long-term climate risks of a lower carbon economy, those that engage the firm to explain how it will operate in a two-degree scenario, and those that call for a reduction in emissions. Operations-related proposals may also involve more investment by the firm that would otherwise be ill-conceived for firm value maximization since the actions imposed on the firm by outside shareholders would likely be based on incomplete information compared to information internal to the firm, even though such actions could be preferred by ethical shareholders willing to sacrifice higher returns to further a climate or sustainability goal or internalize a negative externality (Baker et al., 2022; Barber et al., 2021; Hong & Shore, 2023).

We use a three-phase process to code our sample of climate-related proposals. To categorize each proposal, we rely on the original content of the proposal (see Appendix Table 9 for examples). Initially, to prevent ambiguous interpretations, two of the authors jointly conducted a pilot test considering 236 proposals (25 percent of the total sample of 944 proposals). They met recurrently to discuss all doubts during and after the pilot test. Next, after revising and establishing a robust coding protocol, the same authors manually coded the remaining proposals. A third author not involved in the initial coding then performed a second coding and ran a Cronbach reliability test of whether a proposal was operations- or disclosure-related, finding a high level of rater reliability based on an alpha level of more than 90 percent.

Method

Firms Targeted with a Shareholder Proposal

To understand our first research question of what determines whether activists target a firm with a climate-related proposal, we state the following logistic regression model:

$$\begin{aligned} Targeted_{it} = f(&\beta_0 + \beta_1 Size_{it-1} + \beta_2 BTM_{it-1} \\ &+ \beta_3 Sales\_Growth_{it-1} + \beta_4 Cash_{it-1} \\ &+ \beta_5 Dividend\_Yield_{it-1} + \beta_6 OCF_{it-1} \\ &+ \beta_7 Capex_{it-1} + \beta_8 RD_{it-1} + \beta_9 Tobin\_Q_{it-1} \\ &+ \beta_{10} Leverage_{it-1} + \beta_{11} ROA_{it-1} \\ &+ \beta_{12} Media\_Attention_{it-1} \\ &+ \beta_{13} Carbon\_Intensity_{it-1} + \beta_{14} Board\_Size_{it-1} \\ &+ \beta_{15} Board\_Gender_{it-1} + \beta_{16} Board\_Indep_{it-1} \\ &+ \beta_{17} Env\_Score_{it-1} + YearFE + \varepsilon_{it}). \end{aligned} \tag{1}$$

Targeted = 1 if the firm is targeted by a climate-related proposal and zero otherwise (i.e., is a non-targeted control firm as per the previous section). We align the firm-level data to the prior fiscal year closest to the DEF14a filing year. Appendix Table 10 defines the other variables. Note that Eq. (1) is unconditional on a proposal's outcome, as not all targets receive a vote, and some proposals are withdrawn or omitted from the DEF14a. As such, Eq. (1) addresses the question of what determines whether a firm is targeted and, possibly, whether those determinants vary on the mix of proposals. We, therefore, estimate Eq. (1) for the sample of all targets and the subsamples of operations- and disclosure-related proposals. Prior evidence suggests that firms with ESG shareholder proposals are larger and have poorer levels of environmental, social, and operational performance (Dimson et al., 2015; Ertimur et al., 2010; Michelon & Rodrigue, 2015; Wei, 2020). Given that climate-related proposals are a subset of ESG, we also expect such proposals to engage firms that are larger (*Size*) and with lower growth opportunities (*BTM*, *Sales_Growth*). In addition, we expect targets to spend less on R&D and more on plant and equipment (*Capex*) compared to non-targets. Equation (1) also includes media attention and governance variables as regressors that might further explain shareholders' decision to target. We also include year fixed effects and control for industry with a carbon-intensity variable (based on whether a firm is in a carbon-intensive industry). We cluster by firm-year to estimate the standard errors for coefficient significance. Clustering in this way helps control for within-firm correlation among the different proposals since shareholders can target some firms more than once (944 shareholder proposals submitted to 343 firms) and, also, because the control sample could include firms that have been targeted on multiple issues unrelated to climate change.

Firms with an Eligible Shareholder Proposal in the Proxy Statement

We use logistic regression to examine the determinants of why some eligible climate-related proposals proceed to a vote and others do not, which is our second research question. As per Eq. (1), we align the firm-level data to the prior fiscal year. Because we examine a subsample of targets, sample selection bias may be introduced into the model (Breen, 1996). To correct for this bias, we run two-stage regressions that calculate and include the Heckman correction factor (*HCF*) based on the inverse Mill's ratio (Heckman, 1979). This model is

$$
\begin{aligned}
Voted_{it} = f(&\beta_0 + \beta_1 Size_{it-1} + \beta_2 BTM_{it-1} \\
&+ \beta_3 Sales\_Growth_{it-1} + \beta_4 Cash_{it-1} \\
&+ \beta_5 Dividend\_Yield_{it-1} + \beta_6 OCF_{it-1} \\
&+ \beta_7 Capex_{it-1} + \beta_8 RD_{it-1} + \beta_9 Tobin\_Q_{it-1} \\
&+ \beta_{10} Leverage_{it-1} + \beta_{11} ROA_{it-1} \\
&+ \beta_{12} Media\_Attention_{it-1} + \beta_{13} Carbon\_Intensity_{it-1} \\
&+ \beta_{14} Republican_{it-1} + \beta_{15} Non\_Profit_{it-1} \\
&+ \beta_{16} UNPRI\_Signatory_{it-1} + \beta_{17} Repeated_{it-1} \\
&+ \beta_{18} Operations\_Related_{it-1} + \beta_{19} GHG\_Reduction_{it-1} \\
&+ \beta_{20} Board\_Size_{it-1} + \beta_{21} Board\_Gender_{it-1} \\
&+ \beta_{22} Board\_Indep_{it-1} + \beta_{23} Env\_Score_{it-1} \\
&+ \beta_{24} HCF_{it-1} + \varepsilon_{it})
\end{aligned}
\tag{2}
$$

The dependent variable for Eq. (2) equals one if a climate change proposal proceeds to a vote at the AGM and zero if it does not, that is, it is omitted or withdrawn. For firms with proposals eligible for a repeated vote or other subsequent actions, *Voted* refers to the first eligible proposal. Thus, Eq. (2) counts a proposal only once regardless of the number of subsequent actions associated with that proposal. In addition to the regressors in Eq. (1), Eq. (2) includes proposal-level variables to assess the potential that proposal eligibility changes over time (e.g., before and after Republican presidents), whether voting eligibility is higher for proposals with repeated votes or those calling for emissions reductions, and whether firms' environmental performance might also explain whether a climate change proposal proceeds to a vote at the AGM. Equation (2) does not include year fixed effects to avoid overlap with *Republican*, which is also a time-related variable, or industry fixed effects to prevent overlap with *Carbon_Intensity*, which is also an industry-related variable. Appendix Table 10 defines the other variables.

Proposals with a Voting Outcome

The model for our third research question of what determines the voting percentage is

$$
\begin{aligned}
Voting\%_{it} = f(&\beta_0 + \beta_1 Size_{it-1} + \beta_2 BTM_{it-1} \\
&+ \beta_3 Sales\_growth_{it-1} + \beta_4 Cash_{it-1} \\
&+ \beta_5 Dividend\_yield_{it-1} + \beta_6 OCF_{it-1} \\
&+ \beta_7 Capex_{it-1} + \beta_8 RD_{it-1} + \beta_9 Tobin\_Q_{it-1} \\
&+ \beta_{10} Leverage_{it-1} + \beta_{11} ROA_{it-1} \\
&+ \beta_{12} Media\_Attention_{it-1} + \beta_{13} Carbon\_Intensity_{it-1} \\
&+ \beta_{14} Republican_{it-1} + \beta_{15} Non\_Profit_{it-1} \\
&+ \beta_{16} UNPRI\_Signatory_{it-1} + \beta_{17} Repeated_{it-1} \\
&+ \beta_{18} Operations\_Related_{it-1} + \beta_{19} GHG\_Reduction_{it-1} \\
&+ \beta_{20} Board\_Size_{it-1} + \beta_{21} Board\_Gender_{it-1} \\
&+ \beta_{22} Board\_Indep_{it-1} + \beta_{23} Env\_Score_{it-1} + \beta_{24} HCF_{it-1} + \varepsilon_{it})
\end{aligned}
\tag{3}
$$

The dependent variable (*Voting%*) is the first-vote percentage if the vote is later repeated. As a sensitivity test, we also use the average vote percentage when the proposal attracts multiple votes. Given that the dependent variable is a proportion (ranging from 0 to 1), we estimate a fractional probit model (Papke & Wooldridge, 1996). We keep the same set of variables and time subscripts as in Eq. (2). In addition, because Eq. (3) focuses on a subsample of proposals that proceed to a vote at the AGM, we estimate Eq. (3) as a two-stage fractional regression model and include the Heckman correction factor (*HCF*) to control for selection bias. We expect a higher favorable voting percentage for firms with higher capital spending (*Capex*) and those with less R&D intensity. We also expect higher voting percentages for repeated-vote proposals, potentially reflecting an elevated persistence by shareholders for substantive change. However, unlike Eqs. (1) and (2), it is unclear that larger firms should receive higher voting percentages despite their higher likelihood of being targeted and shareholder success in introducing more eligible proposals [Eq. (2)]. Although larger firms may receive more media attention (Appendix Table 11), such higher attention need not necessarily translate into a higher percentage.

Value Relevance of Shareholder Proposals

To address our fourth research question, we use an event study. We align each shareholder proposal to an expected price-sensitive date, namely, the DEF14a filing date. We access these dates from direct EDGAR. We estimate firms' cumulative excess returns around these dates using the market-adjusted model (the market model and a three-factor excess returns model give similar results). The model is

$$
CAR_{it}(t_1, t_2) = \sum_{t1-t2} \left(R_{it} - RM_t\right) \tag{4}
$$

CAR_{it} refers to a firm i's cumulative market-adjusted excess return from day t_1 to day t_2. R_{it} is the common stock return for day t, and RM_t is the expected common stock return on day t calculated as the return on the CSRP market index for day t. While it is possible to estimate *CAR* around later dates, the proxy filing date is the earliest and forms the basis for our tests (Gillan & Starks, 2007). Different window lengths are analyzed, such as the event windows of days (− 10, 10), (− 5, 5), and (− 1, 1). We assume market efficiency, which is a required maintained hypothesis for an event study (Binder, 1998). We focus on the proxy filing date as the date when stock investors first learn formally that the AGM agenda includes a proposal for voting (and at that point it is not withdrawn or omitted) and form expectations of how the agenda items affect firm value ("The proxy statement filing process" section). We acknowledge, though, that

some leakage could occur through the statements of proxy advisory firms (e.g., Institutional Shareholder Services) and pension funds with a history of shareholder activism (e.g., CalPERS). Some eligible proposals in a DEF14a filing are also repeated proposals. We view any earlier or later event dates as weaker tests, however, as less or no significant price reaction about those shareholder proposals eligible for voting should occur around those times.[9] Also, because the different dates have little overlap, this minimizes the chances that a short window price reaction around an earlier (the annual report date) or later date (e.g., the AGM date) would contaminate the price reaction on the DEF14a date.

We conduct three kinds of tests of the *CAR* measures from Eq. (4). We first check if the cumulative average mean excess return for the sample with climate-related proposals in their DEF14a (treatment firms) differs from zero or differs from the cumulative average mean excess return for the control sample (control firms) around the different $CAR\ (t_1, t_2)$ intervals from $t_1 \geq -10$ to $t_2 \leq 10$. Our null hypothesis for this test is that $CAR\ (t_1, t_2) = 0$ or that $CAR\ (t_1, t_2)_{\text{Treatment}}$ minus $CAR_{it}\ (t_1, t_2)_{\text{Control}} = 0$. However, because firms' DEF14a filing contains much other price-sensitive information (e.g., executive compensation, audit fees), this test has low identification.

Accordingly, to increase identification, we test for *differences* in the mean $CAR\ (t_1, t_2)$, where the differences vary predictably on the attributes of the shareholder proposals. We test the following five cross-sectional predictions: (i) $CAR\ (t_1, t_2)$ | repeated-vote proposals < $CAR\ (t_1, t_2)$ | single-vote proposals, (ii) $CAR\ (t_1, t_2)$ | withdrawn proposals < $CAR\ (t_1, t_2)$ | voted proposals, (iii) $CAR\ (t_1, t_2)$ | GHG-reduction proposals < $CAR\ (t_1, t_2)$ | other proposals, (iv) $CAR\ (t_1, t_2)$ | marginally passing proposals < $CAR\ (t_1, t_2)$ | other proposals, and (v) $CAR\ (t_1, t_2)$ | UNPRI proposals > $CAR\ (t_1, t_2)$ | non-UNPRI proposals. As an initial test of hypothesis (H1), we conduct univariate binomial tests of the null hypothesis that the differences in the mean excess returns for days $-t$ to t for a partition are not positive or negative when the expected likelihood of being positive or negative is 0.5. The first four cross-sectional predictions build on the theory that investors react negatively to proposals that impose costs on the firm as a result of expected deviations induced by the proposal from managers' efficient operating and investment policies to maximize firm value. Assuming targeted firms operate to maximize firm value, the increased cost and higher uncertainty of a shareholder proposal that may succeed should decrease firm value in the short term. Specifically, repeated proposals are likelier to succeed. Withdrawn proposals are likelier to be implemented through negotiation. A track record of non-responsiveness as reflected in repeated-vote proposals may also require more constructive engagement in the future. GHG-reduction proposals are likelier to require additional spending, and marginally passing proposals are likelier to succeed the next time. Additionally, for operations- minus disclosure-related proposals, we also predict negative differential excess returns bolstered by evidence that additional voluntary climate-related disclosure increases firm value (Flammer et al., 2021; Griffin & Sun, 2013). However, if investors interpret such additional disclosure as a form of virtue signaling or the disclosures reveal proprietary information, the differential return (operations-related minus disclosure-related) could be positive or insignificantly different from zero despite an increase in environmental performance and more disclosure. By contrast, UNPRI proposals should generate positive excess returns by improving firms' environmental performance metrics given the engagement of large sustainability-minded institutions in support of the resolutions. We also explore whether higher levels of media attention generate positive or negative excess returns over the event period. On the one hand, a higher level of media attention could increase firm value by giving a larger voice to the arguments of shareholders in favor of change (Barber & Odean, 2007; Stanny & Ely, 2008). On the other hand, if change is costly and media attention tends to generate controversy, firms with eligible votes that attract more media attention may decrease in value compared to firms with eligible votes and less media attention. Media attention may also increase the likelihood that virtue signaling is exposed, which can sap investor confidence and damage firm reputation leading to further negative price adjustments (Du, 2015).

In addition to the univariate tests, we examine these variables jointly by estimating two forms of multivariate regression model, the first based on treatment and control firms where possible and the second based on treatment firms only. The first model is

$$\begin{aligned} CAR_{it}(t_1, t_2) = {} & \beta_0 + \beta_1 Partitioning\ variable_{it} \\ & + \beta_2 Treatment_{it} \\ & + \beta_3 Partitioning\ variable_{it}\ x\ Treatment_{it} \\ & + \beta_4 Size_{it} + \beta_5 Leverage_{it} \\ & + Year\ and\ Industry\ FE + \varepsilon_{it}, \end{aligned} \quad (5)$$

where *Partitioning variable* = A firm-level dummy variable for high versus low $Media\_Attention_i$ = one if the amount of media attention given to each firm-year based on a count of RavenPack documents (all types) is above the median and zero otherwise, and *UNPRI_Signatory*. For example, if we were to observe a significantly negative coefficient for β_3 for the *Media Attention*, this would indicate that high media attention more negatively associates with $CAR\ (t_1, t_2)$ for treatment firms compared to control firms. For the partitions

[9] The median difference between the DEF14a date and the later AGM date for our sample is 43 days. The median difference between the DEF14a date and the earlier annual report date (which contains no details of DEF14a eligible items for voting) for our shareholder proposal sample is 30 days.

of *Withdrawn/Voted*, *GHG_Reduction*, *Marginally_Passing_Vote*, and *Repeated*, the treatment and treatment interaction variables drop out of Eq. (5) because there is no equivalent partitioning variable for the control sample.

The second model below applies to the treatment sample only and includes all the variables as regressors to estimate the marginal effects of each partition. The model is

$$\begin{aligned} CAR_{it}(t_1,t_2) &= \beta_0 + \beta_1 Media\_Attention_{it} \\ &+ \beta_2 UNPRI\_Signatory_{it} \\ &+ \beta_3 GHG\_Reduction_{it} \\ &+ \beta_4 Marginally\_Passing\_Vote_{it} \\ &+ \beta_5 Repeated_{it} + \beta_6 Size_{it} + \beta_7 Leverage_{it} \\ &+ \text{ Year and Industry FE } + \varepsilon_{it}. \end{aligned} \tag{6}$$

The dummy variable regressors in Eq. (6) are the same as defined for Eq. (5). As in Tables 3, 4, and 5, the regressions control for year and industry fixed effects and use firm-year clustered standard errors. While several of the variables are correlated, we mainly expect the same signs for the coefficients in Eqs. (5) and (6) as in the univariate tests. The significance levels of the tests (and possibly the direction of the univariate relations) may differ, however, due to the correlations among the variables. We include *Size* and *Leverage* as firm-level controls in Eqs. (5) and (6), as they should be highly significant in determining whether a vote will occur, which would likely influence investors' assessment of cost.

Shareholder Proposals and Change in Environmental Performance Rating and Emissions

Our last research question asks whether climate-related proposals associate with a change in firms' future environmental performance rating and emissions performance, a topic that has generated mixed results (Christensen et al., 2022) and controversies over whether such scores track real effects (Simpson et al., 2021; Tang et al., 2022). We measure environmental performance using the Bloomberg environmental score, which indicates a firm's environmental performance based on publicly available and verifiable information on different themes, such as emissions performance and resource use. Given the controversy over the commensurability of outside ratings, we test the robustness of our results using an alternative rating measure (from Refinitiv) ("Additional tests" section). Our goal is to understand which characteristics of shareholder proposals might condition firms' future environmental and emissions performance.

First, we conduct a univariate difference-in-difference analysis of the two performance measures, namely, $\Delta Env\_Score_{\text{Treatment}}$ minus $\Delta Env\_Score_{\text{Control}}$ and $\Delta Emissions_{\text{Treatment}}$ minus $\Delta Emissions_{\text{Control}}$. If the proposals generate measurable effects, we expect the mean of the first difference to be positive and significant (environmental performance improves for treatment firms compared to control firms) and the mean of the second difference to be negative and significant (i.e., emissions decline for treatment firms compared to control firms). Also, if the firms targeted also have lower ratings or high emissions to begin with (compared to control firms), this is another reason to expect a general improvement over time compared to control firms.

Second, we conduct a multivariate regression analysis based on treatment observations only, as we have no equivalent data on relevant shareholder proposal characteristics for control firms except for whether a firm has high or low media attention or is in a carbon-intensive industry. Specifically, we assume an autoregressive process and regress Env_Score_{t+2} or $Emissions_{t+2}$ (Scope 1 plus Scope 2) on Env_Score_{t-1} or $Emissions_{t-1}$ and interact these measures with the characteristics of a shareholder proposal. The model is

$$\begin{aligned} &Env\_Score_{it+2} or Emissions_{it+2} \\ &= \beta_0 + \beta_1 Env\_Score_{it-1} or Emissions_{it-1} \\ &+ \beta_2 Partitioning \text{ variable}_{it-1} \\ &+ \beta_3 Partitioning \text{ variable}_{it-1} x Env\_Score_{it-1} or Emissions_{it-1} \\ &+ \beta_4 Size_{it-1} + \beta_5 Leverage_{it-1} \\ &+ \text{ Year and Industry FE } + e_{it+2}. \end{aligned} \tag{7}$$

Equation (7) thus regresses Env_Score_{t+2} on Env_Score_{t-1} or $Emissions_{t+2}$ on $Emissions_{t-1}$ with controls for firm size, leverage, and fixed effects. The regressions include an interaction variable to test whether the impact of climate-related proposals on environmental performance or emissions differs on that partitioning variable. The partitioning variables are *Media_Attention*, *UNPRI_Signatory*, *Withdrawn, or voted proposal*, whether the proposal relates to *GHG_Reduction*, proposals with a *Marginally Passing Vote* ($35 \geq \% < 50$), and whether the impact varies on the level of *Carbon_Intensity*. The number of observations for each regression depends on the variables and the partition. Because the regressions require measures of change over three years, the regression observations are smaller than in the earlier tables.

The key test from Eq. (7) is the sign and significance of β_3 for a particular partition. For example, if $\beta_3 > 0$ for *Env_Score* for the media attention partition, this would indicate that after controlling for the predictably positive (and sticky) correlation between average past and future environmental performance, the positive correlation between average past and future environmental performance is incrementally more positive for firms with more media attention versus less media attention, consistent with an improvement. We can also conceptualize $0 > \beta_1 \leq 1$ in Eq. (7) as the coefficient for a mean-reverting first-order autoregressive process and β_3 as an estimate of how much more of the first-order lag is

Table 1 Summary statistics of climate-related proposals

Year	Number of proposals	Disclosure-related proposals	% Disclosure-related proposals	Operations-related proposals	% Operations-related proposals	Difference (%)	p-value for difference in mean	Repeated proposals	Average voting* (%)	Average voting* Disclosure-related (%)	Average voting* Operations-related (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Breakdown of climate-related proposals by year											
2009	32	30	93.75	2	6.25	87.50	–	–	23.63	23.63	0.00
2010	54	43	79.63	11	20.37	59.26	–	14	21.80	20.34	25.97
2011	67	33	49.25	34	50.75	− 1.49	–	16	18.99	19.54	18.72
2012	54	36	66.67	18	33.33	33.33	–	19	15.61	16.69	13.94
2013	54	34	62.96	20	37.04	25.93	–	14	20.83	23.76	18.49
2014	82	64	78.05	18	21.95	56.10	–	24	23.89	25.04	22.34
2015	88	58	65.91	30	34.09	31.82	–	27	18.97	20.56	17.20
2016	96	60	62.50	36	37.50	25.00	–	41	22.71	20.62	24.81
2017	90	50	55.56	40	44.44	11.11	–	45	28.54	22.57	32.74
2018	82	43	52.44	39	47.56	4.88	–	36	30.84	32.89	29.76
2019	55	20	36.36	35	63.64	− 27.27	–	26	27.20	9.60	31.11
2020	43	16	37.21	27	62.79	− 25.58	–	17	39.57	42.50	38.60
2021	45	23	51.11	22	48.89	2.22	–	13	55.52	53.45	58.78
2022	102	28	27.45	74	72.55	− 45.10	–	24	35.57	26.60	36.36
Average	67.43	38.43	58.49	29	41.51	16.98	0.021	24.31	27.41	25.56	26.34
Total	944	538	56.99	406	43.01	13.98	–	316	25.90	23.96	27.54
Panel B: Breakdown of climate-related proposals by voting outcome											
Voted	400	184	34.20	216	53.20	− 19.00	0.025	170	24.63	22.57	27.49
Withdrawn	456	302	56.13	154	37.93	18.20	0.001	113	–	–	–
Omitted	88	52	9.67	36	8.87	0.80	0.002	33	–	–	–
Total	944	538	100.00	406	100.00	0.00	–	316	24.63	22.57	27.49

Panel A classifies shareholder proposals by year. Panel B classifies shareholder proposal by outcome

*The average percentage of favorable votes calculated using the total voting percentage of voted proposals divided by the total number of voted proposals in a given year. The sample comprises all climate-related proposals in the Ceres database for 2009–2022

passed into the series conditional on the partition, assuming $0 > \beta_1 + \beta_3 < 1$.[10]

We also include *UNPRI_Signatory* as a partitioning variable to explore Kim and Yoon (2023), who find that ESG performance does not improve for firms with UNPRI signatories. Proposals submitted by UNPRI-aligned investors may not necessarily receive more votes in favor, however, as these investors could pressure firm managers directly to carry out more ethical business practices and engage more on environmental issues (Kim & Yoon, 2023). In addition, we distinguish between proposals targeting carbon-intensive firms versus other firms. Carbon-intensive firm proposals can generate significant publicity, yet the firms may be reluctant to improve their environmental or emissions record.

Results

Summary Statistics

We first provide a breakdown of the sample by year and proposal type (operations- versus disclosure-related). Panel A of Table 1 states the frequency of climate-related proposals by year (cols. 1–5), the number of repeated-vote proposals (col. 8), and their voting percentage (col. 9), differentiating by disclosure- and operations-related proposals (cols. 10–11). First, cols. 2–5 of Panel B indicate a split between voted and withdrawn disclosure-related and voted and withdrawn operations-related proposals. Second, we observe a significant difference in the time trend of the percentage of disclosure- and operations-related proposals. Voting likelihood is higher for operations-related proposals, whereas disclosure-related proposals are likelier to be withdrawn. Based on separate time-series regressions of col. 3 and col. 5, the former (latter) increases (decrease) significantly ($p < 0.01$) over time. Relatedly, the percentage of votes in favor of operations-related proposals increases after 2015 (after the post-Paris Agreement), potentially an indication that investors now focus more on this type of shareholder proposal. Panels A and B together also reflect a greater preponderance and an increasing trend of negotiated outcomes for disclosure-related proposals (likelier to be withdrawn) compared to operations-related proposals.[11] The latter thus reflect more non-negotiated outcomes (since such proposals proceed to a vote). Given the firm's involvement, a negotiated or withdrawn proposal is also less likely to impose costs on the firm compared to a repeated proposal or a proposal with a high percentage of votes in favor. We test this idea in a later section.

Table 2 summarizes the main statistics for the targets and their matched counterparts in two panels. Panel A summarizes the characteristics of the target and matched firms for the full sample. Panel B compares the summary statistics of the operations- and disclosure-related subsamples.

To create a control sample of firms not targeted by a climate change proposal, we match the propensity score of each firm with a climate-related proposal to a control firm that has not been targeted by size, year, and GICS industry group ("Non-targeted firms" section). As Dimson et al. (2015) note, firms targeted by an ESG shareholder proposal reflect lower levels of *Sales_Growth*, potentially indicating that climate-related activism can impose a reputational effect on firms' actions. *Size* is a significant characteristic of both disclosure-related proposals and operations-related proposals. Firms targeted by an operations-related proposal indicate larger size than firms targeted by disclosure-related proposals. Firms targeted by an operations-related proposal show larger *BTM* and smaller *Tobin_Q* ratios than firms targeted by disclosure-related proposals. In addition, firms targeted by operations-related proposals invest less in R&D than firms targeted by disclosure-related proposals. Mean *Capex* is similar for both subsamples. Regarding capital structure, firms targeted by an operations-related proposal present lower levels of leverage than firms targeted by disclosure-related proposals. Lastly, we note that while the treatment firms and control firms attract similar levels of media attention, firms subject to disclosure-related proposals are far more newsworthy firms in general but have lower environmental performance scores, which is possibly a reason why they are targeted in the first place (Barko et al., 2021). While Table 2 describes the financial characteristics of targeted (treated) versus non-targeted (control) firms, those measures being univariate do not consider that some characteristics are correlated. Appendix Table 11 shows the correlations. In the next section, we apply logit regression analysis to identify those that are the most important conditional on the correlations.

Firms with a Shareholder Proposal

Table 3 summarizes the estimation of Eq. (1). Col. 1 presents the marginal effects of being targeted for the full sample. The results are largely consistent with Table 2. We find that targets are larger and present higher levels of dividend yield, *OCF* (operating cash flow), *Capex*, and *Tobin_Q*

[10] While Eq. (7) could also be specified as a first differences model, the main advantage of Eq. (7) over a first differences version is that it does not arbitrarily constrain $\beta_1 + \beta_3 = 1$ as the temporal dynamic of the series.

[11] Horster and Papadopoulos (2019) also show that the number of withdrawn proposals trends upward in the United States.

Table 2 Summary statistics

Panel A: Full sample														
	Targets						Matched firms							
Variable	*N*	Mean	SD	p25	p50	p75	*N*	Mean	SD	p25	p50	p75	*t* test	*p* value sig.
Size	944	9.66	1.66	8.51	9.50	11.03	944	9.60	1.57	8.51	9.51	11.01	0.80	0.42
BTM	944	0.51	0.42	0.28	0.46	0.68	944	0.50	0.73	0.26	0.43	0.65	0.24	0.81
Sales_Growth	944	0.04	0.24	− 0.06	0.02	0.13	944	0.35	4.12	− 0.03	0.05	0.15	− 2.31	0.02**
Cash	944	0.08	0.09	0.01	0.04	0.12	944	0.10	0.09	0.03	0.08	0.14	− 5.21	0.00***
Dividend_Yield	944	0.02	0.02	0.01	0.02	0.04	944	0.02	0.03	0.00	0.02	0.03	0.40	0.69
OCF	944	0.10	0.07	0.06	0.09	0.14	944	0.09	0.06	0.05	0.09	0.12	3.80	0.00***
Capex	944	0.07	0.06	0.03	0.06	0.09	944	0.04	0.05	0.02	0.03	0.06	10.56	0.00***
RD	944	0.00	0.02	0.00	0.00	0.00	944	0.01	0.02	0.00	0.00	0.01	− 5.09	0.00***
Tobin_Q	944	1.70	1.29	1.08	1.30	1.76	944	1.65	0.98	1.09	1.34	1.82	1.04	0.30
Leverage	944	0.34	0.27	0.20	0.32	0.42	944	0.33	0.18	0.19	0.32	0.44	0.57	0.57
ROA	944	0.12	0.09	0.07	0.10	0.16	944	0.12	0.07	0.07	0.12	0.15	0.25	0.80
Media_Attention	944	211.90	773.61	45.00	81.00	171.00	944	211.40	579.09	39.00	81.00	127.00	0.02	0.99
Carbon_Intensity	944	0.57	0.50	0	1	1	944	0.31	0.46	0	0	1	11.56	0***
Republican	944	0.27	0.45	0	0	1	944	0.27	0.45	0	0	1	0	1
Non_Profit	944	0.48	0.50	0	0	1								
UNPRI_Signatory	944	0.53	0.50	0	1	1								
Repeated	944	0.33	0.47	0	0	1								
Operations_Related	944	0.43	0.50	0	0	1								
Emissions_Reduction	944	0.45	0.50	0	0	1								
Board_Size	768	11.27	2.09	10	11	12	694	11.46	2.77	10	11	13	− 1.47	0.14**
Board_Gender	768	0.21	0.10	0.15	0.20	0.27	694	0.22	0.10	0.15	0.22	0.29	− 1.35	0.18***
Board_Indep	768	0.85	0.09	0.82	0.88	0.92	694	0.83	0.11	0.8	0.86	0.91	4.11	0***
Env_Score	401	3.04	1.43	1.94	3.11	3.93	202	3.11	1.92	1.56	3.04	4.31	− 0.47	0.63
Panel B: Subsamples of operations- versus disclosure-related proposals														
Operations-related							Disclosure-related							
Size	406	9.85	1.63	8.83	9.58	11.29	538	9.52	1.67	8.21	9.44	10.90	− 3.07	0.00***
BTM	406	0.56	0.39	0.37	0.51	0.71	538	0.48	0.44	0.24	0.41	0.62	− 2.91	0.00***
Sales_Growth	406	0.06	0.24	− 0.07	0.03	0.15	538	0.03	0.23	− 0.06	0.02	0.11	− 1.95	0.05**
Cash	406	0.06	0.08	0.01	0.04	0.09	538	0.09	0.10	0.01	0.05	0.14	3.69	0.00***
Dividend_Yield	406	0.03	0.02	0.01	0.03	0.04	538	0.02	0.02	0.01	0.02	0.03	− 3.63	0.00***
OCF	406	0.09	0.06	0.05	0.08	0.12	538	0.11	0.07	0.06	0.10	0.14	4.69	0.00***
Capex	406	0.07	0.05	0.04	0.06	0.09	538	0.07	0.07	0.03	0.05	0.09	1.15	0.25
RD	406	0.00	0.02	0.00	0.00	0.00	538	0.01	0.02	0.00	0.00	0.00	2.08	0.04**
Tobin_Q	406	1.54	1.09	1.07	1.23	1.52	538	1.82	1.41	1.09	1.37	2.04	3.27	0.00***
Leverage	406	0.31	0.18	0.18	0.32	0.41	538	0.35	0.32	0.21	0.32	0.42	2.15	0.03**
ROA	406	0.11	0.07	0.07	0.09	0.14	538	0.13	0.11	0.08	0.12	0.17	2.93	0.00***
Media_Attention	406	150.24	204.6	45	81	172	538	258.43	1007.23	45.00	81.00	170.00	− 2.13	0.03**
Carbon_Intensity	406	0.69	0.46	0	1	1	538	0.47	0.50	0	0	1	7.06	0.00***
Republican	406	0.31	0.46	0	0	1	538	0.25	0.43	0	0	0	2.14	0.03**
Non_Profit	406	0.59	0.49	0	1	1	538	0.40	0.49	0	0	1	5.89	0.00***
UNPRI_Signatory	406	0.49	0.50	0	0	1	538	0.56	0.50	0	1	1	− 1.93	0.05**
Repeated	406	0.36	0.48	0	0	1	538	0.31	0.46	0	0	1	1.55	0.12
Operations_Related	406	1	0	1	1	1	538							
Emissions_Reduction	406	0.48	0.50	0	0	1	538	0.42	0.49	0	0	1	1.73	0.08*
Board_Size	351	11.62	2.08	10	12	13	417	10.98	2.06	10	11	12	− 4.31	0.00***
Board_Gender	351	0.22	0.10	0.15	0.20	0.27	417	0.20	0.10	0.14	0.20	0.27	− 2.30	0.02**
Board_Indep	351	0.86	0.08	0.83	0.89	0.92	417	0.85	0.09	0.82	0.88	0.92	− 1.99	0.05**
Env_Score	188	3.32	1.28	2.33	3.39	3.97	213	2.79	1.51	1.68	2.82	3.89	3.84	0.00***

Table 2 (continued)

Panel A summarizes the characteristics of targets for the full sample, and comparisons with a group of matched firms. Panel B compares summary statistics for a subsample of operations-related proposals with those of a subsample of disclosure-related proposals. Firm characteristics are measured as of the year before the climate-related proposal

*, **, and ***Coefficients are significant at the 0.1, 0.05, and 0.01 levels, respectively. Appendix Table 10 defines the variables

Table 3 Characteristics of firms targeted by climate-related proposals

Sample	Full sample		Full sample		Operations-related		Disclosure-related	
	Coeff.	*z*-stat. Sig.	Coeff.	*z*-stat. Sig.	Coeff.	*z*-stat. Sig.	Coeff.	*z*-stat. Sig.
Variable	(1)		(2)		(3)		(4)	
Size	0.039	3.34***	0.031	2.12*	0.000	0.00	0.055	2.97***
BTM	− 0.020	− 1.06	− 0.005	− 0.10	0.048	0.49	− 0.001	− 0.02
Sales_Growth	− 0.225	− 3.10***	− 0.130	− 1.59	− 0.106	− 0.77	− 0.133	− 1.32
Cash	− 0.151	− 0.77	− 0.170	− 0.73	− 0.189	− 0.51	− 0.111	− 0.38
Dividend_Yield	− 1.312	− 2.15**	1.922	1.90*	2.755	1.51	1.383	1.14
OCF	0.767	1.84*	1.018	1.76*	1.410	1.47	1.220	1.75*
Capex	1.646	3.33***	1.881	2.56***	2.578	2.66***	1.554	2.16**
RD	− 2.445	− 2.61***	− 2.205	− 2.03*	− 1.931	− 1.01	− 2.171	− 1.65*
Tobin_Q	0.091	4.25***	0.093	3.81***	0.135	3.02***	0.056	1.96*
Leverage	0.016	0.20	− 0.017	− 0.20	− 0.296	− 1.63	0.116	1.15
ROA	− 1.149	− 3.36***	− 1.196	− 2.68***	− 2.028	− 2.49**	− 0.924	− 1.77*
Media_Attention	0.000	0.84	0.000	1.02	0.000	− 0.61	0.000	1.10
Carbon_Intensity	0.269	6.65***	0.264	5.24***	0.353	5.09***	0.213	3.31***
Board_Size			− 0.002	− 0.24	0.018	1.28	− 0.011	− 0.96
Board_Gender			0.065	0.31	0.187	0.57	− 0.175	− 0.67
Board_Indep			0.449	2.31**	0.845	2.55***	0.273	1.16
Env_Score			− 0.025	− 1.82*	− 0.010	− 0.52	− 0.039	− 2.17**
Year FE	Yes		Yes		Yes		Yes	
Clustered error	Firm-Year		Firm-Year		Firm-Year		Firm-Year	
Number of obs.	1888		1452		647		805	
Pseudo R^2	10.92%		12.51%		19.01%		10.91%	

The col. 1 dependent variable = one if the firm is targeted by a climate-related proposal and zero for a control firm-year. The col. 2 dependent variable = one if the firm is targeted by an operations-related proposal and zero for a control firm-year. The col. 3 dependent variable = one if the firm is targeted by a disclosure-related proposal and zero for a control firm-year. Firm characteristics are measured the year before the shareholder proposal

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. Appendix Table 10 defines the variables

relative to matched firms. Moreover, the *RD* variable has a negative and significant coefficient, suggesting that firms targeted by climate-related proposals spend less on R&D. We also find that firms in high carbon-intensive industries are more likely to be targeted by climate-related proposals. The number of independent board members also positively and significantly influences voting likelihood. In addition, climate-related proposals tend to engage firms with poor environmental performance relative to matched firms. We then split the sample into operations-related and disclosure-related proposals. For the operations-related proposals (more likely to change operations) versus disclosure-related proposals (less likely to change operations), based on the sign of the difference in the coefficients, the former set of firms tends to be smaller in size with higher growth prospects, has more capital spending and less R&D, is more likely to be in a carbon-intensive industry, and has an independent board and a higher environmental rating.

Firms with an Eligible Shareholder Proposal in the Proxy Statement

Table 4 reports the results of Eq. (2). Col. 2 reports fewer observations because the regression includes the governance variables and *Env_Score*. As shown in col. 1, the coefficients for *Size* and *BTM* are positive and significant. This suggests that climate-related proposals that engage large firms

Table 4 Characteristics of firms with a climate-related vote at the AGM

Sample	Excludes governance variables		Includes governance variables	
	Coeff.	*z*-stat. Sig.	Coeff.	*z*-stat. Sig.
Variable	(1)		(2)	
Size	0.090	3.82***	0.318	4.77***
BTM	0.108	2.01*	− 0.062	− 0.31
Sales_Growth	− 0.277	− 2.28**	− 1.167	− 3.69***
Cash	0.194	0.73	− 0.714	− 0.86
Dividend_Yield	− 1.192	− 0.94	11.457	3.04***
OCF	− 0.131	− 0.26	1.579	0.81
Capex	0.792	1.42	8.591	4.22***
RD	− 2.645	− 1.59	− 13.623	− 3.05***
Tobin_Q	0.019	0.51	0.422	3.49***
Leverage	0.272	3.04***	0.544	2.08*
ROA	− 0.212	− 0.57	− 3.882	− 2.34**
Media_Attention	− 0.001	− 2.22**	− 0.001	− 0.92
Carbon_Intensity	0.219	1.80*	1.547	4.41***
Republican	− 0.202	− 4.74***	− 0.651	− 4.18***
Non_Profit	− 0.135	− 2.96***	− 0.353	− 2.59***
UNPRI_Signatory	− 0.012	− 0.27	0.034	0.25
Repeated	0.107	3.12***	0.265	2.74***
Operations_Related	0.192	4.11***	0.679	4.62***
Emissions_Reduction	0.159	3.69***	0.459	3.42***
Board_Size			− 0.008	− 0.25
Board_Gender			0.960	1.31
Board_Indep			2.132	2.15**
Env_Score			− 0.120	− 2.67***
HCF	0.265	1.01	3.258	4.34***
Clustered Error	Firm-Year		Firm-Year	
Number of obs.	944		764	
Pseudo R^2	13.37%		16.85%	

The dependent variable = one if the proposal is voted on at the AGM and zero otherwise. In col. 1, *Env_Score* and the board-related variables are excluded. Col. 2 includes these variables but reflects a significant loss of observations due to data availability. Firm characteristics are measured the year before the shareholder proposal

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. Appendix Table 10 defines the variables

Table 5 Determinants of the voting percentage

Sample	Excludes governance variables		Includes governance variables	
	Coeff.	*z*-stat. Sig.	Coeff.	*z*-stat. Sig.
Variable	(1)		(2)	
Size	0.028	1.06	0.020	1.52
BTM	− 0.004	− 0.11	− 0.031	− 0.77
Sales_Growth	0.007	0.10	0.023	0.43
Cash	− 0.128	− 0.74	− 0.152	− 0.81
Dividend_Yield	− 0.155	− 0.23	− 0.056	− 0.08
OCF	− 0.367	− 0.96	− 0.302	− 0.52
Capex	0.070	0.27	− 0.429	− 1.38
RD	− 2.459	− 2.27**	− 2.335	− 1.98**
Tobin_Q	0.024	1.53	0.013	0.90
Leverage	0.079	0.71	0.069	1.21
ROA	− 0.252	− 1.32	− 0.090	− 0.24
Media_Attention	− 0.001	− 2.49**	− 0.001	− 1.95*
Carbon_Intensity	0.037	0.85	0.012	0.38
Republican	0.020	0.25	0.010	0.02
Non_Profit	− 0.033	− 0.68	− 0.018	− 0.63
UNPRI_Signatory	0.058	2.73***	0.056	2.43**
Repeated	0.081	2.08**	0.044	2.08**
Operations_Related	0.093	1.86*	0.078	2.39**
Emissions_Reduction	0.131	2.28**	0.112	4.16***
Board_Size			− 0.004	− 0.78
Board_Gender			− 0.065	− 0.51
Board_Indep			0.154	1.13
Env_Score			0.026	3.06***
HCF	0.212	1.03	0.129	2.05**
Clustered error	Firm-Year		Firm-Year	
Number of obs.	400		321	
Pseudo R^2	3.62%		4.98%	

This table reports the marginal effects on the voting percentage. The dependent variable is the percentage of votes (in favor) that a climate-related proposal obtains at the shareholders' meeting. Firm characteristics are measured in the year before the shareholder proposal. In col. (1), *Env_Score* and the board-related variables are excluded, while in col. (2) these variables are included to reflect the significant loss of observations due to the data availability. We obtain similar results when we measure environmental performance as the ESG score for each firm from Bloomberg

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. Appendix Table 10 defines the variables

and low growth potential (*BTM*) firms are those likelier to receive a vote at the AGM.

Focusing on col. 2, the coefficients indicate that proposals targeting firms with lower levels of R&D are more likely to receive a vote. In addition, climate-related proposals submitted to firms in high carbon-intensive industries are likelier to receive a vote. By contrast, and similar to Table 3, targets' environmental performance negatively and significantly relates to climate proposals' voting likelihood. In other words, proposals submitted to firms with lower environmental performance scores reflect a higher voting likelihood. Regarding other proposal characteristics, we find that voting likelihood is higher for firms with repeated proposals. In economic terms, an additional earlier proposal increases the probability of being voted on at the shareholders' meeting by 10.7 percentage points (col. 1) or higher

(col. 2). Additionally, the positive and significant coefficient for *Operations_Related* indicates that shareholder proposals related to climate risks are more likely to be voted on. This finding is consistent with the results in "Firms targeted with a shareholder proposal" section. In addition, proposals relating to *Emissions_Reduction* are more likely to be voted on. The negative and significant coefficient ($p < 0.01$) for *Republican* for climate-related proposals filed during Republican administrations suggests they are less likely to be included in the proxy materials and, thus, being voted on at the AGM. The coefficient for this variable is negative and significant at the maximum level for both models in Table 4. We find that non-profit activist investors associate significantly with lower climate-related proposal voting likelihood.

Firms with a Shareholder Voting Outcome

We estimate Eq. (3) and summarize the results in Table 5. The dependent variable for this model is the percentage of votes in favor that a climate-related proposal receives at the AGM. Thus, the sample comprises only those targets whose proposals receive a vote. The sample also controls for proposals that repeat earlier proposals. Regarding the firm-level characteristics, we find that proposals submitted to firms with higher environmental performance are likelier to receive a higher number of votes in favor at the AGM. Thus, even though targets with lower environmental scores exhibit a higher voting likelihood, those that score better environmentally in fact receive significantly higher vote percentages. By contrast, proposals that engage firms with higher levels of R&D are less likely to obtain a higher percentage of votes in favor at the AGM. This also applies to firms with more media coverage, indicating that how well known a firm is does not necessarily translates into more votes in favor of a resolution.

The *UNPRI_Signatory* variable relates positively and significantly to climate-related proposals' voting outcomes. Unlike Kim and Yoon (2023), who find that *UNPRI* membership did not increase voting in favor of environmental proposals, Table 5 indicates that shareholder proposals with a UNPRI-signatory investor versus a non-UNPRI investor associate with a higher percentage of votes in favor at the AGM. We also find that operations-related proposals are likelier to receive a higher vote percentage in favor than disclosure-related proposals, possibly reflecting a stronger desire by ethical investors for organizational change rather than disclosure, even though the former may be costlier for the firm. Lastly, we find that repeated proposals and those related to emissions reduction are likelier to obtain more votes in favor at the AGM. Repeated proposals may also exert more pressure on firms for constructive change, which could have adverse effects on firm value. We examine this idea further in the next subsection.

Value Relevance of Shareholder Proposals

A direct measure of how investors evaluate the success of shareholder activism is the market response. Following Gillan and Starks (2000), we select the proxy statement filing date as the date most likely to attribute a market reaction to shareholder activism. On or around this date, the marginal investor first learns that a firm has been engaged formally by a shareholder proposal. We measure the market response over days − 10 to 10 as per Eq. (5)[12] around the DEF14a filing date. Given that firms file the DEF14a electronically, this is the same date as the mailing date as per some earlier studies. On this date, we also assume that the marginal investor unbiasedly estimates that a proposal in a DEF14a will receive a vote at the AGM (although some could be withdrawn) and the percentage of shareholders that will vote in favor of a proposal, and knows whether the vote is the first or follows one or more prior votes or other outcomes, and knows the proposal type based on the DEF14a description. The marginal investor also assumes market efficiency regarding public information about the firm (e.g., from prior financial statements and prior news media reports that are already impounded into prices) (Prevost et al., 2016).

We report our investor reaction tests in Fig. 2 and Table 6. We first present the results on a univariate basis by testing whether the differential cumulative excess return over DEF14a days − 10 to 10 for the different partitions of the sample differs from zero based on a binomial test. Each of the plots in Fig. 2 states the probability that the differences in the mean excess returns for each of days − 10 to 10 for a partition are not significantly positive or negative when the expected likelihood of each being positive or negative is 0.5. In the same order as the columns in Panel A of Table 6, Fig. 2 documents five key results consistent with our cost hypothesis (H1): (i) Proposals with more versus less media attention generate negative excess returns (significant, $p < 0.05$) (Fig. 2a), (ii) withdrawn minus voted proposals generate negative excess returns (significant, $p < 0.05$) (Fig. 2b), and (iii) GHG-reduction proposals compared to other proposals generate negative excess returns (significant, $p < 0.01$) (Fig. 2c). In addition, proposals targeting high minus low carbon-intensity firms generate negative excess returns ($p < 0.10$) (Fig. 2d), and UNPRI-signatory proposals compared to other proposals generate positive excess returns ($p < 0.05$) (Fig. 2e). The other plots do not indicate a significant differential price response over days − 10 to 10 different from zero suggesting that factors at play in addition to cost are driving the results. Not significantly different from zero

[12] Equation (5) does not include a dummy variable for voted and non-voted proposals because targets are not required to report the dates of these actions. As such, we cannot track their excess returns relative to an event date, which is a requirement of Eq. (5).

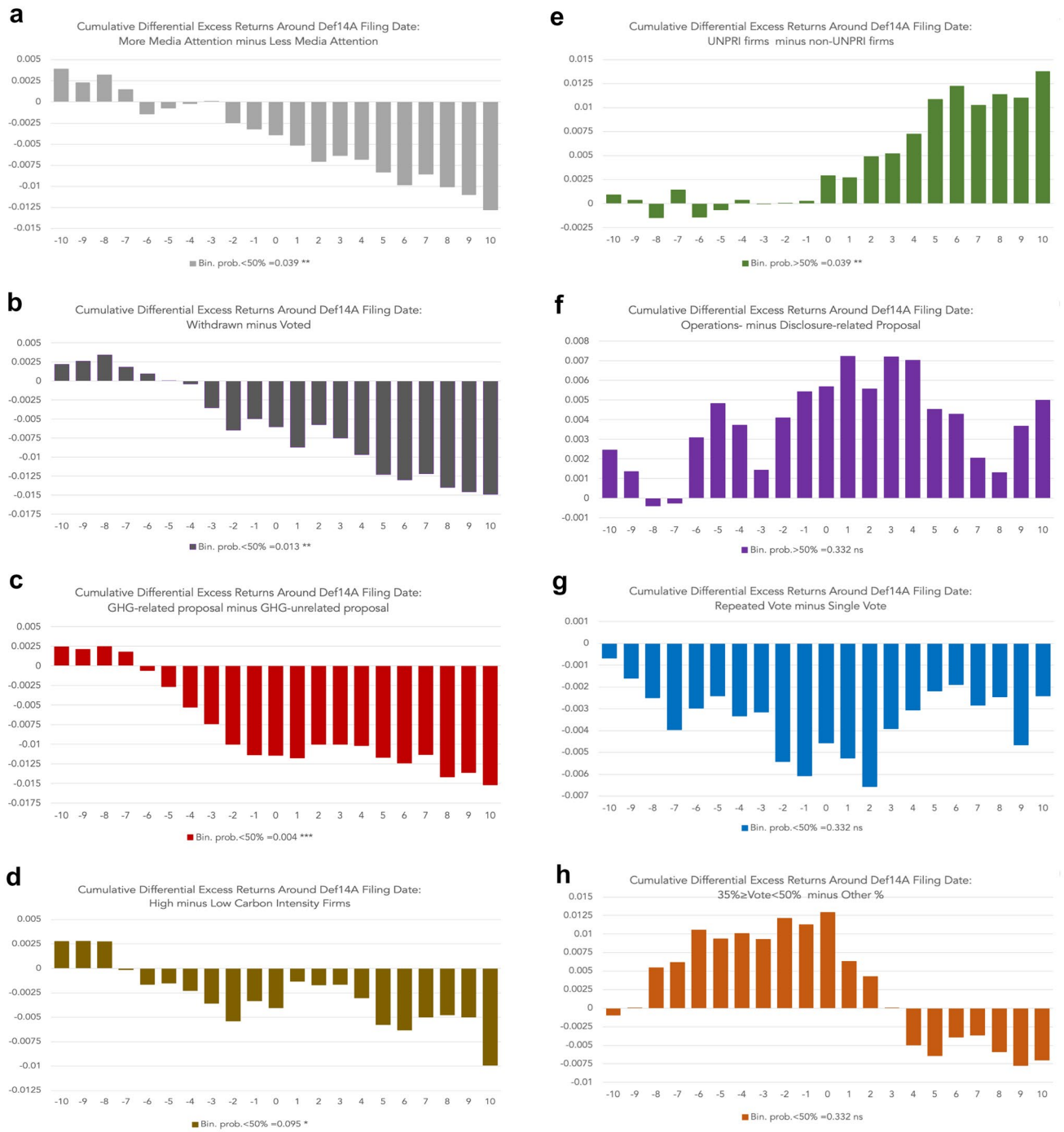

Fig. 2 Cumulative mean excess returns over days − 10 to 10 around the DEF14a filing date. **a** Proposals with more versus less media attention generate negative excess returns. **b** Withdrawn minus voted proposals generate negative excess returns. **c** Emissions reduction proposals compared to other proposals generate negative excess returns. **d** Proposals targeting high minus low carbon-intensity firms generate negative excess returns. **e** UNPRI-Signatory proposals compared to other proposals generate positive excess returns. **f** Operations- minus disclosure-related proposals generate positive and negative excess returns. **g** Repeated minus single-vote proposals generate negative and positive excess returns. **h** Marginally passing ($35 \geq \% < 50$) votes generate positive and negative excess returns. These figures plot the cumulative difference in mean excess returns over days − 10 to 10 around the DEF14a filing date. Each figure states the binomial probability that the difference in mean excess returns over days − 10 to 10 for a partition is not positive or negative when the expected likelihood of being positive or negative is fifty percent

Table 6 Multivariate tests of excess return differences in response to climate-related proposals

Panel A	Media attention		UNPRI_Signatory		Withdrawn/Voted		Emissions_Reduction		Marginally passing vote		Repeated	
	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.
Dependent variable	CAR (− 1,10)		CAR (− 1,10)		CAR (− 1,10)		CAR (− 1,10)		CAR (− 1,10)		CAR (− 1,10)	
	(1)		(2)		(3)		(4)		(5)		(6)	
Partitioning variable	0.00367	1.37	− 0.00144	− 0.47	− 0.00545	− 2.03**	0.00135	0.50	− 0.00850	− 1.66*	0.00242	0.93
Treatment vs. control firm	− 0.00337	− 1.27	na	na	na	na	na	na	na	na	na	na
Partitioning variable x Treatment	− 0.00725	− 3.02***	0.00701	2.22**	na	na	na	na	na	na	na	na
Size	− 0.00167	− 1.02	− 0.00215	− 1.50	0.00573	0.95	0.00731	1.27	0.00954	0.88	0.00691	1.20
Leverage	0.00119	0.91	0.00063	0.49	− 0.02342	− 1.88*	− 0.01845	− 1.54	− 0.02007	− 0.71	− 0.01879	− 1.57
Intercept	0.01670	1.02	0.02441	1.64	0.04914	2.41**	0.02711	1.41	0.07851	2.36**	0.03101	1.63
Year and Sector fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	1152		1368		723		801		343		801	
Adjusted R^2	1.61%		1.83%		2.98%		1.90%		13.84%		1.98%	
Panel B	CAR (− 1,10)		CAR (− 1,1)		CAR (− 10,10)		CAR (− 5,5)		CAR(− 10,0)		CAR (− 5,0)	
	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff.	*t*-stat. Sig.
Media attention	− 0.00002	− 1.31	− 0.00001	− 1.57	− 0.00001	− 0.51	− 0.00003	− 2.14*	0.00000	− 0.08	− 0.00003	− 1.93*
UNPRI signatory	0.01439	2.32**	− 0.00585	− 1.25	0.00970	2.60**	0.00522	2.31**	− 0.00838	− 1.29	− 0.00122	− 0.31
Emissions reduction	− 0.01788	− 1.82*	− 0.00981	− 2.95**	− 0.02614	− 2.21**	− 0.02115	− 2.53**	− 0.01808	− 2.83**	− 0.01681	− 3.65***
Marginally passing vote	− 0.01502	− 1.27	− 0.00595	− 1.58	0.00213	0.21	− 0.01339	− 2.15*	0.01639	4.34***	0.00433	0.90
Repeated	− 0.00430	− 0.4	− 0.00534	− 1.56	− 0.01141	− 1.34	0.00216	0.35	− 0.01024	− 1.56	0.00147	0.60
Size	− 0.00559	− 1.29	− 0.00307	− 5.06***	− 0.00691	− 1.24	− 0.00178	− 0.72	− 0.00280	− 0.84	− 0.00125	− 0.59
Leverage	0.00666	1.63	0.00386	1.01	0.00450	1.12	0.00696	1.53	0.00328	1.11	0.00614	1.30
Intercept	0.07179	1.71	0.04278	5.68***	0.09082	1.76	0.03495	1.33	0.04161	1.34	0.02452	1.24
Year and sector fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	341		347		339		343		346		347	
Adjusted R^2	15.35%		14.85%		12.64%		19.51%		10.40%		15.67%	

This table summarizes OLS regressions of CAR (t_1, t_2) relative to the DEF14a filing date (day 0) on the characteristics of climate-related proposals. Panel A regresses CAR (− 1,10) on a binary partitioning variable. These are media attention (col. 1), UNPRI signatory (col. 2), withdrawn or voted proposal (col. 3), whether the proposal relates to emissions reduction (col. 4), votes that marginally passed ($35 \geq \% < 50$) (col. 5), and proposals that were repeated in the prior year (col. 6). Panel B summarizes the regressions of CAR (t_1, t_2) on all the binary partitioning variables. The regressions controls for year and sector fixed effects and compute year and sector clustered standard errors

***$p < 0.01$, **$p < 0.05$, *$p < 0.10$

are the excess returns of operations- minus disclosure-related proposals (Fig. 2f), repeated minus single-vote proposals (Fig. 2g), and marginally passing proposals (Fig. 2h). Note that other than the results for the UNPRI-signatory partition (Fig. 2e), none of the tests indicates a significantly positive differential price reaction over days − 10 to 10, which would be a finding contradicting our main contention that investors are reacting to a particular climate proposal type based on expected cost to the firm.

To address the above findings as a multivariate analysis, Table 6 summarizes the regressions defined by Eqs. (5) and (6). These models regress *CAR* (t_1, t_2) for return intervals of days − 1 to 10 (Panel A) and − 1 to 10, − 1 to 1, − 10 to 10, − 5 to 5, − 10 to 0, and − 5 to 0 (Panel B) on the partitioning variables in two ways, namely, one at a time [Panel A summarizes Eq. (5)] and together [Panel B summarizes Eq. (6)]. In Panel B, we examine the consistency of the results across multiple cumulation periods. The results from Panel A are consistent with Fig. 2 for the following partitions. (i) *Media Attention* has a negative impact on excess returns compared to control firms (significant in Fig. 2a). (ii) Firms with withdrawn proposals experience more negative stock returns (significant in Fig. 2b), and (iii) UNPRI-signatory firms experience positive stock returns compared to control firms (significant in Fig. 2e). In addition, Panel A shows firms with marginally passing votes ($35 < \% \leq 50$) experience more negative stock returns (not significant in Fig. 2c). The marginal effects of a partition in Panel B are significant as follows: (i) *GHG-Reduction* proposals generate more negative returns (also significant in Fig. 2c) and (ii) *UNPRI_Signatory* proposals generate more positive returns (also significant in Fig. 2e). The other partitioning variables, while significant in Panel A and for some shorter *CAR* intervals in Panel B are not significant after controlling for the effects of the other characteristics of the climate-related proposals.

Tying the results in Fig. 2 and Table 6 together allows us to draw the following overall conclusion—climate-related proposals expected to impose costs on the firm assuming implementation are also those that prompt a negative price reaction by investors (in line with H1). Such negative price reaction is also consistent with ethical investors who engage the firm for change on climate issues as accepting lower returns as a consequence of the negative price reactions. With one exception, we also find no clear evidence that a particular proposal type generates positive excess returns. Even withdrawn proposals that may be negotiated with firm managers or repeated in the future generate negative excess returns. Nonetheless, proposals supported by a UNPRI-signatory associate with positive excess returns, consistent with the idea that large institutional investors can more easily engage the firm directly on climate issues and produce positive future outcomes for ethical investors such as a decrease in emissions (Azar et al., 2021). Overall, these results support our hypothesis (H1) that costlier climate-related proposals (e.g., GHG-reduction proposals) generate negative returns for investors versus the alternative that less costly proposals (e.g., UNPRI-signatory proposals) generate less negative or positive returns.[13]

Shareholder Proposals and Future Environmental Performance Ratings

Similar to the previous section, we conduct univariate and multivariate tests to explore whether environmental performance or emissions change from before to after a climate-related proposal. Should the proposals induce constructive change in the ways intended, we would expect the mean of the difference from year $t-1$ to $t+2$ to be positive (environmental performance improves for treatment firms compared to control firms) and the mean of the difference in emissions to be negative (i.e., emissions decline more for treatment firms compared to control firms). We evaluate the significance of the difference in difference as a two-sample *t* test. Table 7 summarizes the analysis and Fig. 3 plots the results. We first show that the environmental performance of treated firms improves more than for control firms by 19.48 percent (50.41%–30.93%) over three years), but that the reduction in emissions is insignificantly different from zero (8.07%–7.06%) over three years (Fig. 3a and Rows 1–4 of Table 7). We next show that low carbon-intensity treatment firms improve their environmental performance more than high carbon-intensity treatment firms compared to control firms (by 27.43% = 31.62%–4.19%) (Fig. 3b and Rows 7 and 8 of Table 7). The treatment less control firm differences in emissions are not significant, however, for low (2.46%) or high carbon-intensity firms (− 6.96%) compared to control firms (Rows 11 and 12 of Table 7). Lastly, we show that firms targeted with an emissions reduction proposal versus other proposal types increase their environmental performance by 3.63 percent (37.32%–33.69%) and decrease their emissions slightly more than firms targeted with other proposals, by 4.53 percent (10.69%–6.16%), but the difference in difference is not significant (Rows 13–16 of Table 7). These results are univariate, that is they do not control for other factors not incorporated into the propensity score matching procedure that might also explain the differences.

[13] After studying a wide range of shareholder proposals targeting U.S. firms in 2003–2014, Gantchev and Giannetti (2020) observe negative long-run abnormal returns–in the month of and 12 months after the AGM date. While their research method and sample are different from ours, they also draw a similar conclusion to that of this study, i.e., that the negative excess returns they observe are consistent with investors responding to the expected cost of the higher probability associated with the implementation of a proposal (Gantchev and Giannetti 2020, p. 5630).

Table 7 Changes in environmental performance and emissions from year $t-1$ to $t+2$

Row	Variable	Sample	Partition	Sample size	Mean percentage change (%)	Difference in change (%)	Row diff.	*t*-stat. prob. Sig.	Difference in change (%)	Row diff.	*t*-stat. prob. Sig.	Location
1	Δ*Env_Score*	Control	All firms	88	30.93							Fig. 3a
2		Treated	All firms	106	50.41	19.48	2–1	0.0040***				Fig. 3a
3	Δ*Emissions*	Control	All firms	134	− 7.06							Fig. 3a
4		Treated	All firms	126	− 8.07	− 1.01	4–3	0.7238				Fig. 3a
5	Δ*Env_Score*	Control	Low carbon intensity	51	23.03							
6		Control	High carbon intensity	37	41.83	18.80	6–5	0.0645*				
7		Treated	Low carbon intensity	54	54.64				31.62	7–5	0.0005***	Fig. 3b
8		Treated	High carbon intensity	52	46.02	− 8.62	8–7	0.3785	4.19	8–6	0.7004	Fig. 3b
9	Δ*Emissions*	Control	Low carbon intensity	88	− 7.59							
10		Control	High carbon intensity	46	− 6.04	1.55	10–9	0.7284				
11		Treated	Low carbon intensity	79	− 5.13				2.46	11–9	0.4726	Fig. 3b
12		Treated	High carbon intensity	47	− 13.00	− 7.87	12–11	0.0587*	− 6.96	12–10	0.1672	Fig. 3b
13	Δ*Env_Score*	Treated	Other proposals	63	33.69							Fig. 3c
14		Treated	Emissions reduction proposals	43	37.32	3.63	14–13	0.7592				Fig. 3c
15	Δ*Emissions*	Treated	Other proposals	58	− 6.16							Fig. 3c
16		Treated	Emissions reduction proposals	68	− 10.69	− 4.53	16–15	0.2224				Fig. 3c

This table summarizes the mean change in environmental performance and emissions from year $t-1$ to $t+2$ for the control and treatment samples and, for the treatment sample, shareholder proposals for emissions reduction versus other shareholder proposals. The test of zero difference in the mean is a two-sample *t* test assuming unequal variances. The column marked *Location* refers to the location in Fig. 3 of a mean change in environmental performance or emissions

***$p<0.01$, **$p<0.05$, *$p<0.10$

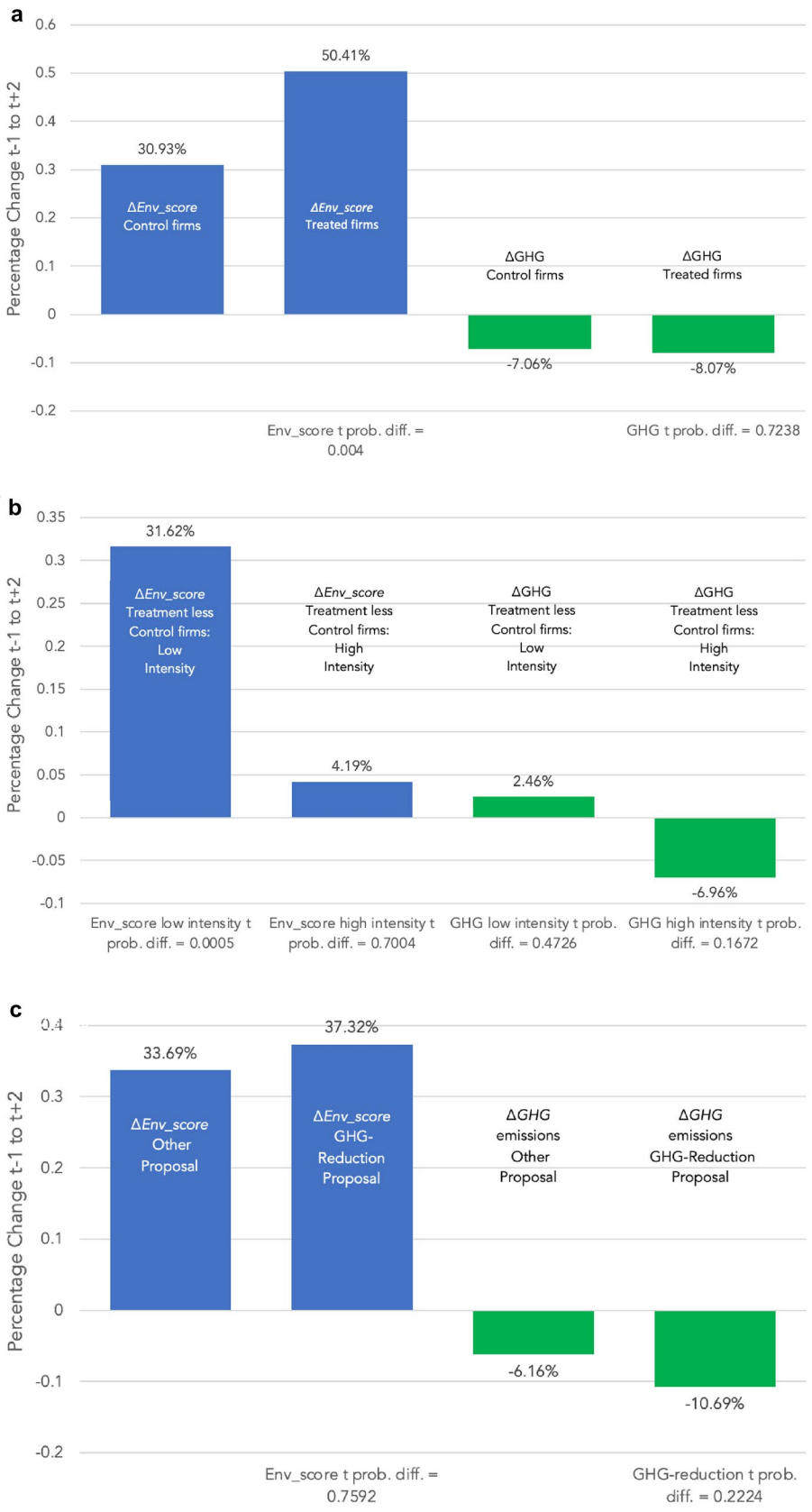

Fig. 3 Changes in environmental performance and emissions from $t-1$ to $t+2$. **a** Percentage change from year $t-1$ to $t+2$ in environmental performance (ΔEnv_Score) and emissions (Scope 1 plus Scope 2) for firms with climate-related proposals versus PSM-matched control firms without climate-related proposals. **b** Difference in the percentage change from year $t-1$ to $t+2$ in environmental performance (ΔEnv_Score) and emissions (Scope 1 plus Scope 2) for low versus high carbon-intensity firms with climate-related proposals versus PSM-matched low versus high carbon-intensity control firms. **c** Difference in the percentage change from year $t-1$ to $t+2$ in environmental performance (ΔEnv_Score) and emissions (Scope 1 plus Scope 2) for emissions reduction proposals versus other proposals (for proposal firms only). Each graph reports the probability that the difference in difference is zero based on a two-sample t test assuming unequal variances

Table 8 Multivariate tests of effect of climate-related proposals on future environmental performance and future emissions

Panel A: Future environmental performance	Media attention		UNPRI_Signatory		Withdrawn/Voted		Emissions_Reduction		Marginally passing vote		Treatment vs. control Low carbon intensity		Treatment vs. control high carbon intensity	
	Coeff.	t-stat. Sig.	Coeff.	t-stat. Sig.	Coeff.	*t*-stat. Sig.	Coeff	*t*-stat. Sig.	Coeff.	*t*-stat. Sig	Coeff.	t-stat. Sig.	Coeff.	t-stat. Sig.
	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Intercept	− 0.7000	− 1.04	− 0.2285	− 0.42	− 0.4035	− 0.75	− 0.3868	− 0.69	− 0.0870	− 0.16	− 0.6366	− 1.26	− 1.0289	− 1.31
Pre-proposal rating	0.7075	7.88***	0.7692	8.78***	0.8162	11.97***	0.8326	13.51***	0.7429	6.77***	0.8224	9.34 ***	0.9001	15.40***
Partitioning variable	− 0.3668	− 2.60**	− 0.0608	− 0.66	0.0522	3.40***	0.1119	1.89*	− 0.0719	− 0.69	0.0853	0.55	0.2681	1.28
Partitioning variable x Pre-proposal rating	0.1498	1.20	0.0655	1.39	− 0.0505	− 3.08**	− 0.0598	− 2.21*	0.0410	0.32	− 0.0028	− 0.04	− 0.0541	− 1.12
Size	0.1312	2.04*	0.0754	1.47	0.0908	1.81	0.0834	1.60	0.0745	1.34	0.0953	1.71	0.1254	1.49
Leverage	0.0496	3.23**	0.0036	0.12	− 0.0029	− 0.10	0.0039	0.14	− 0.0172	− 0.94	− 0.0123	− 0.51	0.0509	1.27
Year and Sector fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R^2	80.26%		79.09%		77.16%		79.07%		77.21%		74.64%		83.32%	
Number of observations	560		771		690		771		332		686		621	
Panel B: Future emissions	Media attention		UNPRI_Signatory		Withdrawn/Voted		Emissions_Reduction		Marginally passing vote		Treatment vs. control Low carbon intensity		Treatment vs. control high carbon intensity	
Intercept	− 2,026,504	− 0.28	− 3,535,042	− 0.81	− 2,953,731	− 0.64	− 5,824,025	− 1.55	7,654,367	1.03	1,096,017	2.37**	− 2,117,287	− 0.14
Pre-proposal emissions	0.6314	7.37***	0.9461	49.07***	0.9240	22.83***	0.9584	37.42***	1.0205	42.88***	1.0532	49.32***	0.9067	14.32***
Partitioning variable	− 2,337,385	− 2.10*	− 152,076	− 0.15	− 596,411	− 0.77	1,727,138	1.41	2,899,646	1.41	72,279	1.55	− 1,488,890	− 0.76
Partitioning variable x Pre-proposal emissions	0.3070	3.40***	− 0.0038	− 0.13	0.0444	1.46	− 0.0695	− 2.67**	− 0.1148	− 3.22**	− 0.0412	− 2.63**	0.0325	0.49
Size	549,291	0.98	357,883	0.79	315,144	0.59	497,992	1.44	− 835,966	− 1.23	− 117,832	− 2.12*	415,965	0.25
Leverage	412,323	1.32	− 225,180	− 0.75	− 298,513	− 0.91	− 125,169	− 0.53	− 372,461	− 0.91	− 5,201	− 0.13	− 923,537	− 2.52
Year and sector fixed effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	

Table 8 (continued)

Panel B: Future emissions	Media attention	UNPRI_Signatory	Withdrawn/Voted	Emissions_Reduction	Marginally passing vote	Treatment vs. control Low carbon intensity	Treatment vs. control high carbon intensity
Adjusted R^2	97.46%	97.02%	96.96%	97.10%	96.12%	97.42%	95.62%
Number of observations	320	391	345	391	170	308	291

This table regresses Env_Score_{t+2} on Env_Score_{t-1} (Panel A) and $Emissions_{t+2}$ on $Emissions_{t-1}$ (Panel B) with controls for firm size and leverage, year and sector fixed effects, and firm-sector clustered standard errors

***$p<0.01$, **$p<0.05$, *$p<0.10$. The regressions include an interaction variable to test whether the impact of climate-related proposals on environmental performance or emissions differs for that partitioning variable. The partitioning variables are *Media Attention*, *UNPRI_Signatory*, *Withdrawn/Voted* proposal, whether the proposal relates to emissions reduction, proposals with a marginally passing vote ($35 \geq \% < 50$), and whether the impact relates to a treatment versus a control firm, separately for *Low carbon-intensity* and *High carbon-intensity* firms. The number of observations for each regression depends on the variables and the partition in the regression

Table 8 summarizes the regressions defined by Eq. (7). The results in cols. 1, 6, and 7 include observations for the treatment and control samples. The results in the other columns are relative only to firms in the treatment sample, as there is no equivalent partition for these columns for control firms. The coefficient for the interactions of Partitioning variable x Pre-proposal rating for environmental performance and emissions is our main focus. If positive, this indicates that the observations within the partition exhibit a higher growth in environmental performance or emissions from $t-1$ to $t+2$, that is, an additional portion of the Pre-proposal variable is passed into future values of the series conditional on a partition.

The main results from Panel A of Table 8 are (i) that environmental performance growth is lower for withdrawn versus voted proposals (col. 3) and GHG-reduction versus non-GHG-reduction proposals (col. 4) and (ii) that environmental performance growth is no different for proposals involving UNPRI-signatory firms (col. 2) and marginally passing vote proposals (col. 5), and does not differ based on the level of media attention (col. 1) or carbon intensity (cols. 6 and 7). The main results from Panel B are (i) that emissions growth is higher for firms with high versus low media attention (col.1) and lower for firms with GHG-reduction proposals (col. 4), marginally passing vote proposals (col. 5), and low carbon intensity (col. 6) and (ii) that emissions growth is no different for the other partitions (cols. 2, 3, and 7) conditional on controls and fixed effects.

The results in Table 8 also align well with those in Table 6 and Fig. 2, in that several of the results reinforce each other intuitively. First, the negative excess returns for withdrawn proposals (Fig. 2b) and GHG-reduction proposals (Fig. 2c) versus other proposals associate with a drop in environmental performance (cols. 3 and 4 of Table 8). Second, as expected, GHG-reduction proposals (Fig. 2c) compared to other proposals result in a reduction in emissions (col. 4 of Table 8). Third, consistent with a negative price reaction for high minus low carbon-intensive firms (Fig. 2d), emissions do not drop for high carbon-intensity firms (col. 7) but drop for low carbon-intensity firms (col. 6). (iv) Proposals with marginally passing votes whose excess returns tend to be positive (Fig. 2h) associate with lower emissions (col. 5). Table 8 also aligns with Kim and Yoon (2023), who find that UNPRI-aligned investors do not significantly improve firms' ESG performance following their decision to adhere to the principles. However, we caution against a direct comparison as Kim and Yoon (2023) posit that PRI investors use "cheap talk" and greenwashing to attract funds to increase their assets under management, which is fundamentally different from the conceptual underpinnings of this paper, where shareholder voting on climate proposals reflects the expected costs to the firm of the outcomes of the different types of climate proposal.

Additional Tests

We conduct a host of additional analyses to ascertain whether our results are robust. In all cases, the results are similar and do not change the main inferences of the study. To increase reliability regarding the characteristics of climate-related engagements, we run a bootstrap model for Eq. (1) by taking random samples of the control firms. For each of 500 bootstrap iterations, we set the number of control firms equal to the number of treatment firms. The results are consistent with those in Table 3. We re-estimate Tables 3, 4, and 5 [Eqs. (1), (2), and Eq. (3)] using OLS regression versus logit regression. We rerun our market response tests [Eq. (4)] using the market model and a three-factor excess returns model and find results similar to those in Fig. 2. Because no additional proposal-related information is expected, we also find no similar investor responses around the annual report or AGM dates. We rerun Table 8 using Refinitiv measures of environmental performance and emissions measures based on Scope 1 and Scope 2 emissions to total sales (*Emissions_Intensity*). We find similar results. Mean *Env_Score* increases and mean *Emissions_Intensity* decreases for treatment versus control firms. We exclude Scope 3 emissions in this analysis because they reflect low reliability and commensurability. They are also mostly not firm specific, being based on industry information (Refinitiv, 2022) or model estimates.[14]

Conclusion

We find several results of interest to investors, regulators, climate change advocates, and others who seek to understand firms' response to shareholder proposals on climate change. Compared to a matched sample of firms without climate proposals, we first find that activists target larger, more carbon-intensive, and less R&D-active firms. Targets also receive more operations-related proposals to reduce climate risk and develop climate opportunities. Second, votes are likelier for repeated and operations-related proposals and when the firms have lower pre-proposal environmental ratings. In addition, proposals supported by ethically minded UNPRI-aligned investors receive higher voting percentages in favor, whereas firms with more media attention receive lower voting percentages. Third, we find that investors respond negatively to proposals that are arguably costlier to implement, namely, those that are repeated, call for emissions reduction, and target carbon-intensive firms. By contrast, stock prices respond positively to proposals submitted by UNPRI investors, which also attract a higher percentage of votes in favor. This positive reaction and the higher voting percentage of UNPRI proposals suggest that ethical investors play a key role in driving environmental performance. For example, compared to a matched sample, targeted firms' environmental performance scores increase by almost 20 percent in the next two years, although their emissions do not change appreciably.

Taken together, these results suggest that investors respond negatively to operations-related proposals, acting as if these proposal types are costly to the firm. These negative effects are also consistent with evidence of ethical shareholders' acceptance of lower returns as a consequence of constructive change on climate issues (Baker et al., 2022; Hong & Shore, 2023). From an ethical perspective, our results highlight the growing importance of shareholder proposals on climate change, especially those related to how firms will operate in a low carbon economy by addressing carbon risk, reducing emissions, and increasing environmental performance. In addition, they underscore the key role played by ethical investors, such as UNPRI-aligned institutions, through constructive engagement on climate-related issues. Moreover, for our sample of climate-related shareholder proposals, such engagement associates with an increase in firms' environmental performance. Yet, at the same time, our results highlight that not all climate-related proposals designed to address non-pecuniary externalities and considered important by ethical shareholders lead universally to more positive returns and higher firm value. An increasing number of climate-related proposals may also have political overtones (Vanderford, 2023).

An avenue for future study would be to examine whether our models and findings in the U.S. setting are valid elsewhere, especially in the U.K. and European Union, where compared to the U.S. environment, shareholder proposals are infrequent in general (Cziraki et al., 2010), rare on climate issues (Horster & Papadopoulos, 2019), and typically do not receive strong support at shareholder meetings. For example, shareholders targeted only three U.K. companies in the 2022 proxy season with climate proposals, none of which received a passing vote (Linklaters, 2023).

Our study has limitations. First, the data in this study are drawn from a single research context that was bounded by country (the United States) and data source (Ceres). Second, this paper only focuses on one type of shareholder proposal, that is, those related to climate change. As such, the effects of shareholder proposals on a different ESG topic may confound our control sample. Thus, caution should be exercised when generalizing the results of this research to proposals on other topics such as corporate governance and social justice.

[14] For example, the Institutional Shareholder Services (ISS) dataset (as of 2022) on the Scope 1, 2, and 3 emissions of firms in multiple countries indicates that for U.S. firms upward of 80% are based on ISS model estimates and less than 10% come from firm-level measures such as those submitted to the Carbon Disclosure Project (CDP) or found in firms' sustainability reports.

Appendix

See Tables 9, 10, and 11.

Table 9 Examples of timeline and content of climate-related proposals

Panel A: Example of timeline for filing of climate change proposal. Source: SEC The following illustrates the timing of the events for the 2017 annual general meeting of Exxon Mobil Corporation held May 31, 2017. This timetable should not be generalized to other firms	
December, 2016	*Shareholder proposal date*: Deadline to submit a shareholder proposal (under SEC Rule 14a-8) 120 calendar days before the date of the company's proxy statement mailed to stockholders in connection the previous year's annual meeting. In the case of Exxon Mobil Corporation (hereinafter "the company"), shareholder proposals deadline is on December 15, 2016, given that the proxy materials for the previous year's annual meeting were released on April 14
January, 2017	*No-action letter date*: The company files a *no-action letter* giving reasons why the SEC should allow It to *omit* a shareholder proposal from its proxy materials. Per SEC Rule 14-a8, the company must notify the SEC 80 calendar days before it files its definitive proxy materials. For example, on January 23, 2017, the company mailed a letter to the SEC requesting the omission of a proposal submitted by As You Sow on December 13, 2016
April, 2017	*Proxy Filing Date (DEF14a)*: The company files its definitive proxy statement on April 13, 2017 (generally, 30 to 50 calendar days before annual meeting of shareholders). Up to the day before the annual shareholders' meeting, the company can file additional definitive proxy soliciting materials
May, 2017	*AGM Date*: Annual meeting of shareholders (May 31, 2017). Within four business days after the annual shareholders' meeting, the company must file an item 5.07 Form 8-K to report the voting outcome of the shareholder resolutions
Panel B: Example of disclosure-related shareholder proposal. Source: Ceres	
Company:	JPMorgan Chase & Co
Filer:	Boston Common Asset Management, LLC
Resolution:	"Given the broader societal implications of climate change, shareowners request that the Board of Directors report to shareholders by September 2013, at reasonable cost and omitting proprietary information, JPMorgan Chase's assessment of, and programs to address, the greenhouse gas emissions related to its lending, investing, and financing portfolios."
Meeting date:	May 21, 2013
Outcome:	Withdrawn
Panel C: Example of operations-related shareholder proposal. Source: Ceres	
Company:	Occidental Petroleum Corporation
Filer:	Wespath benefits and investments
Resolution:	"Shareholders request that Occidental Petroleum Corporation (Occidental), with board oversight, produce an assessment of long-term portfolio impacts of plausible scenarios that address climate change, at reasonable cost and omitting proprietary information. The assessment, produced annually with the initial report issued prior to the 2018 Annual Meeting of Stockholders, should explain how capital planning and business strategies incorporate analyses of the short- and long-term financial risks of a lower carbon economy. Specifically, the report should outline the impacts of multiple, fluctuating demand and price scenarios on the company's existing reserves and resource portfolio—including the International Energy Agency's "450 Scenario," which sets out an energy pathway consistent with the internationally recognized goal of limiting the global increase in temperature to 2 degrees Celsius"
Meeting date:	May 12, 2017
Outcome:	Voted 67.3% in favor (passed)

Table 10 Variable definitions

Variables	Description	Source
Dependent variables		
Voting%	Percentage of votes in favor of climate-related proposals	Ceres
Marginally_Passing	35 ≥ Percentage of votes in favor < 50	Ceres
Targeted	1 if the firm is targeted by a climate-related proposal and 0 otherwise	Ceres
Voted	1 if the climate-related proposal goes to a vote at the AGM and 0 if does not i.e., if it is omitted or withdrawn	Ceres
Firm data		
Size	Natural logarithm of the firm's total revenues (SALE)	Cmpst
BTM	Book-to-market ratio is common equity (CEQ) divided by market value of equity (PRCC_F*CSHO)	Cmpst
Sales_Growth	Net sales (SALE) divided by previous fiscal year's net sales	Cmpst
Cash	Ratio of firm's cash and short-term investments (CHE) to total assets (AT)	Cmpst
Dividend_Yield	Dividends per share—Payable Date/ Stock Price Fiscal Year Close (DVPSP_F/PRCC_F)	Cmpst
OCF	Operating CF is operating cash flows divided by total assets calculated as the difference between operating activities-net cash flow and extraordinary items and discontinued operations (OANCF–XIDOC), divided by total assets (AT)	Cmpst
Capex	Capital expenditures calculated as the ratio of capital expenditures to total assets (CAPX/AT)	Cmpst
RD	Research and development expenditures calculated as the ratio of research and development expenditures to total assets (XRD/AT)	Cmpst
Tobin_Q	Tobin's Q equals the market value of assets divided by total assets (AT). The market value of assets is calculated as total assets (AT) plus the market value of common stock (CSHO*PRCC_F), less the sum of common stock (CEQ) and balance sheet deferred taxes (TXDB)	Cmpst
Leverage	(Debt in current liabilities (DLC) + Long-term debt DLTT)/total assets (AT)	Cmpst
ROA	Return on assets calculated as operating income before depreciation (OIBDP) divided by total assets (AT)	Cmpst
Carbon_Intensity	Dummy variable that equals 1 if a firm operates in a carbon-intensive industry, namely, Energy (GICS = 10), Materials (GICS = 15), or Utilities (GICS = 55) and 0 otherwise	Cmpst
Shareholder proposal data		
Republican	Dummy variable = 1 if the US Presidency is Republican and 0 otherwise	U.S. Govt
Non_Profit	Dummy variable = 1 if the climate-related proposal was filed by a non-for-profit investor and 0 otherwise	UNFCCC
UNPRI_Signatory	Institutional ownership UNPRI signatory = 1 and 0 otherwise	UNPRI
Repeated	Dummy variable = 1 if the proposal was submitted to the same firm in the previous year and 0 otherwise	Ceres
Operations_Related	Dummy variable = 1 for operations- versus disclosure-related proposals	Ceres
Emissions_Reduction	Dummy variable = 1 for emissions reduction proposals	Ceres
Governance data		
Board_Size	The total number of board members (TR.BoardSize)	Refinitiv
Board_Gender	Percentage of females on the board (TR.AnalyticBoardFemale)	Refinitiv
Board_Indep	Percentage of independent board members (TR.AnalyticIndepBoard)	Refinitiv
Other		
Env_Score	Environmental performance score	Bloomberg
Emissions	Scope 1 and 2 emissions	Refinitiv
Media_Attention	The amount of media attention in a firm-year based on a count of RavenPack documents (of all types)	RavenPack
Year	Dummy variable equal to 1 for year and 0 otherwise	
Industry	Dummy variable for each industry (GICS)	
HCF	Heckman correction factor, which controls for sample selection bias	

All variables are measured at the end of fiscal year-end before the date of the shareholder proposal. All continuous variables are winsorized at the 1st and 99th percentiles

Table 11 Correlation analysis

		1	2	3	4	5	6	7	8	9	10	11	12
1	*Size*	1.000	− 0.138	0.007	0.055	0.101	0.010	− 0.144	0.091	− 0.016	0.043	0.493	0.545
2	*BTM*	− 0.136	1.000	− 0.113	− 0.078	0.045	− 0.054	0.097	− 0.109	− 0.393	− 0.081	− 0.044	-0.088
3	*Sales growth*	− 0.021	− 0.221	1.000	0.012	− 0.080	0.050	0.022	0.068	0.127	− 0.043	− 0.045	− 0.056
4	*Cash*	0.189	− 0.129	− 0.042	1.000	− 0.169	0.035	− 0.175	0.263	0.351	− 0.025	− 0.043	− 0.005
5	*Dividend yield*	0.206	0.107	− 0.139	− 0.244	1.000	− 0.076	− 0.027	− 0.064	− 0.150	0.265	0.018	0.248
6	*OCF*	0.005	− 0.288	0.079	0.082	− 0.052	1.000	0.338	− 0.044	0.398	− 0.101	0.001	− 0.024
7	*Capex*	− 0.112	0.106	0.024	− 0.392	0.164	0.336	1.000	− 0.049	− 0.075	0.021	0.030	− 0.066
8	*RD*	0.202	− 0.245	− 0.028	0.312	− 0.055	0.194	− 0.151	1.000	0.190	− 0.050	0.029	0.049
9	*Tobin's Q*	0.084	− 0.899	0.238	0.273	− 0.183	0.417	− 0.130	0.337	1.000	− 0.087	− 0.032	− 0.003
10	*Leverage*	− 0.057	− 0.116	− 0.021	− 0.260	0.174	− 0.217	− 0.067	− 0.237	− 0.159	1.000	0.003	0.106
11	*Media_Attention*	0.387	− 0.042	− 0.038	− 0.101	0.227	0.041	0.292	0.008	− 0.024	− 0.058	1.000	0.336
12	*Env_Score*	0.566	− 0.089	− 0.053	0.068	0.352	− 0.020	0.017	0.208	0.040	0.067	0.309	1.000

Pearson correlations are above the diagonal and Spearman rank correlations are below the diagonal for the continuous (non-governance) variables in Table 3 (firms targeted), Table 4 (firms subject to a vote), and Table 5 (firms with a voting percentage)

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Declarations

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

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