# Accountability of Corporate Emissions Reduction Targets*

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**Abstract**

Firms are increasingly announcing targets to reduce their carbon emissions, but it is unclear whether firms are held accountable for these targets. In this paper, we examine emissions targets that ended in 2020 to investigate the prevalence of missed targets, how firms disclose target results, and whether there are consequences for missed emissions targets. Using data from the CDP, 1,041 firms have emissions targets ending in 2020, of which 88 (8%) failed and 320 (31%) disappeared. We find limited evidence of accountability and low awareness of the target outcomes. Only three of the failed firms are covered by the media. After a firm fails its 2020 emissions target, we do not observe significant market reaction, changes in media sentiment, environmental scores, and environment-related shareholder proposals. In contrast, we observe significantly positive reactions in media sentiment and environmental scores when firms initially report setting their 2020 emissions targets. Our findings underscore the importance of institutions increasing transparency and holding firms accountable for emissions target outcomes, providing insights for emissions targets ending in 2030, 2040, and 2050.

**Keywords**: emissions reduction target, decarbonization, climate change, accountability

**JEL classification**: Q54, M14, M41, G14

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# 1 Introduction

Companies play a vital role in achieving the Paris Agreement to limit global warming to 2 degrees Celsius above pre-industrial levels (the 2-degree scenario). As of the end of 2022, 3,904 companies have set emissions reduction targets, of which 1,859 have been approved by the Science-Based Targets Initiative to be in line with the 2-degree scenario (SBTi, 2022). Announcements of these emissions targets, such as Microsoft's claim to become carbon negative by 2030, often make media headlines.[1] Yet it remains unclear if there are oversights of these claims and whether firms are held accountable for the target outcomes. In the absence of accountability, firms may lack sufficient incentives to pursue genuine decarbonization efforts, leading instead to opportunities for cheap talk, raising concerns about the overall credibility of these emissions reduction targets.

In this paper, we study whether there is accountability for companies' emissions targets that ended in 2020 (i.e., targets with final target years of 2020). More specifically, we ask three questions related to such accountability. First, what are the target outcomes and can they be meaningfully interpreted? Second, what is the level of transparency (e.g., firm disclosure, media dissemination) of the target outcomes? Third, are there any consequences associated with missing emissions targets, and if so, what are they?

It is unclear whether firms are held accountable for their 2020 emissions targets. On the one hand, firms are increasingly under stakeholder scrutiny for their climate impacts (e.g., Dyck et al., 2019; Azar et al., 2021). Firms that voluntarily set emissions targets likely find it beneficial to lower emissions in the face of higher climate transition risk and increased pressure from various stakeholders. As such, we expect firms to be under the spotlight to report on emissions target outcomes and face consequences when the targets are not fulfilled. Similarly, the financial accounting

[1] PR: https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/; this press release is further disseminated by ten other news articles.

literature finds that missing an earnings target is associated with negative market reaction and heightened litigation risk (Skinner and Sloan, 2002), CEO bonus reduction and turnover (Puffer and Weintrop, 1991; Matsunaga and Park, 2001; Mergenthaler et al., 2012), and negative media coverage (Oliver et al., 2023). These negative consequences make managers accountable to the earnings targets to the extent that they are willing to use earnings management to prevent missing an earnings target (Graham et al., 2005).

On the other hand, the institutional structure for providing environmental oversight is still under development. In the financial accounting setting, there are standardized reporting (e.g., US GAAP, IFRS), well-established regulatory frameworks (e.g., US SEC, UK FCA), and sophisticated information analyzers (e.g., institutional investors, analysts). These elements together create a robust and reliable system for financial accountability (Leuz, 2010). When it relates to emissions reduction, however, most of these institutional infrastructure are still under development. Recent literature emphasizes the role of mandatory greenhouse gas disclosure as a disciplining mechanism to hold firms accountable for their emissions targets because such disclosure allows stakeholders to assess a firm's target progress over time (Bolton et al., 2021; Comello et al., 2023; Greenstone et al., 2023), and provides ex-ante incentives for firms to voluntarily disclose forward-looking targets that they intend to achieve (Ball et al., 2012). However, it is not clear if mandatory disclosure is sufficient without other supporting institutions to disseminate and process the information being disclosed, such that stakeholders can identify firms with poor performance and impose penalties. As such, the extent to which these institutions effectively provide oversight generates important evidence to inform the need for such institutions to hold firms accountable for the majority of emissions targets that will end in 2030, 2040, and 2050.

Studying the accountability of these emissions targets is challenging for three reasons. First, it is difficult to measure accountability when emissions targets are relatively new. For example, it is

not clear which stakeholders should be responsible for providing such accountability, and what a failed target means. As such, we define accountability broadly by examining target outcomes, its transparency, and whether stakeholders like investors and ESG rating agencies respond to target outcomes. This interpretation of accountability means we are not assuming all firms with failed targets should be penalized, but that we study whether there is transparency of the outcomes and whether institutions can tell apart firms with good versus bad performance.

Second, in the absence of standardized environmental disclosure in most countries, it is difficult to consistently identify emissions targets and outcomes. We identify emissions targets using the CDP (formerly the Carbon Disclosure Project) data, the largest source of corporate disclosure on climate-related matters. To enhance the comparability of the emissions targets and the power of our analysis, we focus on targets that end in 2020. As companies often set emissions targets with target years every ten years (e.g., targets due in 2020, 2030, 2040, or 2050), 2020 is the first year in which we can obtain a large sample of emissions target outcomes. While we acknowledge that firms self-select to have 2020 emissions targets, our main analysis compares among these firms based on their target outcomes. In Appendix B, we find that these firms have higher investments in decarbonization, environmental scores, and media visibility. As such, we expect more accountability among this sample, which also helps enhance the power of our analysis.

Third, we need to ensure our analysis provides sufficient power to identify any results, including a null result showing a lack of accountability. To enhance the power of our analysis, we focus on emissions targets with the highest visibility. We identify these targets by imposing a few criteria based on observing firm-level targets that best resemble those reported in press releases and sustainability reports. We keep targets that cover scopes 1 or 2, since these are emissions under the firm's control and measurement is more reliable. We require the target to cover over 80% of the emissions in the scopes, and have a target period longer than 3 years. We identified 1,041 firms

with 1,541 emissions targets that end in 2020. These firms collectively represent 2.5 billion tons of scope 1 greenhouse gas emissions in 2020, and on average, promise to reduce emissions by 3 percent per year in their targets for 2020.[2] Additionally, we also conduct a similar set of analysis with the announcement of new targets to contrast the effects of target outcomes and provide evidence that our sample and methodology has sufficient power to identify significant results.

To answer the first question, we examine the outcomes of the emissions targets. To the extent that firms are held accountable to the targets, we expect the outcomes to be readily available and easy to interpret. Out of the 1,041 firms, only 721 firms provide status on the completed emissions targets that end in 2020. In other words, 320 (31%) firms set an emissions target in an earlier year with a target year of 2020 but we cannot find information about the outcomes of the targets in 2020 or after, and we label them as "disappeared firms." Among these disappeared firms, only 15% disappeared in the year 2020, meaning that most of the disappeared firms did not stop reporting the targets because of COVID-19. Indeed, as shown in Panel B of Figure 1, the disappeared firms are more likely to lag behind in target progress in earlier years.[3] Of the 721 firms with target outcomes, 88 firms have a failed emissions target. We label these 88 firms as "failed firms" and the remaining as "achieved firms." We validate that failed firms are indeed associated with a lower reduction in greenhouse gas changes.[4] Contrary to the expected disciplining mechanism, among firms in countries with mandatory environmental disclosure, we find a lower rate of "achieved firms" and a higher rate of "disappeared firms," raising concerns about the role of other complementary institutions, such as information dissemination and verification.

[2] According to the Breakthrough Energy Ventures, annual global emissions is estimated to be around 51 billion tons (Breakthrough Energy, 2023). 2.5 billion tons is around 5% of annual global emissions.

[3] In the consequences analysis, we separately study the consequences of disappeared firms with high and low emissions reduction and do not observe negative consequences for either when compared to achieved firms.

[4] We acknowledge that in some cases, missing targets can be the appropriate business decision if these firms face other tradeoffs (e.g., COVID shock, earnings tradeoff) or if the firm is in hard-to-abate sectors. Emissions target setting is also voluntary, and hence firms that set 2020 targets instead of only longer-term targets might be firms that are more environmentally responsible. Nonetheless, we expect there to be institutional oversight to evaluate the outcomes of their emissions targets.

To answer the second question, we study the level of transparency of target outcomes by examining corporate disclosure and media coverage of target outcomes. While CDP is the central source for the disclosure of emissions targets, we examine how companies disclose target outcomes through other channels. Specifically, we consider press releases and sustainability reports for firms' voluntary disclosure. We manually search for the 2020 sustainability reports of firms with failed targets, and out of 88 failed firms, we find 78 firms' sustainability reports. By examining these sustainability reports, we find 26 firms that acknowledge that the 2020 target outcome is less than 100% completed, and only 16 that explicitly acknowledge it by using words like "missing" or "fail to achieve." We also manually search the Ravenpack database for press releases on the outcome of the 2020 emissions targets. We do not find any press releases about missing the target for the failed firms. In contrast, we find 12 news articles of press releases for the achieved firms.

Next, we examine the public awareness and dissemination of the target outcomes by studying media coverage of the target outcomes. For all sample firms, we search in the Ravenpack and TruValue Spotlight databases for news articles (excluding press releases) on the outcomes of 2020 emissions targets. Among the 88 firms with failed targets, only three are covered by the media, and all of these three have acknowledged the target failure in their sustainability reports. For the achieved firms, we identify 14 news articles that are associated with their target outcomes. Among those 14 news articles, 6 are linked to the firm's own press releases on the target outcomes. We do not find media coverage of targets that have disappeared. Overall, the observations suggest weak information dissemination about target outcomes, and that the media are more likely to report on target outcomes based on firms' own disclosure of target performance, as opposed to independent reporting of emissions target outcomes.

To answer our third question, we study four potential consequences for missing emissions targets. First, we consider the market reaction to failing emissions targets to examine if the market

holds companies accountable for their emissions target outcomes. However, the ex-ante prediction for the return response to emissions target outcomes is ambiguous. Prior literature documents that investors price climate risks (e.g., Bolton and Kacperczyk, 2021; Pástor et al., 2022). If emissions targets reduce a firm's climate risks, then a failed emissions target can be associated with a negative market reaction. However, if investors do not deem the emissions targets credible or material, or are not aware of the target outcomes, then we may not observe any market reactions. The market on aggregate may even respond positively to failed emissions targets if the market on average believes achieving emissions targets to be a costly activity. However, the prediction for trading volume response is more clear – the target outcome should elicit higher trading volume if the information is considered by investors.

We study the market reaction to the target outcome information release around the date CDP makes the firm disclosures publicly available to investors. Per correspondence with CDP, the outcomes of 2020 emissions targets are reported in the 2021 CDP survey and were available to investors on 11 October 2021. The market tests reveal insignificant capital market consequences for missing 2020 emissions reduction targets. We do not find significant return responses [-1,1] and [-1,3] days around the CDP releases of failed and achieved targets. For the failed firms with sustainability report dates, we also examine market reaction around the release of these reports and do not find statistically significant market reaction. Finally, we examine market responses around the media coverage of failed and achieved targets. The returns around media coverage for both failed and achieved targets are insignificant. For all target outcome information events, we do not observe a significant increase in trading volume. The absence of a trading volume increase suggests that target outcome information is not that decision-useful for investors, and that the market on aggregate does not hold companies accountable for missing emissions targets.

In addition to market reaction, we examine three other potential consequences and also do not

find significant results for failed firms. We consider changes in shareholder proposals using US Institutional Shareholder Services (ISS) data. If investors are concerned about climate risks, then a failed target can signal concerns about the firm's ability or incentives to address climate risks, where investors can engage with the firm through shareholder proposals (e.g., Flammer et al., 2021). We consider changes in media sentiment, using TruValue media sentiment scores related to environmental issues. If the media scrutinizes suboptimal behavior (e.g., Dyck and Zingales, 2002; Baloria and Heese, 2018), we expect negative sentiment toward firms with failed targets. Finally, we consider changes in environmental scores and the relevant subscores (Asset4 and MSCI). To the extent that environmental scores reflect a firm's environmental performance, we expect scores to decline for firms with missed targets. For all three outcomes, we do not find statistically significant negative consequences for failed firms using a difference-in-differences specification that compares these firms to achieved firms and compares 2021 outcomes to previous years.

Overall, our paper finds limited evidence of accountability over firm's emissions reduction targets that ended in 2020, and that the lack of public awareness and transparency potentially explains the lack of consequences from missing these targets. To provide more color to these results, we separately look at the three firms that are covered by the media as having failed targets: Fedex, Kraft Heinz, and Gildan Activewear. Some common features of these firms are that they are large firms, all three acknowledged failing the target in their sustainability reports. The news article covering Kraft Heinz and Fedex explicitly mentioned the failed environmental target in the headline. The [-1,10] cumulative abnormal return to these two article are -5.757% and -4.224%, respectively. Furthermore, both firms received environmental-related shareholder proposals in the subsequent year. Despite the case study nature of these observations, they suggest that media or information dissemination helps amplify the target outcomes and we observe some negative consequences for these failed firms.

We provide four sets of additional analyses to shed light on the potential reasons for the lack of accountability and attempt to rule out alternative explanations. First, we separately examine failed firms with ambitious and unambitious targets and do not find negative consequences for either, except that failed firms with unambitious targets experience a decline in MSCI Environmental scores. Second, to mitigate the impact of COVID-19, we separately examine industries affected less by COVID-19 and do not find negative consequences. Third, we separately examine industries where emissions are likely a more material issue and do not find negative consequences. Finally, to address the possibility that information about target progress was incorporated by the market before 2020, we study the market reaction to firms already behind in their target progress when CDP results are shared with investors for fiscal 2018 and 2019, and do not find statistically significant reactions. These analyses further support the overall weak accountability over emissions reduction targets that end in 2020.

Finally, we contrast our findings with the announcement of new targets. While failing a target has a 3/88 chance of getting covered by the media, announcing a target receives more media coverage and press releases. We identify 194 firms in our sample that have announced new emissions targets from 2010 to 2021. These announcements are associated with 218 news articles from the media and 109 press releases. The difference between how firms disclose new emissions targets and how they reveal the outcomes of these targets suggests that firms actively disseminate their new targets and the media actively covers it, while there is a lack of attention to the outcomes of such targets. We further explore the potential benefits firms may receive from announcing targets. Although setting new targets does not translate into benefits for the stock market or shareholder engagement, we find that the media and certain market participants, particularly ESG rating agencies, view setting new targets as positive. Firms' long-term environmental media sentiments, Asset4 and MSCI environmental scores increase by 1.3%, 2.1% and 3.9% after setting targets, respectively.

Our findings suggest that stakeholders reward firms for setting emissions targets, but do not hold firms accountable for the outcomes of these targets.

Our paper contributes to three lines of literature. First, we contribute to understanding the credibility of the firm's emissions reduction targets. Prior papers on emissions targets have primarily focused on the establishment of these targets and concerns about whether firms are on track to meet these targets (Ioannou et al., 2016; Rogelj et al., 2021; Dietz et al., 2021; Freiberg et al., 2021; Bjørn et al., 2022a,b; Comello et al., 2023; Kim, 2023). We know very little about the accountability and consequences of missing emissions reduction targets partly because these targets tend to be long-term (e.g., net-zero by 2050), and therefore most target outcomes are not realized yet. By focusing on emissions reduction targets that ended in 2020, we provide the first evidence of which companies fail their emissions targets, how they disclose, and the consequences companies face after failing their emissions targets. We posit that the insights derived from the observed absence of accountability provide critical lessons for monitoring the many emissions targets set for the years 2030, 2040, and 2050.

Second, we add to the literature examining the need for complementary institutions to facilitate credible corporate environmental disclosure. We draw an analogy to earnings targets in the financial accounting literature, where institutional infrastructures, such as standard setters, enforcement, and monitoring agencies, are crucial to providing accountability to financial reporting numbers (e.g., Leuz, 2010; Landsman et al., 2012; Christensen et al., 2013). Christensen et al. (2021) and Grewal and Serafeim (2020) highlight that similar institutional support is important to provide oversight for disclosures related to corporate social responsibility. We provide the first evidence on the institutional responses to firms that missed their 2020 targets, and do not find evidence of institutional oversight on the outcomes of these emissions targets. Our paper documents a lack of awareness from the media and investors when target outcomes are released and a high prevalence

of disappeared targets. We add to the literature on the role of mandatory greenhouse gas disclosure (Bolton et al., 2021; Comello et al., 2023; Greenstone et al., 2023) by showing that mandatory disclosure alone may not be sufficient as without complementary institutions to facilitate information dissemination and analysis, firms can "go dark" or engage in strategic avoidance (Leuz et al., 2008; Kamar et al., 2009; DeFond and Lennox, 2011).

Third, our work adds to the literature examining the consequences, particularly market reactions, to firms' climate actions. Prior research has documented that market prices a firm's carbon emissions (e.g., Pástor et al., 2022; Bolton and Kacperczyk, 2021; Aswani et al., 2023), carbon disclosure (e.g., Matsumura et al., 2014), and green commitments (e.g., Flammer, 2021). Our research extends this literature by studying the market reactions to the outcomes of completed emissions targets. Our finding highlights the lack of market reaction on completed emissions targets, even among more material sectors, and suggests a need for better information dissemination and analysis on target outcomes.

Our findings provide practical implications for enhancing the accountability of future emissions reduction targets by highlighting the need for three sets of complementary institutions. First, our study reinforces the proposed SEC climate disclosure rule requiring firms to disclose emissions targets and annual progress toward them. Second, our result highlights the need to facilitate timely dissemination of target outcome information. Potentially, setting emissions announcement dates, similar to earnings announcement dates, can help align attention from media and other stakeholders. Literature in earnings announcements highlights the importance of preannouncing earnings release dates and that the timing of announcement dates affects information dissemination (e.g., DellaVigna and Pollet, 2009; Boulland and Dessaint, 2017). Third, we need monitoring institutions to keep track of the target outcomes (e.g., Oxford Net Zero Tracker), paying particular attention to firms with targets that disappeared, and providing analysis to evaluate target performance.

# 2 Sample and Data

## 2.1 Emissions Targets

Our sample consists of firms from the CDP database that have reported emission targets with the target year being 2020. Our sample includes companies' emissions targets reported in fiscal years ranging from 2010 to 2021.[5] In the CDP survey, the specific question of interest is phrased as follows: "Did you have an emissions target that was active in the reporting year?" If the company responds affirmatively, they are then asked to provide further details of the target, e.g., the target type (absolute target vs. intensity target), the scope of the emissions that is covered by the target, the target year, and the percentage of progress in completing the target at the reporting year.

In order to retain the emission targets that are most visible and hence are of the most concern to companies and investors, we keep targets that satisfy the following four requirements.[6] First, we keep targets that cover more than 80 percent of base year emissions within that scope. Second, we retain targets with more than 3 years in horizon, defined as the difference between the base year and the target year. Third, we keep targets that cover either scope 1 or scope 2 because scopes 1 and 2 are more under a firm's control, and that scope 3 involves more complexity in measurement and comparability. Lastly, around 9% of firms have more than one target per target type and scope combination. For these firms, for each combination of target type and scope, we keep the target with the highest base year emissions level, the highest percentage of emission coverage in the base year, and the longest time horizon. Therefore, for each firm in each reporting year, we select the most important emissions target for each combination of target type and emissions scope. On

[5]The CDP reports correspond to the fiscal year preceding the reporting year, e.g., the 2021 CDP reporting year contains data related to fiscal 2020.

[6]An example of an emissions target that is dropped because of our criteria is Korean Air Lines' scope 1 and 2 absolute target. This target only covers 5% of emissions and is not reported in their sustainability reports. In contrast, Korean Air Lines' other 2020 target on scope 1 intensity covers 94% of emissions, is included in our sample and also covered in their sustainability reports.

average, these targets cover 98.10% of the emissions of the sample firms with an average reduction goal of 23.81%.

For each target, We consider a target to be achieved if the self-reported target progress reaches 100% or the self-reported target status is "achieved" in the most recent year of reporting for that specific target. Note that while we keep emission targets with the target year being 2020, a target can be achieved prior to 2020.[7] A target is deemed failed if the most recent year of reporting for that specific target is 2021 and the self-reported target progress is less than 100% or the self-reported target status is not "achieved". We define a target as disappeared if the most recent year of reporting for that specific target is prior to 2021 and the self-reported target progress is less than 100% or the self-reported target status is not "achieved ."[8] We also manually read the sustainability reports of companies with failed targets and the comments related to the specific failed target in the CDP survey to rule out possibilities of labeling targets that are in fact achieved as "failed".

Since a firm can have multiple targets, we label firms that have at least one failed target as "failed firms." Firms that achieve 2020 targets and do not have failed targets are regarded as "achieved firms." Finally, firms that have disappeared targets as defined above and do not have achieved or missed targets are considered as "disappeared firms." Hence, every firm falls into one of three categories: achieved, failed, or disappeared.

### 2.2 Disclosure date of target outcome

To explore how the completion of emissions targets may generate market responses, we consider three potential dates to identify when a firm's 2020 emissions target outcome is released to the public. The first is based on when CDP releases its 2020 data to investors in the year 2021. Every

[7] For example, BMW's target of scope 1 + 2 emissions from 2015 to 2020 by 20% was achieved early in 2017, according to BMW's comment on this target in its 2018 CDP report.

[8] Our sample excludes firms that stopped reporting to CDP all together as these are likely due to external business events. For example, in 2017, Dell Technologies began reporting to CDP in place of Dell Inc. because of the merger of Dell and EMC Corporation in September 2016.

year, firms have a deadline to respond to the CDP (usually in July or August), and then CDP provides access to this data to investor signatories around October. Specifically, for 2020 data, investors received the information on 11 October 2021. We use this CDP release date to study market reaction to target outcomes.

The second is the dates of the publications of sustainability reports for content related to fiscal 2020. We manually search for each failed company's sustainability report pertaining to fiscal year 2020 and identify their release dates by checking the reports and related news releases. Out of 88 failed firms, we find 78 firms with sustainability reports, and 50 of them have exact release dates. We also review each report to find sections or sentences where emissions targets are discussed to study how firms disclose failed targets.

The third is the dates when the media picks up the outcomes of emissions targets. To identify news article dates, we use data from RavenPack and TruValue Spotlight. From RavenPack, we first identify environment-related news articles and press releases from 2017 to 2021 that link each news article to the related firm. Following Lu (2023), we identify articles related to environmental performance by searching for relevant keywords in the news title.[9] We exclude firms with a name that includes any of the keywords. We then go through each headline that contains "target" or "goal" and identify news articles that are related to companies' emissions target outcomes. From TruValue Spotlight, we detect emissions-target-related news articles from 2015 to 2021 by checking whether the headline contains the words "target" or "goal" and also contains at least one of the words "emission," "environment," or "climate."

[9]The keywords are as follows: environmental, green, renewable, recycling, emission, carbon, warming, climate, pollution, co2, ghg, net zero, and CDP.

### 2.3 Other Data

To validate emissions targets with actual reduction in emissions, we use data related to emissions change in CDP. Specifically, firms are asked to disaggregate total change in scopes 1 and 2 greenhouse gas emissions into different sources (e.g., renewable energy, output, measure). We focus on changes in real decarbonization activities, such as through energy efficiency or the use of renewable energy, and label this measure *% Emissions Reduction*. A positive and larger *% Emissions Reduction* means having a larger reduction in emissions.

For our market tests, we collect daily stock market information from Refinitiv Datastream. We obtain stock returns information around event dates and the corresponding country-level market returns to calculate abnormal returns around the event dates. For the trading volume analyses, we estimate the normal trading volume over the estimation window prior to the event date for each firm and calculate abnormal trading volume around the event date.

To understand how missing emissions targets may prompt shareholders' reactions, we obtain proxy voting records over the period from 2017 to 2021 from Institutional Shareholder Services (ISS) Voting Analytics. The database contains the agenda item subjected to each cast vote, and each agenda item is mapped to a specific category in the ISS code list. We focus on two relevant categories based on the agenda item, E&S shareholder proposals and environmental shareholder proposals. Proposals that belong to the E&S category include establishing an environmental/social issue board committee, sustainability activities and action, etc. Examples of items in environmental proposals relate to greenhouse gas ("GHG") emissions, climate change action, report on climate change, etc. We count the number of shareholder proposals that belong to 1) E&S and environmental categories, and 2) only the environmental category, as two separate outcomes. We treat all the US firm-years that do not have observations in the database as having zero proposals. Non-US

firms are excluded from this analysis.

Another outcome we study in the consequences analyses is environmental scores from ESG rating agencies. We use environmental scores from 2 sources: Thomson Reuters Asset4 and MSCI. The environmental pillar score from Thomson Reuters captures a firm's environmental performance and incorporates three categories: emission scores, innovation scores, and resource use scores, where the emission score is the most relevant subscore that we also include in the analysis. From MSCI, we use the environmental pillar score, carbon emissions score, and carbon emissions management score. In terms of the carbon emissions score, companies can achieve higher scores by actively investing in low-carbon technologies and improving the efficiency of their facilities. The carbon emissions management score assesses a company's ability to effectively handle carbon emissions risks and opportunities, and a higher management score indicates a greater capacity to manage risks.

To identify the impact of failing emissions targets on media sentiment, we use data from TruValue Labs. TruValue Labs monitors ESG-related information daily for numerous companies, categorizing the news as either positive or negative, and gathers this information from credible external sources such as analyst reports, diverse media outlets, advocacy groups, and government regulators (Serafeim and Yoon, 2022). We use the following scores from TruValue Labs: the Insight Score, which measures a company's longer-term ESG track record, and the Pulse Score, which measures the short-term performance changes that highlight opportunities and controversies.[10] The Insight Score and the Pulse Score pertain to the sentiment on companies' performance in environmental issues, which range from 0 (indicating the most negative) to 100 (indicating the most positive), where a score of 50 denotes a neutral sentiment. We calculate the environmental media scores as the average of scores of the following categories based on TruValues Labs' classification: GHG

[10]https://insight.factset.com/resources/at-a-glance-factset-truvalue-sasb-scores-datafeed

emissions, air quality, ecological impacts, energy management, waste & hazardous material, and water & wastewater management. The monthly scores are averaged to the annual level.

Following Ioannou et al. (2016), we include other financial and environmental measures as control variables in the consequences test. We include financial variables from Datastream, variables related to emissions reduction initiatives and management incentives from CDP reports. In the consequences tests where the unit of observation is at the firm-year level, we construct the data as panel data with the sample period spanning from 2017 to 2021. Summary statistics for the firm-year level panel data are presented in Table 2.

## 3 What happened to the 2020 emissions targets

We first examine the outcomes of the 2020 emissions targets to understand the prevalence and nature of firms failing to meet these targets. Panel A of Table 1 summarizes the sample of firms in this study. Out of 2,638 firms with ISIN that have reported to the CDP, 1,041 firms have reported targets with the target year being 2020, and among them, 88 (8.5%) firms are categorized as failed, 633 (60.8%) firms are classified as achieved, and the remaining 320 (30.7%) firms had disappeared targets.[11]

Panel B of Table 1 shows the breakdown of sample firms by GICS sectors and is ranked based on the ratio of failed firms to all firms. While the industry with the highest number of failed firms is industrials, the materials sector has the highest proportion of failed firms at around 14%, followed by consumer discretionary and consumer staples. The energy sector has the highest percentage of disappeared firms at around 39%, while this sector does not have failed firms. The utilities sector

[11] We specifically focus on targets that end in 2020 to enhance the comparability of emissions targets and investigate their accountability conditional on firms setting those targets. We acknowledge that firms voluntarily set and disclose emissions targets via CDP. In Appendix B, we compare the characteristics of firms with and without 2020 emissions targets in the CDP sample. Firms that have set 2020 targets have higher market value and lower price volatility, invest more heavily in emission reduction initiatives, tend to provide incentives for management on climate change issues, and perform better based on their environmental scores. Additionally, studying this sample likely gives us higher power as these firms have higher media visibility and are more likely to disclose to CDP for longer.

and communication services sector also have a relatively high proportion of disappeared firms at around 35% but only two and one failed firm respectively. Panel C of Table 1 shows the breakdown by country. Hong Kong, Greece, and China have the highest proportion of firms that failed their 2020 emissions targets, but they also have fewer firms with targets to begin with. South Korea has the highest proportion of firms with disappeared 2020 targets. Mexico, India, Netherlands, and Finland also have a relatively high percentage of disappeared firms but only one or two failed firms. This highlights the institutional variations that potentially influence the target outcome.

We further examine the emissions target outcomes to shed light on whether mandatory greenhouse gas disclosure has disciplining effects as suggested in the existing literature (Bolton et al., 2021; Comello et al., 2023; Greenstone et al., 2023). As shown in Panel D of Table 1, using the disclosure regulation data from Krueger et al. (2021), countries with mandatory environmental disclosure have relatively more disappeared firms and fewer firms with achieved emissions targets.[12] Similarly, if we consider the UK, a country with scopes 1 and 2 emissions disclosure requirements since 2013, we observe a relatively high rate of disappeared firms albeit a smaller ratio of failed firms. There are a few potential explanations for this finding. One is that under mandatory disclosure regulations, firms might be subject to heightened scrutiny; therefore, making the target disappear is the less costly option compared to missing it. In other words, without other supporting institutions to disseminate and process the information being disclosed, firms can "go dark" on these targets, similar to using market exit as a strategy to avoid regulatory constraints in response to regulations (Leuz et al., 2008; Kamar et al., 2009; DeFond and Lennox, 2011). Alternatively, it is possible that in the absence of mandatory environmental disclosure regulations, firms are more likely to manipulate the achievement of emissions targets, and the achieved targets might be of low quality. Future studies can further examine this relation.

[12]The Carrots & Sticks (C&S) project is the primary source for mandatory ESG disclosure regulations used in Krueger et al. (2021). The mandates may not contain specific disclosure requirements on emissions targets.

We validate the categorization of firm's target outcomes in two ways. First, failed firms indeed have lower emissions reductions over the same period. Panel A of Figure 1 shows that while failed firms have real emissions reductions ranging from 2% to 5% leading up to 2020, achieved firms on average reduce real emissions by 5% to 12%. Disappeared firms have emissions reductions similar to that of achieved firms. Indeed, from regression results presented in Columns 1 and 2 of Table 3, where the dependent variable is the percentage of real reduction in emissions, there is no clear evidence on whether disappeared firms have higher or lower emission reductions relative to the achieved firms. However, the coefficient on *Failed* is statistically significant and negative. In Column 2, the specification with industry and year fixed effects means that failed firms on average have 2.98% lower emission reductions than achieved firms.

Second, we examine each category of firms' likelihood of lagging behind in the target before 2020. We assume the progress in achieving the target is linear, e.g., a target from 2011 to 2020 should have reached a level of 50% accomplishment in 2015. Based on this assumption, we compare the target progress in each year with the imputed linear target progress. If the firm has one target that is behind the imputed target progress, then they are labeled as "lagging behind". In Panel B of Figure 1, disappeared firms are more likely to have lagging-behind targets in earlier years, while there is a spike in the percentage of failed firms with lagging-behind targets in 2019, one year before the final outcome. In Columns 3 and 4 of Table 3, where the dependent variable is an indicator of whether the firm has lagging-behind targets, the coefficients on *Failed* and *Disappeared* are both statistically significant and positive. In other words, failed firms and disappeared firms are more likely to lag behind in target progress than achieved firms in earlier years.

### 3.1 Disappeared firms

While we can observe the final outcome of an achieved or failed target, it is unclear whether the disappeared firms have achieved their emissions targets or whether they are making satisfactory

progress along the way. Based on our observation, there are two main reasons for the disappearance. First, the target is replaced with a newer target that ends in a later year. One example of firms updating targets to future years is Hyundai Motor. In their 2018 CDP reports, they stated that the company has adjusted its emissions target to align with both the government's GHG reduction targets and the goals outlined in the Paris Agreement, and the target year has been subsequently updated to 2030 and 2050. We note that this type of disappeared companies may not be lagging behind in their emissions reduction. A part of this group may have updated their 2020 targets with more ambitious targets ending in later years to signal stronger commitment to the environment. Second, we observe firms that give up on the target for being lagging behind. For example, Finnair reported a target of a 17% improvement in emissions intensity from base year 2013 to 2020 in both CDP and their own sustainability reports for fiscal 2019, but they were already behind the target progress in fiscal 2019 by only completing 54% reduction. The target outcome was not reported in 2020, and they also acknowledged in their 2019 sustainability report that "the ambitious target is estimated to be unreachable during the coming year."

While it is difficult to identify each firm's reason for the disappearance, we classify these disappeared firms into two groups based on % *Emissions Reduction* from the CDP. We compare each firm's average % *Emissions Reduction* from 2017 to 2020 with its industry median. If the firm has % *Emissions Reduction* above the median, we consider them to be making satisfactory progress and label them *Disappeared - leaders*, and those below the median as *Disappeared - laggards*. We use this classification in the subsequent consequences analysis.

# 4 Transparency of Target Outcomes

Transparency of target outcomes is a critical component of ensuring accountability. The premise of accountability is that stakeholders are aware of a company's target outcomes and can make in-

formed decisions based on such environmental performance, for example, by imposing costs on companies that deviate from their environmental target promises. We consider transparency along two dimensions. The first is the firm's own disclosure, the extent to which a firm makes it easy for the public to observe its target outcomes by disclosing the outcomes in sustainability reports or press releases. The second is media coverage, the extent to which the media disseminates information about the target outcomes. In addition, it is not clear whether the media can independently investigate the target outcomes if they are not publicly disclosed by companies and thus serve as an information analyzer.

### 4.1 Firm Disclosure

While we rely on firms' CDP reports as the main source of data for firm's emissions target performance, firms can also provide additional disclosure to increase the visibility of their emissions target outcomes. We examine two additional disclosure channels: press releases and sustainability reports. Table 4 presents the number of companies in each target outcome category and different channels through which the target outcomes are disclosed by the firms or covered by the media.

The first channel is press releases, in which firms sometimes share outcomes on their emissions targets. Through a keyword search with manual review in Ravenpack, we find 12 press release articles related to the performance of emissions targets[13]. All of the 12 articles are linked to successfully achieved emissions targets, and none on failed targets. This suggests that firms utilize press releases as a medium to showcase their accomplishments while potentially concealing unfavorable results.

The second channel is sustainability reports. Sustainability reports allow more flexible reporting, and firms may find it a preferable platform to discuss their target outcomes and the challenges

[13]One example of press release is that Medtronic plc announced that they had achieved their FY20 environmental performance goals on October 13, 2020, on their official website: https://news.medtronic.com/Putting-Purpose-into-Action.

they face in attaining them. For the failed firms, we manually collect the 2020 sustainability reports to examine how firms acknowledge the failed target. Out of 88 failed firms, we are able to find 78 sustainability reports. By examining sections or sentences related to emissions targets, we only find 26 firms that acknowledge the failure in achieving emissions targets. Out of those 26 firms, only 16 explicitly acknowledge the failure. The difference between explicit and implicit acknowledgment is that for explicit acknowledgment, firms have to include phrases such as "fail to achieve" in the discussion of their 2020 emissions targets and the readers can learn the outcome without comparing the target number and the actual performance.[14] Instead of acknowledging target failure, we observe some firms discuss their future emissions targets that will end in 2030, 2050, etc. In summary, in sustainability reports, firms may be inclined to obscure unfavorable information by using future targets and implicitly acknowledging or completely hiding the target outcome, raising concerns about the significance of sustainability reports as a key medium for communicating environmental performance.

### 4.2 Public Awareness

In this section, we examine the public awareness of corporate emissions reduction targets that ended in 2020 by studying the associated media coverage. For firms to be held accountable for their emissions targets, the public needs to be aware of the outcomes. Media plays an essential role in the dissemination of information, including in earnings announcements (Fang and Peress, 2009), and functions as a critical channel to bridge information asymmetry (Stiglitz, 2006). Brammer and Pavelin (2006) show that corporate reputation is determined by social responsibility and is shaped by media exposure. On the other hand, it is not clear if the media can effectively play this role. The media's role as an information intermediary can be constrained by conflicts of interest, corporate influence, and selective reporting (Mullainathan and Shleifer, 2005). Related evidence finds that

[14] One example of explicitly acknowledging failure is Intercontinental Hotels Group. They stated in their 2020 sustainability report that "we ended the target period with a 10.2% increase, meaning we did not achieve our target."

media coverage of corporate social responsibility (CSR) tends to be sporadic and focused on a narrow subset of firms, thus limiting its overall impact (Dyck et al., 2008). Specific to emissions targets, it is also unclear if media can uncover target outcomes that are hidden in CSR reports or CDP reports without explicit firm disclosure.

Using data from RavenPack and TruValue, we identify media coverage related to emissions target outcomes by a keyword search with manual review. Out of the 88 firms with missed targets, only three are covered by the media. Not surprisingly, all of these three firms have corresponding disclosures in their sustainability reports. We examine these three firms in more detail in Section 6. For the achieved firms, we identify 14 news articles on their successful target achievement. Among those 14 new articles, 6 (43%) are released on the same date as the press release articles on the same topic of target accomplishments, i.e., they can be directly linked to press releases detailing the relevant emissions target. We do not find media coverage of the disappeared firms. Overall, our data reveals low transparency of target outcomes, and that the media is more likely to disseminate information disclosed by firms, but not independently investigate and report on target outcomes.

## 5 Consequences of missing an emissions target

Did firms face negative consequences for missing their 2020 emissions reduction targets? While many firms set emissions reduction targets due in 2020 and missed them, little is known about the cost companies paid for missing those targets. In this section, we examine the potential consequences of missing emissions reduction targets, focusing on various stakeholders that could potentially penalize companies for missing their targets.

The cost of missing emissions reduction targets is crucial as it is central to the issues of accountability and greenwashing. If there are no consequences for missing emissions reduction targets, firms have greater incentives to announce ambitious emissions reduction targets without real in-

tention to take action to reduce emissions. If such empty targets attract at least some stakeholders, companies can enjoy the benefits of greenwashing. The lack of penalty may also signal that there is no serious oversight of firms' progress on emissions reduction targets. Only with real consequences of missing emissions reduction targets would we obtain a separating equilibrium where only green companies (or companies with real intention to take action) announce ambitious emissions reduction targets. However, we might not observe any consequences for firms missing 2020 emissions targets for reasons other than the lack of oversight. Both companies and various stakeholders may be at the learning stage for emissions reduction targets, and setting emissions reduction targets may be good enough for some stakeholders as these firms are at least stating their intention to reduce emissions. We discuss more on the potential explanation for our findings on the consequences of missing 2020 emissions reduction targets in the next section.

### 5.1 Market Responses to 2020 Emissions Reduction Target Outcomes

We examine the market responses to the 2020 emissions target outcomes to test if the market on aggregate penalize companies for missing the targets. We note that we do not have a directional prediction for the market return tests. It is ex-ante unclear how the market on aggregate would response to the failure or achievement of emissions targets. Pressure from institutional investors has been discussed as one of the main drivers behind firms' environmental (or more broadly ESG) activities and disclosure (Dyck et al., 2019; Azar et al., 2021; Ilhan et al., 2023). Therefore, investors may hold companies accountable for companies' emissions reduction targets. If so, we would observe positive (negative) return responses to the announcements of 2020 emissions reduction target completions (failures). However, if achieving emissions targets are costly and if most investors only value cash flows, we may observe positive (negative) return responses to the failure (achievement) of emissions targets. Investors may have heterogeneous preferences for companies' environmental activities, and the stock return responses would only reflect the average preference of all the

investors in the market–which is ambiguous (Fama and French, 2007; Friedman and Heinle, 2016; Pástor et al., 2021; Kim, 2023).

For all the information events, we also examine the trading volume at these dates. While we do not have a directional prediction for the return tests, we expect higher trading volume on these event dates if the market perceives the information to be informative (Burzillo et al., 2023). Even in a market with investors with heterogeneous preferences, environmental disclosure can elicit higher trading volume if the information is decision-useful for different types of investors (Friedman and Heinle, 2016; Goldstein et al., 2022). We estimate the normal trading volume for each firm by taking the average trading volume during [-140, -40] days relative to the event date. Then, we calculate the abnormal trading volume at the event date.

We identify multiple events related to the disclosure and dissemination of the outcomes of companies' 2020 targets and examine returns and trading volume around those dates (see Section 2 for more detail). If investors, on aggregate, monitor companies' commitment to reduce emissions, we may observe price and trading volume response to the release of companies' emissions reduction target outcomes.

First, we examine market responses to the CDP report releases containing the 2020 emission reduction target outcomes. A section of the CDP report contains information on companies' progress and outcomes of emission reduction targets. Therefore, the release of 2020 CDP reports may be a significant information event that investors learn about the companies' achieving and missing their 2020 emissions targets. In Table 5 and Figure 2 Panel A, we find that [-1,3] cumulative average abnormal returns around the release of CDP reports are not significantly different from zero for both companies that failed and achieved 2020 emissions reduction targets. Interestingly, the market response to target disappearance is less negative than target failure, suggesting that silently removing

failed emissions reduction targets from firm disclosure may be better than acknowledging failure from the firms' perspective. In the third column, we observe insignificant trading volume response to the target outcome release.

Next, we examine the market response to the release of sustainability reports disclosing missed 2020 emissions reduction targets. Sustainability reports are an important channel through which information about the companies' progress on emissions reduction targets is communicated. We identify the sustainability reports that discuss the failure of firms' 2020 emissions reduction targets and examine the market response around the release dates of those reports. In Table 5 and Figure 2 Panel B, we show that the market response to the release of the sustainability reports disclosing the failure of 2020 emissions reduction targets is insignificantly different from zero ([-1,3] cumulative average abnormal returns of -0.127%). Again, for the release of sustainability reports, there is no significant trading volume response.

Media can play an important role in disseminating information about companies' success and failure to fulfill their 2020 emissions reduction targets, reducing the information awareness and acquisition costs for the investors (Blankespoor et al., 2019). Therefore, repeat the market analysis using media coverage dates of the 2020 target outcomes we identified in Section 4. In Table 5 and Figure 2 Panel C, we show the cumulative average abnormal returns around the media coverage of failed and achieved 2020 emissions reduction targets. While the market responses to both failed and achieved targets are not significantly different from zero, we observe large negative returns around the three media coverage events on failed emissions reduction targets (5-day CAAR of -1.823%). While the small sample limits our ability to interpret or generalize the results, the evidence is consistent with the market negatively responding to bad press related to failed emissions reduction targets.

In Section 4 and Table 4, we find that the media only covered failed firms that acknowledged their failures in their sustainability reports. In conjunction with this finding, the results suggest that while the media seems to have failed in spotting companies that were unable to achieve their emissions target (and relied on firm disclosure to identify failed companies), when the media disseminates that information, it may elicit negative market responses. While insignificant, the results suggest that media could play a vital role in increasing accountability of emissions reduction targets, but it would rely on the media's ability to monitor companies' achievement of targets and shed light on companies that fall short. We take a closer look at these firms in the next section. In the third column, we observe insignificant volume response to the media coverage of both failed and achieved targets.

Overall, the market test reveals no significant consequences for missing 2020 emissions reduction targets from the capital markets. Especially, the absence of market volume response to the events related to the disclosure and dissemination of target outcomes further supports that investors do not trade based on the information and penalize companies for missing their 2020 emissions targets.

### 5.2 Shareholder Proposals

A potential consequence of missing emissions reduction targets is increased scrutiny by stakeholders concerned about climate change and the environmental impact of the firms. Environmental activists and environmentally-conscious investors may increase attention and engagement after a company fails its 2020 emissions targets. Therefore, we examine whether environmental shareholder proposals become more frequent following failed 2020 emissions targets.

To study the consequences of failing emissions targets, we estimate the following difference-in-

differences model:

$$Outcome_{i,t} = \beta_0 + \beta_1 Failed_i \times Post_{i,t} + \beta_2 Disappeared_i \times Post_{i,t} + \sum \beta_j Fixed\ effects + \epsilon \quad (1)$$

The dependent variable is the corresponding outcome variable relating to media sentiment, environmental scores, and shareholder reactions. $Failed_i$ is an indicator that takes the value of '1' for firms that failed a 2020 emissions target. $Disappeared_i$ is an indicator that takes the value of '1' for firms with disappeared 2020 emissions targets. We separately show results for *Disappeared - leaders* and *Disappeared - laggards* as described in Section 3. $Post_{i,t}$ is an indicator that takes the value of '1' for observations after October 2021. $\beta_1$ is the main coefficient of interest, which captures how the outcome changes after the firm fails an emissions reduction target. We include firm fixed and year fixed effects. Firm fixed effects control for time-invariant firm-level variations, and year fixed effects control for overall time trends. These fixed effects resemble a difference-in-differences model where the first difference is the change within the firm before and after the 2020 target outcome release date, and the second difference is the change between failed (or disappeared) and achieved firms. We cluster standard error using firms, and the results are robust to alternative clusters using countries and industries.

In Table 6, we report the results of the difference-in-differences analyses examining the number of environmental shareholder proposals following the 2020 emissions reduction target outcomes. We use the shareholder proposal classification of ISS and keep US firms as the data is only available for this sample. The results show that there is no increase in environmental shareholder proposals following both failed firms and disappeared firms, relative to achieved firms. The results suggest that companies that fail emissions reduction targets do not face increased shareholder engagement by environmentally-conscious investors and stakeholders.

### 5.3 Media

Increased scrutiny following the failures of emissions reduction targets can come from the media. After missing 2020 emissions reduction targets, companies may face greater pressure from the media, with an increased number of environment-related articles – especially negative ones. Therefore, we examine the media sentiment of environmental articles before and after the failure of 2020 emissions reduction targets, relative to the companies that achieved their 2020 targets.

In Table 7, we do not find that the media sentiment decrease significantly after firms miss their 2020 emissions reduction targets. Both the short-term and long-term media sentiment on environmental issues do not change significantly after missing 2020 emissions reduction targets. The analyses suggest that companies do not face heightened pressure from the media after missing their 2020 emissions reduction targets. We also do not observe significant changes for disappeared firms.

### 5.4 Environmental Scores

ESG rating agencies play an important role in aggregating and disseminating companies' ESG information. A potential consequence of missing emissions reduction targets may be lowered environmental ratings. However, recent literature showing a low correlation across ESG ratings raises concerns about whether ESG rating agencies can fulfill this monitoring role (Berg et al., 2022). To examine this, we compare the companies' environmental ratings before and after missing 2020 emissions reduction targets relative to companies that achieved their 2020 targets.

In Table 8, we document that the environmental scores of companies (from both Asset4 and MSCI) do not change significantly after missing emissions reduction targets. The results are consistent with ESG rating agencies not punishing companies for missing their 2020 emissions targets. However, the evidence can be interpreted in multiple ways – for example, it could be evidence

of ESG rating agencies not using the information of failed targets. Similarly, we do not observe significant changes for disappeared firms.

Through exploration of the potential consequences of missing 2020 emissions reduction targets, we were not able to find evidence of significant penalties for missing 2020 emissions targets. The evidence suggests that the cost of failing emissions reduction targets is not large, which raises the concern that companies may set and announce emissions reduction targets primarily for marketing purposes without real intention to reduce emissions (i.e., greenwashing). However, the lack of consequences of missing 2020 emissions reduction targets can be interpreted in many ways. In the following section, we provide further discussion on why we might observe such a lack of consequences.

# 6 Understanding the Lack of Consequences

So far, our study reveals minimal evidence of accountability for corporate emission reduction targets set for 2020. In this section, we consider a few potential reasons for the lack of consequences for failed firms.

## 6.1 Lack of Awareness

Our descriptive observations from earlier sections suggest that the lack of consequences is likely due to weak information dissemination and low public awareness. While earnings dates are pre-announced, target outcome release dates are not, which makes it difficult even for researchers to identify the date we expect the public to learn about a firm's target outcome. In fact, Boulland and Dessaint (2017) find firms schedule their announcement dates well in advance when earnings news is positive and delay when the news is negative. DellaVigna and Pollet (2009) find that the timing of earnings announcements, specifically those made on Fridays, can lead to less market reaction due to investor inattention.

To further examine the importance of information dissemination, we dive deeper into the few instances of failed firms that are covered by the media: Fedex, Kraft Heinz, and Gildan Activewear. From these three case studies, we observe a few common features.

First, these three firms acknowledged failing the target in their sustainability reports, which suggests that the media is more likely to disseminate bad news when firms voluntarily disclose. FedEx and Gildan Activewear explicitly acknowledged failing the target, whereas Kraft Heinz implicitly described the lack of progress in sustainability reports. For example, Gildan Activewear described in their sustainability report: "From 2015 to 2020, our overall emissions intensity decreased by 1%, which means we did not achieve our target."

Second, the two firms with more explicit media headlines face more negative market reactions. The headline covering Kraft Heinz is "Kraft Heinz Says It Will Fall Short of 2020 Environmental Goals," which generated a cumulative abnormal return of -5.757% from -1 day to 10 days around the news event. The headline covering Fedex is "Pandemic Cargo Surge Prompts FedEx To Miss 2020 Climate Goals," which generated a cumulative abnormal return of -4.224% from -1 day to 10 days around the news event. In contrast, Gildan Activewear's news headline does not explicitly mention failing targets and has a cumulative abnormal return of -0.298% from -1 day to 10 days around the news event.

Third, the two firms with more explicit media headlines received environmental shareholder proposals in the subsequent year. In 2022, both Kraft Heinz and Fedex received shareholder proposals relating to environmental issues. Kraft Heinz's proposal asks the firm to report on climate-related transition action plan. Fedex's proposal asks the firm to report on climate lobbying.

Despite the case study nature of this section, these observations suggest that media coverage, especially when explicitly describing the event of failed environmental target in the news headline,

generates negative consequences for firms with failed targets. We acknowledge that we cannot draw conclusions with three observations, it's worth noting that this constraint arises due to the limited media attention these failed targets receive.

### 6.2 Target ambition

Firms may not be held accountable for missing emissions reduction targets if these companies have set very ambitious targets to begin with. Environmentally-conscious stakeholders may want firms to set ambitious targets and fail at trying, instead of setting easy targets and achieving them without changing their behaviors. Stakeholders, therefore, may potentially evaluate emissions target outcomes in conjunction with the target difficulty, and only penalize companies for missing unambitious targets. For the results on potential consequences of failing targets in the previous section, we acknowledge the concern that we may not expect negative reactions to firms that miss an ambitious target. As such, we conduct an analysis separating the failed firms into those with ambitious and unambitious targets. We define *Failed Ambitious Targets* as those with above-median average annual targeted emissions reduction percentage among the failed firms, and *Failed Unambitious Targets* as those below the median.

We repeat the consequences analysis comparing these two groups of failed firms to achieved firms in Table 9. We do not find evidence of negative consequences except on one outcome. In Panel E, Column 1 shows that the MSCI Environmental score is statistically significant and 5% $(0.305/6.091)$ lower for *Failed Unambitious Targets* relative to achieved firms, which serves as the benchmark. Per conversation with MSCI, the rating agency takes into consideration prior target achievement in evaluating a firm's environmental performance. For market reaction, environmental shareholder proposals, and media sentiment, we do not observe differences between missing ambitious targets and unambitious targets.

### 6.3 COVID impact

COVID-19 could have impacted firms' ability to achieve 2020 emissions reduction targets and various stakeholders evaluation of the target outcomes. Disruptions in firms' operations may have forced companies to re-evaluate their priorities and resource allocations causing them to fail targets, and stakeholders may find this understandable. To address the potential effect of COVID in emissions target accountability, we repeat our analysis excluding firms where their target outcomes are likely to be highly affected by COVID-19. We first create an industry-level measure for COVID-19 impact using the average change in revenue between fiscal 2019 and 2020, and then consider those with an absolute impact of more than 13% (the median across industries) as high COVID-19 impact industries. In Table 10, we exclude these high COVID-19 impact industries, and still do not find negative consequences for failing emissions targets.

While some may argue that COVID-19 deems these 2020 emissions targets irrelevant, it raises the question of whether we should expect no accountability if companies fail to meet their emissions targets due to external shocks. In particular, given the potential for increasing physical risks from climate change impacts, we may face other external shocks in 2030 and 2040. This concern may lead to consideration of the need for scenario analysis of firms' decarbonization paths in meeting these emissions targets.

### 6.4 Materiality

Another potential reason for the lack of consequences is that the stakeholders are aware of the target outcomes, but do not respond to this information because the emissions reduction targets are immaterial or irrelevant for the companies. In other words, shareholders may not respond for firms where environmental issues have no financial implication, and other stakeholders may not respond for firms where they have little impact on carbon emissions.

To study this reason, we focus on a subsample of firms that operate in a high emissions industry, where carbon reduction is more likely to be a material issue. An industry is considered a high-emissions industry if its scope 1 plus scope 2 location emissions over the period of 2017-2021 are above the median value. Among the 24 GICS industry groups, 12 of them, e.g., energy, materials, and transportation, are classified as high-emissions industries. Among the firms in the main sample, 60.61% of the achieved firms are found in high-emission industries, whereas 77.38% of the failed firms belong to high-emission industries. This implies that emissions could be a more significant and material concern for the firms that failed to meet their targets.

Table 11 shows the results for the subsample in high emissions industries. Although we find significant and positive market response to achieved target in the the short window ([-1,1] days), the magnitude is not statistically different from that of failed firms, which is insignificant. We caution to suggest that achieving emissions targets is perceived more positively by the market when material as firms with 2020 targets may be different from other firms that make up the market. Nonetheless, this result could be because there is less disagreement among investors on the value of reducing emissions for companies that are exposed to more climate change risks and opportunities. We do not observe negative consequences in the other outcome variables.

### 6.5 Prior information

An alternative explanation for the lack of market responses to 2020 emissions reduction target outcomes is that investors were aware or had some expectations of the target outcomes from previously released information (i.e., the information was already priced). To examine this possibility, we examine market reactions and other potential consequences around the release of companies' emissions target completion in 2018 and 2019, reported in the CDP surveys.[15] For each year, we

[15]Emissions target completion information of 2018 (2019) is released in 2019 (2020). We are only able to conduct this analysis using 2018 and 2019 data because, per communication with CDP, CDP did not record the release date prior to 2018.

identify firms as *Lagging Behind* for their 2020 targets if the firm's target progress is less than what is expected based on a linear achievement of the target. For example, a firm is *Lagging Behind* if the total target is to reduce emissions by 20% between 2015 and 2020, and the 2019 target progress is less than 16%. Then we examine the market responses to the release of 2018 and 2019 CDP reports that contained information about firms not on track for their 2020 emissions reduction targets.

Panel A of Table 12 shows no significant market reactions to CDP reports that reveal that a company is lagging behind for their 2020 emissions targets in 2018 and 2019. The coefficients of interest on *Post* X *Lagging Behind* for both 2018 and 2019 remain statistically insignificant, despite a marginally significant increase in environmental shareholder proposals. This result suggests that the lack of significant market response on 2020 for the emissions target failures cannot be explained by the information being already priced or known to the investors beforehand. Instead, the evidence indicates a consistent image of overall market not responding to the information about firms' emissions target completion.

## 7 Benefits from Announcing Emissions Targets

In previous sections, we find a lack of accountability for companies failing 2020 emissions reduction targets. Failed emissions targets are rarely covered by media, and we do not observe negative market responses, increase in environmental shareholder proposals, worse media sentiment, or lower environmental ratings following the failure of 2020 emissions reduction targets.

The lack of observable consequences for failing to meet emissions targets raises questions about the value and credibility attributed to these emissions targets. If stakeholders perceive emissions targets as merely cheap talk, we would observe both a lack of consequences when firms fall short, and no benefits when firms announce these targets. In contrast, if stakeholders reward firms for announcing targets, then our observed lack of consequences present incentives for firms to cheap

talk. Therefore, the findings that point to the lack of consequences for missing emissions targets warrant the examination of the potential benefits from announcing the targets.

We first examine firms' announcements of new emissions targets and the extent to which these are picked up in media articles. We search for press releases and news articles related to the announcement of emissions targets using RavenPack and TruValue. We keep those environment-related news articles with headlines that contain "target" or "goal". [16] Panel A of Table 13 presents the number of firms and articles with press releases and/or media coverage on target announcements over the period of 2010 to 2021, where we identify 194 firms, constituting 18.6% of our sample firms (194/1,041). In contrast, as shown in Table 4, only 12 firms (1.2% of the sample) have issued press releases about the target outcome, and merely 17 firms (1.6% of the sample) have received media coverage regarding the target outcome. Therefore, announcements of emissions targets tend to receive more media coverage and press releases compared to the disclosure of target outcomes, thus obtaining more transparency and attention from the public.

Two more observations arise from this analysis and by comparing to transparency related to target outcomes in Table 4. First, while missing a target receives on average 0.03 media coverage (3/88), announcing a target receives on average 0.57 media coverage (55/97). In other words, media agencies are more likely to publish about announcing emissions targets, but not failing emissions targets. Second, media is more likely to independently identify and report on new target announcements than on target outcomes. Out of the 17 news articles about target outcomes, 8 are not accompanied by press releases or target failure acknowledgments (47%). In contrast, among the 166 firms that have media coverage on new emissions targets, 111 are not accompanied by a press release (67%). The difference implies a general lack of awareness of the target outcomes: the

[16] We search based on article headlines, which do not commonly include the target year. Hence we do not restrict these announcements to targets that end in 2020. Requiring the headline to include the year "2020" would result in only 64 articles.

media is more dependent on firms' own disclosure when it comes to target outcomes instead of investigating independently as a third party.

In Table 13 Panel B, we examine market responses to press releases and media coverage about the announcements of firms' emissions reduction targets. We have stock market information for 215 such articles. Overall, the market test reveals no significant market reaction nor abnormal trading volumes for announcing emissions reduction targets from the capital markets. The absence of market reactions to the target announcements could be attributed to shareholders viewing information regarding emissions targets as not credible, or that targets may not be value-relevant to this group of stakeholders. In an untabulated analysis, the results remain statistically insignificant when we limit the sample to firms in material industries with above-median emissions.

We then investigate whether announcing emissions targets can lead to reactions in shareholder proposals, media sentiment, and environmental scores. If such announcements create benefits for firms in certain aspects, then those emissions targets are not merely perceived as cheap talk or irrelevant, and the lack of responses for the target outcome reflects a lack of accountability. In Table 13 Panels C to F, we repeat our consequences analysis replacing target outcomes with *Post Announcement*, which equals 1 starting the year the firm first reports its 2020 emissions target to the CDP. The announcement year ranges from 2011 to 2017, as we require 2020 targets to have a minimum of a three-year horizon. Although there is no reaction in shareholder proposals, we find a positive and statistically significant reaction in long-term media sentiment (*Insight Score*) and in both Asset4 and MSCI environmental scores. Firms' Insight Scores increase by 1.3% (0.743/57.605), and their Asset4 and MSCI environmental scores increase by 2.1% (1.399/67.149) and 3.9% (0.238/6.038) after setting targets, respectively. This result indicates that ESG rating agencies and media sentiment do, in fact, take emissions targets into consideration when evaluating a company's environmental performance. However, as shown in Section 5, their assessment mainly includes whether targets

have been set and does not incorporate the final outcomes of those targets.

In this section, we provide evidence that the announcements of emissions targets are more likely to receive media coverage and press releases than the revelation of target outcomes, thus obtaining more visibility and public attention. Although the increased attention does not result in changes in market reaction or shareholder engagement, some market participants, such as ESG rating agencies and media sentiment, do interpret setting new targets as positive. These findings attenuate the concern that emissions targets are perceived as irrelevant or insignificant and contrast the lack of consequences for missing those targets, which calls for more attention to the outcomes of emissions targets.

# 8 Conclusion

In conclusion, this paper studies the accountability mechanisms over the outcome of a firm's emissions reduction targets that ended in 2020. Unlike earnings targets, where missing targets are associated with negative consequences, our findings reveal that emissions target outcomes are not associated with immediate oversight and consequences. Although the process of setting emissions targets often attracts substantial media attention, our findings reveal that only a handful of the firms that failed to meet their targets were featured in media coverage. Upon emissions targets completion, we do not find that firms that fail to meet these targets experience changes in market reaction, environmental-related shareholder proposal, environmental media sentiment, and environmental score. These findings raise concerns regarding the credibility of emissions targets and the implications for firms failing to meet them, especially as we approach future target years of 2030, 2040, and 2050.

We find suggestive evidence that the lack of response is partly due to a lack of awareness and attention concerning the information release about emissions targets. Earnings targets attract sig-

nificant attention and scrutiny, partially due to the existence of a sophisticated institutional infrastructure that ensures accountability for earnings target outcomes. For instance, the U.S. GAAP sets standards for defining and measuring earnings, auditors offer assurance over these figures, and skilled analysts and investors evaluate earnings outcomes, benchmarking against their expectations and scrutinizing deviations. This information is then incorporated into various parties' decision-making processes. However, the institutional infrastructure for emissions targets is still in its nascent stages. As we move forward, the development of such an infrastructure may play a pivotal role in ensuring accountability for emissions targets and shaping the market and other stakeholders' responses to them.

As a practical implication for future emissions targets, our paper raises three questions. First, to address the lack of attention, would it be beneficial to preannounce an emissions target release date, similar to earnings announcement dates? This could help lower information processing costs and coordinate attention for when information about emissions targets is released. Second, which institutions should we rely on to process and disseminate information about emissions target outcomes, including monitoring firms with disappeared targets? Our paper considers the role of media, investors, and ESG rating agencies. Future papers can examine other institutions, such as NGO, employees, and customers. Third, a caveat about this paper is that the 2020 emissions targets are potentially affected by COVID-19. Even so, we would expect to see information dissemination and analysis discussing which firms are more or less affected by COVID-19. This raises the question: if there are external shocks in 2030, 2040, and 2050, are we comfortable with firms failing or ceasing to release information about their targets? Especially as natural disasters may become more prevalent with rising climate change.

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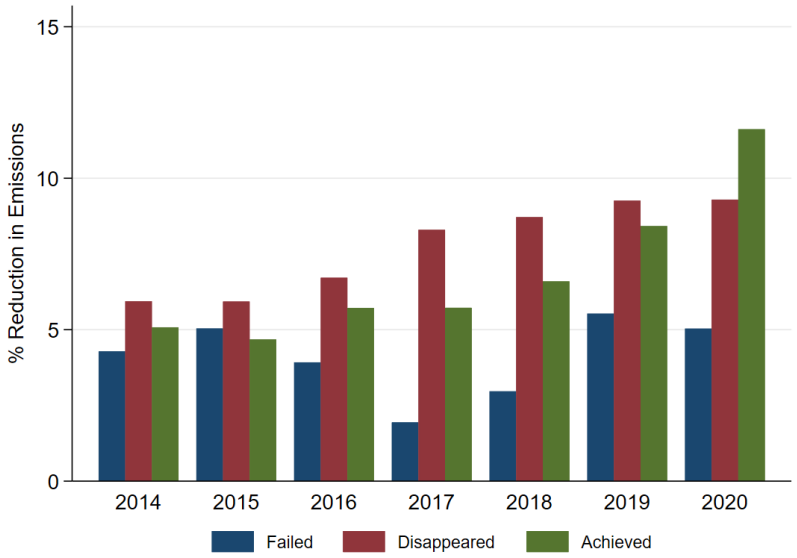
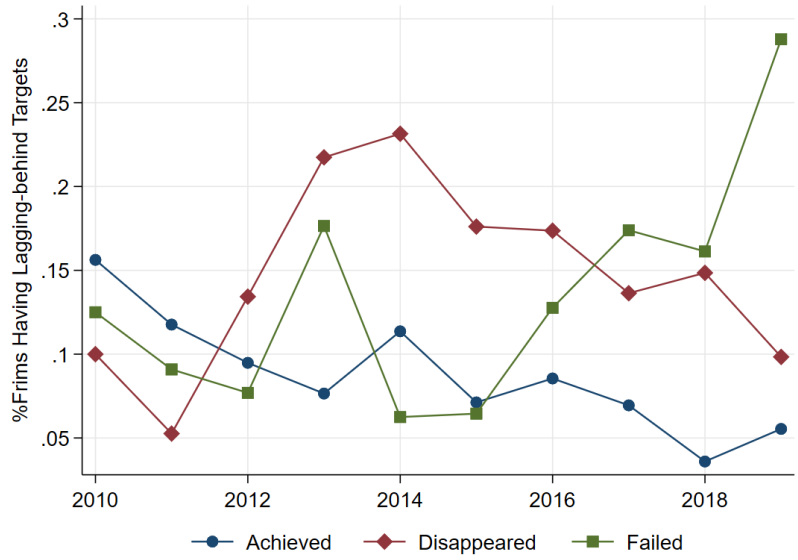
**Figure 1: Target Outcome and Decarbonization Efforts**

**Panel A: Emissions Reduction by Year**



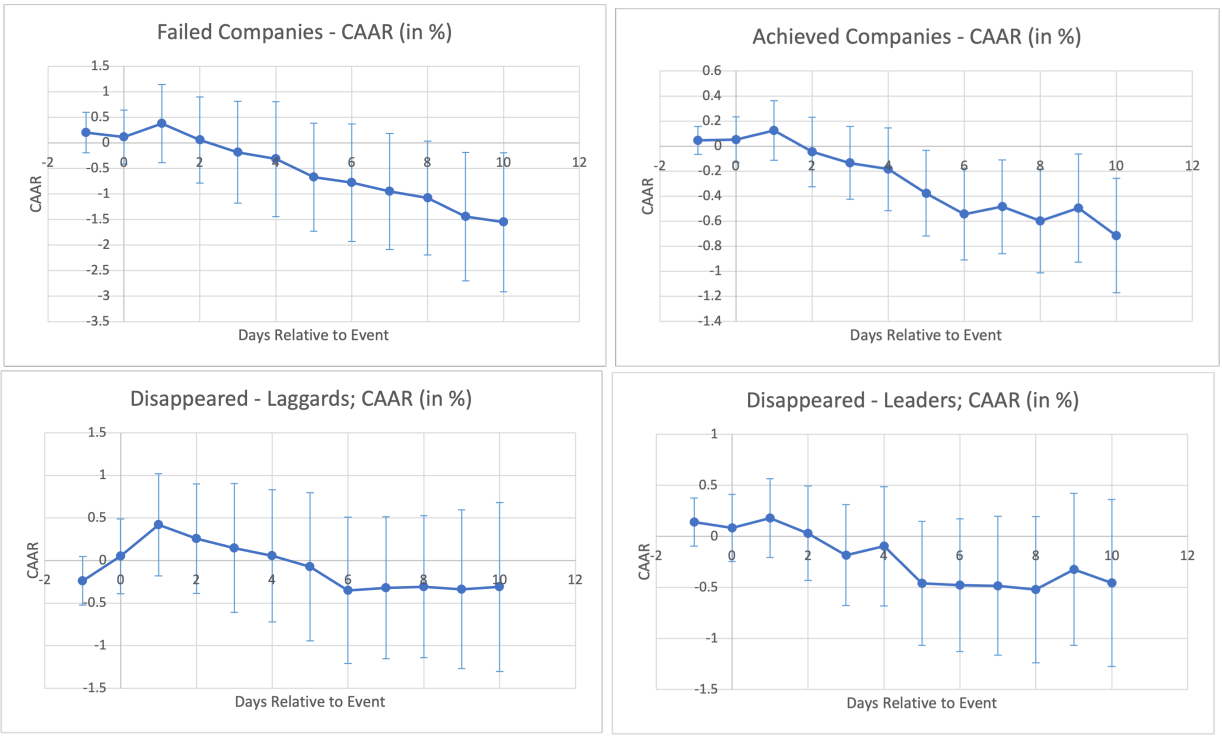

**Panel B: Whether Having Lagging-behind Targets by Year**




Panel A plots the percentage reduction in emissions over years for achieved, failed, and disappeared firms separately. Panel B plots the percentage of firms with emissions targets that are lagging behind compared to the linear progress over years for achieved, failed, and disappeared firms separately.

## Figure 2: Market Responses to Failed and Achieved 2020 Emissions Targets

### Panel A: CDP Report Release of 2020 Target Outcomes




### Panel B: Sustainability Report Release of Failed Companies

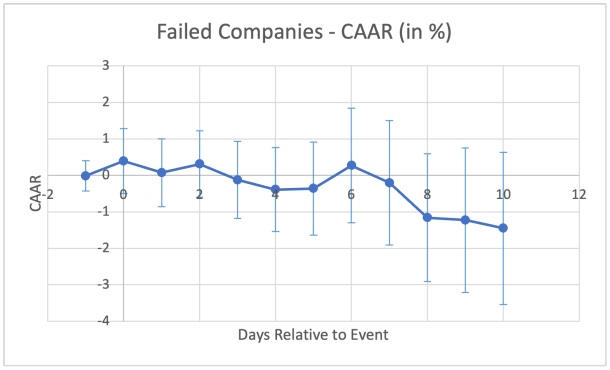
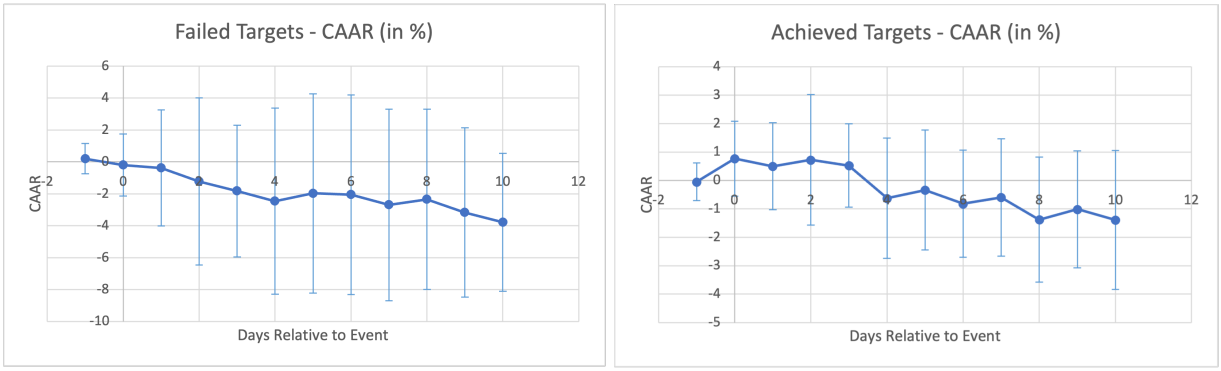


**Figure 2: Market Responses to Failed and Achieved 2020 Emissions Targets**

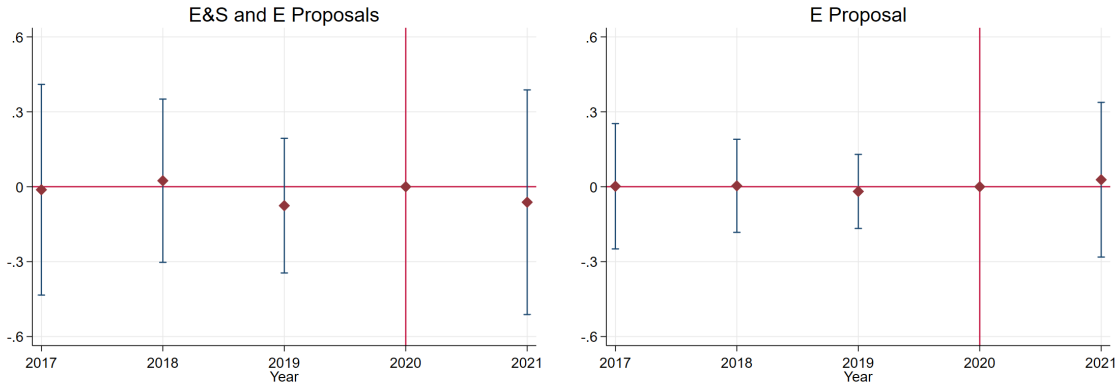
**Panel C: Media Coverage of Failed/Achieved Targets**



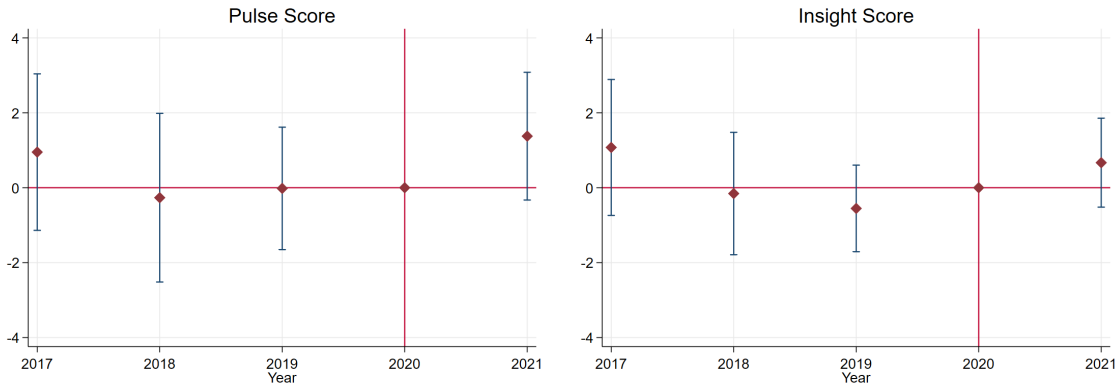

This figure plots the market return responses to events related to the disclosure of failed and achieved 2020 emissions reduction targets. The plot shows the cumulative average abnormal market returns during the [-1,10] day windows around the information events. Returns are adjusted using the market model. Panel A shows the returns around 2020 CDP report release date. The CDP reports contain information about 2020 emissions target outcomes. Panel B reports the returns around the release of sustainability reports that contain information about 2020 target outcomes. Panel C shows the returns around media coverage on failed and achieved targets.

## Figure 3: Consequences around Failing the Target

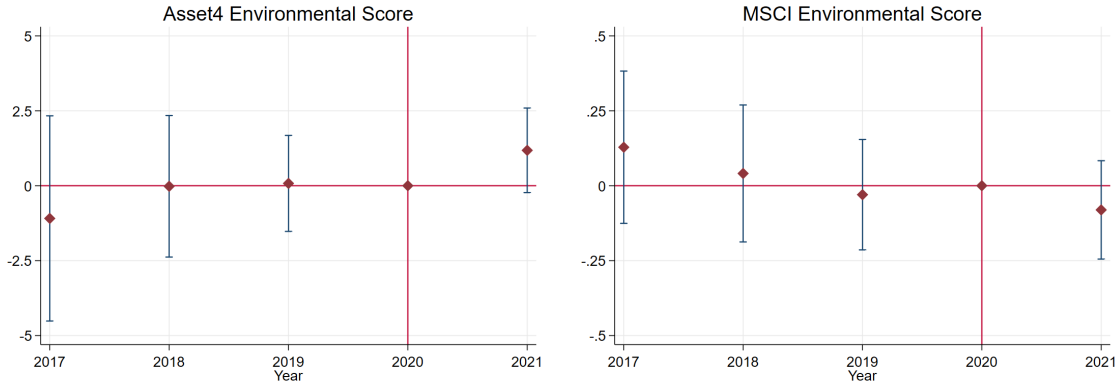
### Panel A: Shareholder Proposal




### Panel B: Environmental Media Sentiment




### Panel C: Environmental Score




This figure plots the coefficient and 95% confidence interval for the main regression investigating the consequences of failing 2020 emissions targets. Panel A shows the results where the dependent variables are *E&S and E Proposals* and *E Proposal*. Panel B shows the results where the dependent variables are *Pulse Score* and *Insight Score*. Panel C shows the results where the dependent variables are *Asset4 Environmental Score* and *MSCI Environmental Score*. The post indicator is replaced with an indicator for each year. The indicator for Fyear 2020 is omitted, which serves as the benchmark with a coefficient and standard error of zero. Firm fixed effects and year fixed effects are included. Standard errors are clustered by firm.

**Table 1: Emissions Targets Sample and Descriptive Statistics**

*Panel A: Sample Composition*

| | Sample Size | Ratio |
|---|---|---|
| CDP Firms with ISIN | 2,638 | |
| CDP Firms that have reported 2020 emissions targets | 1,041 | |
| Failed | 88 | 8.5% |
| Achieved | 633 | 60.8% |
| Disappeared | 320 | 30.7% |

*Panel B: By GICS Sectors*

| | All Firms | Failed Firms | Failed Ratio | Disappeared Firms | Disappeared Ratio |
|---|---|---|---|---|---|
| Materials | 121 | 17 | 0.14 | 42 | 0.35 |
| Consumer Discretionary | 130 | 15 | 0.12 | 42 | 0.32 |
| Consumer Staples | 118 | 13 | 0.11 | 38 | 0.32 |
| Industrials | 202 | 21 | 0.10 | 64 | 0.32 |
| Information Technology | 102 | 8 | 0.08 | 26 | 0.25 |
| Energy | 28 | 2 | 0.07 | 11 | 0.39 |
| Health Care | 59 | 3 | 0.05 | 14 | 0.24 |
| Financials | 127 | 6 | 0.05 | 31 | 0.24 |
| Utilities | 51 | 2 | 0.04 | 18 | 0.35 |
| Communication Services | 52 | 1 | 0.02 | 18 | 0.35 |
| Real Estate | 51 | 0 | 0.00 | 16 | 0.31 |
| Total | 1,041 | 88 | 0.08 | 320 | 0.31 |

Continued on following page

**Table 1 (continued)**

*Panel C: By Countries*

| | All Firms | Failed Firms | Failed Ratio | Disappeared Firms | Disappeared Ratio |
|---|---|---|---|---|---|
| Hong Kong | 8 | 2 | 0.25 | 3 | 0.38 |
| Greece | 4 | 1 | 0.25 | 0 | 0.00 |
| China | 4 | 1 | 0.25 | 1 | 0.25 |
| South Africa | 25 | 5 | 0.20 | 7 | 0.28 |
| Turkey | 21 | 4 | 0.19 | 6 | 0.29 |
| South Korea | 46 | 8 | 0.17 | 26 | 0.57 |
| Mexico | 7 | 1 | 0.14 | 3 | 0.43 |
| Ireland | 7 | 1 | 0.14 | 1 | 0.14 |
| Sweden | 30 | 4 | 0.13 | 11 | 0.37 |
| Taiwan | 31 | 4 | 0.13 | 10 | 0.32 |
| Japan | 165 | 20 | 0.12 | 51 | 0.31 |
| Australia | 17 | 2 | 0.12 | 4 | 0.24 |
| Canada | 29 | 3 | 0.10 | 6 | 0.21 |
| India | 21 | 2 | 0.10 | 9 | 0.43 |
| USA | 215 | 16 | 0.07 | 47 | 0.22 |
| Brazil | 15 | 1 | 0.07 | 2 | 0.13 |
| France | 55 | 3 | 0.05 | 16 | 0.29 |
| Germany | 40 | 2 | 0.05 | 12 | 0.30 |
| Netherlands | 21 | 1 | 0.05 | 9 | 0.43 |
| Finland | 23 | 1 | 0.04 | 10 | 0.43 |
| Spain | 28 | 1 | 0.04 | 7 | 0.25 |
| Switzerland | 29 | 1 | 0.03 | 7 | 0.24 |
| United Kingdom | 105 | 3 | 0.03 | 33 | 0.31 |
| Other | 95 | 1 | 0.01 | 39 | 0.41 |
| Total | 1,041 | 88 | 0.08 | 320 | 0.31 |

*Panel D: By Mandatory Environmental Disclosure*

| | All Firms | Failed Firms | Failed Ratio | Disappeared Firms | Disappeared Ratio |
|---|---|---|---|---|---|
| Mandatory E Disclosure | 750 | 69 | 0.09 | 256 | 0.34 |
| No Mandatory E Disclosure | 291 | 19 | 0.07 | 64 | 0.22 |
| Total | 1041 | 88 | 0.08 | 320 | 0.31 |

This table shows the firms' emissions target sample selection and summary statistics by industry and country. Panel A presents the sample composition. Panel B, C, and D present the number of firms that have 2020 emissions targets, the number of failed firms, the ratio of failed firms, the number of disappeared firms, and the ratio of disappeared firms by industry, country, and country-level mandatory environmental disclosure regulation respectively. Panel C shows countries with at least 3 firms reporting to CDP and at least one firm with failed targets, and aggregate remaining countries as "Other". ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. A detailed description of the variables is in Appendix A.

**Table 2: Summary Statistics**

| | Count | Mean | Std. dev. | P25 | P50 | P75 |
|---|---|---|---|---|---|---|
| Achieved | 4,611 | 0.612 | 0.487 | 0.000 | 1.000 | 1.000 |
| Failed | 4,611 | 0.089 | 0.284 | 0.000 | 0.000 | 0.000 |
| Disappeared | 4,611 | 0.299 | 0.458 | 0.000 | 0.000 | 1.000 |
| Disappeared - leaders | 4,611 | 0.202 | 0.401 | 0.000 | 0.000 | 0.000 |
| Disappeared - laggards | 4,611 | 0.097 | 0.297 | 0.000 | 0.000 | 0.000 |
| Failed Ambitious Targets | 4,611 | 0.046 | 0.209 | 0.000 | 0.000 | 0.000 |
| Failed Unambitious Targets | 4,611 | 0.043 | 0.202 | 0.000 | 0.000 | 0.000 |
| E&S and E Proposals | 970 | 0.329 | 0.790 | 0.000 | 0.000 | 0.000 |
| E Proposal | 970 | 0.141 | 0.445 | 0.000 | 0.000 | 0.000 |
| Pulse Score | 4,137 | 57.981 | 9.165 | 52.190 | 57.640 | 63.427 |
| Insight Score | 4,137 | 57.643 | 8.663 | 52.263 | 57.351 | 62.895 |
| Asset4 Environmental Score | 4,250 | 69.761 | 18.632 | 59.420 | 73.195 | 83.940 |
| Asset4 Emission Score | 4,250 | 78.511 | 19.010 | 68.670 | 83.825 | 93.070 |
| MSCI Environmental Score | 4,184 | 6.091 | 2.156 | 4.500 | 5.900 | 7.400 |
| MSCI Emissions Score | 4,179 | 8.947 | 1.799 | 8.600 | 10.000 | 10.000 |
| MSCI Emissions MGMT Score | 4,179 | 6.212 | 1.082 | 6.000 | 6.300 | 7.000 |
| Log(MV) | 4,611 | 9.043 | 1.552 | 7.986 | 9.061 | 10.117 |
| ROA | 4,611 | 0.043 | 0.061 | 0.012 | 0.037 | 0.068 |
| Price Volatility | 4,611 | 22.801 | 7.175 | 17.720 | 21.730 | 26.840 |
| Sales Growth | 4,611 | 3.911 | 11.868 | -0.750 | 3.090 | 7.630 |
| Price to Book | 4,611 | 2.757 | 27.280 | 0.980 | 1.650 | 3.040 |
| Capital Intensity | 4,611 | 9.007 | 18.005 | 1.970 | 4.190 | 8.390 |
| Monetary Management | 4,611 | 0.729 | 0.444 | 0.000 | 1.000 | 1.000 |
| Non-Monetary Management | 4,611 | 0.126 | 0.332 | 0.000 | 0.000 | 0.000 |
| #Initiatives | 4,611 | 4.131 | 4.826 | 1.000 | 3.000 | 5.000 |
| Log(Total Carbon Savings) | 4,611 | 7.775 | 4.109 | 6.031 | 8.495 | 10.619 |
| Log(Total Project Investment) | 4,611 | 10.895 | 6.891 | 0.000 | 13.729 | 15.836 |
| % Emissions Reduction | 3,444 | 6.618 | 24.851 | 0.450 | 2.675 | 6.700 |
| Lagging-behind Indicator | 3,444 | 0.102 | 0.302 | 0.000 | 0.000 | 0.000 |
| #Targets | 3,444 | 1.607 | 0.861 | 1.000 | 1.000 | 2.000 |

This table shows the summary statistics of the firm-year level variables used in the consequences test and validation test. A detailed description of the variables is in Appendix A.

**Table 3: Validation of Target Outcome Types**

| | (1) % Emissions Reduction | (2) % Emissions Reduction | (3) Lagging-behind Indicator | (4) Lagging-behind Indicator |
|---|---|---|---|---|
| Failed=1 | -2.854** | -2.982** | 0.094** | 0.097** |
| | (-2.43) | (-2.52) | (2.35) | (2.40) |
| Disappeared=1 | -1.183 | -1.106 | 0.092*** | 0.088*** |
| | (-0.80) | (-0.72) | (4.44) | (4.29) |
| Log(MV) | -0.229 | -0.309 | -0.007 | -0.008 |
| | (-0.48) | (-0.63) | (-1.14) | (-1.22) |
| ROA | 18.087* | 18.031* | -0.071 | -0.050 |
| | (1.86) | (1.83) | (-0.51) | (-0.36) |
| Price Volatility | 0.057 | 0.058 | -0.000 | -0.000 |
| | (0.91) | (0.86) | (-0.14) | (-0.33) |
| Sales Growth | -0.018 | -0.016 | 0.001** | 0.001** |
| | (-0.66) | (-0.62) | (1.96) | (2.03) |
| Price to Book | 0.006 | 0.007 | -0.000 | -0.000 |
| | (1.14) | (1.35) | (-0.64) | (-1.05) |
| Capital Intensity | -0.008 | -0.008 | 0.000 | 0.000 |
| | (-0.82) | (-0.77) | (0.87) | (0.78) |
| Monetary Management | 2.429** | 2.252** | 0.007 | 0.013 |
| | (2.20) | (2.05) | (0.39) | (0.75) |
| Non-Monetary Management | -0.483 | -0.453 | -0.024 | -0.024 |
| | (-0.33) | (-0.30) | (-1.39) | (-1.39) |
| #Initiatives | 0.025 | 0.015 | -0.000 | -0.000 |
| | (0.29) | (0.18) | (-0.09) | (-0.15) |
| Log(Total Carbon Savings) | 0.518*** | 0.621*** | -0.001 | -0.002 |
| | (4.18) | (4.66) | (-0.59) | (-0.76) |
| Log(Total Project Investment) | -0.102 | -0.087 | -0.001 | -0.001 |
| | (-1.56) | (-1.28) | (-1.03) | (-1.15) |
| #Targets | -0.617 | -0.608 | 0.033*** | 0.032*** |
| | (-1.32) | (-1.28) | (3.19) | (3.12) |
| N | 3444 | 3444 | 3444 | 3444 |
| Adj. R-squared | 0.018 | 0.017 | 0.050 | 0.053 |
| Year FE | No | Yes | No | Yes |
| Industry FE | Yes | Yes | Yes | Yes |

This table presents the firm-year level percentage reductions in emissions and the indicator for whether the firm has lagging-behind targets from 2010 to 2019 in relation to whether the firm has failed or disappeared targets. *Failed* equals 1 if the firm misses its emissions targets. *Disappeared* equals 1 if the firm has disappeared 2020 emissions targets. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by GICS industry group. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 4: Transparency of Target Outcomes**

| | Achieved | Failed | Disappeared |
|---|---|---|---|
| CDP Sample | 633 | 88 | 320 |
| Sustainability Reports | | 78 | |
| Acknowledged Failure | | 26 | |
| Explicitly Acknowledged Failure | | 16 | |
| Press Release | 12 | 0 | 0 |
| Media Coverage | 14 | 3 | 0 |
| Media coverage linked to press release | 6 (43%) | 0 | 0 |
| Media coverage linked to acknowledged failure | | 3 (100%) | |

This table shows the number of companies in each category and different channels through which the target outcomes are disclosed by the firms or covered by the media. The CDP Sample represents the main sample in this study as Panel A of Table 1. The channels of corporate disclosure include sustainability reports (only for the failed firms) and press releases. If the information of failure in achieving the emissions targets can be found in their sustainability reports, then the firm acknowledged their failure. For explicit acknowledgment, firms have to include phrases such as "fail to achieve" in the discussion of their 2020 emissions targets, and the readers can learn the outcome without comparing the target number and the actual performance. Press release data is from Ravenpack. Media coverage data is from Pavenpack and TruValue. If there is a news article on the same date as the press release on the same topic of target achievement, then the news article is linked to press releases. If a news article covers the same topic of failure to achieve the target as what companies provide in their sustainability reports, then the news article is linked to explicit acknowledgment in sustainability reports.

**Table 5: Market Responses to 2020 Emissions Reduction Target Outcomes**

| *Panel A: Around CDP Report Releases* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed | 0.380 | -0.183 | -0.112 |
| | (0.975) | (-0.358) | (-0.879) |
| N | 85 | 85 | 85 |
| Achieved | 0.126 | -0.134 | -0.142 |
| | (1.031) | (-0.904) | (-0.898) |
| N | 576 | 576 | 576 |
| Disappeared - laggards | 0.419 | 0.147 | -0.151 |
| | (1.373) | (0.381) | (-0.887) |
| N | 109 | 109 | 109 |
| Disappeared - leaders | 0.180 | -0.183 | -0.066 |
| | (0.916) | (-0.724) | (-0.420) |
| N | 177 | 177 | 177 |

| *Panel B: Around Sustainability Report Releases* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed | 0.072 | -0.127 | -0.082 |
| | (0.151) | (-0.236) | (-1.176) |
| N | 50 | 50 | 50 |

| *Panel C: Around Media Coverage* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed | -0.383 | -1.823 | -0.054 |
| | (-0.206) | (-0.866) | (-0.297) |
| N | 3 | 3 | 3 |
| Achieved | 0.499 | 0.525 | -0.099 |
| | (0.639) | (0.703) | (-1.166) |
| N | 13 | 13 | 13 |

Panel A presents the cumulative average abnormal return (CAAR) over 3 days of the event window from day -1 to day 1, 5 days of the event window from day -1 to day 3, and abnormal trading volume at the event date, where the event is the CDP report release. Panel B presents the CAAR from day -1 to day 1, from day -1 to day 3, and abnormal trading volume at the event date, where the event is the ESG report release. Panel C presents the CAAR from day -1 to day 1, from day -1 to day 3, and abnormal trading volume at the event date, where the event is the media coverage of achieved or failed targets. The table reports CAAR estimates, abnormal trading volume in log percentages, and (in parentheses) t-statistics. Abnormal returns are based on the same day market returns. Abnormal trading volume is calculated using an estimation window from day -140 to day -40. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 6: Consequences of Failing Emissions Targets: Shareholder Proposals**

| | (1) E&S and E Proposals | (2) E Proposal |
|---|---|---|
| Failed X Post | -0.001 | 0.036 |
| | (-0.00) | (0.29) |
| Disappeared - leaders X Post | 0.284 | 0.058 |
| | (1.59) | (0.75) |
| Disappeared - laggards X Post | -0.172 | -0.115 |
| | (-0.71) | (-1.19) |
| Log(MV) | 0.014 | -0.062 |
| | (0.20) | (-1.42) |
| ROA | -0.504 | -0.177 |
| | (-1.12) | (-0.55) |
| Price Volatility | -0.024** | -0.016** |
| | (-2.31) | (-2.31) |
| Sales Growth | 0.003 | 0.000 |
| | (1.20) | (0.36) |
| Price to Book | 0.000 | 0.000 |
| | (0.89) | (1.00) |
| Capital Intensity | -0.002 | -0.001 |
| | (-1.05) | (-0.93) |
| Monetary Management | 0.083 | -0.004 |
| | (1.22) | (-0.09) |
| Non-Monetary Management | -0.040 | 0.022 |
| | (-0.58) | (0.54) |
| #Initiatives | -0.007 | -0.001 |
| | (-1.19) | (-0.26) |
| Log(Total Carbon Savings) | -0.001 | -0.010 |
| | (-0.08) | (-1.06) |
| Log(Total Project Investment) | 0.002 | 0.001 |
| | (0.24) | (0.20) |
| N | 967 | 967 |
| Adj. R-squared | 0.558 | 0.371 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

This table presents the consequences of failing emissions targets in relation to shareholder proposals. The main variables of interest are the interactions between *Failed* and *Post*, *Disappeared - leaders* and *Post*, and *Disappeared - laggards* and *Post*, denoted by Failed X Post, Disappeared - leaders X Post, and Disappeared - laggards X Post respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 7: Consequences of Failing Emissions Targets: Media Sentiment**

| | (1) Pulse Score | (2) Insight Score |
|---|---|---|
| Failed X Post | 1.084 | 0.404 |
| | (1.16) | (0.53) |
| Disappeared - leaders X Post | -0.299 | -0.347 |
| | (-0.44) | (-0.59) |
| Disappeared - laggards X Post | -0.719 | -1.178 |
| | (-0.70) | (-1.32) |
| Log(MV) | 0.128 | 0.320 |
| | (0.26) | (0.81) |
| ROA | -0.700 | -0.156 |
| | (-0.23) | (-0.06) |
| Price Volatility | -0.155** | -0.142** |
| | (-2.13) | (-2.25) |
| Sales Growth | 0.005 | 0.016 |
| | (0.34) | (1.33) |
| Price to Book | 0.004*** | 0.001 |
| | (3.33) | (0.93) |
| Capital Intensity | -0.002 | -0.002 |
| | (-0.18) | (-0.21) |
| Monetary Management | 0.020 | -0.093 |
| | (0.04) | (-0.23) |
| Non-Monetary Management | 0.320 | 0.033 |
| | (0.50) | (0.07) |
| #Initiatives | -0.018 | -0.012 |
| | (-0.61) | (-0.56) |
| Log(Total Carbon Savings) | -0.006 | 0.016 |
| | (-0.11) | (0.37) |
| Log(Total Project Investment) | -0.041 | -0.045* |
| | (-1.35) | (-1.82) |
| N | 4102 | 4102 |
| Adj. R-squared | 0.597 | 0.722 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

This table presents the consequences of failing emissions targets in relation to media sentiment. The main variables of interest are the interactions between *Failed* and *Post*, *Disappeared - leaders* and *Post*, and *Disappeared - laggards* and *Post*, denoted by Failed X Post, Disappeared - leaders X Post, and Disappeared - laggards X Post respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 8: Consequences of Failing Emissions Targets: Environmental Scores**

| *Panel A: Asset4* | | |
|---|---|---|
| | (1) | (2) |
| | Asset4 Environmental Score | Asset4 Emission Score |
| Failed X Post | 1.730 | 1.509 |
| | (1.59) | (1.03) |
| Disappeared- leaders X Post | 0.222 | 1.357 |
| | (0.29) | (1.29) |
| Disappeared - laggards X Post | 2.623* | 2.144* |
| | (1.96) | (1.75) |
| Log(MV) | 0.800 | 1.626* |
| | (1.04) | (1.75) |
| ROA | 0.642 | -0.827 |
| | (0.21) | (-0.19) |
| Price Volatility | -0.020 | -0.095 |
| | (-0.21) | (-0.84) |
| Sales Growth | -0.009 | 0.004 |
| | (-0.50) | (0.16) |
| Price to Book | 0.006* | 0.016*** |
| | (1.88) | (3.02) |
| Capital Intensity | -0.019 | -0.017 |
| | (-1.29) | (-0.77) |
| Monetary Management | 0.636 | 0.392 |
| | (1.04) | (0.51) |
| Non-Monetary Management | -0.233 | -0.862 |
| | (-0.33) | (-0.96) |
| #Initiatives | -0.016 | -0.051 |
| | (-0.36) | (-1.05) |
| Log(Total Carbon Savings) | 0.026 | 0.143* |
| | (0.43) | (1.79) |
| Log(Total Project Investment) | 0.011 | 0.019 |
| | (0.37) | (0.47) |
| N | 4236 | 4236 |
| Adj. R-squared | 0.874 | 0.805 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

| *Panel B: MSCI* | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| | MSCI Environmental Score | MSCI Emissions Score | MSCI Emissions MGMT Score |
| Failed X Post | -0.119 | 0.139 | 0.001 |
| | (-1.09) | (1.43) | (0.01) |
| Disappeared - leaders X Post | -0.029 | 0.067 | 0.148** |
| | (-0.39) | (1.10) | (2.06) |
| Disappeared - laggards X Post | 0.000 | -0.048 | -0.042 |
| | (0.00) | (-0.49) | (-0.37) |
| Log(MV) | 0.021 | -0.031 | -0.031 |
| | (0.39) | (-0.69) | (-0.54) |
| ROA | 0.206 | 0.352 | 0.343 |
| | (0.76) | (1.22) | (1.04) |
| Price Volatility | -0.001 | -0.010 | -0.024** |
| | (-0.09) | (-1.23) | (-2.37) |
| Sales Growth | -0.002 | -0.000 | 0.001 |
| | (-1.33) | (-0.15) | (0.59) |
| Price to Book | -0.000 | -0.000 | 0.000 |
| | (-0.65) | (-0.30) | (0.47) |
| Capital Intensity | -0.003** | -0.002** | -0.002** |
| | (-2.58) | (-2.15) | (-2.10) |
| Monetary Management | 0.087 | 0.043 | 0.057 |
| | (1.56) | (0.94) | (1.02) |
| Non-Monetary Management | -0.001 | 0.043 | 0.003 |
| | (-0.02) | (0.80) | (0.05) |
| #Initiatives | -0.000 | 0.001 | 0.000 |
| | (-0.03) | (0.20) | (0.08) |
| Log(Total Carbon Savings) | -0.008 | 0.003 | 0.002 |
| | (-1.42) | (0.46) | (0.24) |
| Log(Total Project Investment) | -0.001 | 0.000 | -0.001 |
| | (-0.17) | (0.04) | (-0.22) |
| N | 4188 | 4184 | 4184 |
| Adj. R-squared | 0.909 | 0.905 | 0.581 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

This table presents the consequences of failing emissions targets in relation to environmental scores. Panel A shows the scores from Thomson Reuters Asset4. Panel B shows the scores from MSCI. The main variables of interest are the interactions between *Failed* and *Post*, *Disappeared - leaders* and *Post*, and *Disappeared - laggards* and *Post*, denoted by Failed X Post, Disappeared - leaders X Post, and Disappeared - laggards X Post respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 9: Consequences Additional Tests: Target Ambition**

| *Panel A: Market Responses Around CDP Releases* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed - Ambitious | -0.054 | -0.290 | -0.024 |
| | (-0.130) | (-0.516) | (-0.155) |
| N | 43 | 43 | 43 |
| Failed - Unambitious | 0.235 | -0.791 | -0.169 |
| | (0.451) | (-1.187) | (-1.241) |
| N | 38 | 38 | 38 |

| *Panel B: Shareholder Proposals* | | |
|---|---|---|
| | (1) | (2) |
| | E&S and E Proposals | E Proposal |
| Failed Ambitious Targets X Post | -0.006 | 0.264 |
| | (-0.02) | (0.95) |
| Failed Unambitious Targets X Post | -0.022 | -0.109* |
| | (-0.18) | (-1.68) |
| N | 748 | 748 |
| Adj. R-squared | 0.511 | 0.398 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

| *Panel C: Media Sentiment* | | |
|---|---|---|
| | (1) | (2) |
| | Pulse Score | Insight Score |
| Failed Ambitious Targets X Post | 0.053 | -0.483 |
| | (0.04) | (-0.49) |
| Failed Unambitious Targets X Post | 2.669* | 1.768 |
| | (1.94) | (1.60) |
| N | 2857 | 2857 |
| Adj. R-squared | 0.627 | 0.744 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 9 (continued)**

*Panel D: Asset4 Environmental Scores*

| | (1) Environmental Score | (2) Emission Score |
|---|---|---|
| Failed Ambitious Targets X Post | 1.793 | 0.549 |
| | (1.19) | (0.29) |
| Failed Unambitious Targets X Post | 1.597 | 2.609 |
| | (1.09) | (1.23) |
| N | 2999 | 2999 |
| Adj. R-squared | 0.871 | 0.806 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

*Panel E: MSCI Environmental Scores*

| | (1) MSCI Environmental Score | (2) MSCI Emissions Score | (3) MSCI Emissions MGMT Score |
|---|---|---|---|
| Failed Ambitious Targets X Post | 0.014 | 0.066 | -0.047 |
| | (0.09) | (0.60) | (-0.34) |
| Failed Unambitious Targets X Post | -0.305** | 0.257 | 0.096 |
| | (-2.32) | (1.57) | (0.58) |
| N | 2909 | 2907 | 2907 |
| Adj. R-squared | 0.915 | 0.912 | 0.568 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

This table presents the cross-sectional tests for consequences of missing emissions targets for failed and achieved firms based on whether the firm misses ambitious or unambitious targets. Panel A shows the market response around CDP report releases in 2021. Panel B, C, D, and E show the outcomes of shareholder proposals, media sentiment, environmental scores from Thomson Reuters Asset4, and environmental scores from MSCI respectively. *Failed Ambitious Targets* equals 1 if the firm has failed its 2020 emissions targets and has above-median average target ambition among the failed firms. *Failed Unambitious Targets* equals 1 if the firm has failed its 2020 emissions targets and has below-median average target ambition among the failed firms. *Post* equals 1 if the year is 2021. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 10: Consequences Additional Tests: COVID Impact**

| *Panel A: Market Responses Around CDP Releases* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed | -0.258 | -0.768 | -0.125 |
| | (-0.537) | (-1.428) | (-0.983) |
| N | 29 | 29 | 29 |
| Achieved | 0.219 | -0.169 | -0.183 |
| | (1.298) | (-0.792) | (-1.161) |
| N | 260 | 260 | 260 |
| Disappeared - laggards | -0.133 | -0.148 | -0.042 |
| | (-0.316) | (-0.240) | (-0.249) |
| N | 44 | 44 | 44 |
| Disappeared - leaders | 0.047 | -0.447 | -0.111 |
| | (0.161) | (-1.323) | (-0.706) |
| N | 75 | 75 | 75 |

| *Panel B: Shareholder Proposals* | | |
|---|---|---|
| | (1) | (2) |
| | E&S and E Proposals | E Proposal |
| Failed X Post | 0.416 | 0.277 |
| | (1.22) | (0.62) |
| Disappeared - leaders X Post | -0.043 | -0.014 |
| | (-0.15) | (-0.10) |
| Disappeared - laggards X Post | -0.312 | -0.198 |
| | (-0.86) | (-1.20) |
| N | 416 | 416 |
| Adj. R-squared | 0.558 | 0.345 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 10 (continued)**

*Panel C: Media Sentiment*

| | (1) Pulse Score | (2) Insight Score |
|---|---|---|
| Failed X Post | 0.656 | 0.701 |
| | (0.42) | (0.48) |
| Disappeared - leaders X Post | 0.116 | 0.195 |
| | (0.11) | (0.23) |
| Disappeared - laggards X Post | -0.454 | -0.485 |
| | (-0.32) | (-0.33) |
| N | 1836 | 1836 |
| Adj. R-squared | 0.574 | 0.696 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

*Panel D: Asset4 Environmental Scores*

| | (1) Environmental Score | (2) Emission Score |
|---|---|---|
| Failed X Post | 3.869** | 2.551 |
| | (2.13) | (1.03) |
| Disappeared - leaders X Post | 1.436 | 2.459 |
| | (1.23) | (1.57) |
| Disappeared - laggards X Post | 2.329 | -0.132 |
| | (0.95) | (-0.07) |
| N | 1922 | 1922 |
| Adj. R-squared | 0.869 | 0.787 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 10 (continued)**

*Panel E: MSCI Environmental Scores*

| | (1) MSCI Environmental Score | (2) MSCI Emissions Score | (3) MSCI Emissions MGMT Score |
|---|---|---|---|
| Failed X Post | -0.001 | 0.192 | 0.086 |
| | (-0.00) | (1.26) | (0.40) |
| Disappeared - leaders X Post | -0.036 | 0.084 | 0.185* |
| | (-0.34) | (1.36) | (1.87) |
| Disappeared - laggards X Post | 0.240 | 0.012 | -0.104 |
| | (1.05) | (0.09) | (-0.52) |
| N | 1836 | 1834 | 1834 |
| Adj. R-squared | 0.907 | 0.713 | 0.496 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

This table presents the consequences of failing or having disappeared emissions targets by repeating the main specification and dropping firms that are highly impacted by COVID-19, defined as firms in industries that have below-median changes in revenue between fiscal 2019 and 2020. Panel A shows the market response around CDP report releases in 2021. Panel B, C, D, and E show the outcomes of shareholder proposals, media sentiment, environmental scores from Thomson Reuters Asset4, and environmental scores from MSCI respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 11: Consequences Additional Tests: Materiality**

| *Panel A: Market Responses Around CDP Releases* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Failed | 0.212 | -0.355 | -0.094 |
| | (0.528) | (-0.675) | (-0.734) |
| N | 63 | 63 | 63 |
| Achieved | 0.446** | 0.249 | -0.118 |
| | (2.568) | (1.196) | (-0.748) |
| N | 334 | 334 | 334 |
| Disappeared - laggards | 0.584 | 0.610 | -0.103 |
| | (1.603) | (1.289) | (-0.605) |
| N | 70 | 70 | 70 |
| Disappeared - leaders | 0.314 | -0.004 | -0.123 |
| | (1.220) | (-0.013) | (-0.783) |
| N | 118 | 118 | 118 |

| *Panel B: Shareholder Proposals* | | |
|---|---|---|
| | (1) | (2) |
| | E&S and E Proposals | E Proposal |
| Failed X Post | -0.019 | -0.003 |
| | (-0.13) | (-0.02) |
| Disappeared - leaders X Post | 0.263 | 0.095 |
| | (1.03) | (0.83) |
| Disappeared - laggards X Post | -0.471 | -0.208* |
| | (-1.37) | (-1.66) |
| N | 560 | 560 |
| Adj. R-squared | 0.574 | 0.393 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 11 (continued)**

*Panel C: Media Sentiment*

| | (1) Pulse Score | (2) Insight Score |
|---|---|---|
| Failed X Post | 0.713 | 0.357 |
| | (0.77) | (0.46) |
| Disappeared - leaders X Post | 0.462 | -0.027 |
| | (0.60) | (-0.04) |
| Disappeared - laggards X Post | -1.045 | -1.119 |
| | (-0.89) | (-1.04) |
| N | 2686 | 2686 |
| Adj. R-squared | 0.603 | 0.721 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

*Panel D: Asset4 Environmental Scores*

| | (1) Environmental Score | (2) Emission Score |
|---|---|---|
| Failed X Post | 1.372 | 1.348 |
| | (1.11) | (0.77) |
| Disappeared - leaders X Post | 0.766 | 1.226 |
| | (0.80) | (0.90) |
| Disappeared - laggards X Post | 1.578 | 2.387 |
| | (1.03) | (1.55) |
| N | 2721 | 2721 |
| Adj. R-squared | 0.868 | 0.805 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 11 (continued)**

*Panel E: MSCI Environmental Scores*

| | (1) MSCI Environmental Score | (2) MSCI Emissions Score | (3) MSCI Emissions MGMT Score |
|---|---|---|---|
| Failed X Post | -0.150 | 0.173 | 0.053 |
| | (-1.58) | (1.39) | (0.43) |
| Disappeared - leaders X Post | -0.004 | 0.063 | 0.174** |
| | (-0.06) | (0.82) | (2.09) |
| Disappeared - laggards X Post | 0.061 | -0.070 | -0.009 |
| | (0.41) | (-0.55) | (-0.07) |
| N | 2688 | 2686 | 2686 |
| Adj. R-squared | 0.929 | 0.913 | 0.630 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

This table presents the consequences of failing or having disappeared emissions targets by repeating the main specification and keeping firms that belong to industries with above-median average emissions from 2017 to 2020. Panel A shows the market response around CDP report releases in 2021. Panel B, C, D, and E show the outcomes of shareholder proposals, media sentiment, environmental scores from Thomson Reuters Asset4, and environmental scores from MSCI respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 12: Consequences Additional Tests: Prior Information in 2018 and 2019**

*Panel A: Market Responses Around 2018 and 2019 CDP Releases*

| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
|---|---|---|---|
| Lagging Behind in 2018 | -0.160 | 0.244 | 0.240 |
| | (-0.224) | (0.315) | (1.499) |
| N | 41 | 41 | 41 |
| Lagging Behind in 2019 | -0.833 | -0.215 | -0.270 |
| | (-1.364) | (-0.270) | (-1.375) |
| N | 46 | 46 | 46 |

*Panel B: Shareholder Proposals*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | E&S and E Proposals | E Proposal | E&S and E Proposals | E Proposal |
| Post 2018 X Lagging Behind in 2018 | 0.283 | 0.247* | | |
| | (1.42) | (1.79) | | |
| Post 2019 X Lagging Behind in 2019 | | | 0.091 | 0.041 |
| | | | (0.55) | (0.33) |
| N | 967 | 967 | 967 | 967 |
| Adj. R-squared | 0.555 | 0.372 | 0.555 | 0.371 |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

Continued on following page

**Table 12 (continued)**

*Panel C: Media Sentiment*

| | (1) Pulse Score | (2) Insight Score | (3) Pulse Score | (4) Insight Score |
|---|---|---|---|---|
| Post 2018 X Lagging Behind in 2018 | 0.564 | 1.161 | | |
| | (0.44) | (1.12) | | |
| Post 2019 X Lagging Behind in 2019 | | | 0.463 | -0.101 |
| | | | (0.37) | (-0.10) |
| N | 4102 | 4102 | 4102 | 4102 |
| Adj. R-squared | 0.597 | 0.722 | 0.597 | 0.721 |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

*Panel D: Asset4 Environmental Scores*

| | (1) Asset4 Environmental Score | (2) Asset4 Emission Score | (3) Asset4 Environmental Score | (4) Asset4 Emission Score |
|---|---|---|---|---|
| Post 2018 X Lagging Behind in 2018 | 1.966 | 1.028 | | |
| | (0.83) | (0.36) | | |
| Post 2019 X Lagging Behind in 2019 | | | -0.662 | -0.426 |
| | | | (-0.45) | (-0.18) |
| N | 4236 | 4236 | 4236 | 4236 |
| Adj. R-squared | 0.874 | 0.805 | 0.874 | 0.805 |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

Continued on following page

**Table 12 (continued)**

*Panel E: MSCI Environmental Scores*

| | (1) MSCI Environmental Score | (2) MSCI Emissions Score | (3) MSCI Emissions MGMT Score | (4) MSCI Environmental Score | (5) MSCI Emissions Score | (6) MSCI Emissions MGMT Score |
|---|---|---|---|---|---|---|
| Post 2018 X Lagging Behind in 2018 | 0.126 | -0.010 | 0.093 | | | |
| | (0.45) | (-0.06) | (0.45) | | | |
| Post 2019 X Lagging Behind in 2019 | | | | 0.123 | 0.137 | 0.234 |
| | | | | (1.09) | (1.13) | (1.48) |
| N | 4155 | 4151 | 4151 | 4155 | 4151 | 4151 |
| Adj. R-squared | 0.910 | 0.905 | 0.582 | 0.910 | 0.906 | 0.583 |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

This table examines whether the market responses to the progress in 2020 emissions targets released in 2018 and 2019 CDP reports. Panel A presents the cumulative average abnormal return (CAAR) over 3 days of the event window from day -1 to day 1, 5 days of the event window from day -1 to day 3, and abnormal trading volume at the event date, where the event is the 2018 or 2019 CDP report releases. Panel B, C, D, and E show the outcomes of shareholder proposals, media sentiment, environmental scores from Thomson Reuters Asset4, and environmental scores from MSCI respectively, where the *post* variable is defined based on 2018 and 2019 respectively. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 13: Announcement of Emissions Targets**

| *Panel A: Target Announcement by Press Release and Media Coverage* | | |
|---|---|---|
| | Number of Firms | Number of Articles |
| Press Release | 97 | 109 |
| Media Coverage | 166 | 218 |
| Media coverage linked to press release | 55 | 61 |
| Total | 194 | 266 |

| *Panel B: Market Responses Around Media Coverage* | | | |
|---|---|---|---|
| | CAAR [-1,1] | CAAR [-1,3] | AbnTradingVolume |
| Target Announcement | 0.221 | 0.271 | 0.052 |
| | (0.927) | (0.811) | (1.231) |
| N | 215 | 215 | 215 |

| *Panel C: Shareholder Proposals* | | |
|---|---|---|
| | (1) | (2) |
| | E&S and E Proposals | E Proposal |
| Post Announcement | -0.018 | -0.001 |
| | (-0.42) | (-0.04) |
| N | 1960 | 1960 |
| Adj. R-squared | 0.371 | 0.254 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

| *Panel D: Media Sentiment* | | |
|---|---|---|
| | (1) | (2) |
| | Pulse Score | Insight Score |
| Post Announcement | 0.570 | 0.743** |
| | (1.44) | (2.17) |
| N | 6954 | 6950 |
| Adj. R-squared | 0.494 | 0.563 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

Continued on following page

**Table 13 (continued)**

*Panel E: Asset4 Environmental Scores*

| | (1) Environmental Score | (2) Emission Score |
|---|---|---|
| Post Announcement | 1.399** | 2.372*** |
| | (2.17) | (3.25) |
| N | 7670 | 7670 |
| Adj. R-squared | 0.756 | 0.693 |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |

*Panel F: MSCI Environmental Scores*

| | (1) MSCI Environmental Score | (2) MSCI Emissions Score | (3) MSCI Emissions MGMT Score |
|---|---|---|---|
| Post Announcement | 0.238*** | 0.130 | 0.168* |
| | (3.27) | (1.56) | (1.80) |
| N | 6611 | 6109 | 4969 |
| Adj. R-squared | 0.692 | 0.682 | 0.455 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |

This table presents the announcements of new emissions targets and the responses to these announcements. Panel A presents the announcements of new emissions targets by press release and media coverage from 2010 to 2021. Panel B shows the market response around the announcements of emissions targets in Panel A. Panel C, D, E, and F show the outcomes of shareholder proposals, media sentiment, environmental scores from Thomson Reuters Asset4, and environmental scores from MSCI respectively, where the announcement is between 2011 and 2017. A detailed description of the variables is in Appendix A. The table reports ordinary least squares (OLS) coefficient estimates and (in parentheses) t-statistics based on robust standard errors clustered by firm. Firm fixed effects and Year fixed effects are included. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Appendix A: Variable Definitions**

| Variable | Description | Source |
|---|---|---|
| Achieved | An indicator variable equal to 1 if the firm has achieved its 2020 emissions targets. | CDP |
| Failed | An indicator variable equal to 1 if the firm failed its 2020 emissions targets. | CDP |
| Disappeared | An indicator variable equal to 1 if the firm has disappeared 2020 emissions targets. | CDP |
| Disappeared - leaders | An indicator variable equal to 1 if the firm has disappeared 2020 emissions targets and has above-industry-median real emissions reduction from 2017 to 2020. | CDP |
| Disappeared - laggards | An indicator variable equal to 1 if the firm has disappeared 2020 emissions targets and has below-industry-median real emissions reduction from 2017 to 2020. | CDP |
| Failed Ambitious Targets | An indicator variable equal to 1 if the firm has failed its 2020 emissions targets and has above-median average target ambition among the failed firms. | CDP |
| Failed Unambitious Targets | An indicator variable equal to 1 if the firm has failed its 2020 emissions targets and has below-median average target ambition among the failed firms. | CDP |
| Monetary Management | An indicator variable equal to 1 if the firm provides monetary incentives for managers to manage "climate change issues (including the attainment of targets)". | CDP |
| Non-Monetary Management | An indicator variable equal to 1 if the firm provides non-monetary incentives for managers to manage "climate change issues (including the attainment of targets)". | CDP |
| #Initiatives | Total number of carbon emission reduction initiatives. | CDP |
| Log(Total Carbon Savings) | Log (1 + Total estimated amount of CO2 savings generated by these initiatives). | CDP |
| Log(Total Project Investment) | Log (1 + Total amount of investment in these initiatives). | CDP |
| #Targets | Total number of 2020 emissions targets a company has had. | CDP |
| Lagging-behind Indicator | An indicator variable equal to 1 if the firm has lagging-behind targets, defined as targets with progress that falls short of the expected progress based on the linear progress assumption. | CDP |
| % Emissions Reduction | Percentage reductions in emissions resulting from emissions reduction activities and changes in renewable energy consumption. | CDP |

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Appendix A, continued

| Variable | Description | Source |
|---|---|---|
| E&S and E Proposals | Total number of shareholder proposals that belong to the E&S and environmental categories. | ISS |
| E Proposal | Total number of shareholder proposals that belong to the environmental category only. | ISS |
| Pulse Score | Pulse Score that measures the near-term performance changes that highlight opportunities and controversies on environmental issues. | TruValue |
| Insight Score | Insight Score that measures a company's longer-term track record on environmental issues. | TruValue |
| Asset4 Environmental Score | Environmental Pillar Score (scale: 0 - 100). | Asset4 |
| Asset4 Emission Score | Emission Score (scale: 0 - 100). | Asset4 |
| MSCI Environmental Score | Environmental Pillar Score (scale: 0 - 10). | MSCI |
| MSCI Emissions Score | Carbon Emissions Score (scale: 0 - 10). | MSCI |
| MSCI Emissions MGMT Score | Carbon Emissions Management Score (scale: 0 - 10). | MSCI |
| Log(MV) | Log(1 + Market Value). | Datastream |
| ROA | Return on Assets. | Datastream |
| Price 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 |
| Post | An indicator variable equal to 1 if the fiscal year equals 2021. | |

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

**Appendix B: Firm Characteristics: With 2020 Targets vs. Without 2020 Taregts**

| | With 2020 Targets (1) | | Without 2020 Taregts (2) | | Difference (1) - (2) |
|---|---|---|---|---|---|
| | Mean | Std. dev. | Mean | Std. dev. | |
| Log(MV) | 9.089 | 1.477 | 8.283 | 1.605 | 0.806*** |
| ROA | 0.047 | 0.048 | -0.081 | 4.503 | 0.128 |
| Price Volatility | 21.973 | 6.848 | 24.582 | 8.698 | -2.610*** |
| Sales Growth | 5.113 | 9.948 | 6.050 | 12.651 | -0.937* |
| Price to Book | 2.105 | 15.363 | 39.275 | 1293.762 | -37.170 |
| Capital Intensity | 9.139 | 17.136 | 23.598 | 433.562 | -14.459 |
| #Initiatives | 4.259 | 4.253 | 2.066 | 2.851 | 2.193*** |
| Total Carbon Savings | 8.783 | 3.235 | 5.058 | 4.702 | 3.725*** |
| Total Project Investment | 12.976 | 5.527 | 6.979 | 7.273 | 5.996*** |
| Monetary Management | 0.823 | 0.382 | 0.472 | 0.499 | 0.350*** |
| Non-Monetary Management | 0.213 | 0.410 | 0.125 | 0.331 | 0.088*** |
| Asset4 Environmental Score | 68.429 | 18.862 | 52.165 | 22.628 | 16.264*** |
| Asset4 Emission Score | 76.942 | 19.379 | 59.235 | 25.473 | 17.706*** |
| MSCI Environmental Score | 6.054 | 2.106 | 5.319 | 2.205 | 0.735*** |
| MSCI Emissions Score | 8.886 | 1.794 | 7.908 | 2.199 | 0.978*** |
| MSCI Emissions MGMT Score | 6.136 | 0.988 | 4.858 | 1.594 | 1.278*** |
| Environmental Media Volume | 4.136 | 12.354 | 2.299 | 9.366 | 1.837*** |
| #Years Reporting to CDP | 10.422 | 2.767 | 7.268 | 3.990 | 3.154*** |
| Mandatory E Disclosure | 0.691 | 0.462 | 0.700 | 0.459 | 0.008 |
| Observations | 891 | | 1389 | | 2280 |

This table presents the summary statistics of firms with and without 2020 emissions targets and the differences in means. *Environmental Media Volume* is the Volume Score from TruValue that measures the information flow or number of articles about a company. #*Years Reporting to CDP* is defined as the number of years that the firm reports to CDP. *Mandatory E Disclosure* is an indicator variable equal to 1 if the firm is under mandatory environmental disclosure regulations. Each variable represents the average from 2017 to 2019 except for #*Years Reporting to CDP* and *Mandatory E Disclosure*. The number of firms with 2020 emissions targets is smaller than the number of firms presented in Table 1 because of missing financial or environmental variables. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.