Market Reaction to Announcements of Corporate Emissions Reduction Targets*

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Abstract

We study stock market reactions to corporate announcements of emissions reduction targets. Using GPT, we identify 2,417 emissions target announcements from 2006 to 2023 based on news headlines, and document three findings. First, target announcements are associated with negative short-term stock price reactions, and this result is robust to controlling for a firm's propensity to announce targets. Second, firms with more credible disclosures, such as those with higher environmental scores, reasonable assurance of greenhouse gas data, and a longer track record of disclosing greenhouse gas data, receive more negative market reactions. Third, firms with more negative market reactions subsequently reduce their emissions intensity more, consistent with the market anticipating that these targets are substantive and costly. These findings add to the literature on voluntary climate disclosure, the market pricing of climate risk, and the credibility of forward-looking climate commitments.

Keywords: emissions reduction target, decarbonization, climate change, accountability, event study

JEL classification: Q54, M14, M41, G14

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1 Introduction

This paper studies the market reaction to a firm's announcement of emissions reduction target, and examines how the market reaction relates to the firm's subsequent decarbonization. Companies are central to the net-zero transition, and a growing number of companies are announcing emissions targets. If these targets are credible, they could contribute meaningfully to global decarbonization efforts and the achievement of the Paris Agreement goals (Rogelj et al., 2016, 2023). However, academic research on corporate emissions targets remains in its early stages and has largely focused on firm-level target characteristics (Freiberg et al., 2021; Bolton and Kacperczyk, 2025). Understanding how the equity market perceives the announcement of these targets is important for two reasons. First, these targets are voluntary disclosure of forward-looking information about future emissions, and whether these target announcements generate market reaction speaks to the credibility and value-relevance of voluntary disclosure on a material climate issue. Second, to the extent that the market prices this voluntary disclosure, we can learn how investors assess the value of emissions targets. If these assessments are associated with firms' subsequent realization of their climate commitments, it would shed light on how equity markets may shape firms' incentives to decarbonize.

Ex-ante, a market reaction to these announcements could be positive, negative, or nonexistent, each carrying distinct implications. A positive reaction would suggest that the targeted emissions reductions are perceived as value-enhancing, such as from improved stakeholder relations or a reduction in transition risks. Bolton and Kacperczyk (2021) find that firms with higher carbon emissions tend to have higher expected returns, consistent with investors requiring compensation for greater exposure to transition risk. A credible disclosure about future emissions reductions could mitigate these risks and, in turn, generate a positive market reaction. Moreover, if stakehold-

ers—including customers, employees, and long-term investors—reward firms for credible climate commitments, such disclosures could also enhance firm value through reputational benefits or increased demand, further contributing to a positive market response (Lins et al., 2017; Dyck et al., 2019).

On the other hand, a negative market reaction would suggest that emissions reduction efforts are perceived as costly for firms. Because greenhouse gas emissions are a negative externality, decarbonizing firms typically bear the costs of abatement without fully capturing the societal benefits. Meeting emissions targets often requires significant capital expenditures, operational restructuring, and supply chain transformation (Gillingham and Stock, 2018). Estimates from McKinsey suggest that achieving a global net-zero transition would require approximately $9.2 trillion in annual investment through 2050 (McKinsey & Company, 2022). Especially when the potential benefits are long term and uncertain—such as avoided carbon pricing regulations or future declines in decarbonization technology costs—investors may perceive these commitments as costly in the present, leading to negative market reactions.

Another possibility is that the market does not react to emissions target announcements. This can occur if investors view the targets as lacking credibility, as immaterial to firm value, or if they are simply unaware of the disclosures. For example, Jiang et al. (2025) do not find significant stock price response to either the initial announcement or the eventual outcomes of emissions targets due in 2020, based on a sample of 90 firms. Similarly, Desai et al. (2023) report no significant reaction to emissions target announcements in the oil and gas sector for 32 firms. One concern for the lack of significant findings in prior studies is small sample size, which limits statistical power. Additionally, market reactions may be muted if investors are unaware of emissions target announcements.

In this paper, we address these challenges by constructing the largest and most comprehensive dataset of corporate emissions target announcement events. Leveraging GPT-based natural language processing (NLP), we identify 2,417 corporate emissions target announcements from 2006 to 2023 using news headlines from RavenPack, a widely used financial news analytics database covering over 55,000 global firms. We require the headline to contain a target year, a word relating to environmental issues (e.g., emissions, climate), and a word relating to target setting (e.g., announce, target, aim). We exclude events within five days of an earnings event, where it will be difficult to isolate the market reaction of the emissions target announcement. Among the 2,417 events, 800 (33%) mention net-zero targets, 759 (31%) have a target year of 2030, and 630 (26%) have a target year of 2050, based on the headlines. 1,326 (55%) announcement events come from firms covered by the CDP, suggesting our sample has substantially higher coverage than focusing on the CDP sample (Jiang et al., 2025; Bolton and Kacperczyk, 2025).

On average, our event study reveals a negative stock price reaction following firms' emissions target announcements. The 5-day cumulative abnormal return (CAR) around days [-1,3] using the market model is -0.224%, and this result is robust to using the capital asset pricing model (CAPM), 3-factor model, and 5-factor models. Plotting out in event time, Figure 1 shows that CAR is flat around zero between days -10 to 0, and becomes negative starting from the announcement event, reaching an average of -0.2% in day five, -0.4% in day ten, and -0.8% in day thirty.[1] Overall, this result is consistent with investors viewing emissions targets as costly to firm value. At the same time, we observe a significant amount of heterogeneity in the market response. For example, the negative market response is more pronounced for targets that are more ambitious (net-zero targets, those classified by GPT as more ambitious, and those with higher reduction rate based on

[1]This pattern suggests that investors gradually incorporate the implications of emissions targets into firm valuation rather than reacting instantaneously. Overall, we do not find statistically significant abnormal trading volume around these events, but the abnormal volume is significantly higher for firms with more media coverage.

CDP targets data), consistent with a larger reduction in emissions being more costly.[2]

One concern in interpreting our results is the potential for selection bias, as firms self-select into announcing emissions targets. To address this, we first estimate a determinants model to identify firm characteristics associated with target announcements among all firms in our RavenPack sample. The results show that larger firms, firms with higher environmental scores, and firms with higher emissions are more likely to announce targets, while high-growth firms are less likely to do so. We then control for this propensity to announce in our subsequent analysis. Among the 1,911 events with sufficient data for the determinants model, the average 5-day CAR is –0.253% and statistically significant. After controlling for announcement propensity, the 5-day CAR becomes more negative at –0.666% and remains statistically significant. This more pronounced negative reaction is consistent with two possibilities: first, firms may self-select into announcing targets when the expected benefits outweigh the costs; and second, these announcements may be less anticipated by the market, thereby containing more new information, both resulting in a more negative market reaction.

Having established a negative market reaction, we explore two key factors that influence this response. First, we examine whether market reactions depend on the credibility of emissions targets. If investors believe targets are merely symbolic, they should exhibit little to no reaction. However, if they view credible targets as costly to implement, we expect a more negative stock price reaction for stronger commitments. We find that market reactions are significantly more negative for firms with external assurance on their Scope 1 or 2 emissions, a commonly used measure of credibility in the accounting literature (Simnett et al., 2009; Gipper et al., 2024). Similarly, firms with a longer track record of disclosing annual emissions data experience a more negative reaction, consistent

[2]The more negative response for more ambitious targets is less consistent with an alternative explanation that the negative market reaction stems from firms announcing targets that are less ambitious than market expectations.

with the idea that regular disclosure of backward-looking information serves a disciplining role and enhances the credibility of forward-looking commitments (Ball et al., 2012). Additionally, we use environmental scores as a proxy for overall environmental credibility and find that firms with higher environmental scores experience a significantly more negative reaction. We also take the first principal component of these three proxies for credibility, and the results remain robust.

Second, we analyze whether market reactions are shaped by the relative costs and benefits of decarbonization. If emissions reduction is technologically difficult or costly for a firm, we expect a more negative market reaction. In contrast, firms that are able to benefit from emissions reductions should experience a less negative or even positive reaction. We find that the negative market reaction is significantly stronger for firms in hard-to-abate sectors, such as energy and airlines, and where the majority of emissions are in scope 1 direct emissions, where decarbonization is technologically challenging and costly. Conversely, we find a positive market reaction among industries with more accessible climate solutions, suggesting that investors perceive greater feasibility for firms with decarbonization options. Finally, we find that firms facing carbon tax regulations experience a significantly more positive market reaction, supporting the view that emissions reduction efforts may provide financial benefits by mitigating regulatory costs.

Next, we examine how the market reaction to emissions target announcements relates to the firm's subsequent decarbonization. We consider two competing hypotheses. First, the confirmation hypothesis posits that the market correctly anticipates which firms will follow through with meaningful and costly emissions reductions, such that firms with more negative market reactions are expected to decarbonize more. Second, the learning hypothesis suggests that managers interpret the stock price response as a signal of how investors perceive the value of their climate commitments (Chen et al., 2007; Cao et al., 2024). Under this view, firms receiving negative reactions may scale back their climate strategies, resulting in lower decarbonization. To test these hypotheses,

we conduct a staggered difference-in-differences analysis based on the timing of each firm's first emissions target announcement. We also implement a stacked difference-in-differences specification, in which each treated firm is matched with three control firms based on pre-announcement characteristics used in the determinants model. Across both approaches, we find that firms with more negative market reactions subsequently achieve greater reductions in emissions intensity, consistent with the confirmation hypothesis.

Overall, we find that emissions target announcements are associated with negative short-term market reactions, and firms receiving negative reactions decarbonize more after emissions target announcements. This behavior suggests that firms may be motivated by long-term strategic and reputational considerations that are not fully reflected in immediate stock price responses. Survey evidence from Stroebel and Wurgler (2021) shows that respondents identify regulatory risk (e.g., carbon tax) as a firm's main motivation for addressing emissions, and that respondents overwhelmingly believe climate risk is underpriced by the market. Prior research also highlights that firms with stronger reputations perform better during periods of market stress, such as the global financial crisis (Lins et al., 2017), suggesting that reputational capital enhances long-term value that may not be reflected in short-term stock prices. Consistent with this view, we find that firms announcing emissions targets experience subsequent increases in environmental scores, suggesting recognition by stakeholders despite negative shareholder reactions.

This paper contributes to three key areas of literature. First, we contribute to research on voluntary environmental disclosure by providing new evidence on how markets process forward-looking climate information. While most prior work focuses on the voluntary disclosure of backward-looking metrics such as greenhouse gas emissions (e.g., Matsumura et al., 2014), we add to the emerging literature examining forward-looking emissions reduction targets (e.g., Ioannou et al., 2016; Freiberg et al., 2021; Bolton and Kacperczyk, 2025). Distinct from prior studies that examine

the firm-level determinants of target adoption (e.g., Freiberg et al., 2021; Bolton and Kacperczyk, 2025), or target progress and outcomes (Aldy et al., 2025, 2023; Jiang et al., 2025), our analysis centers on the announcement event itself, allowing us to isolate the informational content of the disclosure and assess its perceived value to investors. By leveraging RavenPack data to identify target announcements across a large sample of firms, we mitigate the small-sample and power limitations that constrain earlier studies of market reactions to emissions target announcements (Desai et al., 2023; Jiang et al., 2025).

Second, we contribute to the literature on the market pricing of climate-related risks and disclosures. Prior research shows that financial markets respond to ESG-related information, particularly when it is financially material or exposes firms to transition risk (Flammer, 2013; Grewal et al., 2019; Krueger et al., 2020; Bolton and Kacperczyk, 2023). However, little is known about how investors interpret these forward-looking climate commitments. We provide the first large-sample evidence on short-term stock price reactions to such announcements and find that, on average, the market responds negatively to these announcements, but with significant heterogeneity. These findings suggest that investors differentiate across emissions targets based on expected costs and credibility, consistent with theories that carbon risk is priced, but also potentially mispriced due to information frictions (Stroebel and Wurgler, 2021).[3]

Third, we contribute to the literature on the credibility of voluntary disclosure. The market reaction is more negative for firms with characteristics that enhance disclosure credibility, consistent with the notion that investors perceive credible commitments as more binding, and thus costlier to implement. For example, we find stronger negative reactions for firms that obtain reasonable assurance on GHG emissions, a practice shown to enhance the reliability of carbon reporting (Gip-

[3]This interpretation contrasts with evidence from green bond announcements, which tend to elicit positive market reactions (Tang and Zhang, 2020; Flammer, 2021). Unlike green bonds, which are tied to specific financing mechanisms and may signal access to climate solutions (Lu et al., 2024), emissions targets involve longer-term operational commitments and uncertain costs, which may explain the divergent investor responses.

per et al., 2024), and for firms with a longer track record of emissions disclosure, which increases the confirmatory power of forward-looking commitments (Ball et al., 2003). Together, these results highlight how the credibility of emissions targets influences their pricing and provide new evidence on how markets distinguish between symbolic and substantive climate disclosures.

2 Data and Methodology

2.1 Emissions Targets Announcement Events

To identify emissions target announcement events, we use data from RavenPack. RavenPack collects and structures real-time news content from thousands of global sources, including major newswires, press release services, and financial publications. Their entity-level analytics cover over 55,000 business entities worldwide, allowing us to capture a wide range of firm-level announcements as they appear in the media.

We begin with three criteria to identify headlines that potentially correspond to emissions target announcement events. First, we require the article to have a relevance score of 90 or higher, which indicates that the article is highly relevant to the specific firm mentioned. Articles with lower relevance scores often refer to broader economic developments rather than firm-level actions (e.g., a country setting an emissions reduction target). Second, we require that the headline contains two sets of keywords: one related to environmental topics and another related to target-setting language.[4] Third, we require the headline to contain a valid target year, and apply two additional filters. (1) The year must fall between 2015 and 2100; this range excludes invalid or misclassified numbers (e.g., "1005" or "3020") and reflects the period covered by our media data, which begins in 2015—the same year the Paris Agreement was signed and the Science-Based Targets initiative

[4]Environmental keywords: environment, environmental, green, renewable, emission, emissions, carbon, climate, pollution, electricity, co2, ghg, greenhouse gas, net zero, cdp, net-zero, sbti, science-based, science based, sasb, sustainable, sustainability, warming, recycle, circularity, clean energy, energy efficiency, energy transition. Target-related keywords: target, goal, commit, aim, objective, quota, pledge, ambitio, resolution, mission, milestone, benchmark, sbt, science-based, science based, net-zero, net zero, carbon neutral, carbon-neutral, climate neutral, climate-neutral.

(SBTi) was launched. (2) The year mentioned in the headline must be later than the article's publication year, since earlier or same-year references are more likely to reflect existing or past targets rather than forward-looking commitments. To implement this, we use regular expressions to extract the most recent year mentioned in the headline and compare it to the article's publication year.

The first three steps yield approximately 12,000 unique media headlines that broadly relate to a firm's environmental targets. We then use GPT to refine this sample by classifying whether each headline specifically refers to an emissions-related target. This step helps filter out headlines referring to broader sustainability goals or industry-wide announcements that mention multiple firms. To train and refine the GPT prompt, we manually labeled 300 headlines and iteratively improved the classification process, achieving a 96% accuracy rate on this training sample. Applying the finalized prompt to the full dataset results in roughly 8,000 headlines being classified as emissions-related. To validate accuracy out-of-sample, we randomly selected an additional 100 headlines not used in the original training set and found a 95% accuracy rate. Additionally, for headlines classified as emissions target announcements, we further use GPT to extract whether the target is described as ambitious. Details on the GPT classification process, including sample sentences and the prompt used, are provided in Online Appendix 1.

Table 1 summarizes the sample selection process. Among the 55,198 firms covered by RavenPack, the first three steps yield 1,868 firms with headlines related to environmental targets. After applying the GPT classification to identify emissions-related targets, the sample is refined to 1,454 firms. Because many headlines refer to the same underlying event, we aggregate observations into a single event if they occur within a 30-day window. We assign the event date as the day with the highest number of media articles, which in most cases corresponds to the first day in the window [5].

[5] In 95.1% of target announcement event windows, the event date is the first day of the window.

This aggregation reduces 4,613 firm-day observations with target headlines to 2,941 distinct target announcement events. We exclude 524 events that occur within five days of an earnings announcement, where the market reaction could be driven by earnings news rather than the emissions target disclosure. Our final sample includes 2,417 emissions target announcements.

Table 2 shows the sample distribution of the target announcement events. Among the 2,417 target announcement events, 1,326 (55%) are from firms that are covered by the CDP, indicating that our sample offers broader coverage than studies relying on CDP data (Jiang et al., 2025; Bolton and Kacperczyk, 2025). Based on headline content, 800 events (33%) mention net-zero targets, 759 (31%) specify a target year of 2030, and 630 (26%) reference a 2050 target year. Panel B shows that the most amount of target announcements are concentrated in recent years, with the highest amount in 2021 with 780 announcement events. At the same time, the dates of announcements are spread out, where the median number of firms announcing on the same date is 2. The highest is on Earth Day, April 22, 2021, where 15 firms announced targets on that date. The dispersion of dates mitigates concerns that the observed effects are driven by confounding events, such as around policy announcement shocks.

2.2 Other Data

Following Ioannou et al. (2016) and Bolton and Kacperczyk (2025), we include several financial and environmental variables as determinants of emission-reduction target announcements, as well as control variables in the market reaction tests and post-announcement tests. Specifically, we incorporate financial data from Datastream, environmental scores from Refinitiv and MSCI, emissions data from Refinitiv, and the assurance status of reported emissions from CDP reports. Summary statistics for the firm-event-window level panel data are presented in Table 3.

2.3 Event Study Methodology

We apply the standard event study methodology to examine market reactions around emissions target announcement events (Krüger, 2015; Tang and Zhang, 2020). We use the market model to estimate abnormal returns based on the market returns of the country in which the firm is domiciled. For each emissions target announcement, we first estimate the cumulative abnormal returns (CAR) over various windows around the event date (e.g., [-1 day, 3 days] windows, [-10 days, 30 days] windows). Abnormal returns are calculated using the market model: $AbnRet_{i,t} = Ret_{i,t} - \alpha_i - \beta_i M_{i,t}$. $Ret_{i,t}$ is the daily return of the firm i on date t, where $t = 0$ is the target announcement date. $M_{i,t}$ is the market return of the date. To estimate α_i and β_i, we use the daily returns during [-130 days, -30 days) window—the estimation window—for each announcement. Abnormal returns are in log percentages.

3 Market Reaction to Emissions Target Announcements

Table 2 shows the average 5-day CAR around days [-1,3] of emissions target announcement events for different sample groups. Panel A reports an average CAR of –0.224% for the full sample, with a t-statistic of –2.732, indicating that the mean CAR is significantly different from zero under the assumption of normally distributed returns. To complement this, we also report results from the nonparametric Wilcoxon signed-rank test, which evaluates whether the median CAR differs from zero without relying on distributional assumptions, and is less sensitive to outliers. The Wilcoxon test yields a p-value of 0.0003, reinforcing the finding of a statistically significant negative market reaction. This result remains similar when we use CAPM, Fama-French 3-factor, or Fama-French 5-factor models. The magnitude is comparable to prior studies, where Krüger (2015) finds an 11-day CAR around days [-5,5] of -1.54% for negative environmental events. We focus on a shorter event window to reduce noise, but also show results for longer time periods after the

initial announcement event. Figure 1 plots CAR for a longer time period from days -10 to 30. CAR remains flat around zero -10 to 0, and becomes negative starting from the announcement event, reaching an average of -0.2% in day five, -0.4% in day ten, and -0.8% in day thirty. This pattern suggests that investors gradually incorporate the implications of emissions targets into firm valuation rather than reacting instantaneously. Overall, our result is consistent with the market viewing emissions targets as costly to firm value.[6]

While the overall market reaction is negative, we observe significant heterogeneity across different target characteristics. First, the negative market response is more pronounced for targets that are more ambitious, which is consistent with a larger reduction in emissions being more costly. Target headlines that mention net zero, and those classified by GPT as being more ambitious, have more negative 5-day CARs. We also bring in the average emissions target reduction rate from CDP, and firm-years with more ambitious targets have more negative 5-day CARs. Second, we observe a more negative market response for firms in hard-to-abate industries, where decarbonization is more costly, which see an average 5-day CAR of -0.773%. Third, most of the negative reaction concentrate on targets that were announced after 2021 and for targets with a target year of after 2030. Relatedly, Table 2 Panel B shows the distribution of emissions target events by year of announcement. The majority of target announcements concentrate in 2021 and 2022, and the average 5-day CAR are -0.448 and -0.231, respectively.

Table 2 Panel C shows the cross-sectional variation by GICS industry groups, which reveals several patterns. First, industry groups with high decarbonization costs, such as transportation, energy, and materials, show some of the most negative 5-day CARs, consistent with investor concerns about future implementation costs. Second, industry groups with more climate solutions

[6]Our results differ from papers that find a positive reaction to green bond issuance, such as Flammer (2021) and Tang and Zhang (2020), likely because green bond issuance signals the availability of climate solutions, where Lu et al. (2024) find that firms with climate solutions have higher valuation.

experience less negative reactions, such as utilities (driven by the renewable energy industry) and capital goods (driven by battery producers in the electrical equipment industry). Third, the market reaction is less negative for retails with lower scope 1 emissions, such as hotels and restaurants in consumer services, and apparel firms in commercial and professional services. Notably, media and entertainment receive a large negative reaction, which is driven by firms with ambitious targets, such as Facebook and Google, in the interactive media and services industry.

3.1 Addressing selection concern of target announcements

One concern in interpreting our results is the potential for selection bias, as the decision to announce an emissions target is not random. Firms that believe the benefits of target setting outweigh the costs may be more likely to make such announcements. To address this concern, we estimate a determinants model using all firms covered in the RavenPack dataset, and control for the propensity to announce targets in the subsequent analysis. We construct a panel of firm-year observations and define the outcome variable as equal to one in the year a firm first announces an emissions target. We include year fixed effects to control for aggregate trends in target adoption, industry fixed effects to account for differences in industry-level climate risks and opportunities, and country fixed effects to capture variation in regulatory environments.

Table 4 presents the results of the determinants analysis. In column (1), we include all firm-year observations and define the outcome as an indicator equal to one only in the year the firm announces an emissions target (*Announcement Year*). In column (2), the outcome is an indicator equal to one in the announcement year and all subsequent years (*Post Announcement*). In column (3), we define *Post Announcement* as an indicator equal to one only in the three years following the announcement. In column (4), we repeat the specification in column (1) but after a firm announces an emissions target, it is no longer included in the control group in subsequent years. We use the predicted values from column (4) to construct the announcement propensity score because

it ensures that the control group only includes firms that have not yet announced a target. We present all specifications for completeness, and the determinants results are similar across models.

Across all specifications, we observe consistent patterns. Firms are more likely to announce emissions targets if they are larger, have higher leverage, exhibit greater return volatility, and have lower sales growth. These results are consistent with prior findings that high-growth firms may be more hesitant to commit to emissions reduction due to the perceived trade-off with expansion and flexibility (Bolton and Kacperczyk, 2025). We also find that firms with higher environmental scores and higher greenhouse gas emissions intensity are more likely to set targets, suggesting that firms facing greater climate risks and opportunities have more to benefit from setting targets.[7]

Next, we use the predicted values from the determinants model (Table 4, column 4) to proxy for each firm's propensity to announce an emissions target and include this measure as a control in our event study analysis. Table 5 reports average CARs across different event windows, both with and without controlling for announcement propensity. The 3-day CAR in the [-1,1] window is not statistically different from zero, while the longer-window CARs—[-1,3], [-1,5], and [-1,10]—are all statistically significantly negative. Focusing on our main measure, the 5-day CAR in [-1,3] is -0.253% without controlling for announcement propensity, and becomes more negative at -0.666% after including the control. We observe similar patterns for the [-1,5] and [-1,10] windows: the negative reaction becomes more pronounced after accounting for firms' propensity to announce. Additionally, the coefficient on the announcement propensity is positive and statistically significant, consistent with firms that are more likely to benefit from target setting being more likely to disclose. These results suggest that such firms self-select into announcing emissions targets and

[7] Bolton and Kacperczyk (2025) find that firms with lower emissions are more likely to set emissions targets. This difference is potentially due to sample differences, where they cover firms with CDP targets and SBTi targets from 2005 to 2019, whereas we cover firms with target announcement events from 2005 to 2023. We find that the majority of target announcements occur in 2021 and 2022, and that approximately half of the firms announcing targets in our sample do not appear in CDP disclosures.

that their announcements may be less anticipated by the market, resulting in more negative market reactions.

3.2 Credibility of corporate emissions targets

We examine whether the market reacts more negatively to emissions target announcements that are perceived as more credible. Having established that the average market reaction is negative, we hypothesize that this effect is more pronounced for firms whose targets are likely to be viewed by investors as binding and enforceable. If emissions reductions are seen as costly, then credible commitments—such as those backed by verification, a history of emissions disclosure, or stronger environmental performance—should generate a larger negative price response than symbolic or low-commitment announcements.

To test this, we regress the 5-day CAR on three credibility proxies: whether the firm receives third-party assurance on emissions, environmental scores, and the number of years it has disclosed GHG emissions. We include the same control variables used in the determinants model, along with year, industry, and country fixed effects. We continue to control for announcement propensity to mitigate the concern that firms with more credible targets may also be those most likely to benefit from setting them. Controlling for announcement propensity allows us to account for observable firm characteristics associated with the decision to disclose, helping to reduce potential confounding when estimating the relationship between credibility and market reaction.

We consider three proxies for credibility. First, we use reasonable assurance on greenhouse gas (GHG) emissions as a measure of target credibility. Firms that subject their Scope 1 and Scope 2 emissions to external assurance provide more verifiable and auditable emissions data, making their targets more credible to investors. Prior literature in accounting suggests that assurance enhances the reliability of non-financial disclosures, reinforcing investor expectations that the firm will fol-

low through on its commitments (Simnett et al., 2009; Gipper et al., 2024). In Table 6 columns (1) and (2), we find that firms with reasonable assurance receive significantly more negative market reactions. Column (1) finds that firms with reasonable assurance on scope 1 or 2 receive 0.711% more negative CAR.

Second, we use a firm's environmental score, as firms with higher environmental scores tend to have more established environmental policies, stronger emissions reduction programs, and more transparent sustainability practices. Columns (3) and (4) show that the coefficients on MSCI environmental scores and climate change subscore are negative and statistically significant. Column (4) means that a one standard deviation increase in MSCI climate change subscore is associated with a 0.365% (0.143*2.55) more negative market reaction.[8]

Third, we use the number of years a firm has been disclosing annual GHG emissions, based on the idea that firms with a longer track record of emissions disclosure face greater external discipline. Consistent disclosure history enhances the confirmatory role of backward-looking information, reinforcing the credibility of forward-looking statements such as emissions targets (Ball et al., 2003). Firms with a history of emissions reporting are more likely to be held accountable for their climate commitments, increasing the perceived costs of compliance and leading to a stronger negative market reaction. Column (5) shows that one additional year of emissions disclosure is associated with 0.062% more negative market reaction, and this result is statistically significant.

As an additional measure, we construct a credibility measure using the first principal component of three variables: whether the firm has reasonable assurance on Scope 1 or 2 emissions, the MSCI Climate Change subscore, and the number of years the firm has disclosed emissions data.

[8]We use MSCI climate change subscore as it is a more direct proxy for the perceived credibility of emissions targets, where this subscore takes into consideration a firm's performance on carbon emissions, energy efficiency, product carbon footprint, climate risk management, and environmental impact financing. In the determinants test, we use Asset4 environmental score primarily because it has a larger coverage than MSCI scores.

To expand data coverage, we treat firms with missing assurance data as not having received assurance. In column (6), we find that this *Credibility PC* is negative and statistically significant. Panel B of Table 6 further shows that the result is robust to alternative measures of market reaction, including CARs over [-1,1], [-1,5], and [-1,10], as well as an indicator for whether the CAR in [-1,3] is negative. Overall, the findings are consistent with the interpretation that more credible emissions targets are associated with stronger decarbonization commitments and they generate more negative market reactions.

3.3 Relative costs and benefits of emissions reduction

We next examine cross-sectional variation in market reactions based on the relative costs and benefits of emissions reduction. We consider three sources of variation: hard-to-abate industries, industries with climate solutions, and markets with carbon pricing regulation. These analyses follow a similar model specification as the credibility analysis, with the addition of *Credibility PC* as a control to account for variation in perceived target credibility.

First, firms in hard-to-abate industries are likely to face higher costs of decarbonization, and we therefore expect more negative market reactions to emissions target announcements in these sectors. We identify hard-to-abate industries using two measures. The variable *Industry Scope 1 Ratio* measures the industry average percent of emissions that come from Scope 1 sources, which are typically more difficult to reduce. The variable *Hard-to-Abate Industries* captures firms operating in sectors classified as hard to abate in the International Renewable Energy Agency (IRENA) report (IRENA, 2024).[9] In Table 7, columns (1) and (2), we find that firms with high *Industry Scope 1 Ratio* and in *Hard-to-Abate Industries* receive significantly more negative CARs. We exclude industry fixed effects in these specifications, as the independent variables of interest vary at the industry level.

[9]The IRENA (2024) report classifies hard-to-abate sectors as heavy-duty trucking, shipping, aviation, iron and steel, and chemicals and petrochemicals, which corresponds to the Ground Transportation, Marine Transportation, Air Freight & Logistics, Passenger Airlines, Metals & Mining, and Chemicals industries in the GICS codes.

Second, firms in industries with greater access to climate solutions may view decarbonization as a business opportunity rather than a cost, potentially resulting in more favorable market reactions to emissions target announcements. We identify such industries using data from Lu et al. (2025), where they apply textual analysis to 10-K Item 1 business descriptions to measure firms' involvement in climate solutions. We obtain the abatement potential of each climate solution from Project Drawdown. For each industry, we compute the average abatement potential as the weighted average of the abatement potential of each solution, where the weights are based on the frequency with which each climate solution appears among firms in that industry. In Table 7, column (3), we find that firms in industries with higher abatement potential experience a positive and statistically significant 5-day CAR.

Third, firms that are exposed to carbon pricing regulation are more likely to benefit from emissions reductions, as lowering emissions can reduce future carbon-related costs. We identify such firms using two measures: (1) whether the firm is headquartered in a country with a carbon pricing policy, and (2) whether the firm reports being subject to carbon pricing regulation in its CDP disclosures. In Table 7 columns (4) and (5), we find that both indicators are associated with more positive market reactions. In particular, column (4) shows that firms located in countries with carbon pricing experience a 0.403% higher 5-day CAR, and the coefficient is statistically significant.

4 Market Reaction and Emissions Change after Target Announcement

Next, we examine emissions changes after firms announce emissions reduction targets, and how the amount of decarbonization relates to the market reaction to the target announcement event. We test two competing hypotheses. The confirmation hypothesis posits that firms experiencing more negative market reactions will subsequently decarbonize more, suggesting that the market correctly anticipated the costly nature of credible emissions targets. In contrast, the learning hypoth-

esis suggests that managers learn from the market reaction and firms receiving negative market reactions may interpret the signal as investor concern about the cost or feasibility of decarbonization, and therefore scale back or delay implementation, resulting in weaker emissions reductions.

To test these hypotheses, we conduct a generalized difference-in-differences (DiD) analysis using firm-year panel data and the following two specifications:

$$CO2\ Intensity_{i,t} = \beta_0 + \beta_1 Post\ Announcement_{i,t} + \sum Controls + \sum Fixed\ effects + \epsilon \quad (1)$$

$$CO2\ Intensity_{i,t} = \beta_0 + \beta_1 Post\ Positive\ Reaction_{i,t} + \beta_2 Post\ Negative\ Reaction_{i,t} + \sum Controls + \sum Fixed\ effects + \epsilon \quad (2)$$

The dependent variable is CO2 intensity, defined as scopes 1 and 2 emissions per unit of revenue. We use this intensity measure because it controls for changes in firm size and likely reflects firm efforts to decarbonize (Aswani et al., 2024; Zhang, 2025). We include firm fixed effects to control for time-invariant firm characteristics, and year fixed effects to control for time trends in emissions. We cluster standard errors using firms.

In model (1), the main independent variable of interest, *Post Announcement*, is an indicator that switches to one after the year a firm announces an emissions target and remains one thereafter. β_1 captures the average change in emissions outcomes for firms after announcing a target, relative to firms that have not yet announced one and relative to the firm's own pre-announcement baseline. In model (2), we separately include indicators for *Post Announcement* for firms with positive and negative market reactions. Under the confirmation hypothesis, *Post Negative Reaction* would be associated with greater subsequent emissions reductions than *Post Positive Reaction*, consistent with the market anticipating costly but credible climate action. In contrast, the learning hypothesis predicts that *Post Negative Reaction* would be associated with less emissions reduction than *Post*

Positive Reaction, as firms with negative reactions interpret the signal as investor concern and adjust their decarbonization efforts accordingly.

Table 8 presents the results. Column (1) shows that a firm's CO2 intensity declines significantly by 0.095 following a target announcement, representing 8.7% of the sample standard deviation of CO_2 intensity (1.082). Column (2) shows the results for firms with positive versus negative market reactions, and the coefficient for firms with negative market reactions is larger in magnitude than that for firms with positive reactions, although the difference between the two is not statistically significant. In column (3), we further distinguish between firms with very negative and very positive market reactions, defined as those in the bottom and top terciles of the market reaction distribution, respectively. In this specification, only the coefficient for firms with very negative reactions is statistically significant. However, similar to column (2), the difference between the very positive and very negative groups is not statistically significant.

To mitigate concerns that firms announcing targets may differ systematically from non-announcing firms, and to address limitations of generalized difference-in-differences designs (e.g., Callaway and Sant'Anna, 2021; Baker et al., 2022), in columns (4) to (6) of Table 8, we repeat the analysis using a stacked difference-in-differences approach with a matched sample. Specifically, for each treated firm, we use nearest neighbor matching to identify the three closest control firms based on pre-treatment average values of the control variables within each industry. We then construct a stacked dataset, aligning each treated firm with its matched controls in event time relative to the target announcement year and keeping -3 to +4 years relative to the announcement year of each cohort. In this specification, we include cohort-year and cohort-firm fixed effects, where cohorts are defined by the year of the emissions target announcement.

In this more stringent specification, in columns (4) - (6) of Table 8, the coefficients of interest

are negative and statistically significant for all targets, targets with negative market reactions, and targets with very negative market reactions. In columns (5) and (6), the coefficient on *Post Negative Reaction* (*Post Very Negative Reaction*) is significantly different from that of *Post Positive Reaction* (*Post Very Positive Reaction*). Overall, these results are consistent with the confirmation hypothesis, where firms with larger decarbonization receive more negative market reaction at the announcement of emissions targets.

Next, we examine how the relationship between market reaction and subsequent decarbonization varies with the credibility of the emissions target. In Table 9, we repeat the stacked difference-in-differences analysis, separating the sample based on the *Credibility PC* measure constructed in Section 3.2. We find that significant reductions in CO2 intensity occur only within the high-credibility subsample. We continue to find significant reductions in CO2 intensity for target announcements with positive or negative market reactions. While the coefficients on *Post Negative Reaction* and *Post Very Negative Reaction* are larger in magnitude than those for their positive counterparts, the differences are not statistically significant.

In contrast, in the low-credibility subsample, CO2 intensity is not statistically different from zero after target announcements. However, when we split by market reaction, we find that only the coefficients on *Post Negative Reaction* and *Post Very Negative Reaction* are negative and statistically significant, and significantly larger than the corresponding coefficients for positive market reactions. These results are again consistent with the confirmation hypothesis: firms that the market reacts negatively at the time of announcement are those that subsequently decarbonize more. The result that this relationship holds more significantly within the low-credibility subsample suggests that markets may be capturing information beyond what is observable in our credibility measures, correctly identifying which targets are likely to be costly and credible ex ante.

5 Why firms announce targets despite negative reaction

Firms that announce emissions targets tend to experience negative market reactions, and consistent with the market anticipating implementation costs, these firms subsequently decarbonize more. This suggests that managers follow through with climate commitments even when the initial investor response is negative. Consistent with this observation, some firms have faced pressure from shareholders to scale back their climate initiatives. For example, BP and Shell have both faced shareholder scrutiny and pushback to pullback on emissions targets (Reuters, 2024). Similarly, Tractor Supply Co. eliminated its previously announced emissions target following public pressure (Pucker, 2024). When the firm initially announced the emissions target in 2021, the market responded with a 3-day CAR of –0.765%. In this section, we explore why managers may continue pursuing decarbonization despite negative market reactions and external pressures.

One potential explanation is the misalignment between short-term costs and long-term benefits with high uncertainty. Emissions reductions often require substantial upfront investments in cleaner technology, operational restructuring, and regulatory compliance (Gillingham and Stock, 2018; McKinsey & Company, 2022). These investments can strain near-term profitability, but the benefits are often long term and with high uncertainty. Moreover, many of the long-term benefits associated with decarbonization are difficult to incorporate into standard valuation frameworks, contributing to potential underpricing. Prior research suggests that climate risks may be systematically underpriced in financial markets. Stroebel and Wurgler (2021) find that among 861 survey respondents, participants were 20 times more likely to believe that climate risk is currently underestimated by asset markets than overestimated. Similarly, Hong et al. (2019) find that food company stock prices underreact to droughts, adding to evidence of market underreaction to environmental risks. This underpricing may arise from long horizons, uncertainty around regulatory timing, or

difficulties in modeling the financial impact of physical and transition risks.

Another important consideration is the role of reputation. Emissions targets, particularly when perceived as credible, can signal leadership on climate and strengthen relationships with customers, employees, and long-term investors. Reputation itself is a valuable intangible asset that may not be fully captured in stock prices at the time of disclosure. Lins et al. (2017) show that firms with stronger reputations performed better during periods of market stress, suggesting that reputational capital enhances firm resilience and long-term value. Emissions target announcements may also operate through a stakeholder reward channel, where firms prioritize credibility with regulators, ESG-focused investors, and the media, even if stock market participants react negatively.

To explore this idea empirically, we test whether firms experience increases in environmental scores following the announcement of emissions reduction targets. We use the same empirical specification as in model (1), replacing the outcome variable with the environmental scores. In Table 10 columns (1) to (4), we include year fixed effects and industry fixed effects, and include a time invariant indicator for firms that announce targets. The coefficient of interest on *Post Announcement* is positive and statistically significant for Asset4 E score, MSCI E score, and MSCI Emission scores. One caveat is that when we include firm fixed effects in columns (5) to (8), the coefficient turns negative for Asset4 scores and MSCI Emissions score. Upon further examination, as shown in columns (1) to (4), firms with targets have higher scores to begin with, which potentially limits the room for improvement. As such, we prefer the specification without firm fixed effects.

6 Conclusion

This paper examines how capital markets respond to corporate announcements of emissions reduction targets and whether these responses relate to firms' subsequent decarbonization behavior.

Using a novel dataset of over 2,000 emissions target announcements identified from media headlines via RavenPack and refined using large language models, we document three main findings. First, we find that, on average, the stock market reacts negatively to emissions target announcements. Second, the negative reaction is more pronounced for firms with more credible targets—those with third-party assurance, a longer history of GHG disclosure, or higher environmental scores. Third, despite the negative market response, firms with more negative reactions are more likely to follow through with emissions reductions in subsequent years, suggesting that the market anticipated these commitments would be costly and substantive.

Our main finding—that credible emissions targets are associated with negative market reactions—suggests that investors view these commitments as costly in the short term. Nonetheless, firms appear to pursue these targets, potentially motivated by long-term strategic and reputational considerations. We find some evidence of these longer-term benefits: firms that announce targets subsequently receive higher environmental scores, consistent with recognition by ESG rating agencies. Future research can build on this work by exploring other long-term benefits of target-setting, such as access to ESG capital, improved employee or customer loyalty, or differential responses to regulatory shocks. As firms continue to face pressure to decarbonize, understanding how markets interpret and respond to these commitments remains an important area for both researchers and policymakers.

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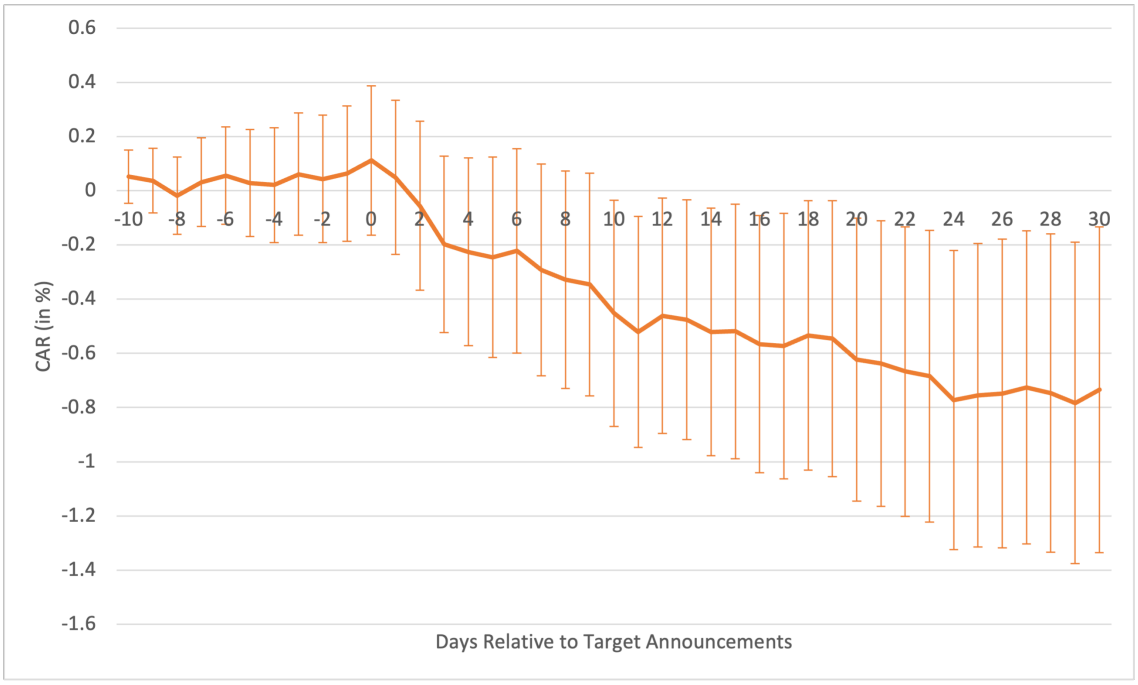
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Figure 1: CAR around emissions target announcement events



This figure plots the cumulative abnormal return around corporate emissions target announcement events from -10 to 30 days.

Table 1: Sample Selection

Sample Selection Criteria	#Firms	#Observations
All news data from Ravenpack with ISIN	55,196	
Keep news regarding emissions target announcements from Ravenpack using keywords	1,868	7,071 firm-date
Keep news regarding emissions target announcements from Ravenpack using ChatGPT	1,454	4,613 firm-date
Aggregating news events regarding emissions target announcement to the event-window level of maximum 30 days	1,454	2,941 firm-event-window
Drop event dates overlapping with earnings announcement dates and event dates without market returns data and firms without industry data	1,260	2,417 firm-event-window

This table shows the sample selection procedure and the number of unique firms as well as the number of observations in the sample.

Table 2: Cumulative Abnormal Return around Emissions Target Announcement Events

Panel A: CAR[-1, 3]						
	N	Mean	T-statistics	Median	P(Sign-test)	% Negative
Full sample	2,417	-0.224***	-2.732	-0.238	0.000	53.41%
CDP sample	1,326	-0.343***	-3.361	-0.305	0.000	55.05%
Net-zero targets	800	-0.318**	-2.202	-0.410	0.013	55.75%
Science-based targets	89	-0.360	-1.139	-0.011	0.485	50.56%
Ambitious targets (GPT)	929	-0.299**	-2.296	-0.190	0.011	52.74%
Unambitious targets (GPT)	1,488	-0.178*	-1.680	-0.298	0.008	53.83%
Ambitious targets (CDP)	572	-0.394***	-2.738	-0.244	0.014	54.55%
Unambitious targets (CDP)	589	-0.277*	-1.734	-0.364	0.011	55.86%
High scope 1+2 intensity industries	1,189	-0.324***	-2.604	-0.383	0.002	53.49%
Low scope 1+2 intensity industries	1,228	-0.128	-1.186	-0.163	0.046	53.34%
High % scope 1 industries	1,160	-0.326***	-2.647	-0.363	0.001	53.53%
Low % scope 1 industries	1,257	-0.130	-1.188	-0.176	0.049	53.30%
Hard-to-abate industries	377	-0.773***	-3.221	-0.822	0.000	57.56%
2006 – 2020	706	-0.159	-1.083	0.015	0.190	49.72%
2021 – 2023	1,711	-0.251**	-2.540	-0.369	0.001	54.94%
Target Year $\leq$ 2030	1,303	-0.074	-0.655	-0.107	0.113	51.73%
Target Year $>$ 2030	1,114	-0.400***	-3.372	-0.421	0.000	55.39%
CAPM	2,417	-0.229***	-2.671	-0.272	0.000	53.70%
Fama–French 3-factor	2,417	-0.235***	-2.860	-0.266	0.001	53.50%
Fama–French 5-factor	2,417	-0.272***	-3.325	-0.217	0.000	52.79%

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Table 2 (continued)

Panel B: Cumulative Abnormal Return by Year

Year	# Targets	# Firms with Targets	Total # Firms	Ratio	CAR [-1, 3]
2006	1	1	38,674	0.00%	0.748
2007	6	5	38,674	0.01%	2.083
2008	16	15	38,674	0.04%	-1.057
2009	14	14	38,674	0.04%	0.079
2010	8	8	38,674	0.02%	-1.674
2011	17	16	38,674	0.04%	-1.472
2012	16	16	38,674	0.04%	0.209
2013	9	9	38,674	0.02%	-1.599
2014	15	15	38,674	0.04%	0.418
2015	30	29	38,674	0.07%	1.052
2016	18	18	38,674	0.05%	-0.621
2017	38	34	38,674	0.09%	-0.224
2018	58	53	38,674	0.14%	0.067
2019	146	125	38,674	0.32%	0.258
2020	314	258	38,674	0.67%	-0.382
2021	780	616	38,674	1.59%	-0.448
2022	557	454	38,674	1.17%	-0.231
2023	374	328	38,674	0.85%	0.131
Overall	2,417	1,260	38,674	3.26%	-0.224

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Table 2 (continued)

Panel C: Cumulative Abnormal Return by Industry

Industry Group	# Targets	# Firms with Targets	Total # Firms	Ratio	CAR [-1, 3]
Automobiles & Components	196	48	881	5.45%	-0.096
Banks	85	46	1294	3.55%	-0.354
Capital Goods	206	126	4947	2.55%	-0.172
Commercial & Professional Services	36	31	1259	2.46%	1.165
Consumer Discretionary Distribution & Retail	62	33	1210	2.73%	-1.022
Consumer Durables & Apparel	67	35	1819	1.92%	0.264
Consumer Services	60	33	1327	2.49%	1.175
Consumer Staples Distribution & Retail	60	29	418	6.94%	-0.266
Energy	187	91	1354	6.72%	-0.583
Equity Real Estate Investment Trusts (REITs)	42	34	623	5.46%	-0.094
Financial Services	50	38	2265	1.68%	-0.474
Food, Beverage & Tobacco	138	65	1722	3.77%	0.229
Health Care Equipment & Services	25	21	1431	1.47%	-0.669
Household & Personal Products	31	13	371	3.50%	-0.215
Insurance	47	29	471	6.16%	-0.730
Materials	315	179	4965	3.61%	-0.802
Media & Entertainment	40	23	1475	1.56%	-0.766
Pharmaceuticals, Biotechnology & Life Sciences	45	32	2256	1.42%	-0.898
Real Estate Management & Development	29	24	1649	1.46%	-0.097
Semiconductors & Semiconductor Equipment	38	26	758	3.43%	-0.256
Software & Services	82	46	1987	2.32%	0.195
Technology Hardware & Equipment	95	47	2038	2.31%	-0.178
Telecommunication Services	65	32	348	9.20%	0.634
Transportation	147	66	971	6.80%	-0.358
Utilities	269	113	835	13.53%	0.011
Overall	2,417	1,260	38,674	3.26%	-0.224

This table reports summary statistics for cumulative abnormal returns (CARs) around emissions target announcement events. Panel A presents the number of events, the mean CAR[-1, 3] and corresponding t-statistic, the median CAR[-1, 3] and p-value from the Wilcoxon signed-rank test, and the percentage of negative returns across different samples. Panels B and C show the number of target announcement events, the number of firms announcing targets, the total number of firms, the ratio of target-announcing firms, and the average CAR[-1, 3], reported by year and by GICS industry group, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. A detailed description of the variables is in Appendix A.

Table 3: Summary Statistics

Panel A: Summary Statistics						
	Count	Mean	SD	P25	P50	P75
CAR[-1, 3]	2085	-0.256	3.930	-2.347	-0.245	1.721
Size	2085	60.775	141.227	5.227	16.755	51.561
ROA	2085	5.327	7.079	2.440	4.720	8.140
Volatility	2085	23.905	8.027	17.910	22.900	28.610
Sales Growth	2085	4.065	11.635	-1.530	3.190	9.070
Price-to-Book	2085	3.228	6.317	1.080	1.880	3.440
Capital Intensity	2085	11.200	13.928	3.170	5.770	13.530
Leverage	2085	114.526	184.321	44.060	85.590	147.350
CO2 Intensity	1951	0.624	1.404	0.022	0.063	0.434
Announcement Propensity	1911	9.735	4.199	7.070	10.575	12.986
Reasonable Assurance Scope 1 or 2	1198	0.186	0.389	0.000	0.000	0.000
Reasonable Assurance Scope 1	1198	0.182	0.386	0.000	0.000	0.000
MSCI E Score	1623	5.685	2.051	4.200	5.500	7.000
MSCI Climate Change Score	1581	7.372	2.550	5.400	7.900	10.000
Years of Emissions Disclosure	2085	10.411	5.358	6.000	12.000	15.000
Credibility PC	1581	-0.001	1.147	-0.789	0.054	0.812
Industry Scope 1 Ratio	2085	0.290	0.280	0.059	0.122	0.505
Hard-to-abate Industries	2085	0.161	0.367	0.000	0.000	0.000
Abatement Potential	1600	10.421	6.647	3.538	9.225	14.755
Carbon Pricing	1198	0.472	0.499	0.000	0.000	1.000

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Table 3 (continued)

Panel B: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) CAR[-1, 3]	1.000																			
(2) Size	-0.002	1.000																		
(3) ROA	-0.022	0.281***	1.000																	
(4) Volatility	-0.058***	-0.168***	-0.138***	1.000																
(5) Sales Growth	-0.032	0.186***	0.373***	0.116***	1.000															
(6) Price-to-Book	0.018	0.322***	0.255***	-0.057***	0.107***	1.000														
(7) Capital Intensity	0.024	-0.060***	-0.190***	-0.100***	0.019	-0.060***	1.000													
(8) Leverage	-0.004	-0.049**	-0.146***	-0.019	-0.086***	0.478***	0.085***	1.000												
(9) CO2 Intensity	0.015	-0.127***	-0.120***	-0.004	-0.041*	-0.082***	0.254***	0.044**	1.000											
(10) Announcement Propensity	0.046**	0.185***	-0.046**	-0.373***	-0.141***	-0.088***	0.066***	0.003	0.064***	1.000										
(11) Reasonable Assurance Scope 1 or 2	-0.031	0.006	-0.035	-0.019	0.061**	-0.058**	0.181***	-0.003	0.125***	0.065**	1.000									
(12) Reasonable Assurance Scope 1	-0.029	0.008	-0.034	-0.012	0.062**	-0.055*	0.159***	-0.004	0.119***	0.055*	0.986***	1.000								
(13) MSCI E Score	0.003	0.060**	0.031	-0.327***	0.004	0.063**	0.019	0.078***	-0.208***	0.126***	-0.085***	-0.081***	1.000							
(14) MSCI Climate Change Score	-0.012	0.113***	0.114***	-0.281***	-0.019	0.074***	-0.033	-0.058**	-0.277***	0.137***	0.017	0.015	0.600***	1.000						
(15) Years of Emissions Disclosure	-0.012	0.141***	0.027	-0.243***	-0.213***	-0.008	-0.037*	0.014	-0.013	0.505***	0.078***	0.072**	0.166***	0.228***	1.000					
(16) Credibility PC	-0.027	0.134***	0.085***	-0.277***	-0.102***	0.011	0.010	-0.034	-0.095***	0.402***	0.563***	0.551***	0.393***	0.672***	0.759***	1.000				
(17) Industry Scope 1 Ratio	-0.030	-0.186***	-0.146***	0.020	-0.051**	-0.137***	0.369***	0.039*	0.563***	0.014	0.198***	0.193***	-0.173***	-0.271***	0.038*	-0.041	1.000			
(18) Hard-to-abate Industries	-0.064***	-0.129***	-0.006	0.330***	-0.007	-0.059***	-0.014	-0.024	0.109***	-0.113***	0.085***	0.091***	-0.233***	-0.270***	0.051**	-0.061**	0.412***	1.000		
(19) Abatement Potential	0.023	-0.002	0.037	-0.033	0.106***	0.044*	0.316***	0.013	0.077***	-0.062**	0.058*	0.066**	0.223***	0.332***	-0.129***	0.132***	-0.062**	-0.251***	1.000	
(20) Carbon Pricing	0.032	0.028	-0.095***	0.041	-0.086***	-0.097***	-0.006	-0.007	0.001	0.127***	0.037	0.030	-0.079***	-0.116***	0.308***	0.108***	0.093***	0.235***	-0.100***	1.000

This table shows the summary statistics (Panel A) and the correlation matrix (Panel B) of the firm-event-window level variables used in the market reaction test. A detailed description of the variables is in Appendix A.

Table 4: Determinants of Target Announcement

	(1) Announcement Year	(2) Post Announcement	(3) Post Announcement (3 years)	(4) Announcement Year (Exclude after announcement)
Log(MV)	0.025***	0.057***	0.034***	0.031***
	(19.51)	(19.12)	(19.33)	(19.09)
Capital Intensity	-0.003	-0.014**	-0.009**	-0.005*
	(-1.36)	(-2.31)	(-2.21)	(-1.73)
Leverage	0.002**	0.005***	0.004***	0.003***
	(2.57)	(2.81)	(2.87)	(2.71)
ROA	-0.059***	-0.113***	-0.082***	-0.068***
	(-3.89)	(-4.15)	(-3.60)	(-4.03)
Price-to-Book	-0.175***	-0.370***	-0.195***	-0.218***
	(-4.14)	(-4.12)	(-3.17)	(-4.34)
Volatility	0.025	0.089**	0.065**	0.034*
	(1.53)	(2.30)	(2.52)	(1.79)
Sales Growth	-0.032***	-0.055***	-0.031***	-0.036***
	(-5.55)	(-4.72)	(-3.52)	(-5.46)
CO2 Intensity	0.005***	0.010**	0.007***	0.006***
	(3.33)	(2.54)	(3.18)	(3.08)
Asset4 E Score	0.006***	0.015***	0.009***	0.008***
	(11.17)	(11.30)	(10.91)	(11.21)
N	36925	36925	36925	34771
Adj. R-squared	0.100	0.215	0.116	0.127
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm

This table presents the regression results on the determinants of firms announcing emissions targets. *Announcement Year* equals 1 if the firm announces an emissions target in a given year. *Post Announcement* equals 1 from the year of the first announcement onward. *Post Announcement* (*3 years*) equals 1 for the three years following the first announcement year. Column (4) replicates the regression from Column (1) and excludes non-target-announcing years after a firm's first announcement. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. Year, country, and firm fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Market Reaction to Emissions Target Announcements

	(1) CAR[-1, 1]	(2) CAR[-1, 1]	(3) CAR[-1, 3]	(4) CAR[-1, 3]	(5) CAR[-1, 5]	(6) CAR[-1, 5]	(7) CAR[-1, 10]	(8) CAR[-1, 10]
Constant	-0.054	-0.210	-0.253***	-0.666***	-0.277***	-0.827***	-0.474***	-1.279***
	(-0.80)	(-1.03)	(-2.79)	(-2.59)	(-2.59)	(-2.59)	(-3.33)	(-2.99)
Announcement Propensity		0.016		0.042*		0.057**		0.083**
		(0.88)		(1.79)		(1.98)		(2.20)
N	1911	1911	1911	1911	1911	1911	1910	1910
Adj. R-squared	-0.000	-0.000	0.004	0.005	0.003	0.005	0.005	0.008
Clusters	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

This table presents the regression results of CARs on *Announcement Propensity*. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Market Reaction to Target Announcements: Credibility

Panel A: CAR[-1, 3]						
	(1)	(2)	(3)	(4)	(5)	(6)
	CAR[-1, 3]	CAR[-1, 3]	CAR[-1, 3]	CAR[-1, 3]	CAR[-1, 3]	CAR[-1, 3]
Reasonable Assurance Scope 1 or 2	-0.711**					
	(-2.08)					
Reasonable Assurance Scope 1		-0.682**				
		(-1.98)				
MSCI E Score			-0.175**			
			(-2.17)			
MSCI Climate Change Score				-0.143**		
				(-2.04)		
Years of Emissions Disclosure					-0.062**	
					(-2.13)	
Credibility PC						-0.415***
						(-3.21)
Log(MV)	-0.130	-0.129	-0.042	-0.055	-0.090	-0.027
	(-0.72)	(-0.71)	(-0.24)	(-0.31)	(-0.62)	(-0.15)
ROA	0.014	0.013	-0.014	-0.012	-0.016	-0.009
	(0.46)	(0.45)	(-0.59)	(-0.50)	(-0.74)	(-0.37)
Volatility	-0.020	-0.020	-0.010	-0.004	-0.018	-0.004
	(-0.75)	(-0.72)	(-0.41)	(-0.18)	(-0.85)	(-0.15)
Sales Growth	-0.021	-0.021	-0.026*	-0.027**	-0.012	-0.030**
	(-1.21)	(-1.22)	(-1.86)	(-1.98)	(-1.01)	(-2.16)
Price-to-Book	0.043	0.043	0.020	0.028	0.024	0.027
	(1.57)	(1.57)	(0.80)	(1.11)	(1.07)	(1.10)
Capital Intensity	-0.006	-0.007	-0.002	-0.002	-0.007	-0.001
	(-0.45)	(-0.51)	(-0.15)	(-0.16)	(-0.59)	(-0.11)
Leverage	-0.002*	-0.002*	-0.000	-0.001	-0.000	-0.001
	(-1.73)	(-1.73)	(-0.38)	(-1.00)	(-0.58)	(-0.92)
CO2 Intensity	0.200	0.197	0.070	0.035	-0.003	0.072
	(1.23)	(1.21)	(0.56)	(0.26)	(-0.03)	(0.55)
Announcement Propensity	0.127*	0.126*	0.103*	0.118*	0.127**	0.144**
	(1.72)	(1.70)	(1.66)	(1.87)	(2.29)	(2.23)
N	1123	1123	1494	1457	1903	1457
Adj. R-squared	0.012	0.012	0.005	0.007	0.007	0.011
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm	Firm	Firm

Continued on following page

Table 6 (continued)

Panel B: Alternative CAR

	(1) Negative CAR[-1, 3]	(2) CAR[-1, 1]	(3) CAR[-1, 5]	(4) CAR[-1, 10]
Credibility PC	0.047***	-0.193*	-0.398**	-0.380*
	(2.80)	(-1.91)	(-2.40)	(-1.75)
Log(MV)	-0.010	0.078	-0.059	-0.101
	(-0.40)	(0.56)	(-0.31)	(-0.37)
ROA	0.000	-0.013	-0.001	-0.004
	(0.12)	(-0.71)	(-0.05)	(-0.12)
Volatility	-0.000	0.004	0.005	-0.043
	(-0.19)	(0.20)	(0.17)	(-1.09)
Sales Growth	0.004***	-0.008	-0.040**	-0.042*
	(2.77)	(-0.72)	(-2.45)	(-1.96)
Price-to-Book	-0.004	0.005	0.047	0.067*
	(-1.28)	(0.34)	(1.57)	(1.68)
Capital Intensity	0.002	0.005	0.001	0.002
	(1.07)	(0.59)	(0.04)	(0.11)
Leverage	0.000*	0.000	-0.001	-0.001
	(1.78)	(0.08)	(-1.11)	(-0.74)
CO2 Intensity	0.006	0.133	-0.071	-0.028
	(0.42)	(1.25)	(-0.47)	(-0.15)
Announcement Propensity	-0.009	0.029	0.191**	0.194**
	(-1.04)	(0.54)	(2.56)	(2.01)
N	1457	1457	1457	1457
Adj. R-squared	0.016	-0.016	0.022	0.006
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm

This table presents the regression results on the market reaction to target announcement with regard to the credibility of environmental disclosure. Panel A shows how different credibility measures are associated with the cumulative abnormal returns (CARs). Panel B shows the robustness of results using alternative specifications of CARs. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. Year, country, and industry fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Market Reaction to Target Announcements: Benefits and Cost

	(1) CAR[-1, 3]	(2) CAR[-1, 3]	(3) CAR[-1, 3]	(4) CAR[-1, 3]	(5) CAR[-1, 3]
Industry Scope 1 Ratio	-1.183**				
	(-1.97)				
Hard-to-abate Industries		-0.653*			
		(-1.94)			
Abatement Potential			0.049**		
			(2.41)		
Carbon Pricing (Country)				0.488**	
				(2.03)	
Carbon Pricing (CDP)					0.403*
					(1.69)
Log(MV)	-0.018	-0.005	0.050	-0.010	-0.055
	(-0.11)	(-0.03)	(0.24)	(-0.06)	(-0.38)
ROA	-0.012	-0.010	-0.016	-0.012	-0.004
	(-0.57)	(-0.45)	(-0.58)	(-0.50)	(-0.14)
Volatility	-0.015	-0.006	-0.036*	-0.013	-0.017
	(-0.80)	(-0.31)	(-1.75)	(-0.55)	(-0.80)
Sales Growth	-0.020	-0.020	-0.010	-0.028**	-0.003
	(-1.56)	(-1.61)	(-0.62)	(-2.09)	(-0.18)
Price-to-Book	0.030	0.032	0.027	0.025	0.042
	(1.23)	(1.33)	(0.99)	(1.01)	(1.52)
Capital Intensity	0.011	0.005	-0.014	0.002	0.001
	(1.10)	(0.54)	(-1.48)	(0.18)	(0.15)
Leverage	-0.001	-0.001	-0.000	-0.001	-0.001
	(-0.77)	(-0.82)	(-0.18)	(-1.16)	(-1.28)
CO2 Intensity	0.125	0.022	-0.014	0.119	0.045
	(1.12)	(0.23)	(-0.15)	(0.83)	(0.39)
Announcement Propensity	0.091	0.091	0.136**	0.097	0.090
	(1.59)	(1.59)	(1.99)	(1.63)	(1.42)
Credibility PC	-0.309**	-0.313***	-0.515***	-0.335***	-0.289**
	(-2.57)	(-2.58)	(-3.75)	(-2.67)	(-2.12)
N	1465	1465	1113	1457	1079
Adj. R-squared	0.012	0.012	0.032	0.005	0.003
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	No
Country FE	Yes	Yes	Yes	No	No
Clusters	Firm	Firm	Firm	Firm	Firm

This table presents the regression results on the market reaction to target announcement with regard to the benefits and costs of decarbonization. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. Year, country, and industry fixed effects are included, depending on the explanatory variable. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8: CO2 Intensity after Emissions Target Announcement

	Dependent Variable: CO2 Intensity					
	Generalized DiD			Matched and Stacked DiD		
	(1)	(2)	(3)	(4)	(5)	(6)
Post Announcement	-0.095***			-0.054***		
	(-3.97)			(-3.01)		
Post Positive Reaction		-0.083**			-0.031	
		(-2.11)			(-1.22)	
Post Negative Reaction		-0.106***			-0.075***	
		(-3.47)			(-3.27)	
Post Very Positive Reaction			-0.070			-0.041*
			(-1.53)			(-1.76)
Post Very Negative Reaction			-0.119***			-0.089***
			(-2.79)			(-3.10)
Log(MV)	-0.054***	-0.054***	-0.054***	-0.046***	-0.046***	-0.045***
	(-3.56)	(-3.57)	(-3.56)	(-2.96)	(-2.97)	(-2.90)
Capital Intensity	0.130***	0.130***	0.129***	0.056**	0.055**	0.053**
	(3.00)	(3.00)	(2.98)	(2.37)	(2.35)	(2.30)
Leverage	-0.003	-0.003	-0.003	0.005	0.004	0.005
	(-0.87)	(-0.89)	(-0.87)	(0.90)	(0.85)	(0.93)
ROA	-0.281***	-0.281***	-0.276***	-0.439***	-0.439***	-0.431***
	(-4.04)	(-4.04)	(-3.98)	(-6.00)	(-6.00)	(-5.85)
Price-to-Book	0.360**	0.363**	0.350**	-0.037	-0.026	-0.050
	(2.38)	(2.40)	(2.32)	(-0.24)	(-0.17)	(-0.32)
Volatility	-0.294	-0.294	-0.291	-0.500**	-0.497**	-0.497**
	(-1.62)	(-1.62)	(-1.60)	(-2.51)	(-2.51)	(-2.53)
Sales Growth	-0.347***	-0.347***	-0.348***	-0.434***	-0.434***	-0.436***
	(-8.59)	(-8.59)	(-8.58)	(-5.34)	(-5.36)	(-5.29)
E Score (Asset4)	-0.006*	-0.006*	-0.006*	-0.011*	-0.011*	-0.011*
	(-1.79)	(-1.80)	(-1.66)	(-1.71)	(-1.72)	(-1.65)
N	37800	37800	37800	14692	14692	14692
Adj. R-squared	0.897	0.897	0.897	0.939	0.939	0.939
Year FE	Yes	Yes	Yes	No	No	No
Firm FE	Yes	Yes	Yes	No	No	No
Cohort × Year FE	No	No	No	Yes	Yes	Yes
Cohort × Firm FE	No	No	No	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Cohort X Firm	Cohort X Firm	Cohort X Firm
P-value (Positive=Negative)		0.327	0.222		0.079	0.088

This table presents the regression results on the post-announcement changes in CO2 intensity. Columns (1)–(3) use a generalized difference-in-differences (DiD) approach, where firms' target announcements are staggered over time. Columns (4)–(6) employ a stacked DiD approach, in which announcement cohorts from -3 to +4 years relative to the announcement year are stacked together. Each target-announcing firm is matched to three never-announced firms using nearest-neighbor matching based on the determinants of target announcements from Table 4, excluding CO2 intensity. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. The generalized DiD models include firm and year fixed effects, while the stacked DiD models include cohort × firm and cohort × year fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: CO2 Intensity after Emissions Target Announcement by Credibility PC

	Dependent Variable: CO2 Intensity					
	High Credibility PC			Low Credibility PC		
	(1)	(2)	(3)	(4)	(5)	(6)
Post Announcement	-0.083***			-0.037		
	(-3.24)			(-1.47)		
Post Positive Reaction		-0.064**			-0.013	
		(-1.98)			(-0.35)	
Post Negative Reaction		-0.097***			-0.060**	
		(-2.64)			(-2.16)	
Post Very Positive Reaction			-0.072*			-0.020
			(-1.78)			(-0.70)
Post Very Negative Reaction			-0.108**			-0.084**
			(-2.29)			(-2.39)
Log(MV)	-0.036	-0.037	-0.035	-0.055***	-0.055***	-0.054**
	(-1.51)	(-1.52)	(-1.45)	(-2.66)	(-2.64)	(-2.57)
Capital Intensity	0.029	0.029	0.027	0.082**	0.080**	0.078**
	(1.02)	(1.02)	(0.98)	(2.21)	(2.16)	(2.10)
Leverage	0.003	0.002	0.003	0.008	0.008	0.008
	(0.31)	(0.26)	(0.35)	(1.16)	(1.15)	(1.20)
ROA	-0.211**	-0.209*	-0.199*	-0.588***	-0.589***	-0.583***
	(-1.98)	(-1.95)	(-1.82)	(-6.22)	(-6.24)	(-6.16)
Price-to-Book	-0.125	-0.105	-0.157	-0.013	-0.015	-0.024
	(-0.51)	(-0.41)	(-0.63)	(-0.07)	(-0.08)	(-0.12)
Volatility	-0.395	-0.396	-0.388	-0.504*	-0.501*	-0.499*
	(-1.33)	(-1.33)	(-1.32)	(-1.89)	(-1.89)	(-1.90)
Sales Growth	-0.558***	-0.558***	-0.564***	-0.355***	-0.354***	-0.354***
	(-3.45)	(-3.47)	(-3.39)	(-4.85)	(-4.85)	(-4.88)
E Score (Asset4)	-0.012	-0.012	-0.012	-0.014*	-0.014*	-0.013*
	(-0.96)	(-0.94)	(-0.91)	(-1.72)	(-1.74)	(-1.69)
N	6173	6173	6173	8064	8064	8064
Adj. R-squared	0.942	0.942	0.942	0.937	0.937	0.937
Cohort × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Cohort X Firm	Cohort X Firm	Cohort X Firm	Cohort X Firm	Cohort X Firm	Cohort X Firm
P-value (Positive=Negative)		0.243	0.275		0.136	0.066

This table presents the cross sectional results on the post-announcement changes in CO2 intensity. Columns (1)–(3) show results for the subsample with above-median *Credibility PC*, and columns (4)–(6) show results for the subsample with below-median *Credibility PC*. The analyses employ a stacked DiD approach, in which announcement cohorts from -3 to +4 years relative to the announcement year are stacked together. Each target-announcing firm is matched to three never-announced firms using nearest-neighbor matching based on the determinants of target announcements from Table 4, excluding CO2 intensity. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. The stacked DiD models include cohort × firm and cohort × year fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Environmental Scores after Emissions Target Announcement

	(1) Asset4 E Score	(2) Asset4 Emissions Score	(3) MSCI E Score	(4) MSCI Emissions Score	(5) Asset4 E Score	(6) Asset4 Emissions Score	(7) MSCI E Score	(8) MSCI Emissions Score
Announcement Firm	1.212***	1.352***	0.485***	0.484***				
	(16.36)	(15.30)	(8.78)	(7.67)				
Post Announcement	0.372***	0.164	0.403***	0.332***	-0.702***	-1.001***	0.105*	-0.108**
	(4.16)	(1.64)	(5.86)	(4.75)	(-10.75)	(-11.98)	(1.81)	(-1.97)
Log(MV)	0.755***	0.861***	0.218***	0.260***	0.320***	0.415***	0.129***	0.206***
	(42.92)	(41.69)	(15.30)	(16.91)	(14.03)	(14.80)	(5.28)	(7.44)
Capital Intensity	-0.212***	-0.242***	-0.059**	-0.155***	-0.158***	-0.167***	0.022	0.056
	(-7.53)	(-7.83)	(-2.20)	(-3.98)	(-6.05)	(-5.67)	(0.85)	(1.59)
Leverage	0.168***	0.157***	-0.002	0.041***	0.059***	0.058***	0.025***	0.010
	(12.13)	(9.64)	(-0.17)	(4.14)	(6.34)	(4.97)	(2.70)	(1.22)
ROA	-1.089***	-1.150***	-1.010***	-0.759***	-0.548***	-0.702***	-0.412***	-0.345***
	(-7.37)	(-6.69)	(-7.59)	(-5.80)	(-5.58)	(-5.81)	(-3.61)	(-2.83)
Price-to-Book	-6.779***	-6.937***	0.748*	-0.583	-2.182***	-2.629***	-1.156***	0.206
	(-11.20)	(-9.73)	(1.72)	(-1.45)	(-5.54)	(-5.15)	(-2.67)	(0.53)
Volatility	-2.686***	-3.281***	-2.099***	-3.806***	-2.528***	-3.351***	-0.556*	-1.698***
	(-10.07)	(-10.43)	(-10.84)	(-17.40)	(-8.18)	(-8.73)	(-1.65)	(-4.34)
Sales Growth	-1.122***	-1.169***	-0.334***	-0.738***	-0.290***	-0.335***	-0.052	-0.128**
	(-17.60)	(-15.88)	(-6.13)	(-12.54)	(-6.17)	(-5.97)	(-1.07)	(-2.45)
N	68648	68648	60180	55012	68032	68032	59182	54005
Adj. R-squared	0.381	0.340	0.392	0.421	0.807	0.772	0.736	0.753
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	No	No	No	No
Firm FE	No	No	No	No	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

This table presents the regression results on the post-announcement changes in environmental scores. A detailed description of the variables is in Appendix A. Ordinary least squares (OLS) coefficient estimates are reported, with (in parentheses) t-statistics based on robust standard errors clustered by firm. Columns (1) - (4) include industry and year fixed effects, while columns (5) - (8) include firm and year fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix A: Variable Definitions

Variable	Description	Source
CAR [-1,3]	Cumulative abnormal return over 5 days of the event window from day -1 to day 3.	Datastream
Log(MV)	Log(1 + Market Value).	Datastream
ROA	Return on Assets.	Datastream
Volatility	Annual standard deviation of stock returns.	Datastream
Sales Growth	3-year sales growth.	Datastream
Price-to-Book	Market value of equity over book value of equity at the end of the calendar year.	Datastream
Capital Intensity	Capital expenditures over sales.	Datastream
Leverage	Total debt over common equity.	Datastream
Hard-to-abate Industries	An indicator variable equal to 1 for firms in the Transportation and Materials Industries.	Datastream
CO2 Intensity	Scope 1 and 2 carbon emissions over revenue.	Refinitiv
Years of Emissions Disclosure	Cumulative number of years in which the firm discloses emissions amount.	Refinitiv
Industry Scope 1 Ratio	GICS Industry-level average of percentage of scope 1 emissions out of total emissions.	Refinitiv
Asset4 E Score	Environmental Pillar Score (scale: 0 - 10).	Asset4
Asset4 Emission Score	Emission Score (scale: 0 - 10).	Asset4
MSCI E Score	Environmental Pillar Score (scale: 0 - 10).	MSCI
MSCI Climate Change Score	Climate Change Theme Score (scale: 0 - 10).	MSCI
MSCI Emissions Score	Carbon Emissions Score (scale: 0 - 10).	MSCI
Reasonable Assurance Scope 1 or 2	An indicator variable equal to 1 for the firm-year in which the firm obtains reasonable assurance for the scope 1 or 2 emissions.	CDP
Reasonable Assurance Scope 1	An indicator variable equal to 1 for the firm-year in which the firm obtains reasonable assurance for the scope 1 emissions.	CDP
Carbon Pricing (CDP)	An indicator variable equal to 1 for the firm-year in which the firm implements a carbon pricing system.	CDP
Announcement Year	An indicator variable equal to 1 for the firm-year in which the firm announces an emissions reduction target.	Ravenpack
Announcement Firm	An indicator variable equal to 1 for firms that have ever announced an emissions reduction target.	Ravenpack
Post Announcement	An indicator variable equal to 1 for the firm-year after the firm announces an emissions reduction target.	Ravenpack
Post Positive Reaction	An indicator variable equal to 1 for the firm-year after the firm announces an emissions reduction target and receives a positive abnormal return.	Ravenpack

Continued on following page

Appendix A, continued

Variable	Description	Source
Post Negative Reaction	An indicator variable equal to 1 for the firm-year after the firm announces an emissions reduction target and receives a negative abnormal return.	Ravenpack
Post Very Positive Reaction	An indicator variable equal to 1 for the firm-year after the firm announces an emissions reduction target and receives an abnormal return in the upper tercile.	Ravenpack
Post Very Negative Reaction	An indicator variable equal to 1 for the firm-year after the firm announces an emissions reduction target and receives an abnormal return in the bottom tercile.	Ravenpack
Abatement Potential	GICS Industry-level average of the emissions abatement potential of firms' climate solutions.	Lu et al. (2025)
Carbon Pricing (Country)	An indicator variable equal to 1 for firms in countries where a carbon pricing system is implemented.	LSE Grantham Research Institute
Announcement Propensity	Propensity score generated from the linear probability model in the determinants test (Column 4 of Table 4).	
Credibility PC	The first principal component of Reasonable Assurance Scope 1 or 2, MSCI Climate Change Score, and Years of Emissions Disclosure.	

This table provides the descriptions and sources of variables used in this paper.

Online Appendix 1: Corporate Emissions Targets Labeling

To evaluate the performance of GPT's labelling of corporate emissions targets, we manually label 300 sentences. For our annotation procedure, we implement the following general rules referencing Webersinke et al., 2022 (Webersinke et al., 2022). The annotators have to determine whether a headline is related to a company's emissions reduction targets. Annotators are asked to apply common sense, e.g., when a given sentence might not provide all the context, but the context might seem obvious. Moreover, annotators are informed that each annotation should be a 0-1 decision. Hence, if an annotator is 70% certain, it is rounded up to 100%. Two researchers annotate the same tasks to obtain some measure of dispersion. In case of a close verdict or a tie between the annotators, the authors of this paper discuss the sentence in depth before reaching an agreement.

We define corporate emissions target for company i as headlines that contain company i's name, an emissions-related target, with a target year. As a general rule, we determine that just discussing sustainability or energy efficiency is not sufficient, the sentence should mention emissions or renewable energy. Below, we provide some examples.

Sentence	**Label**	**Reason**
ANA aims for carbon neutrality by 2050.	1	Yes this is a corporate emissions target.
Lowe's sets goal to reach net-zero emissions across scopes 1, 2 and 3 by 2050.	1	Yes this is a corporate emissions target.
Why Burberry has pledged to be 'climate positive' by 2040	1	Yes this is a corporate emissions target.
Sysco announces sustainability bond framework to advance its 2025 CSR goals.	0	We do not consider CSR or sustainability targets as emissions targets. We also do not consider the issuance of sustainability or green bonds as emissions targets.
Coca-cola aims to collect and recycle all packaging by 2030.	0	We do not consider broad environmental efforts as emissions targets.
China needs to cut 85% of carbon emissions to achieve 2060 goal, ANZ says.	0	This is a country-level target, not a firm-level target.

GPT Prompt

We continuously enhance the GPT prompt until we reach an accuracy rate of above 96%. The final prompt is as follows.

Listing 1: GPT prompt for emissions target identification

```
system_message =     "You are a chatbot trained to classify
   whether a media headline relates to a company's emissions
   reduction target. "
"The headline generally should include the name of the company
   and the target year for emissions reduction. "
"Generic industry targets or a firm's non-climate targets (e.g
   ., social, governance, earnings) should be classified as no
   ."
"Generic sustainability targets should also be classified as no
   ."
"Targets related to the company's renewable energy usage should
    be classified as yes."
"Targets related to low carbon products, such as zero emissions
    vehicles or low carbon steels, should be classified as yes
   ."
```

Target Ambition

For headlines classified as an emissions target, we ask a follow up question on whether or not the target is considered ambitious. As target ambition is subject to interpretation, for full transparency, we create the prompt by asking GPT chatbot the following: "We have a list of headlines that are classified as firm's emissions reduction target, and we'd like to ask chatgpt api if the target is considered ambitious. Can you provide the system message and prompt for this?"

We then use the prompt suggested by GPT, as follows:

Listing 2: GPT prompt for target ambition

```
system_message =     "You are an expert in climate policy,
   corporate sustainability, and environmental science. You
   assess the ambition level of corporate emissions reduction
   targets based on common international standards (e.g.,
   science-based targets, net-zero alignment, 1.5°C pathways,
   sector benchmarks, and target scope and timeframe).
Use your expertise to determine whether a firm's target, as
   described in a brief headline, appears to be ambitious. When
    appropriate, explain your reasoning, taking into account
   whether the target is specific, science-aligned, and
   challenging relative to the firm's sector or baseline."
```

Below, we provide examples of the response from GPT on whether or not the target is ambitious, along with GPT's reasoning.

Sentence	Ambition	GPT Reason
Air Liquide's 2035 CO2 trajectory validated by the science based targets initiative (SBTi).	Yes	The headline indicates that Air Liquide's 2035 CO2 trajectory has been validated by the Science Based Targets initiative (SBTi). This suggests that the company's emissions reduction target is aligned with the latest climate science and is likely consistent with the goals of the Paris Agreement...
Lowe's sets goal to reach net-zero emissions across scopes 1, 2 and 3 by 2050.	Yes	Setting a goal to reach net-zero emissions across scopes 1, 2, and 3 by 2050 is generally considered ambitious.
JPMorgan committing to match all scope 1 operational emissions with equivalent carbon removals by 2030, company officials say.	No	For a financial institution like JPMorgan Chase, the majority of its carbon footprint is likely to be in Scope 3 emissions, particularly those related to its investment and lending activities. An ambitious target would typically include significant Scope 3 emissions reductions.
Adidas targets carbon-footprint reduction of 15% by 2025.	No	A 15% reduction in carbon footprint by 2025 is not likely to be considered ambitious, especially for a company like Adidas AG, which operates in the apparel and footwear sector.
Bluescope to pursue goal of net zero by 2050	Unclear	Without additional details, it is difficult to assess the ambition level. Key factors that would influence this assessment include whether the target covers all scopes of emissions (Scope 1, 2, and 3), if there are interim targets, and how the company plans to achieve this goal, especially given the steel industry's high emissions intensity. Additionally, alignment with science-based targets or sector-specific benchmarks would provide more clarity on the ambition level.
BMO sets net-zero emissions targets in financing activities by 2050.	Unclear	While setting a net-zero target by 2050 aligns with global climate goals, the ambition of this target depends on several factors not specified in the headline. These include whether the target covers all relevant scopes of emissions, the interim targets set for 2030 or earlier, the specific strategies and measures the bank plans to implement to achieve these targets, and how these targets compare to sector-specific benchmarks. Without this additional information, it is difficult to assess the ambition level of the target.