The Impact of Climate Engagement: A Field Experiment[*]

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Abstract

We report results from a pre-registered field experiment about the impact of index provider engagement on corporate climate policy. A randomly chosen group of 300 out of 1227 international companies received a letter from an index provider, encouraging the company to commit to setting a science-based climate target to remain included in its climate transition benchmark indices. After one year, we observed a significant effect: 21.0% of treated companies have committed, vs. 15.7% in the control group. This suggests that engagement by financial institutions can affect corporate policies when a feasible request is combined with a credible threat of exit.

Keywords: Shareholder Engagement, Field Experiment, Climate, ESG, Activism

JEL classification: D22, D62, G23, G34, M14

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1 Introduction

A central question about sustainable investing is whether it impacts the real economy. One of the most promising mechanisms for investors to influence firms' environmental and social performance is shareholder engagement (Broccardo, Hart, and Zingales, 2022). Empirical studies of this mechanism suggest that shareholder engagement drives change within corporations (Dimson, Karakaş, and Li, 2015; Dyck, Lins, Roth, and Wagner, 2019; Becht, Franks, Mayer, and Rossi, 2009; Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2023).

However, existing results on the impact of shareholder engagement leave room for alternative, non-causal explanations. The evidence so far is based on archival records provided by asset managers. These data specify the targeted firms, the requests made, and whether firms fulfilled the request. A reasonable concern with such data is that asset managers may strategically choose engagement requests that targeted firms are moving towards already. Asset managers have an incentive to pick requests in such a way because it makes their engagement activities appear successful. They also have the ability to do so due to their preferred access to management. Strategic targeting would lead to selection bias and create a risk that existing empirical research demonstrates the asset manager's knowledge of a firm's plans rather than the causal impact of their engagement.

In this paper, we investigate the impact of index provider engagement in a pre-registered field experiment.[1] This advances the literature in two directions. First, in terms of methodology, through random assignment of the engagement treatment, we can rule out selection bias. We can also rule out other potential confounders while offering a clear and simple test for causality. Second, we study engagement between an index provider and its benchmark constituents. This is a so far unexplored mechanism, where an index provider conveys the expectations of

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[1]Our preregistration is available on: https://www.socialscienceregistry.org/trials/8924.

financial institutions who invest according to the index. Since the index rules are fixed, this represents a combination of voice with a threat of exit.

We partnered with an index provider that offers a suite of climate indices. The methodology of those climate indices follows EU regulation[2] for Paris-Aligned Benchmark (PAB) and Climate Transition Benchmarks (CTB) indices. In these indices, the constituent weights depend, among other factors, on whether companies have set or have committed to set a science-based climate target (SBT). Several other index providers offer similar products. After establishing these indices, the index provider decided to also engage with index constituents.

The index provider had the capacity to engage with 300 companies and allowed us to randomly select those 300 companies for treatment from a pool of 1227 index constituents without SBT commitment. The treatment was a letter from the index provider's CEO to the companies' chairpersons. The letter pointed out to the company that setting verified SBTs, as defined by the criteria of the NGO Science-Based Targets initiative (SBTi), is a requirement to be eligible for continued inclusion in its climate benchmarks. The letter went on to encourage the company to commit to adopting a SBT in accordance with the SBTi. The outcome variable SBT commitment is binary; it takes the value of one when a company has submitted the commitment letter or has already set climate targets and zero otherwise. We observe the outcome independently, using the public register maintained by the SBTi. The treatment period started on February 1, 2022; the outcomes were observed as of January 31, 2023.

We find that the treatment had a causal impact on corporate climate policy. After the treatment period, 21.0% of companies in the treatment group had an SBT commitment, vs. 15.7% in the control group. A Chi-Square test of independence shows a significant relationship between treatment and outcome ($X^2 = 4.42$, $df = 1$, $p = 0.036$). On average, the treatment increases firms' probability of making an SBT commitment by 33.3% (90% confidence interval from 6.3% to

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[2]European Commission Delegated Regulation (EU) 2020/1818 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council on minimum standards for EU Climate Transition Benchmarks and EU Paris-aligned Benchmarks. See http://data.europa.eu/eli/reg_del/2020/1818/oj

63.7%). Treatment and control groups are well balanced in terms of country and industry representation, size, and carbon emissions metrics. When including these covariates in a probit regression on our outcome measure, the treatment effect becomes slightly stronger and remains statistically significant. We document a significant treatment effect also in subsamples of large firms and firms with high carbon emissions, i.e., among firms with relatively large climate externalities.

The results imply that index provider engagement – as practiced in this study – influences corporate climate policy. Although issuing an SBT commitment is an easy step for firms, there are indications that doing so is costly and is followed by emission reductions. The SBTi keeps companies that commit to an SBT but do not follow up with a compliant target as "removed" in their public registry. Therefore, committing to adopt an SBT but failing to follow through may create reputational costs for firms. Further, there is evidence that SBT commitments are followed by operational improvements. Bolton and Kacperczyk (2023) find that those firms that set an SBT reduce their carbon emissions subsequently, especially when the targets are verified by SBTi. Whether the adoption of SBTs will be followed by emission reductions at the scale needed to limit global warming to 1.5 degrees Celsius remains an important question for future research.

This paper contributes to the literature on the societal impact of sustainable finance. It is most closely related to studies investigating the effectiveness of shareholder engagement. Broccardo, Hart, and Zingales (2022) argue that "Voice" - shareholder engagement - is a superior strategy to "Exit" - selling shares - for investors looking to reduce negative externalities. Previous empirical studies have provided evidence supporting the effectiveness of shareholder engagement. (Dimson, Karakaş, and Li, 2015; Barko, Cremers, and Renneboog, 2021; Dyck, Lins, Roth, and Wagner, 2019). Becht, Franks, Mayer, and Rossi (2009) also document the effectiveness of shareholder engagement but with a focus on financial performance rather than social and environmental outcomes. Concurrent working papers explore the effect of shareholder engagement combined with screening (Becht, Franks, Miyajima, and Suzuki, 2023), in private equity (Bauer, Derwall, and Tissen, 2023), and the ultimate environmental outcomes in terms of toxic emis-

sions (Naaraayanan, Sachdeva, and Sharma, 2022). While these studies have generated highly valuable insights, they all rely on observational data and are potentially subject to concerns about selection bias, as noted before. Our study does not contradict these results. However, we offer an important methodological advancement that eliminates concerns about selection bias.

Our paper also contributes to the literature emphasizing the "Exit" rather than the "Voice" channel of sustainable investing. In theory, firms are incentivized to reform their ESG practices in response to ESG tilts and screens (Pastor, Stambaugh, and Taylor, 2021; Edmans, Levit, and Schneemeier, 2022). However, the empirical evidence for the exit channel's impact is mixed (Heath, Macciocchi, Michaely, and C. Ringgenberg, 2023; Gantchev, Giannetti, and Li, 2022; Berk and van Binsbergen, 2021; Berg, Heeb, and Kölbel, 2022). One reason may be that firms are not optimally informed about the rules that trigger buying and selling decisions and do not react as theoretical models suggest. We study a setting that combines voice, administered in a randomized fashion, with a threat of exit. The results indicate that the combination of an exit threat with explicit communication of this threat is more effective than just the threat of exit alone. A similar point is made by Becht, Franks, Miyajima, and Suzuki (2023), based on observational data. This implies that exit and voice should be considered complements rather than substitutes. In a world of multiple competing ESG ratings and a wide variety of sustainable investing policies, engagement can clarify the conditions under which firms face a threat of exit.

By focusing on the engagement activities of an index provider, our study also adds insights to the literature on corporate governance and index funds. Hirst and Kastiel (2019), Barzuza, Curtis, and Webber (2019), and Bebchuk and Hirst (2019) note that index funds play an increasingly important role in corporate governance. Index providers can potentially influence corporate governance by tying index inclusion to specific firm characteristics. Whether this is a desirable governance mechanism is not our focus. However, we provide an important piece of evidence that "governance by index exclusion" is effective for corporate climate policy. This

finding is also relevant from a policy perspective, given that the methodology of the index provider's climate benchmarks is based on EU climate benchmark requirements.

Finally, our study advances the experimental literature on the social impact of finance. The social impact of finance has been investigated using field experiments that focus mainly on individuals or small enterprises. For example, Banerjee, Duflo, Glennerster, and Kinnan (2015) have studied the impact of microfinance, Casaburi and Willis (2018) the impact of microinsurance, and Dupas and Robinson (2013) the impact of savings technology. Other field experiments in sustainable finance focus on the individual level, for example, on pro-social preferences (Bauer, Ruof, and Smeets, 2021). Our study breaks new ground by bringing experimental methods to a mechanism widely employed in global capital markets and affecting large listed firms as treatment units.

Our results have two implications for practice. First, we provide experimental evidence that index provider engagement can impact corporate climate policies. Though engagement between an index provider and the constituent companies of its indices is not directly analogous to shareholder engagement, this form of engagement can effectively communicate investors' and regulators' expectations. For example, some climate-related benchmarks are developed in partnership with asset managers, who have outlined a specific set of demands as criteria for the rule-based index methodology. Investor groups, such as Climate Action 100+, with USD 68 trillion of combined assets under management, thus have a role to play in the broader push towards a low-carbon economy. Engagement may also be effective for many other areas beyond climate change, possibly extending to social policies and general corporate governance. Second, our results imply that investment funds and indices that already have ESG tilts and screens in place may be able to enhance their societal impact by proactively informing companies about their tilting and screening rules.

Finally, while our experiment allows us to make a strong claim about the causal effect of index provider engagement, it should not be extrapolated too far. We demonstrate a causal

effect of climate engagement in a case where there is a concrete request that can be fulfilled at a reasonable cost, the request was raised in a high-profile letter with a signature by the CEO, and the request was combined with a credible threat of exit in case of non-compliance, due to the climate benchmarks' methodological requirements. Whether there is a causal effect of engagement campaigns that do not share these characteristics is uncertain and offers important avenues for further research.

2   Experimental Setup

2.1   Implementation

We worked together with an index provider which provided the target population of firms and administered the treatment as part of their regular operations. We, the authors, performed the randomization and observed the outcomes independently of the index provider.[3] The index provider's climate benchmark indices are available in two flavors: Paris-aligned benchmarks (PABs) and Climate Transition Benchmarks (CTB). The indices follow the requirements embedded in the European Benchmark Regulation legal framework.

The assets under management in ETFs directly tracking the index provider climate indices are estimated to be above USD 100 million as of January 2023. In addition, these indices are licensed by financial institutions with combined assets under management of several trillion USD. These include some large and well-known asset owners, with whom the index provider partnered to develop the indices. However, we do not have reliable information about what fraction of the total assets is benchmarked against those indices. Another fact worth considering in this context is that the climate indices comply with the European regulatory framework for

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[3]To safeguard the integrity of this research project, we registered the index provider as a partner in the preregistration but reserved the option not to provide the identity of our partner to ensure ex-ante that potential negative effects on our partner would not hamper the publication of results.

PAB and CTP indices[4] and that other index providers provide similar indices. The ETF net asset value of all PAB/CTP indices combined is estimated at EUR 62 billion as of January 2023. In other words, there is substantial uncertainty about the trading flows that would be associated with changes in the index weights of the index provider's climate indices. We note that companies in our sample were subject to that same uncertainty.

2.2 Outcome: SBT commitment

Our source of information for SBT commitments is the public access database of the SBTi.[5] The same data source is used in, for example, Bolton and Kacperczyk (2023). The SBTi is an NGO unrelated to the index provider and can thus serve as a completely independent data repository. It is also considered the gold standard for setting corporate climate goals. SBTi encourages companies to join their initiative by committing to set SBTs and later submit their SBTs for verification by SBTi. As of July 2023, the SBTi database contains 5445 companies with either an SBT commitment or a verified SBT.

The outcome variable of our experiment, *SBT commitment*, is binary. For companies that either have sent a commitment letter to the SBTi or have already achieved SBTi verification of their targets, the variable assumes a value of one and zero otherwise, as defined in our preregistration.

The process for companies to join the SBTi is as follows. To file an SBT commitment, a company needs to send a letter to the SBTi that identifies the company, the responsible contact person, and contains the following statement: "We commit to develop a science-based target aligned with the SBTi criteria, submit the target the SBTi for validation and publish our approved targets within a maximum of 24 months. [. . .] We acknowledge that our commitment

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[4]http://data.europa.eu/eli/reg_del/2020/1818/oj
[5]https://sciencebasedtargets.org/companies-taking-action. We downloaded the baseline data on January 31, 2022 and the endline data on March 15, 2023. We use the field "Near term - Target Status."

will be recognized on sciencebasedtargets.org as well as on our partner websites at We Mean Business, CDP, and UN Global Compact."

Once committed, companies have 24 months to develop and submit their SBTs. The SBTi then validates the target if it fulfills its criteria. Having a climate target verified by the SBTi represents considerable ambition and requires substantial resources. The SBTi aims to check whether the targets align with the Paris Agreement's goals, i.e., limiting global warming to 1.5 degrees Celsius. To this end, SBTi has detailed criteria for a valid climate target, laid out in its documentation material.[6] Firms that do not follow through with adopting a target within 24 months after committing to do so are listed as "removed" on the public homepage of the SBTi.

2.3 Sample

Our experiment's population of eligible companies is based on the constituents of the index provider's climate benchmark indices. These indices are available in two flavors: Paris-aligned benchmarks (PABs) and Climate Transition Benchmarks (CTB). These types of indices are based on European Union guidelines (European Commission 2020), and other index providers offer similar index products.

The climate indices encompass a population of 1964 companies. We removed 672 companies that already had a commitment or target filed with SBTi as of January 1, 2022.[7] In addition,

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[6]Especially relevant are the documents «SBTi Criteria and Recommendations v5.0" and "Target Validation Protocol for Near-Term Targets v3.0". We rely upon the latest documents that were available before the beginning of the treatment period. Specific provisions include, for example, that Scope 1 and Scope 2 GHG (Greenhouse Gas) emissions need to be included and calculated in accordance with the GHG protocol. Scope 3 emissions must also be included when they account for more than 40% of overall GHG emissions. A maximum of 5% of GHG emissions may be excluded from the inventory and the target, respectively, which requires that companies must have a complete GHG inventory before submitting their target. Regarding the timeframe, the first target must be between 5 and 10 years in the future, counted from the year of submission, and the baseline year may not be earlier than 2015. The ambition level must be at least an annual reduction of 4.2% per year for absolute emissions, and for emission intensity, the target must be in line with sector-specific scenarios that comply with the Paris goal.

[7]Thirteen companies were included in the target population during the baseline assessment, while the manual end-line assessment revealed that they had adopted an SBT commitment before the treatment period. We kept these thirteen companies in our analysis to avoid deviating from our preregistered sample size. Excluding these thirteen companies results in a higher confidence level for the observed treatment effect (see Table A.5).

we removed 63 companies that are on the Climate Action 100+ initiative list. Climate Action 100+ is focused on the 170 largest carbon-emitting listed companies globally and is asking those companies to set climate targets. Since Climate Action 100+ has enormous investor backing and is quite successful in convincing companies to set targets, our treatment would have been largely irrelevant to this group of companies. We acknowledge that this exclusion means our results apply only to companies beyond those largest emitters. This resulted in a final sample of 1227 companies.

2.4   Randomization

The treatment group was selected in a blocked random design. The index provider had the capacity to send letters to 300 companies. Exploiting this capacity constraint, we randomly drew 300 companies from the target population, blocking for country. The rationale for this blocking approach is that national policies may affect firms' likelihood of setting climate targets (Bolton and Kacperczyk, 2023). Blocking for country ensures that the sample is optimally balanced concerning countries and reduces noise that might otherwise result from random imbalances. Within each country, we randomly selected companies into the treatment group with a probability of 23.9% (corresponding to the treatment group's share of 300 out of 1227 companies) using the R package "randomizr."

The treatment and control groups are well-balanced concerning firm characteristics, countries, and sectors. Table A.1 shows that the firm characteristics size, total emissions, and emission intensity are not significantly different between groups. Table A.2 shows that firms are evenly distributed across countries, with minor fluctuations for countries with few observations. Table A.3 shows the sample distribution across sectors.

2.5   Treatment: Letter from the index provider's CEO

The treatment consists of a letter asking the company to commit to setting an SBT via the SBTi. The letter is signed by the index provider's CEO and addressed to the company's chairpersons. The letter starts by saying that the company is currently a constituent of at least one of the index provider's climate indices. It then points out that an SBT, verified by the SBTi, is required to remain a constituent of these climate indices in the future. It summarizes the relevant rules and schedules for continued index inclusion, including that EU climate benchmark regulatory obligations require index providers to increase the weights of companies that have set evidence-based targets. It points out that the most ambitious index is backed by major asset owners, with several trillion USD of combined assets under management. The letter culminates in a direct ask, encouraging the company to commit to setting an SBT by the end of 2022; fill out a brief survey explaining its current status and perspectives; and offers to take up a dialogue with the index provider's sustainable investing experts on the matter.

An essential feature of the treatment is that it makes a pre-existing threat of exit more salient. The methodology of the index provider's climate benchmark indices implies a threat of exit for all constituents that do not have an SBT commitment or an SBTi-verified target, following a transition period. The decisive source for the index provider's methodology is the registry of the SBTi. Specifically, companies are sorted into three groups: (i) firms without any SBT commitment, (ii) firms with an SBT commitment letter, and (iii) firms with verified SBTs. The index weights of firms in group (i) are gradually reduced and are set to zero from March 2025 onwards. The index weights of firms in group (ii) are also gradually reduced and are set to zero from March 2030 onwards. One of the climate indices has an accelerated schedule that excludes firms without SBT commitments already in March 2023 and without verified SBTs in March 2025.

3 Results

We find that our engagement treatment causes a significant increase in SBT commitments. Table 1 summarizes our main results in a contingency table. After the treatment period, 146 of 927 companies (15.7%) have an SBT commitment in the control group. In the treatment group, 63 of 300 companies (21.0%) have an SBT commitment. The difference in commitments between the two groups is significant (Chi-Squared test of independence, $X^2 = 4.42$, $df = 1$, $p = 0.036$). Thus, index provider engagement, in the way was pursued in our experiment, caused additional firms to commit to setting an SBT that otherwise would not have done so. Using the control group as a baseline, we estimate that 16 additional companies have made SBT commitments that can be attributed to the engagement treatment.

Table 1
The effect of engagement on SBT commitments

This table reports the main result of our experiment in a contingency table. The row "SBT commitment: yes" shows the number of companies that have committed to set a Science Based Target within the treatment period, separately for the treatment and the control group. The row "SBT commitment: no" shows the number of companies without SBT commitment. The row "Total" shows the column sum. Each cell's percentage share of the column total is reported in parentheses. A Chi-Square test of independence shows a significant relationship between treatment and outcome ($X^2 = 4.42$, $df = 1$, $p = 0.036$).

	CONTROL GROUP Engagement: no	TREATMENT GROUP Engagement: yes
SBT commitment: yes	146 (15.7%)	63 (21.0%)
SBT commitment: no	781 (84.3%)	237 (79.0%)
Total	927 (100%)	300 (100%)

The observed treatment effect unfolds gradually over our treatment period. Figure 1 displays the fraction of firms with SBT commitment each month during the treatment period. The treatment group lags behind the control group in the first month of the treatment period. From the second month onward, the slope of the adoption of SBT commitments is markedly steeper for the treatment group throughout the year. This is consistent with the fact that it

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takes a while for firms to process the letter, understand what setting an SBT entails for them, deliberate what to do, and get the commitment letter signed internally.
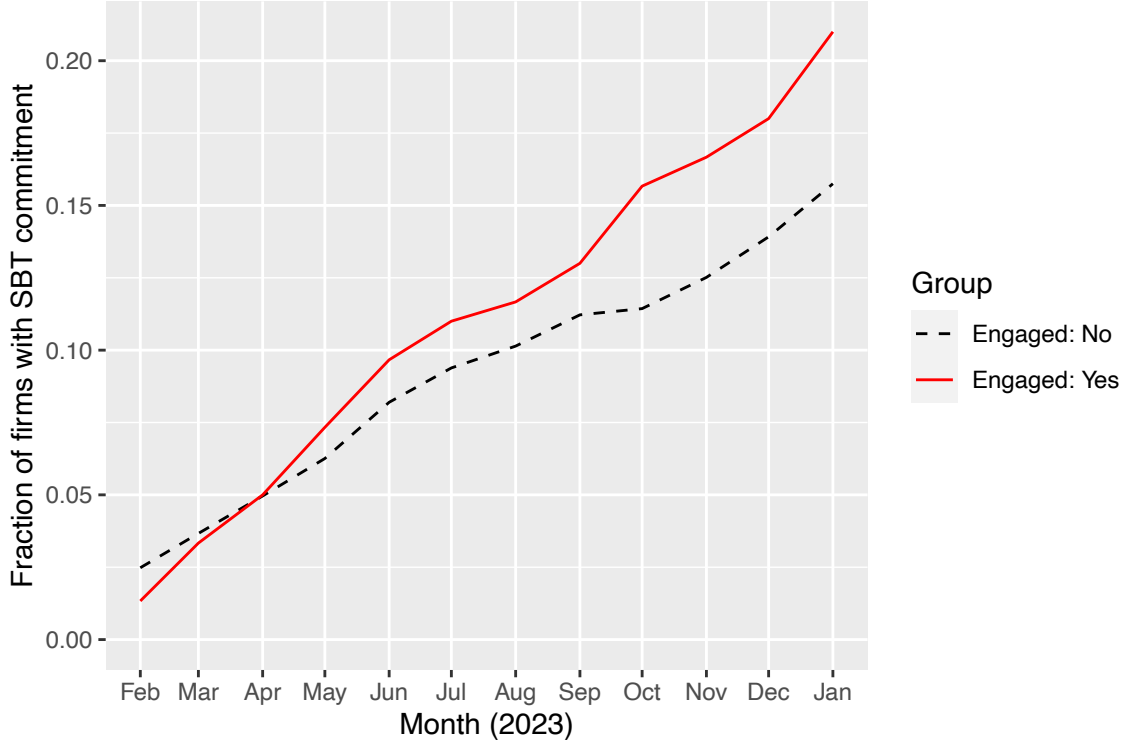
Figure 1. Treatment effect over time. This figure shows how the treatment effect unfolds over the treatment period. The fraction of firms with an SBT commitment is shown in black for the control group and red for the treatment group. The preregistered treatment period was from February 1, 2022, until January 31, 2023. The SBT commitment status is updated on the first day of each month.

Potential imbalances with respect to a series of firm-level covariates do not drive our results. Table 2 shows the results of probit regression with SBT commitments as the outcome variable. Model 1 confirms a significant treatment effect ($p = 0.0378$). Models 2 and 3 show that including country and sector fixed effects do not affect our results. Model 4 shows the same for a regression that includes, in addition, the covariates firm size, absolute emissions, and emission intensity (for a detailed description, see Table A.1). The effect size and the confidence level increase as we add more controls. The probit regressions also allow us to estimate a

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confidence interval for the observed effect size. The point estimate is that the probability of having an SBT commitment increases by 33.3% as a consequence of treatment. According to Model 1 in Table 2, the 90% confidence interval for this estimate ranges from 6.3% to 63.7%.

Table 2
Treatment effect with covariates

This table reports the results of probit regressions with SBT commitments as the outcome variable. Model (1) includes the indicator variable *Treatment*, which takes the value of one if a firm is in the treatment group and zero otherwise. Model (2) adds country fixed effects, and Model (3) Nomenclature of Economic Activities (NACE) sector fixed effects. In addition, Model (4) adds firm-specific covariates, described in detail in Table A.1. Standard errors are reported in parentheses.

	Dependent Variable: SBT Commitment			
	(1)	(2)	(3)	(4)
Treatment	0.198**	0.212**	0.231**	0.249**
	(0.096)	(0.098)	(0.099)	(0.103)
Size				0.002**
				(0.001)
Total Emissions				0.010
				(0.011)
Emission Intensity				-0.0003^{*}
				(0.0002)
Constant	-1.005^{***}	-0.736	-5.211	-6.626
	(0.050)	(0.484)	(266.405)	(387.413)
Country Fixed Effects	*NO*	*YES*	*NO*	*YES*
NACE Sector Fixed Effects	*NO*	*NO*	*YES*	*YES*
Observations	1,227	1,227	1,227	1,227
Log Likelihood	-557.892	-527.028	-531.065	-493.110

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

It is unlikely that the observed treatment effect is primarily driven by firms for which implementing an SBT is of little environmental relevance. Table 3 shows the results for subsamples, where we split the sample at the median of the different covariates. We find a significant (10% level) treatment effect for larger firms, firms with high total emissions, firms with high emission intensity. This suggests that the treatment is effective for large and emission-intensive firms, i.e., those firms where corporate climate policies are most likely to have a meaningful effect on aggregate greenhouse gas emissions. In addition, we find a significant (10% level) interaction term between Treatment and emission intensity (see Table A.4 for an analysis of interaction terms). This is another indication that the treatment is not limited to companies for which emission reductions are relatively easy to achieve.

According to our preregistration, we define the outcome *SBT commitment* as successful when either a commitment letter has been received by SBTi or verified targets are reported. We distinguish these two outcomes in Table 4. Also in this specification, a Chi-Square test of independence indicates a significant relationship between treatment and outcomes ($X^2 = 6.89$, $df = 2$, $p = 0.032$). As expected, the treatment effect is driven by SBT commitment letters and not by verified targets. While sending a commitment letter is feasible within a few months, developing SBTs and having them verified by SBTi may take substantially longer than our treatment period. The fraction of verified SBTs is nearly identical between the treatment and the control group, with 4.0% versus 4.5%. The difference between SBT commitment letters is, by implication, even more pronounced than in the baseline result. Counting only SBT commitment letters, we find 17.0% in the treatment group versus 11.2% in the control group.

Table 3
Treatment effect in subsamples

This table shows the results of probit regressions with SBT commitments as the outcome variable and the treatment variable as the explanatory variable in ten subsamples. For each of the five covariates, we split the sample at the median. Panel A shows the results for firms with a covariate level equal to or above the sample median, and Panel B for firms with a covariate level below the sample median. Standard errors are reported in parentheses.

Panel A: Groups above median

| | Dependent Variable: SBT Commitment | | |
| | Size | Total Emissions | Emission Intensity |
	(1)	(2)	(3)
Treatment	0.253*	0.250*	0.249*
	(0.132)	(0.131)	(0.133)
Constant	−0.955***	−0.956***	−0.972***
	(0.069)	(0.069)	(0.069)
Observations	614	614	614
Log Likelihood	−294.294	−294.303	−289.928

Panel B: Groups below median

| | Dependent Variable: SBT Commitment | | |
| | Size | Total Emissions | Emission Intensity |
	(1)	(2)	(3)
Treatment	0.138	0.133	0.144
	(0.139)	(0.141)	(0.138)
Constant	−1.058***	−1.055***	−1.039***
	(0.072)	(0.071)	(0.071)
Observations	613	613	613
Log Likelihood	−262.163	−262.211	−267.179

| *Note:* | | | *$p<0.1$; **$p<0.05$; ***$p<0.01$ |

Table 4
Treatment effect on SBT commitment letters and verified targets

This table presents a contingency table distinguishing between the outcomes "SBT commitment", "Verified SBT", and "No Target". A verified SBT indicates that a company's climate targets have been approved by SBTi. The first column presents counts for the control group (fractions of the column total in parentheses), the second column for the treatment group. A Chi-Square test of independence between treatment and outcome shows a significant relationship (X^2=6.89, df=2, p=0.032).

	CONTROL GROUP Engagement: no	TREATMENT GROUP Engagement: yes
Targets set	42 (4.5%)	12 (4.0%)
Letter received	104 (11.2%)	51 (17.0%)
No target	781 (84.3%)	237 (79.0%)
Total	927 (100%)	300 (100%)

4 Conclusion

Our study provides advances the literature on four fronts. First, we provide experimental evidence that index provider engagement – as practiced in this study – has a statistically significant effect on corporate climate policy. This result rules out selection bias, which is a potential concern that looms over the existing literature about the effect of shareholder engagement. Second, we find that when a threat of exit is communicated via shareholder engagement, it has a greater combined effect than just the threat of exit. This suggests that firms are not optimally informed about ESG investment rules and that "Voice" and "Exit" are complements rather than substitutes. Third, we provide evidence that so-called corporate governance by index exclusion is an effective mechanism. This issue should be of interest to legal scholars and regulators concerned with the appropriate level of influence that index providers should have. Fourth, we extend the tradition of field experiments investigating the social impact of finance from households and small and medium enterprises to large listed corporations. To our knowledge, this is the first field experiment exploring the societal impact of shareholder engagement on large listed companies.

For practitioners, we offer two major insights. First, we provide solid evidence that index provider engagement is a viable mechanism for investors to take influence on corporate climate policies. This suggests that also passive investors can be active stewards for climate action. Second, we suggest that investment funds with existing ESG screens and tilts can increase their societal impact by informing firms, invested and not, about their screening and tilting rules. This might be a relatively low-cost measure that many investment funds could undertake. Third, we document that the EU benchmark regulation appears to have some effect on corporate policies.

We caution against using these insights without regard for the limitations of our study. We demonstrate the effect of engagement for a case with three key characteristics. First, the engagement request is to commit to setting an SBT. This commitment is an easy step that costs little, at least initially. Second, the engagement letter is signed by the CEO and directly addressed to the

chairperson of the board. Third, the request is coupled with a credible threat of exit that is laid down in explicit index methodologies and are based on regulatory guidelines. From our results, it remains unclear if engagement activities that ask for expensive reforms, involve less senior personnel, or are only vaguely associated with investment decisions will have the same effect.

These limitations, in turn, offer valuable opportunities for further research. One opportunity is to study whether engagement is also effective without the possibility of divestment. Many asset owners are either unwilling or unable to divest from specific positions. Whether engagement by these institutions is effective remains an important question. Another opportunity is to test the limits of engagement by requesting more substantial reforms or reforms in areas other than climate change. One next step in the context of this study would be to analyze decarbonization outcomes over longer time frames, such as verified targets and realized carbon emission reductions. Lastly, the project's partnership approach implies that valuable insights can be obtained by collaborating with market participants to set up field experiments. Especially when financial institutions aim to showcase the impact of their actions, partnering with academics to conduct a pre-registered experiment is worth considering.

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A Appendix

A.1 Tables

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Table A.1

Covariate description and group means

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This table describes the covariates and presents group means for the control group and the treatment group. The columns "Control" and "Treatment" provide the group mean of the variable. The column "p-value" reports p-values of a Mann–Whitney U test, testing for group differences.

Variable Name	Description	Control	Treatment	p-value
Size	Market capitalization in USD billion.	23.16	26.16	0.73
Total emissions	Carbon emissions in million tCO_2, including scope 1, 2, and 3 emissions.	1.58	1.16	0.61
Emission intensity	emission intensity calculated as tCO_2 / enterprise value in USD million.	181.67	178.89	0.84

Table A.2
Countries in treatment and control group

This table shows how firms are distributed across Countries in the treatment and control group. A Chi-Square test of independence between Country and Group Assignment shows no significant relationship ($X^2 = 3.68$, $df = 26$, $p = 1$).

	Counts		Frequencies	
Sectors	Control	Treatment	Control	Treatment
Australia	48	16	0.05	0.05
Austria	6	2	0.01	0.01
Belgium	7	2	0.01	0.01
Brazil	2	0	0.00	0.00
Canada	19	6	0.02	0.02
China	3	2	0.00	0.01
Denmark	3	1	0.00	0.00
Finland	6	2	0.01	0.01
France	23	7	0.03	0.02
Germany	52	17	0.06	0.06
Great Britain	39	13	0.04	0.04
Hong Kong	18	5	0.02	0.02
Ireland	1	1	0.00	0.00
Israel	1	0	0.00	0.00
Italy	22	7	0.02	0.02
Japan	157	51	0.17	0.17
Luxemburg	2	0	0.00	0.00
Netherlands	14	4	0.01	0.01
New Zealand	3	1	0.00	0.00
Norway	7	3	0.01	0.01
Poland	5	2	0.01	0.01
Portugal	2	1	0.00	0.00
Singapore	8	2	0.01	0.01
Spain	9	3	0.01	0.01
Sweden	21	7	0.02	0.02
Switzerland	23	7	0.03	0.02
United States	426	138	0.46	0.46
Total	927	300	1.00	1.00

Table A.3
Sectors in treatment and control group

This table shows how firms are distributed across NACE sectors in the treatment and control group. A Chi-Square test of independence between Sector and Group Assignment shows no significant relationship ($X^2 = 19.34$, $df = 17$, $p = 0.310$).

	Counts		Frequencies	
Sectors	Control	Treatment	Control	Treatment
A - Agriculture, forestry and fishing	2	0	0.00	0.00
B - Mining and quarrying	23	12	0.03	0.04
C - Manufacturing	307	92	0.33	0.31
D - Electricity, gas, steam and air conditioning supply	24	8	0.03	0.03
E - Water supply; sewerage, waste management and remediation activities	6	3	0.01	0.01
F - Construction	20	7	0.02	0.02
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	68	27	0.07	0.09
H - Transporting and storage	45	10	0.05	0.03
I - Accommodation and food service activities	7	3	0.01	0.01
J - Information and communication	117	36	0.13	0.12
K - Financial and insurance activities	169	57	0.18	0.19
L - Real estate activities	70	16	0.08	0.05
M - Professional, scientific and technical activities	31	6	0.03	0.02
N - Administrative and support service activities	12	11	0.01	0.04
P - Education	2	0	0.00	0.00
Q - Human health and social work activities	13	9	0.01	0.03
R - Arts, entertainment and recreation	8	2	0.01	0.01
S - Other services activities	3	1	0.00	0.00
Total	927	300	1.00	1.00

Table A.4
Treatment effect heterogeneity by covariates

This table reports the results of probit regressions with SBT commitments as the outcome variable, exploring treatment heterogeneity with respect to our covariates. Models (1) to (5) separately interact each of our covariates a indicator variable which takes the value of one if a firm is in the treatment group an zero otherwise. The covariates are described in Table A.1. Standard errors are reported in parentheses.

	Dependent Variable: SBT Commitment		
	(1)	(2)	(3)
Treatment	0.134	0.178*	0.142
	(0.109)	(0.100)	(0.101)
Size	0.001		
	(0.001)		
Size:Treatment	0.002		
	(0.002)		
Total Emissions		−0.010	
		(0.010)	
Total Emissions:Treatment		0.016	
		(0.024)	
Emission Intensity			−0.0004**
			(0.0002)
Emission Intensity:Treatment			0.0004*
			(0.0002)
Constant	−1.034***	−0.992***	−0.960***
	(0.055)	(0.051)	(0.053)
Observations	1,227	1,227	1,227
Log Likelihood	−554.310	−557.312	−554.527

Note:			*p<0.1; **p<0.05; ***p<0.01

Table A.5
Main result excluding pre-treated companies

This table reports a robustness check on the main result of our experiment analogous to Table 1. In this table, we exclude thirteen companies that already had an SBT commitment before the treatment period. Of these thirteen, three were assigned to the treatment group, ten to the control group. A Chi-Square test of independence between treatment and outcome shows a significant relationship ($X^2 = 4.78$, $df = 1$, $p = 0.029$). This analysis deviates from the preregistered protocol and is reported merely to demonstrate that the main result is not driven by a contaminated baseline.

	CONTROL GROUP Engagement: no	TREATMENT GROUP Engagement: yes
SBT commitment: yes	136 (14.8%)	60 (20.2%)
SBT commitment: no	781 (85.1%)	237 (79.8%)
Total	917 (100%)	297 (100%)