Grantham Research Institute on Climate Change and the Environment

Can investor coalitions drive corporate climate action?

Nikolaus Hastreiter

August 2025

Grantham Research Institute on
Climate Change and the Environment
Working Paper No. 415

ISSN 2515-5717 (Online)

Grantham Foundation for the Protection of the Environment

The London School of Economics and Political Science

The Grantham Research Institute on Climate Change and the Environment was established by the London School of Economics and Political Science in 2008 to bring together international expertise on economics, finance, geography, the environment, international development and political economy to create a world-leading centre for policy-relevant research and training. The Institute is funded by the Grantham Foundation for the Protection of the Environment and a number of other sources. It has 13 broad research areas:

1. Biodiversity
2. Climate change adaptation and resilience
3. Climate change governance, legislation and litigation
4. Climate, health and environment
5. Environmental behaviour
6. Environmental economic theory
7. Environmental policy evaluation
8. International climate politics
9. Science and impacts of climate change
10. Sustainable public and private finance
11. Sustainable natural resources
12. Transition to zero emissions growth
13. UK national and local climate policies

More information about the Grantham Research Institute is available at: www.lse.ac.uk/GranthamInstitute

Suggested citation:
Hastreiter N (2025) *Can investor coalitions drive corporate climate action?* Grantham Research Institute on Climate Change and the Environment Working Paper 415. London: London School of Economics and Political Science

Can Investor Coalitions Drive Corporate Climate Action?*

Nikolaus Hastreiter†

August 23, 2025

Abstract

This paper investigates the effectiveness of collective investor engagement in influencing corporate behaviour. Empirically, I assess the causal impact of Climate Action 100+ (CA100+), the world's largest investor coalition on climate change. To proxy the coalition's specific engagement asks of companies, I collect novel data on climate-related disclosure, sector-specific carbon intensities and carbon emission reduction targets. After examining the CA100+ company selection process and using various Difference-in-Differences specifications, I find no evidence that the coalition improved climate-related disclosure or reduced carbon emissions. However, its collaborative engagement has led to greater ambition in medium- and long-term target setting. Notably, this impact is concentrated among companies selected on a discretionary basis. Surprisingly, I find no evidence that the initiative's scale – measured via collective ownership and assets under management – amplifies impact, nor any spillover effects to non-target firms. Overall, this study raises doubts about the effectiveness of investor coalitions in driving corporate decarbonisation.

*I thank Simon Dietz and Richard Perkins for their guidance and suggestions. This paper also benefited from feedback from Caroline Flammer, Xi Li, Luca Taschini, Daniel De Kadt, Rayan Chebbi-Giovanetti, the Transition Pathway Initiative (TPI) team and participants at the ARCS Conference 2025, Baruch-JFQA Climate Finance and Sustainability Conference 2025, SIPA colloquium at Columbia University 2025, GRASFI conference 2024, 6th JRC Summer School on Sustainable Finance, EAERE conference 2024 and Environmental Economics Research Seminars 2023 and 2024 at the LSE. I gratefully acknowledge financial support for my PhD research through the TPI Centre Scholarship and the FIR-PRI Finance and Sustainability Awards research grant 2022. I also gratefully acknowledge funding from the European Union's Horizon 2020 research and innovation program under the Marie Sklodowska-Curie grant agreement No 870245 for a research secondment at Columbia University in spring 2025.

†London School of Economics & Political Science (LSE). Email: n.l.hastreiter@lse.ac.uk

Conflict of interest statement: The author is currently employed at the TPI Centre which serves as a data provider to CA100+.

1 Introduction

The transition to a low-carbon economy is a critical global challenge, necessitating substantial shifts in how entire industries operate. Investors can play a key role in accelerating this transition by leveraging their influence over their investees. However, they often hold only small individual stakes in companies. To strengthen their impact, investors have formed coalitions to collectively engage with companies.

Several reviews of the sustainable finance literature note a lack of empirical evidence regarding the the role of investors in driving change (Kölbel et al., 2020). While recent studies have started to fill this gap (Azar et al., 2021; Heeb and Kölbel, 2024), many areas of investor impact remain under-researched. Notably, investor coalitions have received surprisingly limited attention despite their growing importance.[1]

These initiatives combine self-regulatory mechanisms among investors with quasi-regulatory pressure on companies. As such, they represent a new form of collective investor action whose effectiveness remains largely untested. This paper aims to fill this gap by asking: *What is the impact of coordinated investor engagement on corporate climate action?* Developing a conceptual framework and providing new evidence on this question is important to assess the role of investor coalitions in the low-carbon transition.

An important feature of investor coalitions is their impressive collective scale. Climate Action 100+ (CA100+), the world's largest investor coalition on climate change, represents the "biggest shareholder action plan ever"(Financial Times, 2017). As illustrated in figure 1, CA100+ grew from 225 founding investor signatories representing a combined 26 trillion USD of assets under management (AUM) in 2017, to more than 700 members with 68 trillion USD in AUM by 2023.[2] Based on my calculations, CA100+ investors collectively held an average of 4% of outstanding shares in focus companies in 2017 – a figure that rose to 19.5%

[1] For example, investors have established Climate Action 100+ in 2017, the Net-Zero Asset Owner Alliance in 2019 and the Net-Zero Asset Manager Alliance in 2020 to coordinate action on climate change.

[2] The combined AUM figures may include some instances of double counting, as CA100+ is supported by both asset owners and managers.

by 2023. Despite recent departures starting from 2024, the coalition still includes over 600 members as of July 2025.

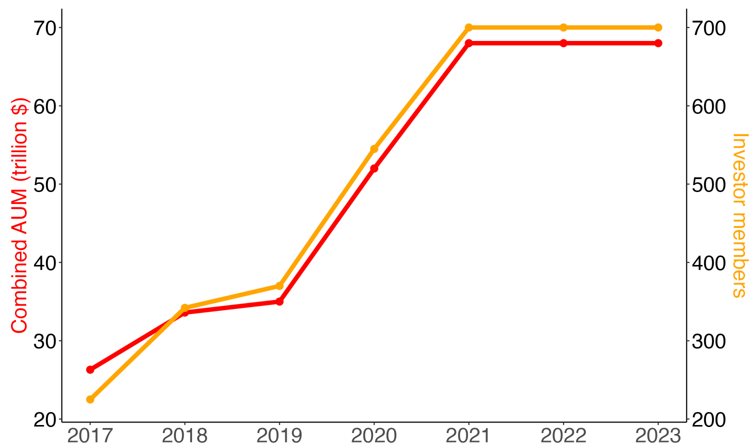

Figure 1: This figure illustrates the growth in the number of CA100+ investor signatories and their combined AUM from 2017 to 2023.

CA100+ aims "to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change" (Climate Action 100+, 2024) by engaging with a focus group of 169 large corporate polluters. Indeed, there is ample anecdotal evidence for the success of CA100+. For instance, The Economist (2021) found that CA100+ companies improved their climate-related disclosure and target setting more than other firms. Moreover, the initiative's website features numerous success stories. In fact, investors deemed the CA100+ model so successful that it inspired the launch of a similar initiative in 2022 on biodiversity: Nature Action 100. At the same time, the Republican party in the United States accuses CA100+ of acting as a "climate cartel" that allegedly pressures companies to commit to "net zero" (Judiciary Committee, 2024).

Distinguishing causation from correlation is a central challenge in research on investor impact. In the case of CA100+, several endogeneity concerns exist. Firstly, CA100+ operates in a dynamic environment where multiple external factors can influence firm behaviour. It is crucial to control for confounding factors, such as other regulatory policies, technological advancements and market forces. Secondly, CA100+ companies may differ systematically from other firms in their climate strategies. There is a risk of selection bias: investors could have deliberately chosen companies that were already inclined to improve their climate actions. This concern is amplified by the fact that CA100+ targets the world's largest corporate polluters – firms that operate in sectors that face heightened public scrutiny, making them more likely to act on climate even absent of CA100+ engagement. These considerations underscore the need to examine the company selection process and carefully select a suitable comparison group based on companies' emission profiles rather than relying on a broad stock market index. Thirdly, measuring the specific engagement goals of CA100+ is difficult due to limited data availability. Previous studies on investor impact typically rely on self-reported measures of engagement success or firms' Scope 1 and 2 carbon intensities based on financial metrics – both of which are prone to measurement error.[3] The omission of Scope 3 emissions is particularly problematic for CA100+ companies, many of which operate in sectors where the bulk of emissions occur downstream. In addition, financial-based carbon intensity metrics can distort results, as fluctuations in the denominator – such as volatility in revenue driven by commodity price changes – may not reflect underlying changes in corporate climate action. Notably, CA100+ itself does not use financial-based carbon intensities to assess company progress.

This study addresses these challenges in three steps. First, I use a series of two-way fixed effects (TWFE) and staggered Difference-in-Differences (DiD) specifications to estimate the impact of CA100+ on the focus companies. I also calculate the collective ownership share of CA100+ investors as a shift-share variable to assess treatment heterogeneity and potential spillover effects. However, a DiD approach does not, by itself, ensure causal identification. For the results to be interpreted causally, the treatment must plausibly constitute an exogenous shock. Moreover, even firm and time fixed effects may not fully capture systematic differences between CA100+ and significantly smaller emitters. In a second step, I therefore examine the treatment assignment – the CA100+ company selection process – and identify

[3]Scope 1 refers to direct emissions from owned or controlled sources, Scope 2 to indirect emissions from purchased energy and Scope 3 to indirect emissions across the value chain (GHG Protocol Initiative, 2004).

two subgroups: the first addition to the CA100+ focus group (the "CA100 companies") which can be considered an exogenous shock and the second addition (the "Plus companies") for which endogeneity cannot be ruled out. Then, I identify a suitable universe of counterfactuals which selects companies by sector based on their absolute carbon footprint and market capitalisation. Third, I employ multi-dimensional and novel metrics that closely match the engagement objectives of CA100+. In particular, I use sector-specific carbon intensities – including all material Scope 1, 2 and 3 emissions from a lifecycle perspective – based on production output rather than a financial metric. I also collect new primary data on the ambition of corporate climate targets and apply a domain-specific language model to analyse companies' climate-related disclosure.

Overall, my findings suggest rather limited effectiveness. I find no statistically significant impact on climate-related disclosure or carbon intensities. However, I observe a significant treatment effect on medium- and long-term target setting. Yet closer examination reveals that this effect is driven primarily by the Plus companies, for which endogeneity cannot be ruled out. Unpacking the effect further, it stands out that CA100+'s impact is absent on short-term targets. This raises concerns about the backloading of corporate decarbonisation efforts, i.e. companies are relying on steeper emission reductions in the distant future. Surprisingly, I do not find that the impact of CA100+ is significantly moderated by the coalition's collective ownership share, suggesting that greater collective ownership does not necessarily translate into greater engagement impact. Moreover, I find no evidence of spillover effects from coordinated CA100+ engagement into investors' individual engagement activities, as higher collective ownership is not associated with changes among non-target firms. All results are robust to a comprehensive set of checks, including alternative measures of climate action (i.e., CDP responses[4] and financial carbon intensities from Trucost), as well as controls for regulatory heterogeneity and sectoral dynamics.

This paper aims to advance the literature on investor impact by providing new causal

[4]CDP is a voluntary environmental disclosure platform for companies, investors, governments and cities.

evidence on the effectiveness of coordinated investor action. In their pioneering studies, Slager et al. (2023) and Dimson et al. (2023) show that subgroups of investors engaging through the United Nations Principles for Responsible Investment can improve corporate sustainability outcomes. My study differs in focus. Rather than examining subgroups, I provide, to the best of my knowledge, the first causal assessment of the investor coalition itself – that is, the governance institution that organises and coordinates these engagements. Moreover, by analysing the CA100+ company selection process, I present first empirical evidence that investor selectivity may indeed matter for engagement outcome – a potential endogeneity concern raised by Heeb and Kölbel (2024).

In the case of CA100+, a few studies offer correlational results suggesting that the coalition may be effective in influencing corporate climate behaviour. Bingler et al. (2024) document an association between the CA100+ focus list and more precise climate commitments while Chang and Fang (2024) find a negative effect on the carbon emissions of focus companies' customers and suppliers in China. The study most closely related to mine is Chuah et al. (2025), who find that the focus firms reduced their carbon intensities, particularly in countries with more climate laws. They also report possible spillover effects via directors who sit on the boards of both CA100+ companies and other firms. While these studies offer valuable suggestive evidence, they stop short of establishing causality. In particular, they do not assess the CA100+ company selection, rely on counterfactuals that may face different decarbonisation challenges and use financial-based carbon intensities excluding Scope 3.

This paper also seeks to enhance the field on the measurement of corporate climate action. While there is a recognised inconsistency in large datasets concerning companies' sustainability and climate actions (Berg et al., 2022; Busch et al., 2022), these are still often used in research due to a lack of alternatives. By constructing new primary datasets of refined measures of corporate climate actions, I provide precise proxies for investors' specific engagement asks. In this context, I contribute to the literature on firm pledges (Ioannou et al., 2016; Bolton and Kacperczyk, 2025; Jiang et al., 2025) by introducing a novel measure of target ambition that accounts for firms' differing starting points and enables consistent comparisons across different time horizons.

Additionally, this study is positioned within the subfield of climate finance, specifically examining how investors try to mitigate climate risks among their investees. Evidence from Flammer et al. (2021) and Ilhan et al. (2023) shows that institutional investors actively seek improved climate disclosures, aligning with one of CA100+'s engagement objectives. Furthermore, Azar et al. (2021) highlight that the Big Three asset managers actively engage their investee companies to lower their carbon footprint. However, the simultaneous impact of investor action on different aspects of companies' climate action, particularly on forward-looking metrics, has not been extensively researched.

In section 2, I provide a conceptual framework for the effectiveness of investor coalitions. In section 3, I analyse the CA100+ company selection process. Section 4 explains challenges in measuring corporate climate action and describes how this study tries to overcome those. Section 5 presents the research design and section 6 evaluates the results. After showing a series of robustness checks in section 7, I discuss my findings and conclude in section 8.

2 Conceptual framework

Why would investor coalitions be able to influence companies' climate action? While investors have a long history of engaging with companies on sustainability issues individually (Dimson et al., 2015), their ability to do so in isolation is often limited. Apart from the world's largest asset managers (Azar et al., 2021), individual investors often lack sufficient ownership stakes. Their position is further weakened when individual demands diverge from those of other shareholders. Consequently, the impact of engagement is likely to depend on both the represented ownership share and the degree of consensus among shareholders.

Stewardship work also requires investors to expend time and resources, while the benefits of improved company performance accrue to all shareholders. This creates a classic collective action problem, where individual efforts are disincentivised despite potential benefits for the group (Olson, 1965) and has been widely discussed as the issue of free-riding in investor engagement (Doidge et al., 2019).

Investor coalitions are an opportunity to overcome these challenges. By bringing together committed investors, they provide an infrastructure for coordinated engagement and reduce free-riding incentives (Gond and Piani, 2013). Through shared expectations, pooled resources and coordinated targeting of companies, collective engagement could amplify investor influence well beyond what individual member could achieve alone (Dimson et al., 2015, 2023).

This is the fundamental idea behind CA100+. CA100+ frames climate change as a material financial risk that could lead to systemic financial instability. Investors can address this risk "[b]y working together" and driving corporate change through collective engagement (Climate Action 100+, 2024). Each CA100+ investor signs a commitment to encourage their investee companies to align with the goals of the Paris Agreement. Every target company is assigned a group of lead and supporting investors. While investors can only take decisions on behalf of their own AUM over which they have fiduciary duty, they engage with companies as part of CA100+. The coalition's significant combined AUM – and the resulting collective ownership stakes – provide the financial weight that underpins the engagement efforts.

Investors can conduct engagement in private and in public. Several studies provide evidence of improved sustainability outcomes following individual investor engagement with companies behind closed doors (Bauer et al., 2023; Hoepner et al., 2024). When private engagement is unsuccessful, investors may resort to more coercive public tools – most notably, exercising their voting rights. Shareholder proposals have been shown to prompt corporate responses on climate issues (Flammer et al., 2021). As Dyck et al. (2019) argue, such proposals are often used strategically to reinforce private engagement efforts.

Given the ongoing debate over the relative effectiveness of engagement versus divestment strategies (Broccardo et al., 2022), it is important to note that investor coalitions do not publicly advocate for capital reallocation. Nonetheless, the effectiveness of engagement may ultimately rest on the implicit threat of divestment. If a critical mass of investors withdraws capital in response to poor sustainability performance, a company's cost of capital may rise (Heinkel et al., 2001; Rohleder et al., 2022). Firms may therefore comply with the demands of investor coalitions in part to maintain future access to capital. Consequently, I derive the following baseline hypothesis:

H1: CA100+ has a positive effect on targeted companies' climate action.

While some of the world's largest pension funds – such as the California Public Employees' Retirement System and Japan's Government Pension Investment Fund – were among the earliest signatories, CA100+ reached a new scale in 2020 when BlackRock and other major asset managers joined. In parallel, CA100+ introduced new tools to publicly monitor and incentivise corporate climate action, notably the Net Zero Company Benchmark in 2021 which evaluates the performance of the focus companies across fourteen key indicators. Prior research shows that such benchmarking can drive behavioural change, particularly when companies are assessed alongside competitors (Chatterji and Toffel, 2010; Sharkey and Bromley, 2015). Given CA100+'s continuous growth and development until 2024, it is plausible to expect that the coalition's influence has increased.

H2: The impact of CA100+ on targeted companies becomes stronger over time.

However, the influence over targeted companies is likely to vary based on the collective ownership shares of CA100+ investors. Dyck et al. (2019) show that a higher share of institutional ownership is positively associated with improvements in corporate sustainability performance. I therefore propose a third hypothesis:

H3: The collective ownership share of CA100+ in targeted companies moderates the impact.

Thus far, I have focused on the direct impact of CA100+ on its focus companies. However, CA100+ may also have indirect effects beyond its official focus list. In particular, coordinated engagement may facilitate knowledge sharing among investors and enhance their stewardship capabilities – what Marti et al. (2024) refer to as "field building". This could, in turn, strengthen individual engagement efforts with non-CA100+ companies and create a spillover effect.[5] If such an effect exists, it can be expected to be stronger among non-CA100+ companies with higher collective CA100+ ownership, as these firms are likely subject to more individual engagement by CA100+ investors. I therefore propose a fourth hypothesis:

H4: Non-CA100+ companies with a higher collective ownership share of CA100+ exhibit greater improvements in climate action than those with a lower share.

3 The CA100+ company selection process

When CA100+ launched in December 2017, it initially targeted the 100 largest publicly listed corporate greenhouse gas emitters (the "CA100 companies"), e.g., Exxon Mobil and Coal India. In June 2018, the focus list was extended to include 61 additional "Plus" firms identified as "transition enablers", such as Walmart and BMW, although no clear selection criterion was disclosed. As of July 2025, the focus list comprises 169 companies, reflecting subsequent additions and changes due to mergers and acquisitions. This study focuses on the CA100 and Plus companies (together the "CA100+ companies"), as these constitute the earliest and most significant additions. Figure 2 shows their sectoral distribution and appendices A and B include the full lists of companies.

In 2020, Climate Action 100+ (2024) stated that the focus companies accounted together for 80% of all global industrial emissions. This figure is likely overstated due to double-counting across Scope 1, 2 and 3 emissions which occurs when direct and indirect

[5] While I use the term "spillover effect" for simplicity, this does not represent a spillover in the classical sense, i.e., the treatment itself is not diffusing from treated to control units. Strictly speaking, the mechanism reflects a secondary treatment effect.

emissions are aggregated across firms without adjusting for overlaps in their value chains. In an effort to avoid double-counting, Heede (2020) traces historical carbon emissions back to major corporate polluters, using only Scope 1 and Scope 3 (category 11 use of sold product) emissions. While only thirty-six CA100+ companies – less than one-quarter of the focus list – are covered by his analysis, these account collectively for over 21% of global cumulative emissions from 1850 to 2018.[6] If CA100+ is successful, its impact on the low-carbon transition could therefore be substantial.

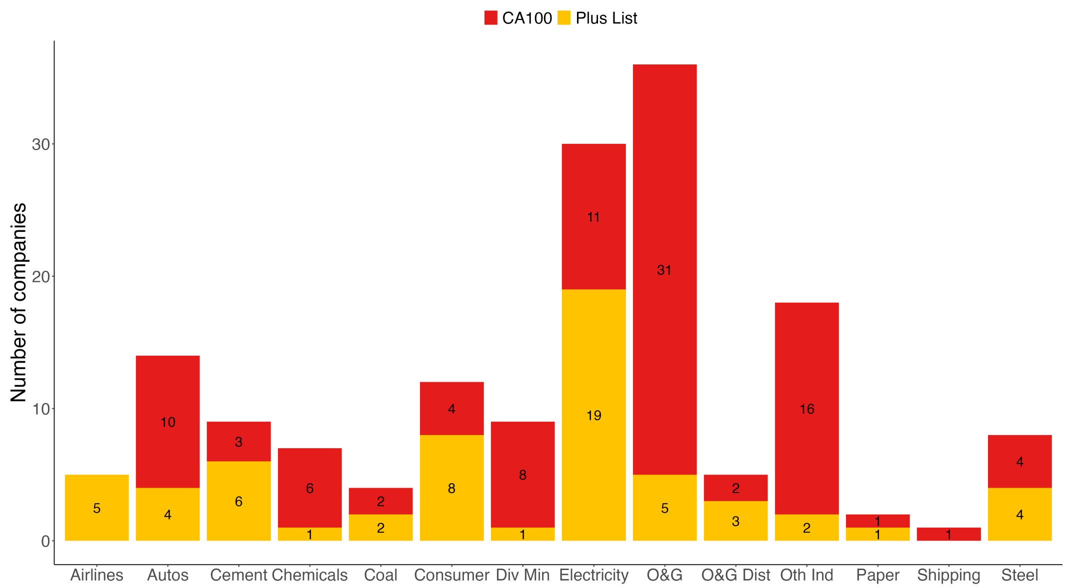

Figure 2: This figure shows the distribution of the CA100 and Plus companies by sector.

Importantly, the focus companies could not self-select or opt-out. The initial CA100 companies were chosen solely based on reported and estimated Scope 1, 2 and 3 emissions from the CDP database. This clear cut-off represents an exogenous shock.

A company's carbon footprint is typically driven by sector and size. By definition, the majority of the initial focus group are therefore large companies in hard-to-abate sectors. However, there is no strong reason to believe that firm size is correlated with the likelihood of companies reducing their emissions. From an economic perspective, a company's capability or willingness to reduce carbon emissions is inversely proportional to marginal abatement

[6]Author's calculations based on the Carbon Major database 2020.

costs (MACs) (Gillingham and Stock, 2018). Some aspects of abatement costs may depend on fixed costs, potentially increasing larger firms' willingness to reduce emissions. Specifically, larger companies may spread fixed abatement investments over greater output, lowering the average cost per ton abated. While this does not reduce MAC in a strict sense, it could make certain abatement options financially feasible. However, MACs are influenced by various other factors such as the cost-effectiveness of different mitigation options which are often difficult to observe and likely unknown to investors. Even if such data were available, a comparison of MACs across companies would require an intensity-based analysis rather than sorting companies by their absolute carbon footprint.

A nuance to consider is that this argument holds for the propensity to reduce carbon emissions but may not apply as well to other measures of climate action. For example, larger companies may have more resources to enhance climate-related reporting (Drempetic et al., 2020). Thus, firm size remains an important factor when selecting counterfactuals.

On the other hand, there was no clear selection criterion for the Plus companies. Based on interviews conducted with CA100+ investors[7], these companies were selected due to their strategic importance in the low-carbon transition and with consideration given to regional balance. This process relied on investors' prior knowledge of the companies, introducing a potential selection bias – investors could have targeted firms they expected to be more responsive to engagement. Given these differences in selection, I assess the impact of CA100+ on the full focus group, as well as separately for the CA100 and Plus companies.

[7]The author was part of a parallel research project examining the role of CA100+ through interviews with both investors and target companies.

4 Data and descriptive statistics

4.1 The CA100+ engagement goals

A central challenge in assessing the effectiveness of investor engagement lies in accurately measuring the intended outcomes, which are rarely directly observable to researchers. Previous studies have dealt with this issue in two main ways. One approach relies on using readily available outcome metrics, such as sustainability ratings (Dyck et al., 2019; Barko et al., 2022) or carbon emissions (Azar et al., 2021) – without necessarily establishing whether these metrics align with the specific engagement goals. The other approach uses self-reported measures of success, such as internal engagement records made available by investors (Dimson et al., 2015, 2023; Hoepner et al., 2024). The latter research design provides valuable insights into how engagement is designed and implemented. Yet, it may be prone to bias if investors have incentives to overstate their effectiveness.

In this context, CA100+ presents a unique empirical setting. Unlike most engagement campaigns, CA100+ articulated its goals publicly at its launch in 2017. While they have been refined over time, the three core engagement objectives have remained consistent:

1. Board-level accountability and oversight of climate-related risks,
2. Adoption of emission reduction targets aligned with the Paris Agreement – a focus on actual emission reductions was added in 2023, and
3. Disclosure of climate-related information in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

I therefore use a multi-dimensional measurement strategy to systematically align my research outcomes with these three goals, drawing on both newly collected primary data and public sources. First, I construct a new dataset with the ClimateBERT-TCFD model by

Bingler et al. (2022) to evaluate climate-related disclosure, including a governance dimension. Then, I assess corporate decarbonisation and the ambition of forward-looking targets using sector-adjusted carbon intensity metrics from the Transition Pathway Initiative (TPI). TPI is an investor-led initiative supported by an independent research team based at the London School of Economics and Political Science, which develops sector-specific methodologies grounded in the Sectoral Decarbonisation Approach (Krabbe et al., 2015). To extend the available time series, I augment the publicly available TPI database with newly collected historical data. Notably, CA100+ relies on TPI data in its Net Zero Company Benchmark. This enables a transparent assessment of the coalition's effectiveness against its own stated goals and tracking metrics.

4.2 Selecting a suitable base universe

Collecting new primary data first requires establishing a baseline universe of companies. By design, the CA100 companies constitute the world's largest corporate polluters and the Plus list similarly includes companies with substantial carbon footprints. A credible causal design must therefore address the challenge of identifying suitable counterfactuals. Even within a DiD setting, firm and time fixed effects may not fully capture systematic differences across companies with varying emissions levels. One key concern is that firms face distinct decarbonisation challenges depending on the sector in which they operate. For instance, technology and service companies may be able to reduce emissions more rapidly than hard-to-abate sectors, where the CA100+ companies are disproportionately concentrated. A second concern is firm size. Larger firms are more likely to face public scrutiny and pressure, potentially prompting climate action independent of CA100+ engagement.

Based on these considerations, I aim to compile a base universe of large firms with substantial carbon footprints operating in the same sectors as CA100+ companies. The corporate universe assessed by TPI is well suited for this purpose. TPI selects firms using a top-down approach based on total emissions and market capitalisation. I therefore adopt as my baseline universe 512 companies covered by TPI from the 14 CA100+ sectors.

4.3 TCFD reporting

The TCFD published its recommendations in June 2017, aiming to enhance corporate reporting across four main areas: governance, strategy, risk management and metrics and targets. Since CA100+ was launched only six months later, obtaining pre-treatment data that precisely follow the TCFD recommendations is challenging. Nonetheless, a broader assessment of corporate disclosures on these topics is possible. The ClimateBERT-TCFD model categorises disclosure into non-climate-related and climate-related content, which is then classified into the four TCFD categories. Due to the inconsistency and incomparability of voluntary disclosures, investors tend to rely more on mandatory disclosures when assessing sustainability information (Ho, 2020). I therefore follow Bingler et al. (2022) and focus on companies' annual reports (AR).

I collect all available ARs for the TPI universe for the period from 2014 to 2022.[8] Then, I extract the raw text, split it into sentences and analyse them with ClimateBERT-TCFD.[9] Lastly, I measure the proportion of AR content (in percentage of total sentences) discussing climate-related information and each of the four TCFD categories. After excluding companies with missing values, I retain a sample of 425 companies, including 84 CA100, 53 Plus, and 288 Non-CA100+ companies. Figure 3 shows that both CA100 and Plus companies generally report more climate-related information than Non-CA100+ companies. In all groups, climate-related reporting increased in the post-treatment period. The proportions of ARs dedicated to climate-related content are similar to the findings on TCFD supporting companies by Bingler et al. (2022). Yet, companies from the TPI universe report primarily on strategy rather than governance.

[8] Public filing requirements vary by country. In cases where ARs were unavailable, I select the most comparable annual disclosure in English, such as the Universal Registration Document in France or the Annual Integrated Report in Japan

[9] I first apply the ClimateBERT base model to retain only climate-related sentences with an accuracy score of 99.5%. Then, I use the TCFD model to classify the climate content into the four categories.

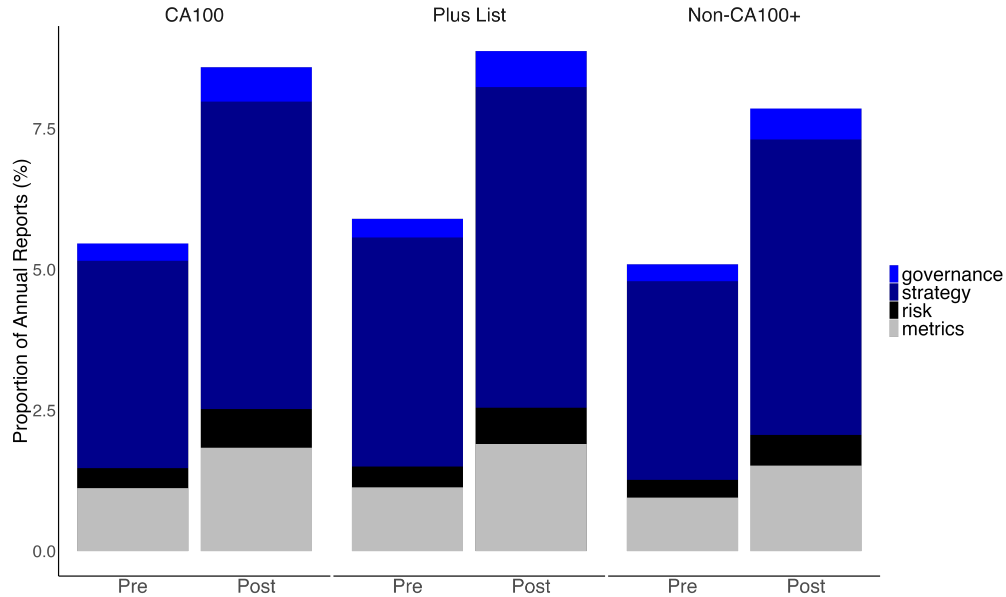

Figure 3: This figure shows the average shares of CA100, Plus and Non-CA100+ companies' ARs that are dedicated to the TCFD categories in the pre- and post-treatment periods.

4.4 Carbon emission reductions

Researchers face a persistent dilemma when measuring corporate carbon emissions. Despite widespread recognition of the limitations in standard emissions datasets, these remain widely used due to a lack of alternatives. Most studies on investor impact rely on carbon intensity metrics with Scope 1 and 2 emissions in the numerator (Rohleder et al., 2022; Chuah et al., 2025). Given the inconsistencies in how Scope 3 emissions are measured (Busch et al., 2022), they are often omitted or used only in robustness checks. However, excluding Scope 3 emissions is particularly problematic in the case of CA100+ companies, which often operate in sectors where the majority of lifecycle emissions occur downstream.

Financial metrics in the denominator can introduce additional measurement issues. For example, revenue or market capitalisation can fluctuate due to factors unrelated to carbon efficiency. In some cases, this can lead to non-classical measurement error. For instance, the 2022 energy price spike lowered revenue-based carbon intensities in the oil and gas sector, although absolute emissions increased due to higher sales. The resulting measurement errors are correlated with companies' "true" climate performance.

To address these concerns, I rely on sector-adjusted carbon intensities from TPI, which are also used by CA100+. TPI has developed methodologies for nine CA100+ sectors – airlines, automotives, cement, coal, electricity, oil and gas, paper, steel and shipping. For each sector, companies' most material carbon emissions from a lifecycle perspective are calculated using publicly available corporate and regulatory data. For instance, in the oil and gas sector, Scope 1 and 2 emissions are taken directly from company disclosures, while Scope 3 downstream emissions are estimated by applying emissions factors to different categories of energy sales volumes (Dietz et al., 2021). The resulting absolute emissions are normalised by physical production output, such as energy sold or tonnes of steel produced. For this analysis, I use carbon intensity from 2014 and 2022. After excluding firms with missing values, my final sample includes 226 companies: 50 CA100, 40 Plus, and 136 Non-CA100+ firms. Appendix C provides further details on the TPI methodology and the distribution of my sample by sector.

Figure 4 presents the average carbon intensities in the pre- and post-treatment periods by sector and by group. I find no systematic pattern in pre-treatment carbon intensity levels across groups. Plus companies have higher average intensities in the electricity and airline sectors, CA100 companies lead in steel and oil and gas, while Non-CA100+ firms have the highest intensities in coal and cement. Differences in the paper and shipping sectors are negligible due to their small number of CA100+ companies. Meaningful reductions in average carbon intensity between the pre- and post-treatment periods are observed only in the electricity and automotive sectors. The airline and coal sectors show increases in their carbon metrics over time. These are driven by external shocks, such as "ghost flights" operated by airlines during the pandemic and the global rebound in coal demand.

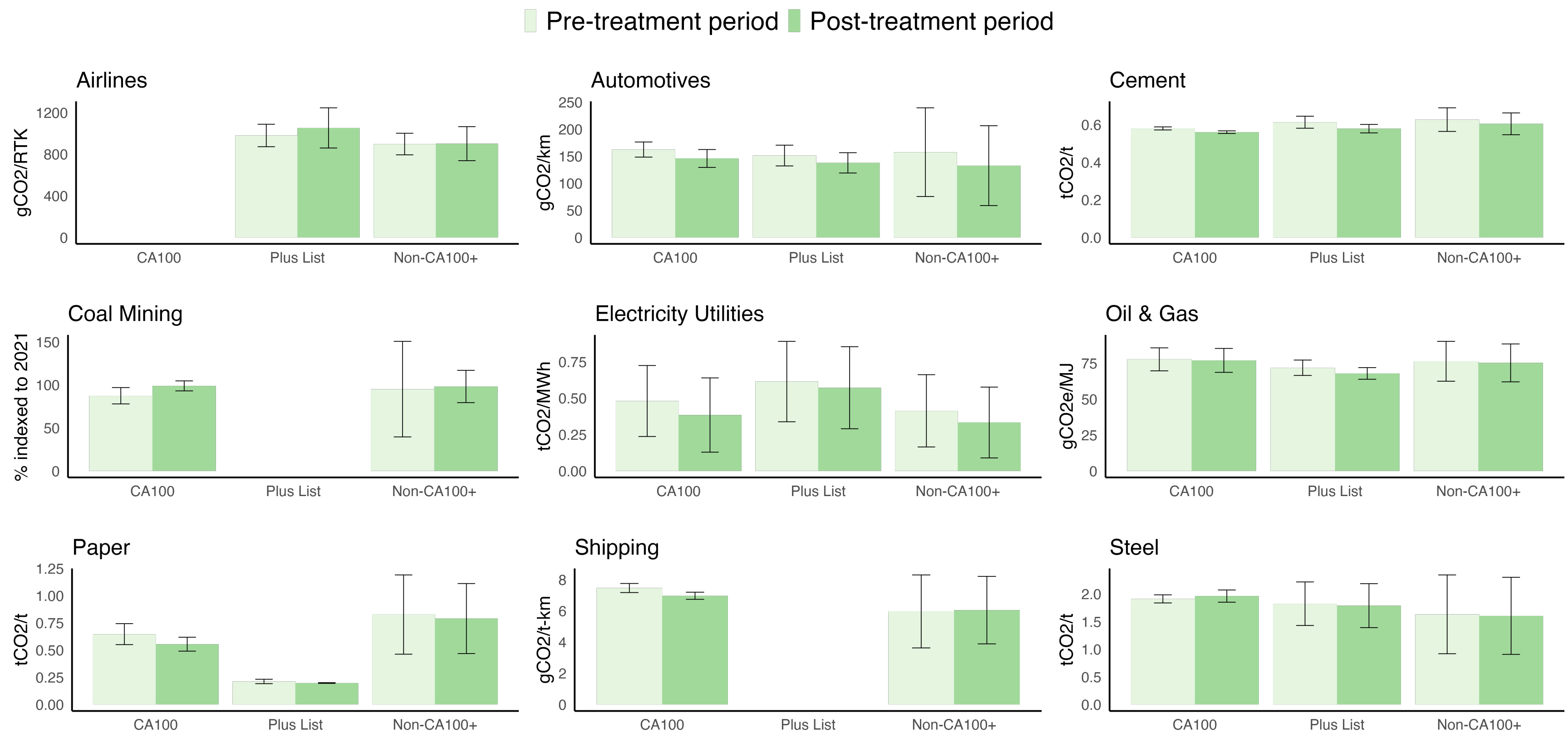

Figure 4: This figure shows the average carbon intensities in the pre- and post-treatment periods with standard deviations across the CA100, Plus and Non-CA100+ groups by sector.

4.5 Carbon emission reduction targets

TPI also uses companies' climate targets to calculate forward-looking carbon intensities until 2050. Importantly, these projections include again Scope 3 emissions in sectors where these are material. For example, if an oil and gas firm sets a Scope 1 and 2 net-zero target, projected Scope 3 emissions are held constant. For firms without targets, TPI assumes a flat trajectory holding the latest historical carbon intensity constant. By anchoring the forward-looking pathway to the firm's most recent historical carbon intensity, the projected slope relative to the starting point yields a robust measure of target ambition.

This method improves on common approaches in the literature, which typically focus only on Scope 1 and 2 targets. It also enables a more robust assessment of target ambition. While reported reduction rates can offer a first approximation – such as a 70% target being deemed more ambitious than a 50% target over the same horizon (Ioannou et al., 2016; Jiang et al., 2025), they may be misleading. Firms can inflate ambition by choosing a base year with unusually high-emissions (Bolton and Kacperczyk, 2025). Anchoring the targeted emissions level to the most recent historical data point mitigates this bias.

Moreover, the forward-looking pathways by TPI allow for the analysis of target ambition across different time horizons. Since CA100+ tracks progress across the target years 2025, 2035 and 2050, I also focus on these reference points. The relevant time variable for my analysis of target ambition is the year in which the TPI assessment was conducted. Appendix C illustrates how a company's forward-looking emissions pathway evolves across research cycles as targets are updated. However, TPI was launched only five months before CA100+ and expanded its coverage gradually. Consequently, there are almost no pre-treatment observations in the readily available TPI dataset. I therefore construct a new primary dataset, extending the TPI target data back to a hypothetical 2015 research cycle. I identify historical targets from corporate disclosures and calculate projected carbon intensities in strict accordance with the TPI methodologies. Appendix D provides further details on this process.

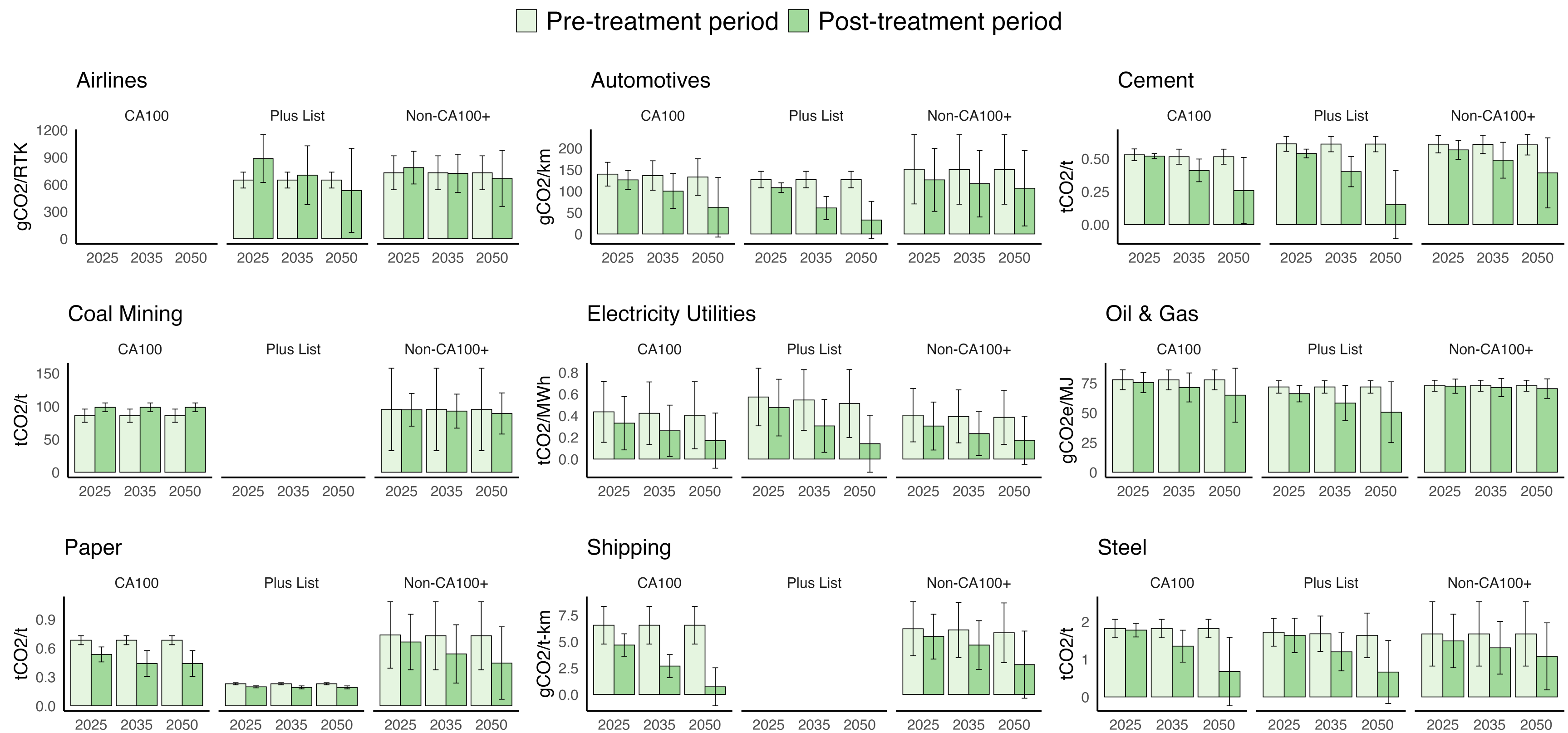

Figure 5: This figure shows the average targeted carbon intensities in the pre- and post-treatment periods with standard deviations for the years 2025, 2035 and 2050 across the CA100, Plus and Non-CA100+ groups by sector.

Figure 5 shows average projected carbon intensities for 2025, 2035 and 2050 across the pre- and post-treatment periods by group and by sector. Targeted carbon intensities are lower in the post- than in the pre-treatment period across nearly all sectors and target years. This suggests that target ambition has increased over time. Electricity utilities exhibit the most pronounced targeted reductions. By contrast, ambition declines strongly in the airline sector, likely due to the rebaselining of emissions targets after the pandemic. Given the magnitude of this distortion, I exclude the sector from the further analysis.

4.6 The collective CA100+ ownership share

Lastly, I calculate the collective ownership share of CA100+ investors for the TPI universe. CA100+ maintains an up-to-date list of current investor signatories on its website but does not disclose the timing of entries or exits. To construct a time-varying ownership measure, I compile a panel of entry and exit years for all current and former signatories based on annual snapshots of the CA100+ website from the Internet Archive.

I then merge this information with historical firm-level data on outstanding shares from Refinitiv. Since Refinitiv lists separate entities within the same investment group (e.g., State Street UK vs. State Street US) as distinct owners, I use fuzzy matching to link the CA100+ investor names with Refinitiv's investor names. I apply a strict matching threshold of 6.5% in string distance determined through multiple rounds of manual checks. Given the concentration of global AUM among a relatively small number of players, I also manually verify matches for the 15 largest CA100+ asset managers. Due to the conservative matching procedure, I expect the resulting estimates to represent a lower bound.

Figure 6 shows the evolution of average collective CA100+ ownership across the three firm groups. In 2017, founding signatories already held an average stake of 4% across all firms. Similar to AUM, ownership shares increased substantially in 2020 with the entry of several large U.S. asset managers. Notably, CA100+ holds the highest average ownership in the Plus group.

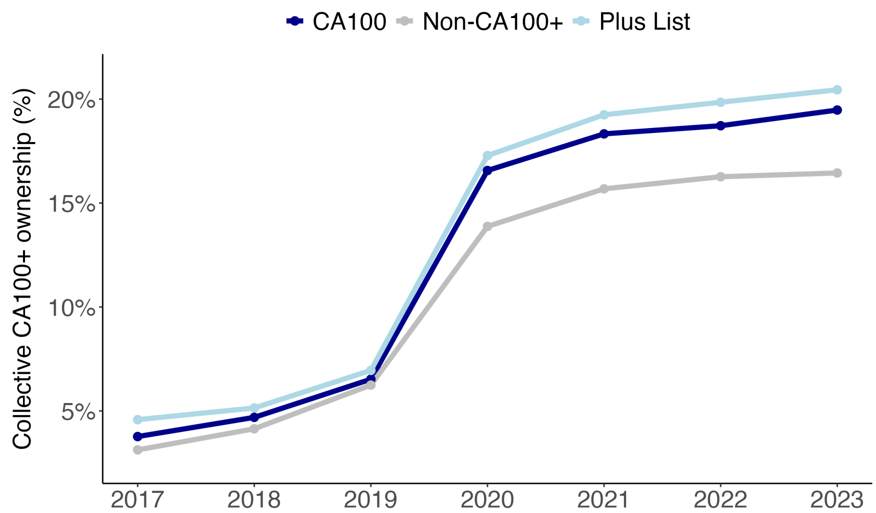

Figure 6: This figure shows the average collective ownership share of CA100+ investors by company group from 2017 to 2023.

5 Research design

As a baseline specification, I estimate a TWFE DiD regression model to measure the impact of CA100+ on corporate climate action. The model is run for the whole focus group and separately for the CA100 and Plus companies, comparing them against Non-CA100+ companies:

$$(1) \quad Y_{it} = \alpha + \beta_1 CA100_i * Post_t + \beta_2 CA100_i + \beta_3 Post_t + \gamma_i + \mu_t + \epsilon_{it}$$

Y is the climate action of company i in year t, $CA100_i$ is a dummy variable that takes the value of 1 for CA100+ companies, $Post_t$ is a time dummy that takes the value of 1 after the start of the treatment (2018 for the combined analysis, 2018 for CA100 companies and 2019 for Plus companies). Company fixed effects, denoted by γ_i, control for any time-invariant differences between CA100+ and Non-CA100+ companies. Year fixed effects, denoted by μ_t, account for shocks that affect CA100+ and Non-CA100+ companies alike in specific years, such as the Covid-19 crisis. The model is estimated using a linear OLS regression. Standard errors are clustered at the company level.

I also run a staggered DiD specification to analyse the simultaneous effect of CA100+ on the CA100 companies and the Plus List and to explore temporal changes. Given the limitations of the TWFE specification in estimating heterogeneous and dynamic treatment effects in staggered models (Goodman-Bacon, 2021), I use the robust estimator developed by Callaway and Sant'Anna (2021).

Next, I analyse treatment intensity by incorporating the CA100+ collective ownership variable. An important consideration is that collective ownership may not be entirely exogenous. It is plausible that CA100+ investors adjust their portfolio holdings in response to firms' climate action – potentially increasing their stakes in companies that appear responsive to engagement and divesting from those that resist. For example, the Church of England, a founding CA100+ member, divested from oil and gas firms after Shell and BP rolled back their emissions targets in 2023 (The Guardian, 2023). To address this concern of post-treatment bias, I construct a shift-share variable, leveraging variation in the timing of investor entry into CA100+.

The identification strategy follows a standard shift-share logic: the expansion of CA100+ – that is, the staggered entry of new signatories – is plausibly driven by exogenous institutional dynamics (e.g., peer pressure, advocacy momentum), not by individual firm-level climate responses. From the perspective of the focus companies, this results in an exogenous shock to investor composition – a company may experience an increase in CA100+ ownership not because of changes in its own behaviour, but because a new signatory already holding a stake in the firm joined the coalition.

Specifically, I calculate the shift-share variable in three steps. First, I use the CA100+ collective ownership shares of founding members for years prior to 2017, allowing for variation over time in the pre-treatment period. Second, I fix the ownership shares of founding CA100+ members at their 2017 levels to represent baseline exposure. Third, for each subsequent year, I add the ownership shares of new joiners only in the year they join, holding their ownership constant thereafter (unless the investor exits the coalition). Formally, the shift-share exposure Z_{it} for firm i at time t is given by:

$$Z_{it} = \begin{cases} \sum_{\text{founders}} s_{it} & \text{if } t < 2017 \\ \sum_{\text{founders}} s_i^{(j=2017)} + \sum_{\substack{\text{new joiners} \\ j \leq t}} s_{it}^j & \text{if } t \geq 2017 \end{cases}$$

where s denotes the ownership share held by a CA100+ investor in firm i at time t with j showing the investor's entry year into CA100+. From year j onward, the investor's ownership share is held constant in all subsequent years t (unless the investor exited CA100+).

I then estimate the effect of treatment intensity via a triple interaction term:

$$(2) \quad Y_{it} = \alpha + \beta_1 CA100_i \times Post_t \times Z_{it} + \beta_2 CA100_i \times Post_t + \cdots + \gamma_i + \mu_t + \epsilon_{it}.$$

The coefficient β_1 is the main parameter of interest. It captures whether the effect of CA100+ engagement is stronger among firms with larger collective CA100+ ownership. All constituent lower-order interactions are included.

Finally, I examine potential spillover effects from CA100+ by testing whether investors' collective engagement experience through CA100+ enhances their individual stewardship efforts with other portfolio companies. Specifically, I assess whether Non-CA100+ firm show differential changes in climate action following the initiative's launch. To do so, I exclude all CA100+ focus companies from the sample and estimate the following panel regression:

$$(3) \quad Y_{it} = \alpha + \beta_1 Post_t \times Z_{it} + \beta_2 Post_t + \beta_3 Z_{it} + \gamma_i + \mu_t + \epsilon_{it}.$$

Here, the coefficient β_1 tests whether non-target firms with higher collective CA100+ shift-share ownership experience greater improvements in climate outcomes after the initiative's launch, relative to non-target firms with lower ownership. A positive and significant β_1 would suggest a learning or diffusion effect from coordinated engagement to individual engagement. Yet this approach does not identify a causal treatment effect, as the analysis lacks a well-defined counterfactual. Accordingly, the results should be interpreted as suggestive rather than causal evidence.

6 Results

6.1 TCFD reporting and carbon emission reductions

Figure 7 plots the pre- and post-treatment trends for climate-related reporting and carbon intensities for the whole focus group and Non-CA100+ companies. Since TPI carbon intensity measures vary by sector, I standardise them using z-scores, reflecting differences in standard deviations from the sector mean in 2014. A visual inspection shows similar pre-treatment trends across groups, supporting the parallel trends assumption. Yet the post-treatment trends remain largely unchanged, suggesting no strong treatment effect on either of the two engagement goals.

These observations are further corroborated by the TWFE DiD results in table 1, which show no statistically significant treatment effects across the baseline models, interactions with the shift-share ownership variable or tests for spillovers. Notably, the main treatment effects and their corresponding standard errors are close to zero. The separate TWFE DiD analyses for the CA100 and Plus companies, the disaggregated results by TCFD category – including governance – and the event study plots in appendices E and F further support these findings. There is little evidence to suggest that CA100+ had a meaningful impact on firms' TCFD reporting or carbon intensities.

6.2 Carbon emission reduction targets

For the analysis of target ambition, the time variable corresponds to the TPI research cycle and the outcome is the firm's projected carbon intensity in a given target year. I standardise the sector-specific carbon intensities again using z-scores, calculated relative to the forward-

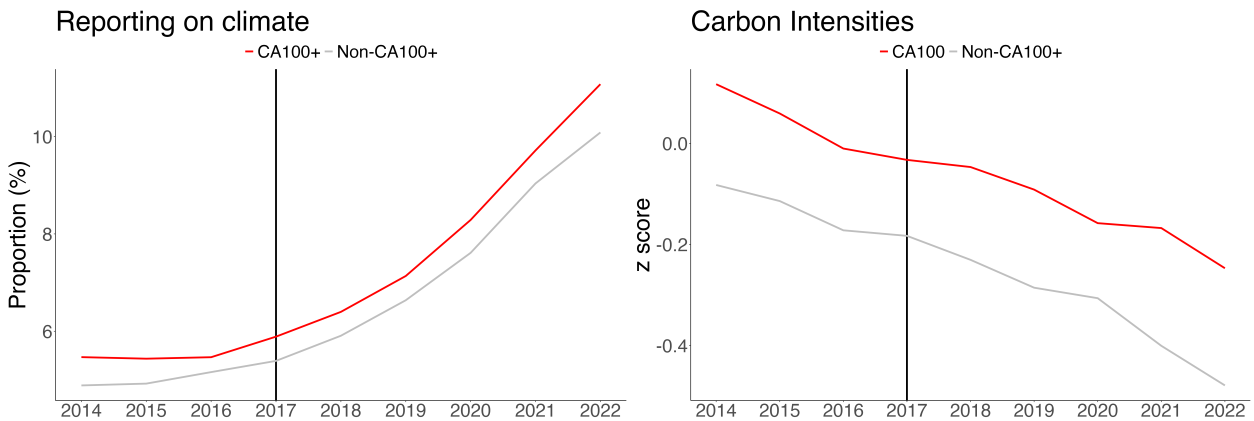

Figure 7: This figure shows the pre- and post-treatment trends on climate-related reporting and carbon intensities (TPI) across the CA100+ and Non-CA100+ companies for each year.

	Climate-related reporting			Carbon Intensities		
	(1)	(2)	(3)	(1)	(2)	(3)
treat*post	0.17	0.16		0.00	0.04	
	(0.36)	(0.50)		(0.05)	(0.07)	
treat*post*ownership		6.45			−0.33	
		(8.60)			(1.81)	
ownership		−1.10	1.41		1.93	1.99
		(3.75)	(3.80)		(1.61)	(1.62)
post*ownership		−1.88	−1.82		−1.83	−1.87
		(3.51)	(3.46)		(1.62)	(1.63)
Num. obs.	3825	3721	2515	1847	1750	1033
R^2	0.75	0.75	0.77	0.92	0.92	0.91
Adj. R^2	0.72	0.72	0.74	0.90	0.90	0.90

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 1: This table shows the results of the average CA100+ impact, CA100+ impact moderated by shift-share ownership and the spillover analyses on climate-related reporting in the left panel and historical carbon intensities in the right panel, comparing CA100+ to Non-CA100+ companies.

looking sector means and standard deviations from the 2015 research cycle. The resulting z-scores thus reflect standard deviation differences from the sectoral mean from research cycle 2015 for each target year.

Figure 8 shows parallel pre-trends between CA100+ and Non-CA100+ firms from 2015 to 2017 across all target years. A visual inspection suggests that CA100+ engagement did not meaningfully impact short-term (2025) targets. However, for medium- (2035) and long-term (2050) targets, the trajectories begin to diverge post-treatment. These patterns are confirmed by the DiD estimates in Table 2. The effect on 2025 targets is statistically insignificant, while the estimates for 2035 and 2050 targets are significant at the 1% level, indicating that CA100+ had a positive impact on the ambition of firms' medium- and long-term climate targets.

Interestingly, CA100+ investors tend to hold disproportionate stakes in firms with less ambitious targets, as indicated by the positive coefficients on the shift-share ownership variable for 2035 and 2050. I find no evidence that higher collective ownership by CA100+ investors causally increases target ambition among focus firms, nor do I find significant spillover effects on non-target firms.

For further investigation, I analyse the impact of CA100+ on the targets of the CA100 and Plus companies separately. Figure 8 includes the separate pathways and table 3 shows the TWFE DiD results. Notably, the effect of CA100+ on companies' 2035 and 2050 targets appears to be primarily driven by the Plus group, where the average effects are significant at the 1% level. For CA100 companies, the effect is only marginally significant for 2050 targets (10%) and substantially weaker in magnitude (–0.42 vs. –1.16 standard deviations). While there is some evidence that higher collective ownership contributed to more ambitious 2035 targets among CA100 firms, the difference in overall treatment effects between the two groups is striking.

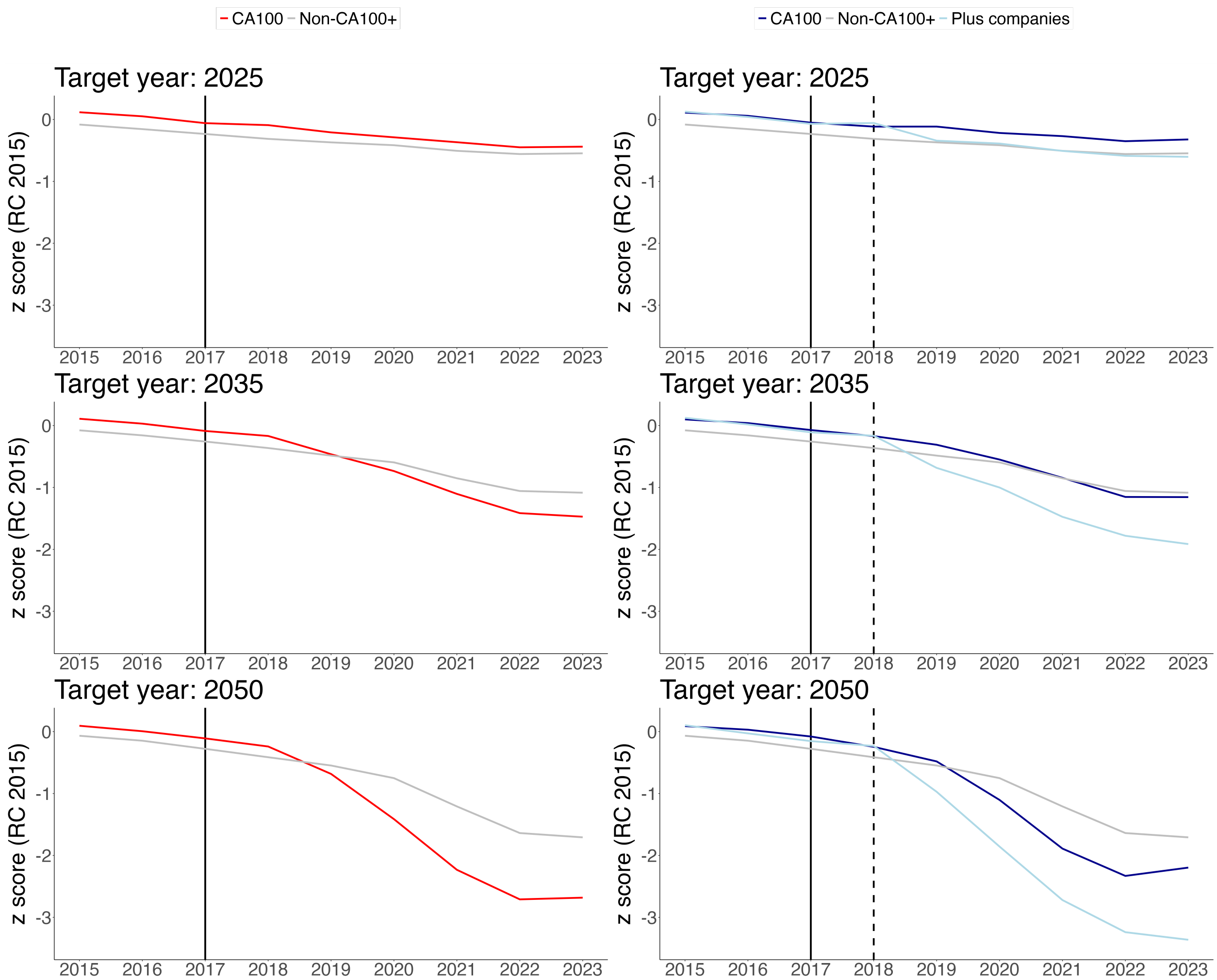

Figure 8: This figure shows the pre- and post-treatment trends across the CA100, Plus and Non-CA100+ companies for each target year.

I next examine the dynamics of the heterogeneous treatment effects. Figure 9 plots the effects by research cycle, with the top panels showing the effect on the CA100 companies and the bottom panels showing the effect on the Plus companies at 95% confidence intervals. For CA100 firms, the effects remain statistically insignificant across all target years. By contrast, the effect is significant for the Plus group for 2035 and 2050 targets from research cycle 2020 onwards, with growing magnitude through 2023.

	TY 2025			TY 2035			TY 2050		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
treat*post	−0.06	0.08		-0.30^{***}	0.03		-0.66^{***}	−0.07	
	(0.06)	(0.09)		(0.11)	(0.16)		(0.21)	(0.31)	
treat*post*ownership		−2.98			−4.80			−6.77	
		(2.20)			(3.58)			(7.26)	
ownership		1.26	0.75		4.45^{**}	2.33		9.26^{***}	4.50
		(1.64)	(1.66)		(2.15)	(2.06)		(3.10)	(2.73)
post*ownership		−1.39	−1.12		−3.25	−2.13		-6.01^{**}	−3.52
		(1.74)	(1.74)		(2.20)	(2.13)		(2.96)	(2.71)
Num. obs.	1847	1750	1032	1847	1750	1032	1847	1750	1032
R^2	0.87	0.88	0.88	0.74	0.75	0.76	0.61	0.62	0.61
Adj. R^2	0.86	0.87	0.86	0.70	0.72	0.72	0.55	0.57	0.56

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 2: This table shows the results of the average CA100+ impact, CA100+ impact moderated by shift-share ownership and the spillover analyses on carbon emission reduction targets set for 2025, 2035 and 2050, comparing CA100+ to Non-CA100+ companies.

	CA100 companies				Plus companies			
	TY 2035		TY 2050		TY 2035		TY 2050	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
treat*post	−0.13	−0.20	-0.42^{*}	0.14	-0.61^{***}	−0.44	-1.16^{***}	−0.65
	(0.12)	(0.17)	(0.22)	(0.34)	(0.19)	(0.31)	(0.39)	(0.65)
treat*post*ownership		-8.48^{*}		−13.78		1.52		2.25
		(4.42)		(9.15)		(5.46)		(12.64)
ownership		3.38		7.68^{**}		4.92^{*}		8.75^{**}
		(2.10)		(3.10)		(2.52)		(3.38)
Num. obs.	1532	1462	1532	1462	1399	1320	1399	1320
R^2	0.77	0.78	0.63	0.63	0.72	0.73	0.59	0.61
Adj. R^2	0.74	0.75	0.58	0.58	0.68	0.69	0.54	0.56

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 3: This table shows the results of the average CA100+ impact and the CA100+ impact moderated by shift-share ownership on carbon emission reduction targets set for 2035 and 2050, comparing the CA100 and the Plus companies separately to Non-CA100+ companies.

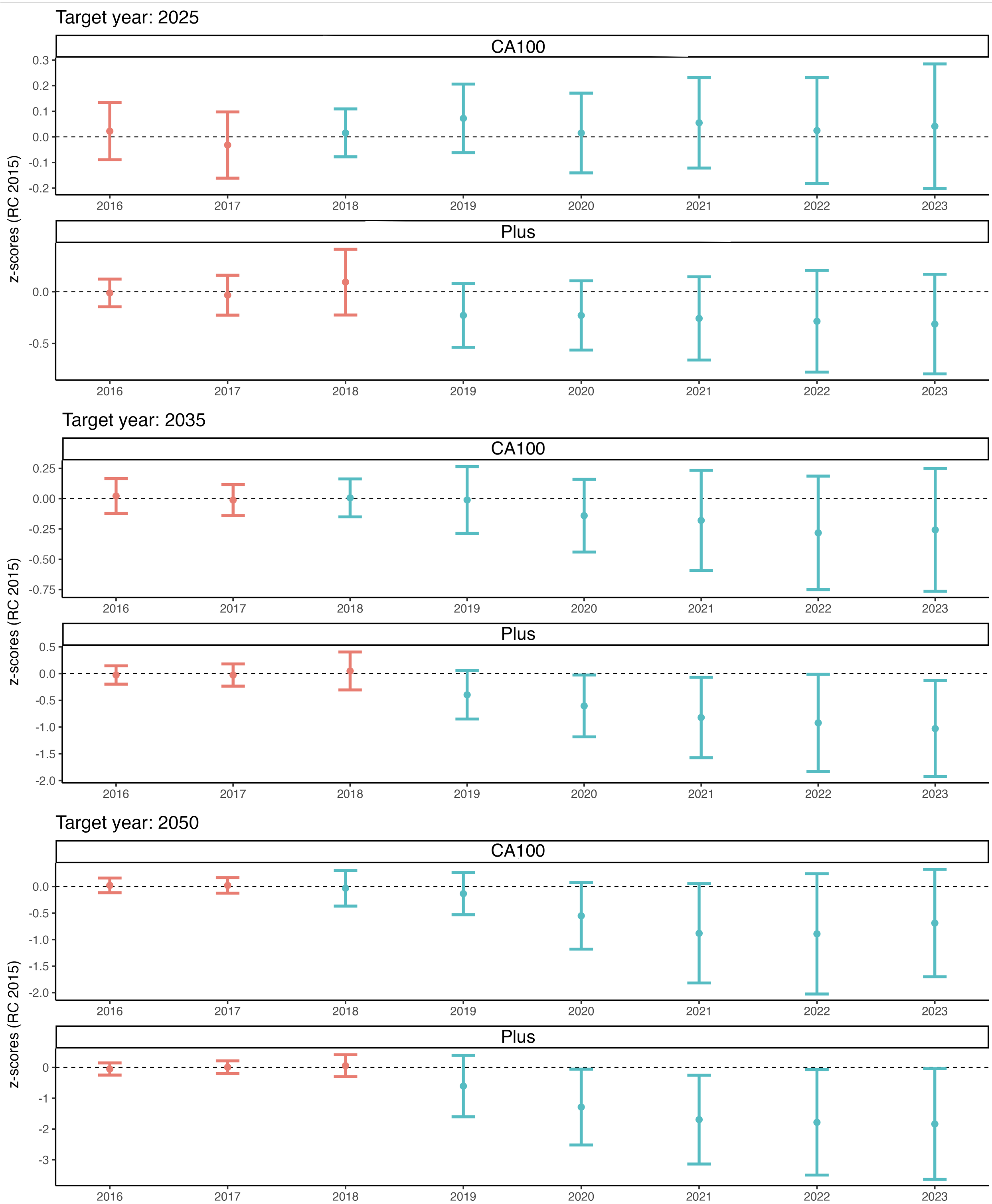

Figure 9: This figure shows the dynamic treatment effect of CA100+ on the CA100 and Plus companies' target setting.

7 Robustness checks

7.1 Alternative measures of disclosure and carbon intensity

A potential concern regarding the analysis of climate-related reporting is that the content in ARs may not comprehensively capture companies' disclosure. To address this, I conduct a robustness check using companies' responses to CDP's climate questionnaire.

CDP plays an important role in driving corporate transparency by annually sending questionnaires to companies. A crucial aspect of the CDP disclosure process is the choice companies have to respond or not respond. It is precisely this strategic decision to opt in or opt out which I exploit for the period 2016 to 2022. If CA100+ increases the propensity of focus companies to report to CDP, this would indicate a positive impact on companies' climate reporting. Appendix G provides more information on how I use the CDP dataset.

Since the CDP variable is binary, I estimate a binned DiD model using a pre-post design. I bin the data into pre- and post-treatment periods and compare the mean response rates between CA100+ and Non-CA100+ firms. The model is estimated as follows:

$$(4) \quad \overline{Y}_{it} = \alpha + \beta_1(CA100_i * Post_t) + \beta_2 Post_t + \gamma_i + \epsilon_{it}$$

$\overline{Y}_{it}$ is the *binned* climate action of company i in either the pre- or post-treatment period t. The model is estimated using a linear OLS regression with standard errors clustered at the company level.

I also conduct a robustness check for carbon intensities using Scope 1, 2 and 3 upstream emissions relative to revenue from Trucost. While the concerns raised in section 4.4 remain – specifically, the omission of material Scope 3 downstream emissions and volatility in the financial denominator – the advantage of the Trucost dataset is its larger sample size. It allows for an analysis from 2010 to 2023 for 86 CA100, 51 Plus and 241 Non-CA100+ firms. The results presented in table 4 reveal no significant treatment effects. CA100+ does not appear to have influenced firms' likelihood of responding to CDP or their carbon intensities relative to revenue.

	CDP reporting (4)	Carbon intensities (1)
treat*post	−0.02	−120.33
	(0.02)	(116.23)
Num. obs.	726	5292
R^2	0.90	0.87
Adj. R^2	0.79	0.86

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 4: This table shows the results of the binned DiD analysis on CDP reporting and the TWFE DiD on carbon intensities (Trucost), comparing all CA100+ companies to Non-CA100+ companies.

7.2 Varying regulatory environments

The CA100+ firms operate across diverse regulatory contexts. While company fixed effects control for time-invariant differences in national climate policy and year fixed effects for common temporal shocks, time-varying regulatory stringency at the country level could still bias the results.

To address this concern, I follow Bolton and Kacperczyk (2023) and incorporate the Climate Change Performance Index (2023) (CCPI) as a control variable for national climate policy stringency in the TWFE DiD model (1). The CCPI provides annual scores of countries' climate policy efforts. I match firms to CCPI scores based on their headquarters' location. Appendix H provides further detail on how the CCPI data were used. Table 5 shows that the results on target setting remain robust when accounting for cross-country variation in regulatory environments. The CCPI coefficients are not statistically significant.

Since even the CCPI data may not fully capture relevant variations in climate policy stringency, I conduct an additional test by restricting the sample to firms headquartered in North America, the region with the largest representation. Table 6 shows that the estimated

	CA100			Plus		
	TY: 2025	TY: 2035	TY: 2050	TY: 2025	TY: 2035	TY: 2050
treat*post	0.00	-0.13	-0.42^{*}	-0.15	-0.61^{***}	-1.18^{***}
	(0.07)	(0.12)	(0.22)	(0.10)	(0.19)	(0.39)
CCPI	-0.00	0.00	0.00	-0.00	-0.00	-0.01
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)
Num. obs.	1532	1532	1532	1399	1399	1399
R^2	0.89	0.77	0.63	0.86	0.72	0.60
Adj. R^2	0.87	0.74	0.58	0.84	0.68	0.54

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 5: This table shows the results of the DiD on targets conducted for the CA100 and Plus analyses including CCPI scores.

effect on target ambition remains insignificant for CA100 firms. Despite the lower statistical power of this regional analysis, the effect on the Plus firms' long-term targets persists at the 10% significance level, while the effect on medium-term targets is slightly above this significance level. Appendix I shows that the non-results for TCFD reporting and carbon intensities are robust to controlling for CCPI and restricting the sample to North American firms.

	CA100			Plus		
	TY: 2025	TY: 2035	TY: 2050	TY: 2025	TY: 2035	TY: 2050
treat*post	-0.04	-0.07	-0.12	-0.18	-0.61	-1.33^{*}
	(0.12)	(0.17)	(0.22)	(0.22)	(0.37)	(0.69)
Num. obs.	412	412	412	369	369	369
R^2	0.88	0.78	0.69	0.80	0.63	0.54
Adj. R^2	0.86	0.75	0.64	0.77	0.57	0.47

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 6: This table shows the results of the DiD conducted for the CA100 and Plus analyses among North American firms.

7.3 Varying sectoral dynamics

Lastly, as discussed in section 4.2 , different sectors face different decarbonisation challenges. Consequently, variations in the sector compositions across the three groups could bias the results. To rule out this possibility, I conduct a stringent test by re-estimating all models within a single sector: electricity utilities.

Table 7 confirms that the effect on target setting remains insignificant for CA100 firms, while the impact on long-term targets among Plus firms persists at the 5% level. Appendix J further shows that the non-effects on TCFD reporting and carbon intensities also hold within this sector.

	CA100			Plus		
	TY: 2025	TY: 2035	TY: 2050	TY: 2025	TY: 2035	TY: 2050
treat*post	-0.11	-0.10	-0.14	-0.02	-0.27	-0.48^{**}
	(0.14)	(0.18)	(0.24)	(0.14)	(0.17)	(0.20)
Num. obs.	438	438	438	512	512	512
R^2	0.89	0.81	0.71	0.88	0.79	0.70
Adj. R^2	0.87	0.78	0.66	0.87	0.75	0.66

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 7: This table shows the results of the DiD conducted for the CA100 and Plus analyses within the electricity sector.

8 Conclusion

This study provides the first causal assessment of the impact of a large investor coalition on corporate climate action. Although there are strong conceptual reasons to expect CA100+ to influence real-economy outcomes, I find only partial support for *H1*. Specifically, I find no significant effect of CA100+ on targeted companies' TCFD reporting or carbon intensities five years after the initiative's launch. These findings contrast with anecdotal evidence and Chang and Fang (2024) and Chuah et al. (2025) who report negative associations between CA100+ targeting and firms' carbon emissions. Yet this study does find a significant effect of CA100+ on companies' carbon emission reduction targets. The effect on medium- and long-term targets strengthens over time, which provides partial support for *H2*. It is worth noting that CA100+ focused its early engagement efforts on target setting, only explicitly requesting reductions in emissions from 2023 onward. Hence, it is possible that effects on emissions may emerge in the future.

However, by examining the company selection process and testing for heterogeneity in the treatment effect, I find that the effect on targets is primarily driven by the Plus list – where endogeneity cannot be ruled out. CA100+ investors may have strategically targeted firms for the Plus list that were predisposed to respond well to engagement. While Heeb and Kölbel (2024) highlight investor selectivity as a potential concern, this study provides the first empirical evidence on this potential mechanism. A sceptical view on the heterogeneous treatment effect would suggest that investors had prior knowledge about the carbon emission reduction targets the Plus companies were going to set anyway. Along similar lines, investors might have anticipated "easy wins". However, these explanations may be overly sceptical. Based on interviews the author conducted with CA100+ investors, selecting the right target companies is considered a crucial element of a successful engagement process. Some described it as part of the "art of engagement." Investor stewardship resources are limited, requiring a focus on firms where engagement is likely to yield results. From this perspective, it is reasonable that CA100+ signatories selected Plus companies they believed would be more responsive to pressure. Dimson et al. (2015) suggest that investors typically target firms based on a combination of prior sustainability performance, reputational risk and ownership stakes.

To explore potential differences between CA100 and Plus companies along these and other dimensions, I conduct independent two-sample t-tests using variables that investors plausibly had access to when the Plus list was compiled in 2017. These include average Scope 1, 2 and 3 upstream emissions and emission intensities from Trucost, CA100+ collective ownership as well as selected operational and financial metrics drawn from the Orbis database.

Table 8 shows that, on average, CA100 companies are nearly twice as large and emitted twice as much as Plus companies, with differences statistically significant at conventional levels. This is unsurprising, given that CA100 companies were selected based on absolute carbon emissions. However, this finding may suggest that investor impact is stronger for slightly smaller firms among the largest corporate emitters. In addition, the average collective ownership share of CA100+ founding members in 2017 was 1 percentage point higher in the Plus list. This could imply that the ownership of early joiners – arguably the more committed members (Bauckloh et al., 2023) – may be more influential than the broader collective ownership across all members

Variable	CA100	Plus	Diff	p-Value
Absolute emissions (Mt)	54.00	27.00	27***	0.00
Emissions intensity (g/USD)	1428.20	2094.50	−666.4	0.12
CA100+ Ownership (%)	3.90	4.90	−1*	0.06
Market cap (bn USD)	59.10	34.10	25***	0.01
Revenue (bn USD)	77.10	33.50	43.7***	0.00
Fixed assets (bn USD)	44.40	24.30	20.1***	0.00
EBIT (bn USD)	6.00	3.00	3***	0.00
Tobin's Q	0.70	0.80	−0.1	0.50
Number of employees (k)	117.70	98.20	19.6	0.73

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 8: This table presents independent two-sample t-test results across a range of variables, comparing the CA100 and Plus companies prior to the launch of CA100+.

Moreover, I find no impact of CA100+ on short-term targets. While it is important to acknowledge companies' challenges in reducing their carbon enmissions in the near term, setting medium- and long-term targets that are not underpinned by short-term milestones raises questions about their credibility. Prior research suggest that ambitious climate targets are linked to actual emission reductions (Ioannou et al., 2016; Bolton and Kacperczyk, 2025), yet there is no evidence that companies are penalised for failing to meet such targets (Jiang et al., 2025). This study does not seek to assess whether CA100+ companies will ultimately deliver on their targets. Nonetheless, the absence of short-term ambition may reflect strategic behaviour aimed at appearing climate-responsible while deferring substantive abatement. As targets extend further into the future, accountability within both firms and investors becomes more diffuse. This could be perceived as a form of greenwashing.

Surprisingly, I also find no evidence in support of *H3* or *H4* – that is, neither the collective ownership share held by CA100+ investors in focus companies nor potential spillover effects via ownership in non-targeted companies appear to influence outcomes. This challenges the common assumption that the collective scale of investor coalitions – often promoted through headline figures on membership and collective AUMs – plays a central role in driving real-economy impact.

I acknowledge several caveats to the interpretation of my findings. First, CA100+ focuses on the world's largest publicly listed corporate emitters. As such, the results may not generalise to smaller polluters, who may respond differently to investor engagement. However, from a climate mitigation perspective, the behaviour of the largest corporate emitters matters the most.

Second, CA100+ organises engagement through company-specific subgroups, each comprising different lead and supporting investors. The composition of these subgroups is not comprehensively disclosed. Prior studies demonstrate that the configuration of such smaller engagement groups can shape outcomes (Dimson et al., 2023; Slager et al., 2023). To be clear, this study does not contradict these existing findings, nor does it suggest that all private engagements conducted within CA100+ were unsuccessful. Rather, my analysis focuses on the broader initiative – evaluating the causal impact of CA100+ as a large-scale coordinated investor coalition across its entire focus list.

Third, although I test for spillover effects operating through investor learning and the diffusion of engagement practices, CA100+ could contribute to broader system-level spillovers by influencing the institutional context in which firms operate (Matisoff, 2015). While acknowledging this possibility, this study offers a key insight. Only focus companies were directly targeted by CA100+'s coordinated engagement. My findings reveal no systematic differences between CA100+ and Non-CA100+ companies, except for medium- and long-term targets among the Plus firms, and no evidence of spillovers into individual investor engagement. If CA100+ has influenced corporate behaviour more broadly, such effects are unlikely to have arisen primarily through its formal engagement activities.

Fourth, it is possible that CA100+ simply requires more time to exert a meaningful influence on corporate behaviour. A follow-up study could offer insights into how the initiative's impact evolves over a longer horizon. Notably, CA100+ has recently become smaller, following the departures of several large US-based asset managers in 2024. In light of my finding that collective ownership by CA100+ investors does not appear to drive engagement outcomes, future research could investigate a potential "reverse" treatment effect – assessing whether a smaller, but potentially more aligned coalition becomes more effective.

Lastly, another promising area for future research is to explore whether collective investor action affects capital reallocation or asset pricing – either by changing firm fundamentals or by altering investor expectations about future transition risks. This could help assess the broader financial ecosystem's response to investor coalitions like CA100+.

References

Azar, J., Duro, M., Kadach, I., and Ormazabal, G. (2021). The Big Three and corporate carbon emissions around the world. *Journal of Financial Economics*, 142(2):674–696.

Barko, T., Cremers, M., and Renneboog, L. (2022). Shareholder Engagement on Environmental, Social, and Governance Performance. *Journal of Business Ethics*, 180(2):777–812.

Bauckloh, T., Schaltegger, S., Utz, S., Zeile, S., and Zwergel, B. (2023). Active first movers vs. late free-riders? an empirical analysis of un pri signatories' commitment. *Journal of business ethics*, 182(3):747–781.

Bauer, R., Derwall, J., and Tissen, C. (2023). Private Shareholder Engagements on Material ESG Issues. *Financial Analysts Journal*, 79(4):64–95.

Berg, F., Kölbel, J., and Rigobon, R. (2022). Aggregate Confusion: The Divergence of ESG Ratings*. *Review of Finance*, 26(6):1315–1344.

Bingler, J. A., Kraus, M., Leippold, M., and Webersinke, N. (2022). Cheap talk and cherry-picking: What climatebert has to say on corporate climate risk disclosures. *Finance Research Letters*, 47:102776.

Bingler, J. A., Kraus, M., Leippold, M., and Webersinke, N. (2024). How cheap talk in climate disclosures relates to climate initiatives, corporate emissions, and reputation risk. *Journal of Banking & Finance*, 164:107191.

Bolton, P. and Kacperczyk, M. (2023). Global pricing of carbon-transition risk. *The Journal of Finance*, 78(6):3677–3754.

Bolton, P. and Kacperczyk, M. (2025). Firm commitments. *Management Science*, 0(0).

Broccardo, E., Hart, O., and Zingales, L. (2022). Exit versus Voice. *Journal of Political Economy*, 130(12):3101–3145.

Busch, T., Johnson, M., and Pioch, T. (2022). Corporate carbon performance data: Quo vadis? *Journal of Industrial Ecology*, 26(1):350–363.

Callaway, B. and Sant'Anna, P. H. C. (2021). Difference-in-Differences with multiple time periods. *Journal of Econometrics*, 225(2):200–230.

Chang, L. and Fang, S. (2024). Climate actions and corporate carbon emissions along the supply chain. *Economics Letters*, 235:111503.

Chatterji, A. K. and Toffel, M. W. (2010). How firms respond to being rated. *Strategic Management Journal*, 31(9):917–945.

Chuah, K., Chung, K., and Henisz, W. J. (2025). Governance & governments: The effects of shareholder engagement and climate laws on firm co2 emissions. *Working Paper*.

Climate Action 100+ (2024). Climate Action 100+. Website. https://www.climateaction100.org/.

Climate Change Performance Index (2023). Climate Change Performance Index (CCPI).

Dietz, S., Gardiner, D., Jahn, V., and Noels, J. (2021). How ambitious are oil and gas companies' climate goals? *Science*, 374(6566):405–408.

Dimson, E., Karakaş, O., and Li, X. (2015). Active Ownership. *Review of Financial Studies*, 28(12):3225–3268.

Dimson, E., Karakaş, O., and Li, X. (2023). Coordinated Engagements.

Doidge, C., Dyck, A., Mahmudi, H., and Virani, A. (2019). Collective Action and Governance Activism*. *Review of Finance*, 23(5):893–933.

Drempetic, S., Klein, C., and Zwergel, B. (2020). The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review. *Journal of Business Ethics*, 167(2):333–360.

Dyck, A., Lins, K. V., Roth, L., and Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics*, 131(3):693–714.

Financial Times (2017). Rapid changes in the climate for carbon-heavy investments. *Financial Times*.

Flammer, C., Toffel, M. W., and Viswanathan, K. (2021). Shareholder activism and firms' voluntary disclosure of climate change risks. *Strategic Management Journal*, 42(10):1850–1879.

GHG Protocol Initiative (2004). The Greenhouse Gas Protocol.

Gillingham, K. and Stock, J. H. (2018). The Cost of Reducing Greenhouse Gas Emissions. *Journal of Economic Perspectives*, 32(4):53–72.

Gond, J.-P. and Piani, V. (2013). Enabling Institutional Investors' Collective Action: The Role of the Principles for Responsible Investment Initiative. *Business & Society*, 52(1):64–104.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, 225(2):254–277.

Heeb, F. and Kölbel, J. (2024). The impact of climate engagement: A field experiment. *Working Paper*.

Heede, R. (2020). Update of carbon majors 1965-2018. *Climate Accountability Institute*.

Heinkel, R., Kraus, A., and Zechner, J. (2001). The Effect of Green Investment on Corporate Behavior. *The Journal of Financial and Quantitative Analysis*, 36(4):431.

Ho, V. (2020). Disclosure Overload? Lessons For Risk Disclosure & ESG Reporting Reform From The Regulation S-K Concept Release. *Villanova Law Review*, 65(1):67.

Hoepner, A. G. F., Oikonomou, I., Sautner, Z., Starks, L. T., and Zhou, X. Y. (2024). ESG shareholder engagement and downside risk. *Review of Finance*, 28(2):483–510.

Ilhan, E., Krueger, P., Sautner, Z., and Starks, L. T. (2023). Climate risk disclosure and institutional investors. *The Review of Financial Studies*, 36(7):2617–2650.

Ioannou, I., Li, S. X., and Serafeim, G. (2016). The effect of target difficulty on target completion: The case of reducing carbon emissions. *The Accounting Review*, 91(5):1467–1492.

Jiang, X., Kim, S., and Lu, S. (2025). Limited accountability and awareness of corporate emissions target outcomes. *Nature Climate Change*, 15(3):279–286.

Judiciary Committee (2024). Sustainability shakedown: How a climate cartel of money managers colluded to take over the board of america's largest energy company. *Committee on the Judiciary U.S. House of Representatives*.

Krabbe, O., Linthorst, G., Blok, K., Crijns-Graus, W., van Vuuren, D. P., Höhne, N., Faria, P., Aden, N., and Pineda, A. C. (2015). Aligning corporate greenhouse-gas emissions targets with climate goals. *Nature Climate Change*, 5(12):1057–1060.

Kölbel, J. F., Heeb, F., Paetzold, F., and Busch, T. (2020). Can Sustainable Investing Save the World? Reviewing the Mechanisms of Investor Impact. *Organization & Environment*, 33(4):554–574.

Marti, E., Fuchs, M., DesJardine, M. R., Slager, R., and Gond, J.-P. (2024). The impact of sustainable investing: A multidisciplinary review. *Journal of Management Studies*, 61(5):2181–2211.

Matisoff, D. (2015). Sources of specification errors in the assessment of voluntary environmental programs: understanding program impacts. *Policy Sciences*, 48(1):109–126.

Olson, M. (1965). *The Logic of Collective Action: Public Goods and the Theory of Groups, Second Printing with a New Preface and Appendix*. Harvard University Press.

Rohleder, M., Wilkens, M., and Zink, J. (2022). The effects of mutual fund decarbonization on stock prices and carbon emissions. *Journal of Banking & Finance*, 134:106352.

Sharkey, A. J. and Bromley, P. (2015). Can Ratings Have Indirect Effects? Evidence from the Organizational Response to Peers' Environmental Ratings. *American Sociological Review*, 80(1):63–91.

Slager, R., Chuah, K., Gond, J.-P., Furnari, S., and Homanen, M. (2023). Tailor-to-target: Configuring collaborative shareholder engagements on climate change. *Management Science*, 69(12):7693–7718.

The Economist (2021). It is not so easy being green. *The Economist*, 438(9238):63–64.

The Guardian (2023). C of e divests of fossil fuels as oil and gas firms ditch climate pledges. *The Guardian*.

A Appendix - CA100 companies

Airbus	Exxon Mobil	Philips
American Electric Power	Fiat Chrysler	Phillips 66
Anglo American	Ford	Posco
Anhui Conch Cement	Formosa Petrochemical	Procter & Gamble
AP Moller - Maersk	Gas Natural	PTT
Arcelor Mittal	Gazprom	Raytheon Technologies
BASF	General Electrics	Reliance Industries
Bayer	General Motors	Repsol
Berkshire Hathaway	Glencore	Rio Tinto
BHP	Hitachi	Rolls-Royce
Boeing	Holcim	Rosneft Oil
BP	Hon Hai Precision Industry	SAIC Motor
Canadian Natural Resources	Honda	Sasol
Caterpillar	Imperial Oil	Shell
Centrica	International Paper	Siemens
Chevron	KEPCO	Sinopec
China Shenhua Energy	Lockheed Martin	SK Innovation
CNOOC	Lukoil	Southern Company
Coal India	LyondellBasell Industries	Suncor Energy
ConocoPhillips	Marathon Petroleum	Suzuki
Cummins	Martin Marietta Materials	Teck Resources
Daikin Industries	Naturgy Energy	Tesoro
Dow	Nestle	ThyssenKrupp
Duke Energy	Nippon Steel	Toray Industries
Dupont	Nissan	TotalEnergies
E.ON	Nornickel	Toyota
Ecopetrol	NTPC	Trane Technologies
EDF	Oil & Natural Gas	United Technologies
Enel	OMV	Vale
Eneos	PACCAR	Valero Energy
Engie	Panasonic	Vedanta
Eni	Pepsico	Volkswagen
Equinor	Petrobras	Volvo
Exelon		

Table 9: This table shows the list of CA100 companies.

B Appendix - Plus companies

ADBRI	Delta Air Lines	Renault
AES	Devon Energy	RWE
AGL Energy	Dominion Energy	Santos
Air France KLM	Enbridge	Severstal
Air Liquide	Eskom	South 32
American Airlines	FirstEnergy	SSAB
ANTAM	Fortum	SSE
Bluescope Steel	Groupe PSA	St Gobain
BMW	Heidelberg Cement	Suzano
Boral	Iberdrola	TC Energy
Bumi	Kinder Morgan	Unilever
Bunge	National Grid	United Continental
Cemex	NextEra Energy	United Tractors
CEZ	NRG Energy	Vistra Energy
China Steel	Occidental Petroleum	Walmart
Coca-Cola	Origin Energy	WEC Energy Group
Colgate-Palmolive	PGE	Weyerhaeuser
CRH	Power Assets	Woodside Petroleum
Daimler	PPL	Woolworths
Dangote Cement	Qantas	XCEL Energy
Danone		

Table 10: This table shows the list of Plus companies.

C Appendix - TPI methodology, process and data

TPI Carbon Performance (CP) assessments are exclusively disclosure-based. Therefore, the length of a company's emission pathway depends on two main factors. First is the availability of historical emissions and production data. While some companies have complete carbon emission pathways with historical carbon intensities ranging from 2014 to 2022, others have shorter pathways or even no pathway at all. Figure 10 shows the past carbon intensities of a company with limited disclosure.

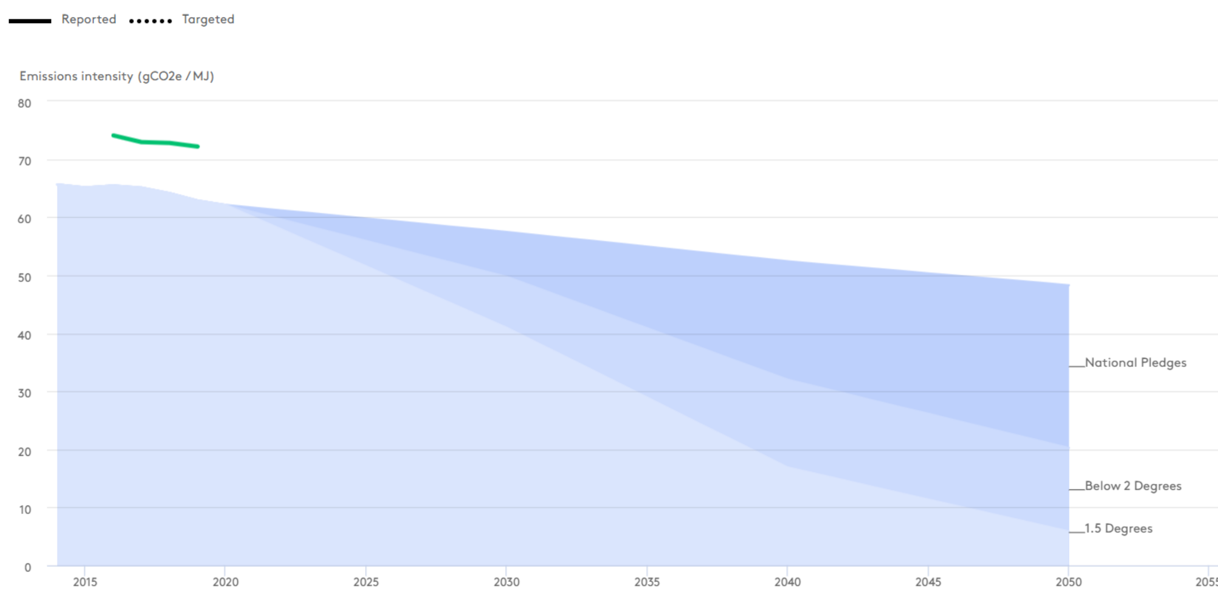

Figure 10: This figure shows an exemplary TPI CP pathway for Oil and Natural Gas from research cycle 2022.

Second, the forward-looking part of the pathway until 2050 is calculated based on companies' carbon emission reduction targets. Figures 11 and 12 illustrate how the forward-looking emission pathway of the same company, Eni, changed between research cycles (RCs) 2020 and 2021. For example, in the TPI RC 2020, Eni had set a target to reduce its carbon intensity to 29.46 gCO2e/MJ by 2050. In the TPI research cycle 2021, Eni had set a target to reach a carbon intensity of 0 gCO2e/MJ by 2050. The reduction of 29.46 gCO2e/MJ for Eni's targeted 2050 carbon intensity between RCs 2020 and 2021 reflects the strengthened ambition of the company's new carbon emission reduction target. The carbon intensities between the year of the current intensities and the year for which a carbon emission reduction target was set are linearly interpolated. Similarly, in the rare cases where there are gaps between years of calculated historical intensities, the missing values are linearly interpolated.

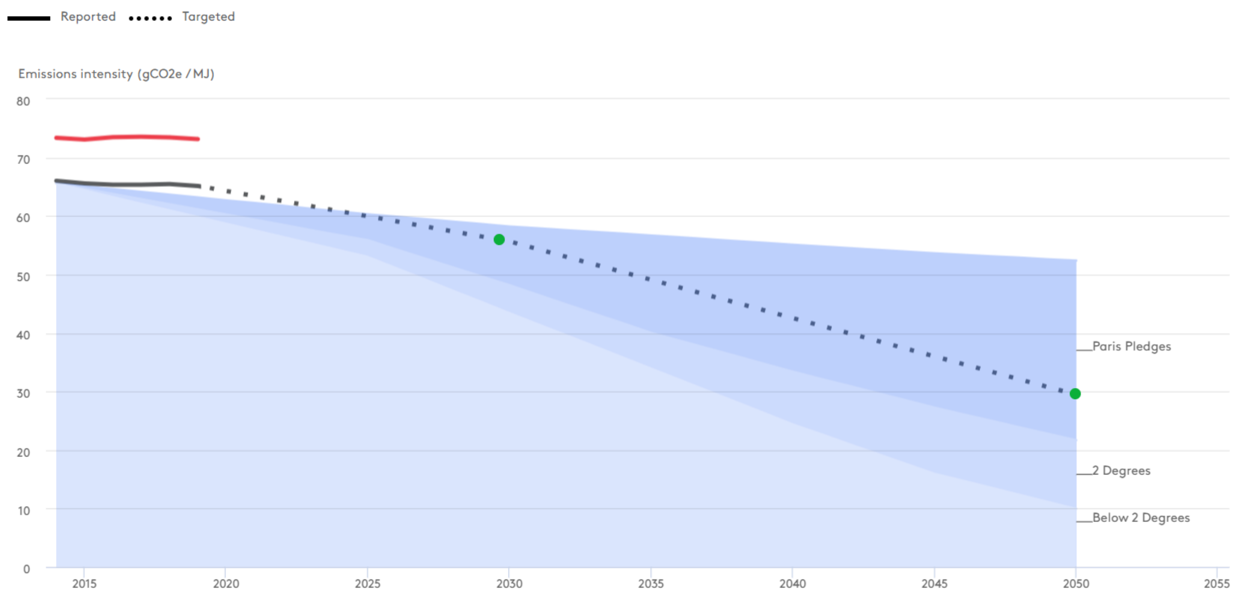

Figure 11: This figure shows an exemplary TPI CP pathway for Eni from research cycle 2020.

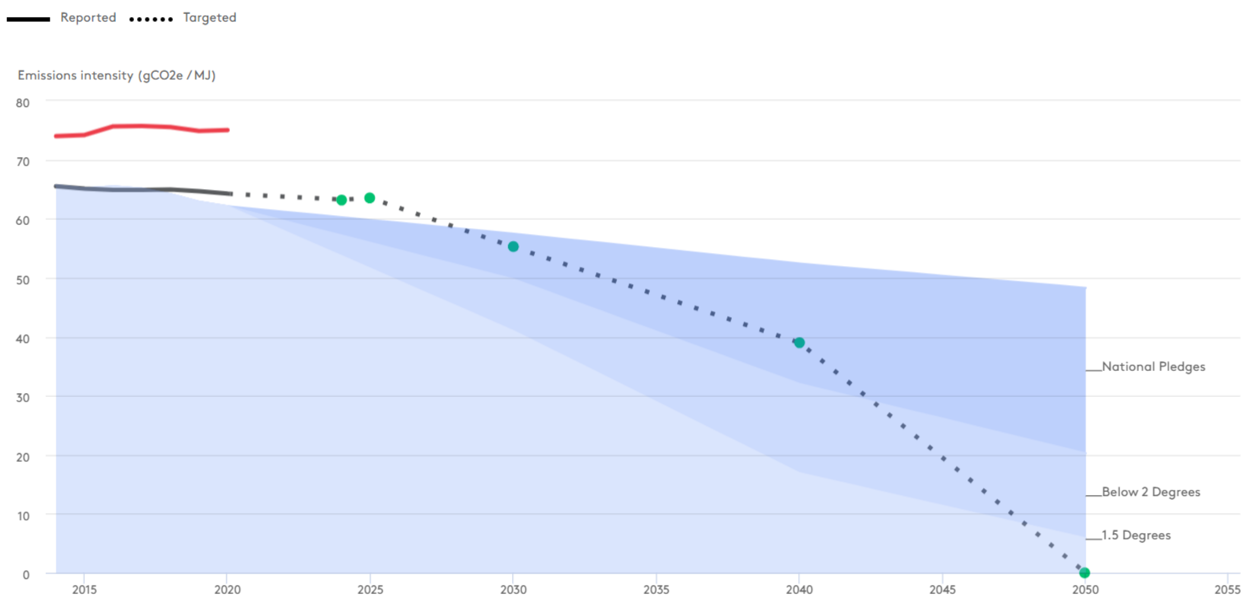

Figure 12: This figure shows an exemplary TPI CP pathway for Eni from research cycle 2021.

Data reliability in CP assessments is ensured through the TPI quality assurance process. Initially, a TPI analyst prepares the CP assessment, which is subsequently reviewed by another analyst. The assessments are then sent to the respective companies for feedback. Following a comprehensive analysis of the feedback and an additional internal review, the assessments are published on the TPI tool.

TPI's sector rules match the CA100+ sector definitions and rely on various GICS and ICB filter settings and additional manual company research. The goal of TPI's sector allocation is to ensure that companies from the same sector face similar challenges in the low-carbon transition.

Five CA100+ sectors, namely chemicals, consumer goods, oil and gas distribution, other industrials and services, are not yet covered by TPI's assessments. Moreover, the carbon intensities in the aluminium and diversified mining sectors are calculated starting only from 2016. Hence, the analysis of CA100+'s impact on companies' emission pathways is conducted for the nine remaining sectors: airlines, automotives, cement, coal, electricity, paper, shipping, steel and oil and gas. Table 11 shows the sample of companies with complete historical carbon intensity pathways from 2014 to 2022.

Sector	**CA100**	**Plus**	**Non-CA100+**	**Total**
Electricity	10	18	38	66
Automotives	9	4	16	29
Oil and gas	22	5	13	40
Cement	1	4	9	14
Steel	4	3	13	20
Airlines	NA	5	16	21
Coal Mining	2	NA	16	18
Paper	1	1	10	12
Shipping	1	NA	5	6
Total	50	40	136	**226**

Table 11: This table shows the sample size for TPI companies with complete historical carbon intensity pathways by sector.

D Appendix - Methodological note on constructing new primary CP data

The goal of the new primary data collection is to replicate forward-looking emissions intensity pathways for companies prior to their initial assessment by TPI. However, since TPI was launched in 2017, the sectoral methodologies have undergone several revisions to enhance their robustness. Additionally, several companies experienced changes due to mergers, acquisitions and other factors affecting how TPI assessed them. This note outlines the potential impacts of such changes and explains which further adjustments were necessary to ensure the final database remains usable for the paper's analysis. These adjustments, affecting both existing CP assessments and new "historical" assessments, were discussed with and reviewed by the TPI team.

Aside from the notes below, the "historical" CP assessments follow the same methodologies and process as standard TPI assessments to ensure data quality. Initial drafts were prepared by a TPI analyst and reviewed by myself between May 2023 and May 2024. Although this study utilises pre-feedback data, the "historical" assessments will be sent to companies for feedback in the future.

Removals from the sample

I removed all companies that TPI stopped assessing during the research period from the sample. This decision primarily impacted Russian companies, as TPI and CA100+ discontinued assessments of Russian companies during research cycle 2022.

Extending the length of emission intensity pathways

During the early TPI RCs from 2017 to 2019, companies' forward-looking emission intensity pathways were calculated until 2030. However, in research cycle 2020, the assessments in all sectors were expanded to cover projections until 2050. Consequently, the early TPI CP assessments from RCs 2017 to 2019 do not allow for an evaluation of companies' carbon emission reduction targets beyond 2030. To enable this long term analysis, I prolonged the assessments for companies that had established targets reaching beyond 2030 in the early RCs, employing the following methodology:

1. I identified companies with 2030 targets in RCs 2017 to 2020.

2. I verified TPI internal assessments to confirm if these companies had set targets extending beyond 2030.

3. I adopted the targeted intensities beyond 2030 if already calculated in early TPI assessments. Otherwise, I calculated the targets myself in adherence to the TPI sectoral methodologies.

4. I conducted all new "historical" assessments with emission intensity pathways extending until 2050.

Completing carbon intensity pathways from previous research cycles

In some cases, companies began reporting historical carbon intensities after their initial assessments by TPI. For example, a company may have been assessed in research cycle 2017 as having "No or unsuitable disclosure", but then published sufficient information to calculate an emission intensity pathway from 2014 to 2019 in research cycle 2020. In such cases, I complete the pathways for research cycles 2017-2019 with the new carbon intensities that became available in research cycle 2020. I also complete historical carbon intensities with newly found information where available.

In cases where methodological changes by the company or TPI resulted in significant shifts in companies' pathways (see some sector-specific explanations below), I adjust the previously reported intensities to align with the new methodologies, assuming that the conversion ratio remained constant over time. For example, if a company reported intensities using an old methodology for 2015 and 2016 but changed its methodology in 2017, providing newly calculated historical intensities only for 2016, I assume that the 2016 conversion factor can also be applied to 2015. I apply the same approach if emissions intensities are available from either company disclosures or TPI calculations for all years, but available for both only for some years. Lastly, for firms with non-calendar fiscal years (e.g., July to June instead of January to December), I align the corresponding TPI calendar years, where possible, with the timing of CA100+'s engagement with Plus companies, which began in June 2018.

Automotive sector

The TPI automotive methodology uses gCO_2/km as the emission intensity metric. Initially, this intensity was based on the New European Driving Cycle (NEDC) test cycle. However, with the gradual phasing out of the NEDC test cycle in the European Union and other regions, TPI transitioned to the Worldwide harmonized Light vehicles (WLTP) test cycle in a methodology update during RC 2022. The adoption of WLTP resulted in an upward adjustment of emission intensities for nearly all automotive companies, except for pure electric vehicle manufacturers. Since this transition affected both CA100+ and Non-CA100+ companies equally and at the same, it does not introduce bias into the analysis.

Additionally, Fiat Chrysler and Groupe PSA, two CA100+ companies, merged to form Stellantis in January 2021. TPI last assessed Fiat and PSA as separate entities in RC 2021, after which it began assessing only Stellantis. To preserve a larger sample size, I include assessments for both Fiat Chrysler and Groupe PSA in my analysis. After R 2021, I applied Stellantis' carbon emission reduction targets to both Fiat Chrysler and Groupe PSA for consistency.

Airlines sector

TPI's methodology for airlines underwent significant changes between RC 2018 and 2019. The emission intensity metric shifted from gCO_2/Revenue-passenger-kilometer (RPK) to gCO_2/Revenue-tonne-kilometers (RTK) to include cargo in the assessments. Airlines assessed in RC 2018, the inaugural year of TPI's airline assessments, initially had their assessments in gCO_2/RPK and subsequently in gCO_2/RTK.

The change in the emission intensity metric caused substantial jumps the pathways of individual companies, such as from approximately 120 gCO_2/RPK to 650 gCO_2/RTK. To mitigate the impact of this methodological change, I converted the gCO_2/RPK pathways into gCO_2/RTK pathways using TPI's conversion factor of 150 kilograms per passenger. In research cycle 2020, TPI updated the conversion factor for RPK to RTK from 150kg per person to 95kg per person. Therefore, I converted all assessments from RCs prior to 2020 again using the updated conversion factor. Starting from RC 2021, the airline assessments are used as available in the TPI database.

Shipping sector

Where avaible, I applied a company-specific conversion ratio of the Energy Efficiency Operational Indicator (EEOI) to TPI carbon intensity (tank-to-wheel CO_2 emissions in grams per tonne-kilometre of transported cargo) to estimate missing carbon intensity values for 2014 and 2015.

Cement sector

TPI assessments use intensities reported in tCO_2/t cementitious products to enable accurate comparisons with the TPI decarbonisation benchmarks. This metric was introduced by the Cement Sustainability Initiative, the precursor of the Global Cement and Concrete Association, in 2011. Before TPI was established, a significantly higher number of companies reported their carbon footprints in tCO_2/t cement. Since this study does not rely on comparisons with TPI decarbonisation benchmarks, and given the minor differences between the two metrics (approximately 1% globally), I also use reported tCO_2/t cement for historical assessments.

Oil and Gas sector

TPI assessments in the oil and gas sector include Scope 1, 2 and 3 (category 11) emissions. While Scope 3 (category 11) emissions are calculated by TPI based on a company's sold products, Scope 1 and 2 emissions are sourced from company disclosures. If a company does not report its Scope 1 and 2 emissions, TPI does not publish historical carbon intensities. For companies where Scope 3 (category 11) emissions can be calculated and Scope 1 and 2 emissions were disclosed for most but not all years, I apply the company-specific Scope 1&2 relative to Scope 3 emission intensity ratio to obtain carbon intensities for the missing years.

E Appendix - DiD results on climate-related and TCFD reporting

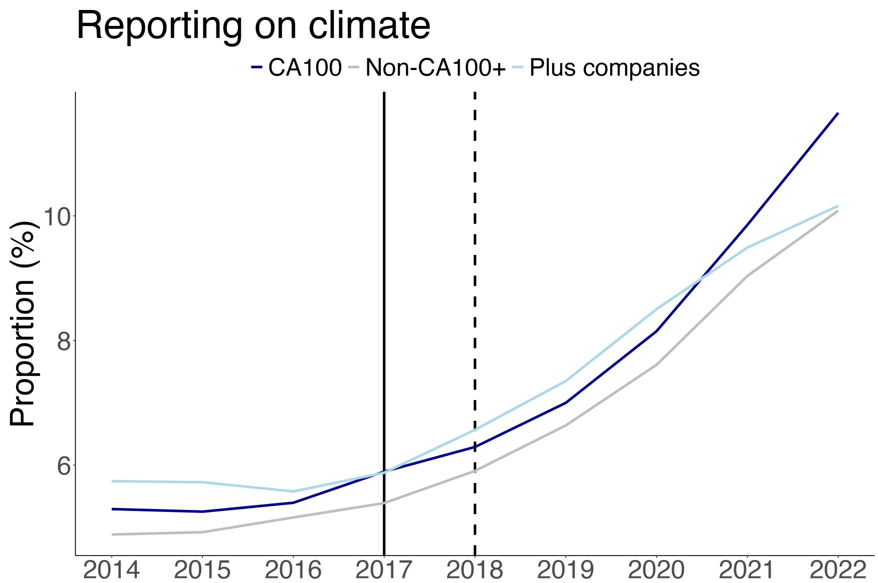

Figure 13: This figure shows the pre- and post-treatment trends on climate-related reporting across CA100, Plus and Non-CA100+ companies for each year.

	Climate			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.37	0.07	−0.08	0.22
	(0.47)	(0.63)	(0.43)	(0.77)
treat*post*ownership		12.08		5.31
		(12.96)		(12.03)
ownership		−0.70		−0.49
		(3.77)		(3.95)
post*ownership		−1.93		−1.16
		(3.46)		(3.57)
Num. obs.	3348	3262	3069	2974
R^2	0.75	0.75	0.77	0.77
Adj. R^2	0.72	0.72	0.74	0.74

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 12: This table shows the results of the DiD analysis on climate-related reporting, comparing the CA100 and the Plus companies to Non-CA100+ companies.

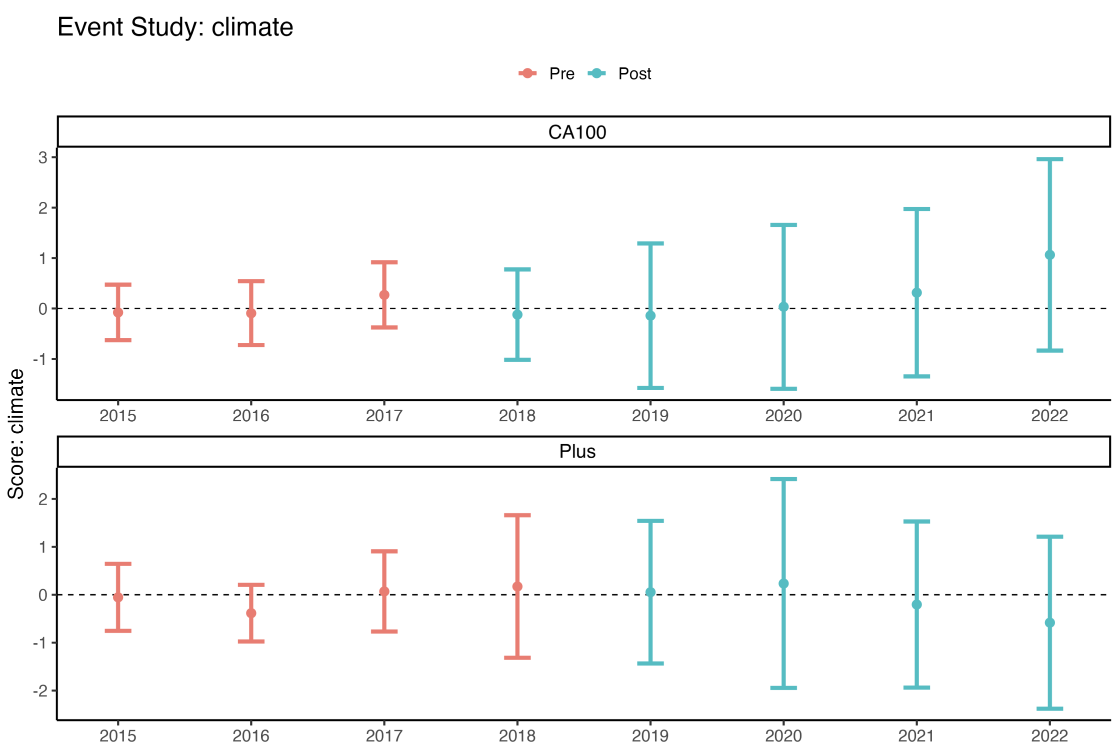

Figure 14: This figure shows the dynamic treatment effect of CA100+ on CA100 and Plus companies' climate-related reporting using a staggered DiD specification.

For risk-related reporting, the DiD results indicate a significant positive effect, in particular for the CA100 companies. However, risk-related reporting comprises only 1% of companies' total ARs, as shown in Figure 3. Moreover, this effect is neither significant in the staggered DiD results nor consistently robust after conducting the checks in Section 7.2.

	Governance		
	(1)	(2)	(3)
treat*post	0.06	−0.03	
	(0.04)	(0.06)	
treat*post*ownership		3.00**	
		(1.17)	
ownership		−0.79*	−0.76*
		(0.43)	(0.43)
post*ownership		0.21	0.20
		(0.39)	(0.39)
Num. obs.	3825	3721	2515
R^2	0.66	0.67	0.66
Adj. R^2	0.62	0.62	0.62

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 13: This table shows the results of the DiD analysis on governance-related reporting, comparing the CA100+ to Non-CA100+ companies.

	Strategy		
	(1)	(2)	(3)
treat*post	−0.11	−0.02	
	(0.24)	(0.32)	
treat*post*ownership		3.11	
		(5.03)	
ownership		0.90	2.08
		(2.66)	(2.71)
post*ownership		−1.66	−2.03
		(2.37)	(2.39)
Num. obs.	3825	3721	2515
R^2	0.75	0.75	0.76
Adj. R^2	0.72	0.72	0.73

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 14: This table shows the results of the DiD analysis on strategy-related reporting, comparing the CA100+ to Non-CA100+ companies.

	Risk		
	(1)	(2)	(3)
treat*post	0.08*	0.09	
	(0.04)	(0.06)	
treat*post*ownership		−0.23	
		(1.02)	
ownership		−1.37***	−1.10**
		(0.47)	(0.48)
post*ownership		0.44	0.36
		(0.45)	(0.45)
Num. obs.	3825	3721	2515
R^2	0.61	0.62	0.64
Adj. R^2	0.57	0.57	0.59

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 15: This table shows the results of the DiD analysis on risk-related reporting, comparing the CA100+ to Non-CA100+ companies.

	Metrics		
	(1)	(2)	(3)
treat*post	0.15	0.12	
	(0.09)	(0.13)	
treat*post*ownership		0.57	
		(2.59)	
ownership		0.16	1.20
		(0.92)	(0.91)
post*ownership		−0.81	−1.13
		(0.85)	(0.84)
Num. obs.	3825	3721	2515
R^2	0.68	0.68	0.73
Adj. R^2	0.64	0.64	0.70

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 16: This table shows the results of the DiD analysis on metrics-related reporting, comparing the CA100+ to Non-CA100+ companies.

Figure 15: This figure shows the pre- and post-treatment trends on reporting on the four TCFD categories across the CA100+ and Non-CA100+ companies for each year.

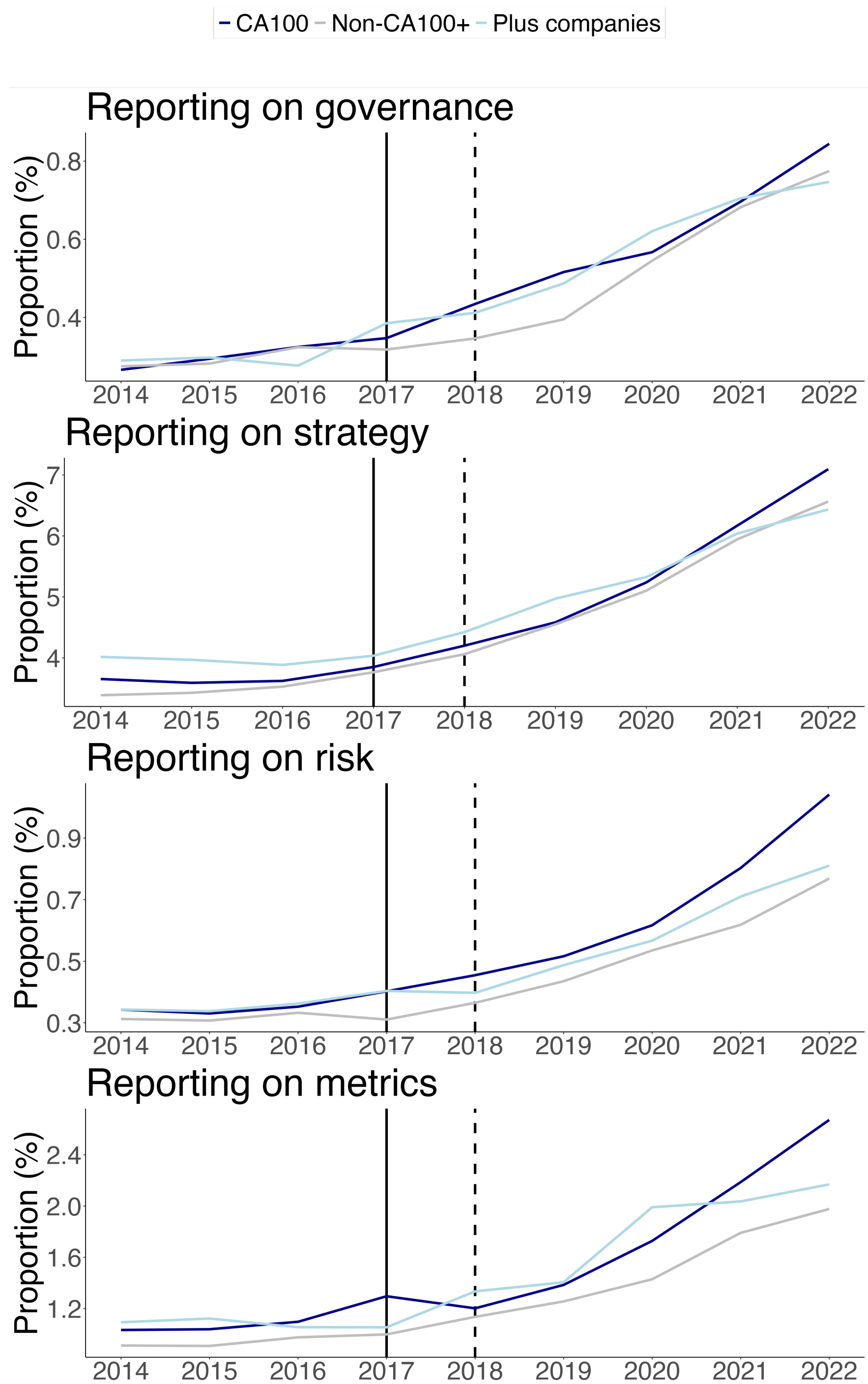

Figure 16: This figure shows the pre- and post-treatment trends on reporting on the four TCFD categories across CA100, Plus and Non-CA100+ companies for each year.

	Governance			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.06	−0.02	0.03	−0.10
	(0.05)	(0.07)	(0.06)	(0.10)
treat*post*ownership		2.82*		3.70**
		(1.51)		(1.81)
ownership		−0.81*		−1.17**
		(0.43)		(0.45)
post*ownership		0.22		0.57
		(0.39)		(0.42)
Num. obs.	3348	3262	3069	2974
R^2	0.66	0.67	0.66	0.66
Adj. R^2	0.62	0.62	0.61	0.62

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 17: This table shows the results of the DiD analysis on governance-related reporting, comparing the CA100 and Plus companies to Non-CA100+ companies.

	Strategy			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.02	−0.08	−0.26	0.03
	(0.30)	(0.39)	(0.27)	(0.47)
treat*post*ownership		6.57		2.68
		(7.51)		(6.79)
ownership		1.02		1.31
		(2.67)		(2.88)
post*ownership		−1.69		−1.39
		(2.37)		(2.50)
Num. obs.	3348	3262	3069	2974
R^2	0.74	0.74	0.77	0.77
Adj. R^2	0.71	0.71	0.74	0.74

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 18: This table shows the results of the DiD analysis on strategy-related reporting, comparing the CA100 to Non-CA100+ companies.

	Risk			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.11**	0.12*	0.00	−0.04
	(0.05)	(0.07)	(0.05)	(0.10)
treat*post*ownership		−0.23		1.04
		(1.20)		(1.66)
ownership		−1.36***		−1.20**
		(0.48)		(0.50)
post*ownership		0.44		0.40
		(0.45)		(0.47)
Num. obs.	3348	3262	3069	2974
R^2	0.62	0.63	0.62	0.63
Adj. R^2	0.57	0.58	0.57	0.58

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 19: This table shows the results of the DiD analysis on risk-related reporting, comparing the CA100 to Non-CA100+ companies.

	Metrics			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.19	0.04	0.14	0.33
	(0.12)	(0.18)	(0.13)	(0.21)
treat*post*ownership		2.93		−2.11
		(4.19)		(3.24)
ownership		0.45		0.57
		(0.92)		(0.93)
post*ownership		−0.90		−0.74
		(0.85)		(0.86)
Num. obs.	3348	3262	3069	2974
R^2	0.70	0.71	0.69	0.70
Adj. R^2	0.67	0.67	0.66	0.66

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 20: This table shows the results of the DiD analysis on metrics-related reporting, comparing the CA100 to Non-CA100+ companies.

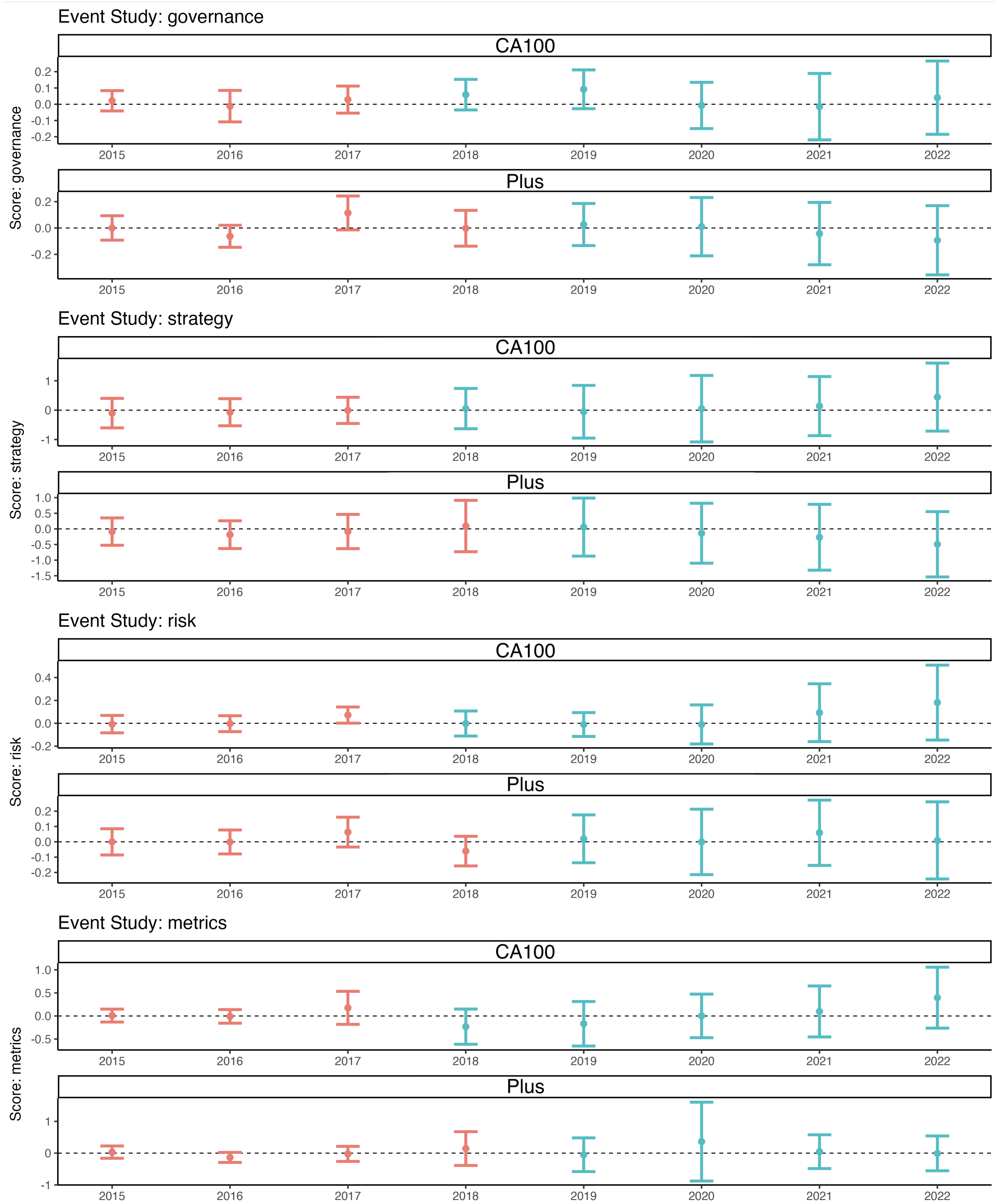

Figure 17: This figure shows the dynamic treatment effect of CA100+ on CA100 and Plus companies' reporting on the four TCFD categories using a staggered DiD specification.

F Appendix - DiD results on historical carbon intensities

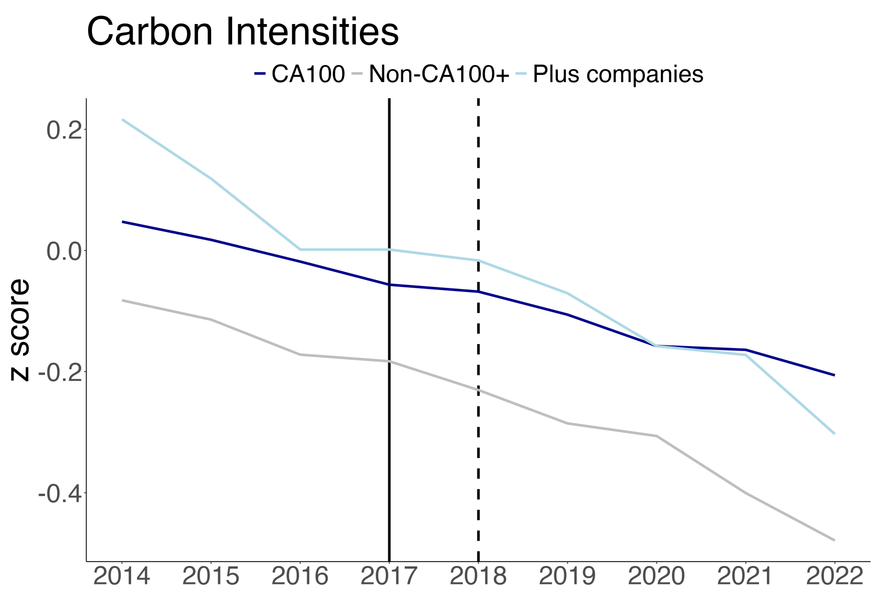

Figure 18: This figure shows the pre- and post-treatment trends on carbon intensities across CA100, Plus and Non-CA100+ companies for each year.

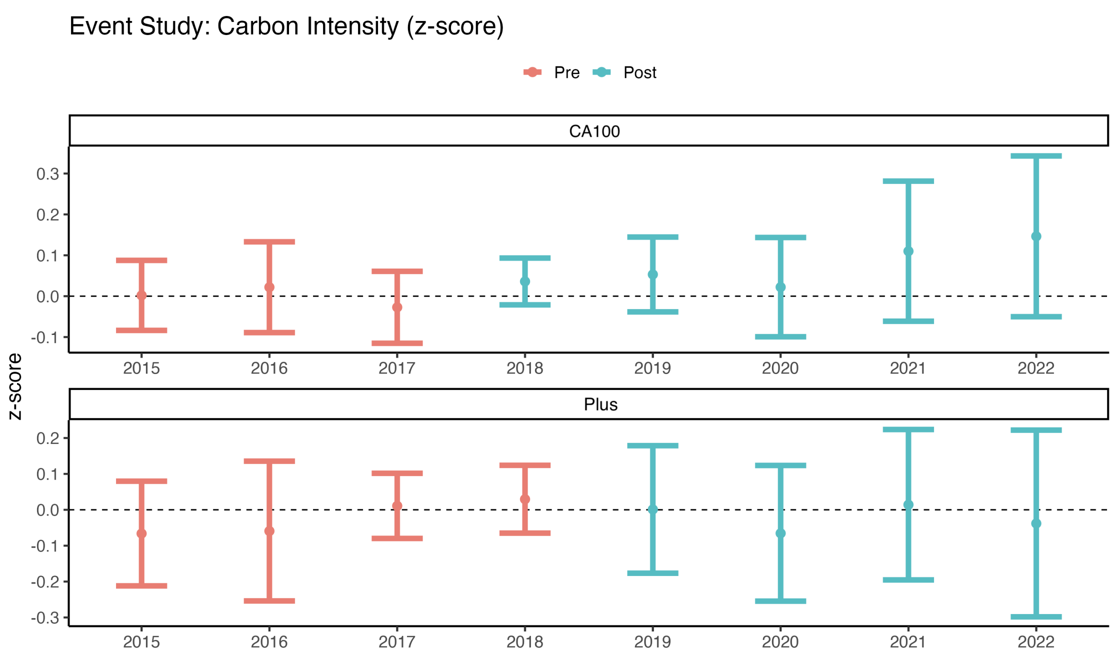

Figure 19: This figure shows the pre- and post-treatment trends on carbon intensities between 2014 and 2022 across CA100, Plus and Non-CA100+ companies for each year.

	Carbon intensities			
	CA100		Plus	
	(1)	(2)	(1)	(2)
treat*post	0.04	0.05	-0.03	-0.01
	(0.05)	(0.07)	(0.08)	(0.11)
treat*post*ownership		-0.27		0.74
		(1.91)		(2.36)
ownership		1.84		2.37
		(1.60)		(1.75)
post*ownership		-1.79		-2.10
		(1.62)		(1.69)
Num. obs.	1532	1462	1400	1321
R^2	0.92	0.92	0.91	0.91
Adj. R^2	0.90	0.90	0.90	0.90

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 21: This table shows the results of the DiD analysis on carbon intensities, comparing the CA100 and the Plus companies to Non-CA100+ companies.

G Appendix - CDP responses

CDP questionnaires allow companies to disclose relevant information which will then be made public on the CDP website. Since 2018, the CDP climate questionnaire is aligned with the TCFD recommendations. Yet, even previous versions required companies to broadly disclose information on the four TCFD categories. Therefore, I employ a binary metric indicating whether companies report to CDP as an indirect measure of their disclosures' alignment with TCFD guidelines in the pre- and post-treatment periods.

A more granular analysis was tested to assess whether companies respond to specific questions that address the four TCFD themes in the CDP questionnaires. However, it appears that companies that decide to participate in the CDP process largely address most or all questions. While the quality of the responses may vary, measuring companies' decision to disclose information on a question level does not add much value compared to a binary assessment of whether companies submit their CDP questionnaire or not.

As for the ClimateBERT-TCFD analysis, I use the TPI companies as my baseline universe. Since the CDP datasets prior to 2018 do not include companies that were contacted by CDP but chose not to respond, I manually collected the data on which TPI companies decided to opt-out from the CDP website for the period 2016 to 2022 in October 2023.[10] Since CDP questionnaires usually reflect the disclosures of the previous year, this period effectively spans from 2015 to 2021.

After excluding companies that were not contacted by CDP in each year, I retain a sample of 70 CA100, 44 Plus and 248 Non-CA100+ companies. Figure 20 shows that treated companies were considerably more responsive to CDP before and after the launch of CA100+. Moreover, it appears that CDP reporting increased in the Non-CA100+ group but decreased slightly among the CA100 and remained largely stable among the Plus companies.

[10]CDP's outreach to companies was considerably less extensive prior to 2016.

	CA100	Plus
treat*post	−0.03	−0.00
	(0.03)	(0.04)
Num. obs.	638	584
R^2	0.90	0.90
Adj. R^2	0.79	0.79

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 22: This table shows the results of the binned DiD analysis on CDP responses, comparing the CA100 and Plus companies to Non-CA100+ companies.)

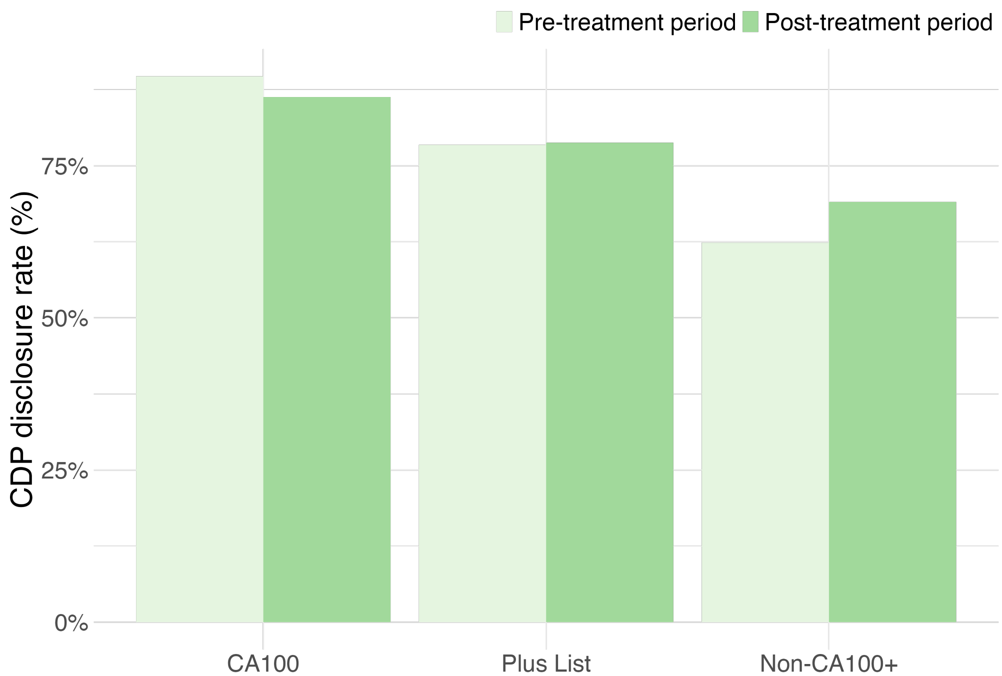

Figure 20: This figure shows the share of CA100, Plus and Non-CA100+ companies responding to CDP in the pre- and post-treatment periods.

H Appendix - Climate Change Performance Index (CCPI) data

The CCPI data were sourced from CCPI annual reports available for download on the Climate Change Performance Index (2023) website. The CCPI rating aggregates scores from four main categories: greenhouse gas emissions (40%), renewable energy deployment (20%), energy use efficiency (20%), and climate policy (20%). Within these categories, the CCPI assesses 14 indicators in total. The final score ranges from 0 to 100%.

The CCPI covers approximately sixty countries, with slight variations in coverage by year. To address minor data gaps for countries where included companies are headquartered but lack CCPI ratings, the following assumptions were made:

1. Values from China were used for Hong Kong.
2. For Singapore, data is available until 2016, and its index evolution post-2016 is assumed to match Malaysia's.
3. The United Arab Emirates have no data before 2023; its index is assumed to evolve similarly to Saudi Arabia's.
4. Qatar's indices are assumed to mirror the UAE's.
5. Nigeria's evolution until 2023 mirrors South Africa's.
6. Chile mirrors Brazil's index evolution until 2019.
7. Colombia mirrors Brazil's index evolution until 2021.
8. The EU's evolution is assumed to be the average of all European countries in the sample until 2017.

Table 23 shows the final CCPI data used for the robustness checks.

Table 23: Climate Change Performance Index (CCPI) Scores by Country (2013-2023)

Country	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Australia	41.53	35.57	36.56	40.66	25.03	31.27	30.75	28.82	30.06	36.26	45.72
Austria	57.19	55.39	50.69	52.00	49.49	48.78	44.74	48.09	52.35	51.56	58.17
Belgium	64.65	61.89	68.73	62.08	49.60	50.63	45.73	45.11	45.90	48.38	55.00
Brazil	55.53	48.51	51.90	52.46	57.86	59.29	55.82	53.26	54.86	48.39	61.74
Canada	40.39	38.81	38.74	43.06	33.98	34.26	31.01	24.82	26.03	26.47	31.55
Chile	62.55	54.65	58.46	59.10	65.18	66.79	62.88	64.05	69.51	69.54	68.74
China	52.41	51.77	48.60	47.49	45.84	49.60	48.16	48.18	52.20	38.80	45.56
Colombia	58.58	51.17	54.75	55.34	61.03	62.54	58.88	56.18	57.87	54.50	58.68
Czechia	53.93	57.99	57.03	58.52	45.13	49.72	42.93	38.98	42.15	44.16	45.41
Denmark	75.23	77.76	71.19	61.87	59.49	61.96	71.14	69.42	76.67	79.61	75.59
EU	65.21	65.05	63.90	62.25	56.89	60.65	55.82	57.29	59.21	59.96	64.71
Finland	56.57	56.76	58.27	56.28	66.55	62.61	63.25	62.63	62.41	61.24	61.11
France	65.90	64.11	65.97	66.17	59.80	59.30	57.90	53.72	61.01	52.97	57.12
Germany	61.90	59.60	58.39	56.58	56.58	55.18	55.78	56.39	63.53	61.11	65.77
Hong Kong	52.41	51.77	48.60	47.49	45.84	49.60	48.16	48.18	52.20	38.80	45.56
India	57.16	56.97	58.19	59.08	60.02	62.93	66.02	63.98	69.20	67.35	70.25
Indonesia	56.24	59.57	58.21	58.86	48.94	48.68	44.65	53.59	57.17	54.59	57.20
Ireland	65.01	65.15	62.65	59.02	38.74	40.84	44.04	45.47	47.86	48.47	51.42
Italy	62.90	61.75	62.98	60.72	59.65	58.69	53.92	53.05	55.39	52.90	50.60
Japan	47.21	45.07	37.23	35.93	35.76	40.63	39.03	42.49	48.53	40.85	42.08
Malaysia	47.06	46.84	53.49	50.96	32.61	38.08	34.21	27.76	33.74	33.51	38.57
Mexico	61.5	61.3	57.04	57.02	54.77	56.82	47.01	48.76	56.05	51.77	55.81
Netherlands	56.99	53.27	54.84	57.1	49.49	54.11	50.89	50.96	60.44	62.24	69.98
New Zealand	53.49	52.56	52.41	50.48	49.57	44.61	45.67	51.3	54.03	50.55	57.66
Nigeria	69.70	70.46	69.34	72.44	52.38	62.23	58.90	59.49	65.94	58.93	63.88
Norway	59.32	57.88	54.65	52.9	67.99	62.8	61.14	65.45	73.29	64.47	67.48
Poland	52.69	54.36	56.09	53.68	46.53	47.59	39.98	38.94	40.63	37.94	44.4
Portugal	68.38	67.26	59.52	62.47	59.16	60.54	54.1	56.8	61.11	61.55	67.39
Saudi Arabia	25.17	24.19	21.08	25.45	11.2	8.82	22.03	22.46	24.25	22.41	19.33
Singapore	50.32	47.27	42.81	43.97	28.14	32.85	29.52	23.95	29.11	28.91	33.28
South Africa	54.04	54.63	53.76	56.17	40.61	48.25	45.67	46.13	51.13	45.69	49.53
South Korea	46.66	44.15	37.64	38.11	25.01	28.53	26.75	29.76	26.74	24.91	29.98
Spain	60.37	57.34	52.63	56.14	48.19	48.97	46.03	45.02	54.35	58.59	63.37
Sweden	68.1	71.44	69.91	66.15	74.32	76.28	75.77	74.42	74.22	73.28	69.39
Switzerland	66.17	65.05	62.09	61.66	61.2	65.42	60.61	60.85	61.7	58.61	61.94
Taiwan	46.81	45.03	45.45	44.76	29.43	28.8	23.33	27.11	30.7	28.35	36.94
Thailand	54.51	50.61	48.16	51.91	49.07	48.71	46.76	53.18	55.01	47.23	61.38
Turkey	46.47	46.95	47.25	45.54	41.02	40.22	40.76	43.47	50.53	43.32	43.82
UAE	31.97	30.72	26.77	32.32	14.22	11.20	27.98	28.53	30.79	28.46	24.55
UK	69.66	70.79	70.13	66.1	66.79	65.92	69.8	69.66	73.09	63.07	62.336
USA	52.93	52.33	54.91	51.04	25.86	18.82	18.6	19.75	37.39	38.53	42.79

I Appendix - Robustness checks regarding varying regulatory environments

	Climate	
	CA100	Plus
treat*post	0.36	0.03
	(0.46)	(0.40)
CCPI	0.04***	0.04***
	(0.01)	(0.01)
Num. obs.	3348	3069
R^2	0.75	0.77
Adj. R^2	0.72	0.74

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 24: This table shows the results of the DiD analysis on climate-related reporting including CCPI, comparing the CA100 and Plus companies to Non-CA100+ companies.

	Climate	
	CA100	Plus
treat*post	−0.20	0.10
	(0.52)	(0.47)
Num. obs.	1098	1053
R^2	0.75	0.77
Adj. R^2	0.72	0.74

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 25: This table shows the results of the DiD analysis on climate-related reporting, comparing the CA100 and the Plus companies to Non-CA100+ companies within North America.

	CA100			
	Governance	Strategy	Risk	Metrics
treat*post	0.05	0.01	0.11^{**}	0.19
	(0.05)	(0.30)	(0.05)	(0.12)
CCPI	0.00^{***}	0.03^{***}	0.00^{***}	0.01^{***}
	(0.00)	(0.01)	(0.00)	(0.00)
Num. obs.	3348	3348	3348	3348
R^2	0.66	0.74	0.62	0.71
Adj. R^2	0.62	0.71	0.57	0.67

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 26: This table shows the results of the DiD analysis on TCFD reporting including CCPI scores, comparing the CA100 to Non-CA100+ companies.

	Plus			
	Governance	Strategy	Risk	Metrics
treat*post	0.04	−0.17	0.01	0.16
	(0.06)	(0.26)	(0.05)	(0.12)
CCPI	0.00^{**}	0.03^{***}	0.00^{***}	0.01^{***}
	(0.00)	(0.01)	(0.00)	(0.00)
Num. obs.	3069	3069	3069	3069
R^2	0.66	0.77	0.62	0.70
Adj. R^2	0.61	0.74	0.57	0.66

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 27: This table shows the results of the DiD analysis on TCFD reporting including CCPI scores, comparing the Plus to Non-CA100+ companies.

	CA100			
	Governance	Strategy	Risk	Metrics
treat*post	−0.01	−0.31	0.05	0.08
	(0.04)	(0.31)	(0.03)	(0.18)
Num. obs.	1098	1098	1098	1098
R^2	0.34	0.75	0.66	0.68
Adj. R^2	0.25	0.72	0.61	0.63

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 28: This table shows the results of the DiD analysis on TCFD reporting, comparing the CA100 to Non-CA100+ companies within North America.

	Plus			
	Governance	Strategy	Risk	Metrics
treat*post	0.05	−0.07	−0.02	0.14
	(0.05)	(0.29)	(0.05)	(0.22)
Num. obs.	1053	1053	1053	1053
R^2	0.34	0.79	0.67	0.61
Adj. R^2	0.25	0.76	0.63	0.56

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 29: This table shows the results of the DiD analysis on TCFD reporting, comparing the Plus to Non-CA100+ companies within North America.

	Carbon intensities	
	CA100	Plus
treat*post	0.04	−0.02
	(0.05)	(0.08)
CCPI	0.00	0.00
	(0.00)	(0.00)
Num. obs.	1532	1400
R^2	0.92	0.91
Adj. R^2	0.90	0.90

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 30: This table shows the results of the DiD analysis on carbon intensities including CCPI scores, comparing the Plus to Non-CA100+ companies.

	Carbon intensities	
	CA100	Plus
treat*post	0.08	0.02
	(0.09)	(0.16)
Num. obs.	411	368
R^2	0.93	0.91
Adj. R^2	0.92	0.90

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 31: This table shows the results of the DiD analysis on carbon intensities, comparing the CA100 and the Plus companies to Non-CA100+ companies within North America.

J Appendix - Robustness check regarding varying sectoral dynamics

	Climate	
	CA100	Plus
treat*post	1.04	−1.34
	(2.18)	(1.08)
Num. obs.	531	594
R^2	0.64	0.66
Adj. R^2	0.59	0.61

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 32: This table shows the results of the DiD analysis on climate-related reporting, comparing the CA100 and the Plus companies to Non-CA100+ companies within the electricity sector.

	CA100			
	Governance	Strategy	Risk	Metrics
treat*post	0.06	0.48	0.34	0.17
	(0.18)	(1.55)	(0.27)	(0.44)
Num. obs.	531	531	531	531
R^2	0.66	0.59	0.65	0.66
Adj. R^2	0.61	0.53	0.60	0.61

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 33: This table shows the results of the DiD analysis on TCFD reporting, comparing the CA100 to Non-CA100+ companies within the electricity sector.

	Plus			
	Governance	Strategy	Risk	Metrics
treat*post	0.07	−1.06	−0.05	−0.29
	(0.15)	(0.68)	(0.11)	(0.32)
Num. obs.	594	594	594	594
R^2	0.64	0.63	0.67	0.65
Adj. R^2	0.59	0.58	0.62	0.60

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 34: This table shows the results of the DiD analysis on TCFD reporting, comparing the Plus to Non-CA100+ companies within the electricity sector.

	Carbon intensities	
	CA100	Plus
treat*post	-0.04	0.13
	(0.11)	(0.12)
Num. obs.	429	503
R^2	0.93	0.94
Adj. R^2	0.92	0.93

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 35: This table shows the results of the DiD analysis on carbon intensities, comparing the CA100 and the Plus companies to Non-CA100+ companies within the electricity sector.