

Credible Engagements or Empty Promises?

**A Study of Investors' Reactions to Commitment to
the Science-Based Target Initiative**

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Abstract:

This paper seeks to explore the short-term financial implications of a commitment to the Science-Based Targets Initiative (SBTi), a previously sparsely researched topic in financial literature. By employing an event study methodology, the findings point towards a non-conclusive link between a commitment to the SBTi and abnormal returns around the date of commitment. While the market seems to react negatively to the announcement on the event day, this effect is not strong enough to persist throughout the event window, even for event windows as short as five days. This paper aims to fill the gap in the literature in two ways: Light is shed on the previously unexplored link between stock returns and a commitment to SBTi, and an event study is conducted on events that look virtually identical across firms. The results of the analysis raise questions about whether information about SBTi commitment is not taken into consideration by investors, or if there could be perceived uncertainties around the initiative that result in investor hesitancy.

Keywords:

Sustainability, ESG, Science-Based Targets Initiative, Event Study, Abnormal Returns

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I. Introduction

Sustainable investing, where one takes environmental, social, and governance (ESG) considerations into account when formulating an investment strategy, has grown rapidly in conjunction with calls for the private sector to take on responsibility with regards to societal issues such as climate change and human rights. In 2021, asset managers had a total of US\$18.4 trillion in ESG-related assets under management (AUM), and this figure is expected to rise to US\$33.9 trillion by 2026 (PwC, 2022).

The link between ESG and financial performance has been studied vigorously, and has yielded some positive results from a societal perspective. For example, a review study by Friede, Busch and Bassen (2015) shows that the aggregated evidence of 2200 studies conducted since the 1970's point towards a non-negative relation between ESG criteria and corporate financial performance. More specifically, ESG performance has been found to negatively affect equity cost of capital, where environmental and governance considerations are the main drivers (Ng and Rezaee, 2015). As such, firms with a high cost of equity capital tend to voluntarily disclose ESG performance, and if their performance is superior relative to competitors, they tend to enjoy a reduction in cost of equity capital (Dhaliwal et al., 2011).

In the asset pricing literature, positive links have been found between ESG-performance and alpha. For example, Edmans (2011) finds that firms on the “100 Best Companies to Work For in America” earned an annual four-factor alpha of 3.5% between 1984 and 2009. Meanwhile, Pástor, Stambaugh and Taylor. (2021) states that in equilibrium, ESG-assets bring a negative alpha, and in Pástor, Stambaugh and Taylor (2022), they attribute the discrepancy between expected and realized returns to unexpectedly strong increases in environmental concerns.

One persistent issue pertaining to research on sustainable finance is the unreliability of ESG-scores. There are many different providers of such scores, and each provider has its own, often proprietary, method of calculating them. As such, it is unclear whether they have any credible bearing. In a study comparing ESG-ratings from six different providers during 2014 to examine their potential divergence, the mean pairwise correlation between the providers were 0.54, with some dropping as low as 0,38 (Berg et al., 2022). The low correlation between the providers makes it difficult to draw any strong conclusions about the link between ESG-ratings and financial performance.

Furthermore, these kinds of studies run the risk of reverse causality. There is an ongoing debate around studies that find positive correlations between firm value and CSR efforts, and more specifically those that use “low-frequency measures” (Krüger, 2015). Finding a positive correlation between two measures that are infrequently updated (such as annual firm value measures and ESG scores), often fail to conclude whether firms are doing well because they are doing good, or if they can afford to do good because they are doing well.

To combat this, Krüger (2015) conducts a study on investors' short-term reactions to corporate CSR events. Using a dataset of 2,116 corporate events, he finds that investors react strongly negatively towards negative news about a company's ESG performance. More striking, however, is the finding that investors react weakly negatively towards positive news. In both cases, events regarding community and the environment have the strongest impact on investor reactions. To explore the reaction to positive events further, he divides them into two categories – those who are likely to be a result of agency-problems, and those where firms are trying to compensate for prior ESG underperformance. Here, he finds that for firms with a low (high) probability of agency problems, there is a positive (negative) market reaction to ESG news. This shows that while investors on average do not tend to value ESG initiatives, their views are mainly driven by instances where agency-problems are the cause for the initiatives.

We extend on this paper by examining a particular type of event – namely, firms' commitment to the Science-Based Targets Initiative (henceforth SBTi). The SBTi is an initiative helping firms to reduce their green-house gas (GHG) emissions by setting tangible short-term and long-term targets based on the latest research in climate science. After committing, there is a 24-month period where the firm is to formulate their targets. If their targets are deemed to be too unambitious, or if they fail to set the targets within the 24-month period, they are excluded from the initiative. By following the methodology of Krüger, we try to answer whether or not SBTi commitment has a short-term effect on firms' stock returns. As such the following hypothesis materializes:

Hypothesis: *Commitment to SBTi will result in short-term abnormal returns.*

We contribute to Krüger (2015) and to the literature in two ways. Firstly, the events Krüger (2015) refers to in his paper are not identical, in the sense that they will differ in severity. It is reasonable to assume that a major oil spill of one firm will have a different impact on returns than a news story about a slight increase in scope 1 emissions of the same firm. In our study, the events are virtually identical, since the SBTi commitment looks the same for every firm. To add on to this, we also fill a gap in the more general sustainable finance literature by the same rationale, as research on the topic has historically been focusing on unreliable ESG scores.

Secondly, as opposed to ESG-news where there is no clear distinction between realized events and expected events, all events in this study are announcements of expected action in the future. Similarly to M&A announcements, there is no guarantee that the commitments that are communicated will be followed through on, which could have an effect on how investors evaluate this information. This discussion is also adjacent to the issue of greenwashing, where the potential effects of merely communicating an intent to act in the future, could shed light on the potency of these types of commitment in terms of greenwashing-prospects.

The findings of this paper suggest no conclusive link between SBTi commitment and the average abnormal return of the firm during the event window. While the firms experience a significantly negative spike in their abnormal returns on the 90%-level during the event day,

this effect is non-persistent, and no effects can be seen in the cumulative average abnormal returns.

One hypothesis that could explain the lack of significant results is that there is no guarantee that the firms will follow through on their commitment. It may be so that investors deem that probability too low for it to trigger a market reaction in any direction. However, another possibility could simply be that investors do not view the SBTi commitment as something that is worth taking into consideration while making decisions regarding the firm's security.

The disposition of the paper is as follows. In section II we will review previous literature on the topic of ESG in finance. In section III, we elaborate on the collected data and the final sample, as well as the methodology and in section IV, the findings are presented. Lastly, in section V, concluding remarks are presented with a discussion around the results, a conclusion of the study, the study's limitations, as well as suggestions for future research.

II. Literature Review

A. ESG Initiatives in Finance

While there are some major third-party initiatives that promote sustainability in finance, the research on them is quite nascent. Liang, Sun and Teo (2022) shows that hedge funds that have signed the United Nation's Principles for Responsible Investment enjoy greater investor flows and can charge higher management fees, even though their risk-adjusted return is lower than other hedge funds. They attribute this result to agency problems and potential greenwashing, as the main drivers of the underperformance are PRI-signatories with low ESG-scores. On the other hand, a similar study by Humphrey and Li (2021) shows that the PRI signatories who enjoy the greatest increase in flow are the ones that fulfil their commitment of reducing GHG emissions after endorsing the initiative, because of investor preferences.

As seen by these two studies, sustainability initiatives in finance can be used for dual purposes. On one hand, it is possible to pander to investors with certain preferences to increase the financial performance, but on the other hand, there seems to lie additional value in following through on the commitments and promises that have been made.

The SBTi in particular has received little attention within financial research. One study points towards the fact that SBTi-committed firms that are increasing their corporate carbon emission performance CCP enjoy an increase in both ROA and Tobin's Q (Bendig, Wagner and Lau, 2023). However, as shown by Gieseke et al. (2021), a significant number of signatories were underperforming in at least one of their targets – especially those regarding scope 3 emissions. Similarly, Blok and Manuel (2023) also find that the majority of the progress towards the targets on an aggregated level is driven by a few of the most emission intensive firms. Following this, they state that “most members show little evidence of emission reductions within their operations, only achieving progress via renewable energy purchases.”

The lacking amount of research on SBTi, as well as the ambiguous performance in relation to the targets amongst signatories make it difficult to assess the financial implications of committing to the initiative based on previous literature on the topic.

B. Carbon Emissions in Asset Pricing

An ongoing discussion within the asset pricing literature is the impact of investor behavior on security prices, and whether norms and societal values play a role in investors' decision-making processes. In a study by Hong and Kacperczyk (2009), they studied so-called “sin” stocks (firms involved in the industries of, for example, alcohol, tobacco and gaming), and found that institutional investors constrained by societal norms (e.g pension funds, universities etc.) hold less of these types of stocks relative stocks with otherwise comparable characteristics. Additionally, they find that these stocks earn a higher expected return than comparable firms using the Fama-French Four-Factor Model. These findings support their theory of societal norms playing a role in the pricing of securities, and while high-emission companies were not studied specifically, it is possible that the same economic rationale can be extended to these types of stocks as well. This is also in line with the views of Pástor, Stambaugh and Taylor (2022) on the subject.

Bolton and Kacperczyk (2020) disputes this theory by looking at exclusionary screening of institutional investors based on emissions. While exclusionary screening is done to some extent on Scope 1 emission-intensity, no such behavior can be found for absolute levels of emissions. In the same study, they also find that emission-intensity has no impact on stock returns, while both absolute emissions and changes in emissions positively predict returns. As such, they reject the divestment hypothesis, and rather suggest a carbon risk premium that is priced in at the firm-level.

Similarly, Tsu, Li and Tsou (2023) look at firm pollution and find a pollution price premium which they cannot attribute to existing systematic risks nor investor preferences. Instead, they propose a systematic risk linked to environmental policy uncertainty, which is a systematic risk that disproportionately affects high-polluting firms.

Based on these findings, it seems not unlikely that a commitment to the SBTi would negatively impact the returns of the firm, as it not only signals a negative change in future carbon emissions, but also signals that the firm is planning on positioning itself to decrease the exposure to environmental policy uncertainty.

C. ESG News and Market Reactions

In addition to the effect of ESG performance on financial performance, previous literature has also explored the market reactions to positive and negative ESG-related news. Krüger (2015) examined the effect of positive and negative CSR related news coverage on returns and found that the market reacted strongly to such news publishings. On average the market reacted strongly negatively on negative news and weakly negatively on positive news.

Only when the positive news can be traced to managerial efforts to offset prior CSR irresponsibility do the stock prices increase on average.

Following this line of research Capelle-Blancard and Petit (2021) explored more specifically ESG related news and found that on average, firms facing negative ESG related news events experience a market value drop of 0.1% while firms gain nothing on average from positive announcements. In general, previous research seems to suggest that the market on average tends to react negatively to negative ESG and CSR news and only weakly positively or even weakly negatively to positive news. Similarly, Serafeim and Yoon (2022) explored the market reaction on ESG news and found that the prices only react to financially material news as defined by the Sustainability Accounting Standards Board (SASB) and do not react at all to financially immaterial news.

From a strictly environmental perspective, the communication of a firm's SBTi commitment must be considered a positive piece of news. As such, this paper sheds further light on how investors evaluate and react to positive ESG-news. In contrast to the other articles mentioned, however, the type of news studied in this paper are identical in character and so there is no need to account for the news pieces' severity.

D. ESG News and Size Differences

Firms of different sizes may also be impacted in different ways by news events and be subject to varied levels of information and investor coverage. For example, Krüger (2015) includes market capitalization as a control variable in the analysis and finds that it has a statistically significant effect on cumulative average abnormal returns when examining negative ESG news, both when using a CAPM model and a value-weighted FF48 - industry model. Firms with a larger market cap tend to have more coverage in news outlets and a larger investor audience and therefore see a larger impact of news on abnormal returns.

Capelle-Blancard and Petit (2019) also control for this effect, stating that “on the one hand, investors may be more sensitive to ESG news concerning large firms, but on the other hand, the shares of small firms are less liquid, and their reallocation possibilities are weaker.” In the paper, the authors reference a more in-depth study done on the effect of ESG news on market value of firms by Aouadi and Marsat (2018). Here they find that market value of firms that have higher GSV score (which in this case was used as a proxy for investor attention) is more susceptible to news events than firms who have a lower GSV score. With this taken into account, the main analysis of this paper is supplemented by a secondary analysis, where the firms are split up into three portfolios based on what tercile they belong to on the market capitalization distribution.

III. Data & Methodology

A: The Science Based Targets Initiative

As of December 2022, the total committed annual reduction of CO₂ emissions across all approved Science Based Targets was 76 million tonnes and firms that have committed to the initiative represented approximately 34% of the global market capitalization. The ambitions of the Science Based Targets Initiative can be described to be threefold. For one, it is making an effort to fight climate change by reducing GHG emissions from individual institutions. Two, to help firms to set actionable, realistic yet ambitious emission reduction targets that will have a material impact on the climate footprint of the firm. Thirdly, to validate that the targets set by the firms are in line with the targets set out in the Paris Agreement and the latest science and findings on the topic.

The process of joining the Science Based Targets Initiative is a step-by-step process. First the firm makes an internal assessment whether to join SBTi. Thereafter, they issue a letter of commitment to SBTi which is then published and made official on the SBTi website. The firm then enters a 24-month period of drafting their targets and following up on their data collection before officially submitting these targets to SBTi for validation.

The emission reduction targets have to follow a strict guideline set out by SBTi to either be compatible with the 2°C Paris Agreement, 1.5°C scenario or as of 28 October 2021, a corporate net zero scenario (SBTi Corporate Net Zero Standard, 2023). The targets and the firm are then analyzed by the independent experts at the organization and if the targets are concluded to be in line with the standard set out by SBTi, the firm will officially be part of the initiative and can communicate this to their stakeholders. After this, the firm has to report annually on their progress in reaching said targets. Figure I illustrates the entire process in a timeline.

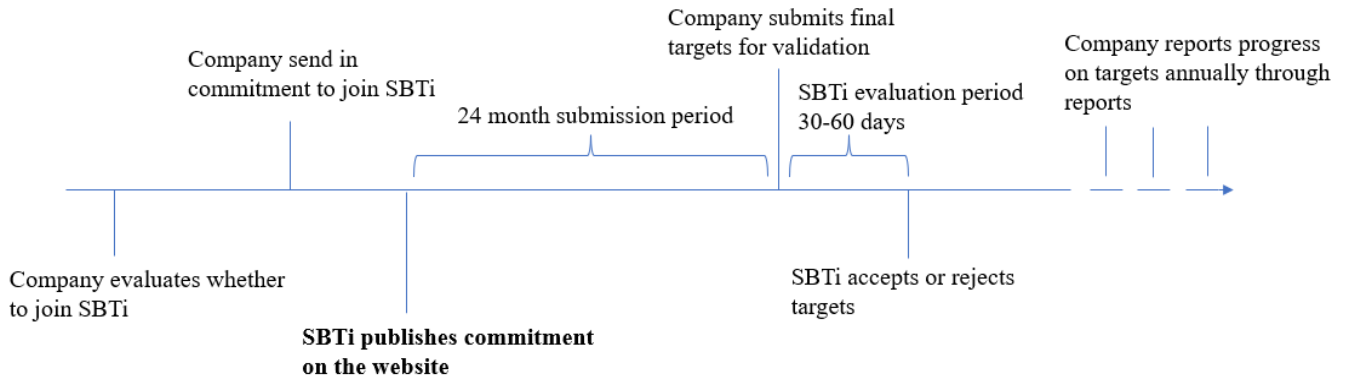
The initiative is currently working on a system to evaluate the progress of the firms in reaching the targets but at this point in time, it is up to each individual firm to report on progress through annual reports and sustainability reports. A firm may also choose to publicly report on the progress in CDP's own database. As of 2022, 76% of firms publicly reported on the progress in some form, while more than half (53%) of firms fully reported progress on all their near-term and long-term targets. Around 50% of financial institutions also chose to report on their progress publicly via CDP (SBTi 2023)

B: Sample and Data

The firm-specific data pertaining to the status of their SBTi commitment was gathered from SBTi's own website. In this data set information is provided on when the organizations committed to the initiative, what type of institution they are classified as, if they are publicly listed or not (displayed by whether or not they have an ISIN), the region where their

Figure I

This figure illustrates the process of joining the SBTi. It includes all major steps, beginning with internal evaluation and ending with annual reporting on the progress towards the targets. The date of commitment used as the event date in this paper is highlighted in bold.



headquarters reside, and the status of their commitment. For this paper, the organizations studied must meet the criteria displayed in Table I. Historical daily closing prices of the firms, as well as their individual market capitalization for the year 2022 were collected from Refinitiv Eikon, and the corresponding daily return of the S&P500 index was retrieved from Yahoo Finance.

The combined dataset includes daily data on historical stock returns for 360 publicly listed firms all in the North American region who have committed to the SBTi between the period 2016-04-01 and 2023-08-01 as well as the dates during which the commitment of each individual firm to the SBTi was published on the official SBTi website. The reason for the regional demarcation is both the availability of financial data, as well as the comparability and ability to regress on a common stock index (the S&P500).

Important to note is that the dataset includes both firms that have committed as well as firms that have come further in the process and thus have had their targets officially validated by the SBTi. To ensure comparability between the firms' events, we have chosen the date of commitment as the event date of interest. There are three main reasons for this. Firstly, while the act of committing to the SBTi is identical across all firms, they can decide to set unequally ambitious targets. As such, the effect of the validation of the firms' targets on the stock return could vary in intensity in accordance with how ambitious the targets are, thus increasing variance and the difficulty to analyze the results. Secondly, the number of North American firms that have had their targets validated are significantly lower than those who have committed, and as a result the sample would simply be too small to conduct any meaningful analysis. Lastly, specifying the date of when the validation of the targets becomes public knowledge is hard, since this is not something that the SBTi discloses in their data.

The commitment date signifies when the firm is publicly acknowledged on the SBTi website. In addition to this, the Commitment Submission Application form

Table I

This table states the characteristics and criteria the firms have to meet in order to be included in the final sample. All variables are reported on by the Science-Based Target Initiative.

Characteristics	Criteria
Region	North America
Institutional Type	Company
Ownership Type	Public
Commitment Date	1/3/2018 - 1/8/2023
Status of Commitment	Committed or Targets Set

of the SBTi states that the commitment is also published on the partner websites at [Home - We Mean Business Coalition](#) and for firms participating in UN Global Compact they will be recognized on the UNGC webpage ([Our Participants | UN Global Compact](#)). For some firms, the commitment date coincided with a non-trading day, and for those firms, the first superseding trading day was chosen as the event date to avoid look-ahead bias. The same goes for a select few firms where the return data was missing on the commitment date.

To avoid skewing of the results by outliers with extreme abnormal returns and variance, “penny stocks” have been excluded from the sample. Penny stocks are defined as stocks that have a daily closing price of under \$1 at any point during the estimation period. This resulted in the removal of a total of four stocks from the sample, leaving 356 stocks in the dataset. Additionally, three firms were removed due to missing data in the estimation period, leaving 353 firms in the final dataset.

C: The Event Study

We follow the methodology established in Krüger (2015), with some minor adjustments due to data availability. For each firm we establish an estimation period of 251 trading days, with the start date being 300 trading days before the event date, and the end date 50 trading days before. In the estimation period, we estimated each firms’ alpha and beta using the market model, by regressing the firm daily return on the S&P 500 market index. Using these parameters, we then calculate the abnormal returns for certain event windows defined as $[\tau_1: \tau_2]$, where τ_1 represents the number of days prior to the event date, and τ_2 is the number of days after the event date. The abnormal returns are calculated as follows:

$$AR_{it} = r_{it} - (\alpha_i + \beta_i r_{mrkt,t}) \quad (1)$$

where r_{it} is the realized return of firm i at time t , α and β are the estimated parameters for firm i , and $r_{mrkt,t}$ is the corresponding market return index. Thus, the AR is defined as the

Figure II

This figure reports the results of the regression of the daily return of each firm in the full sample on the daily return of the S&P 500 index. The results show that the intercept has a p-value of 0.959 and is thus statistically nonsignificant, while the standard error of 0.22484 is of a large nature. The sample size is 353 and the sample period is 2016-04-01 to 2023-08-01.

Residuals:				
Min	1Q	Median	3Q	Max
-14.227	-1.688	-0.248	1.757	20.536
Coefficients:				
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.01167	0.22484	0.052	0.959
MARKET_DATA	1.92885	0.16857	11.442	<2e-16 ***
--- Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 3.561 on 249 degrees of freedom				
Multiple R-squared: 0.3446, Adjusted R-squared: 0.342				
F-statistic: 130.9 on 1 and 249 DF, p-value: < 2.2e-16				

difference between the realized return for firm i at time t and the corresponding expected return. The results of the market model regression are presented in Figure II. While the calculated intercept is non-significant, the standard error is very large and thus, we decided to omit the intercept from the abnormal return calculation. As such, equation (1) is modified to:

$$AR_{it} = r_{it} - \beta_i r_{mrkt,t} \quad (1)$$

The main analysis is done on the Cumulative Average Abnormal Returns (CAAR) for the event window. The CAAR is calculated as follows:

$$CAAR(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} \left(\frac{1}{N} \sum_{i=1}^N AR_{it} \right)$$

The sample variance of the event window abnormal returns is unknown and must therefore be estimated by using the estimation period residuals (for reasonably large estimation periods):

$$\sigma_{AR_{it}}^2 = \frac{1}{T-2} \sum_{t=2}^T u_{it}^2$$

Where T is the number of days in the event window and u_{it}^2 is the square of the residual for each firm and day of the estimation period. $\sigma_{AR_{it}}^2$ is then used to calculate the variance of the average abnormal returns:

$$\sigma_{AAR_t}^2 = \frac{1}{N^2} \sum_{i=1}^N \sigma_{AR_{it}}^2$$

Where N is the number of firms. Lastly, the variance for the cumulative average abnormal returns is calculated as follows:

$$\sigma_{CAAR(\tau_1:\tau_2)}^2 = \sum_{t=\tau_1}^{\tau_2} \sigma_{AAR_t}^2$$

The test-statistics for AAR and CAAR respectively thus become:

$$\frac{AAR_t}{\sigma_{AAR_t}} \sim N(0,1)$$

and

$$\frac{CAAR(\tau_1:\tau_2)}{\sigma_{CAAR(\tau_1:\tau_2)}} \sim N(0,1)$$

In the cases where non-trading days have occurred during an event window, the last available closing price for the security and the S&P500 index was used, resulting in an abnormal return of zero. The AAR was calculated for each day of a 21-day event window, while the CAAR was calculated for three different event window lengths ([-2:2], [-5:5] and [-10:10]). Their respective variances were used to calculate the two-tailed significance levels of the results.

IV. Results

Table II illustrates the findings of the analysis with regards to the effect on average abnormal returns in the [-10:10] event window. When viewing the full sample of 353 firms, a drop of -0.21151% in average abnormal returns on the event day can be observed, which is statistically significant at the 90% level. The drop in average abnormal returns at the event day is also of larger magnitude than any of the other days in the event window. These findings indicate that there is some sort of market reaction, albeit small, to the SBTi commitment.

Apart from the event day, only on the last day of the event window a statistically significant AAR can be observed at the 90% level, with a magnitude of 0.0855%. It is difficult to conclude what this observation can be attributed to, but likely it is due to some noise that the model fails to control for. Furthermore, the effect on AAR that can be observed on the event day is quickly nullified during the days superceding the event, as seen by Table II.

Table II also illustrates the result when the sample is divided into portfolios based on market capitalization. In order to be able to observe how the size of the firm affects the abnormal return, the dataset is divided into three different portfolios based on the 2022 market

Table II

This table reports the Average Abnormal Returns, t-statistics and p-values for the full, as well as the “High”, “Mid”, and “Low” portfolios based on the market capitalization for the fiscal year of 2022. The sample sizes are 353, 120, 116 and 117 respectively. The studied event window is 21 days and the event day is defined as day 0.

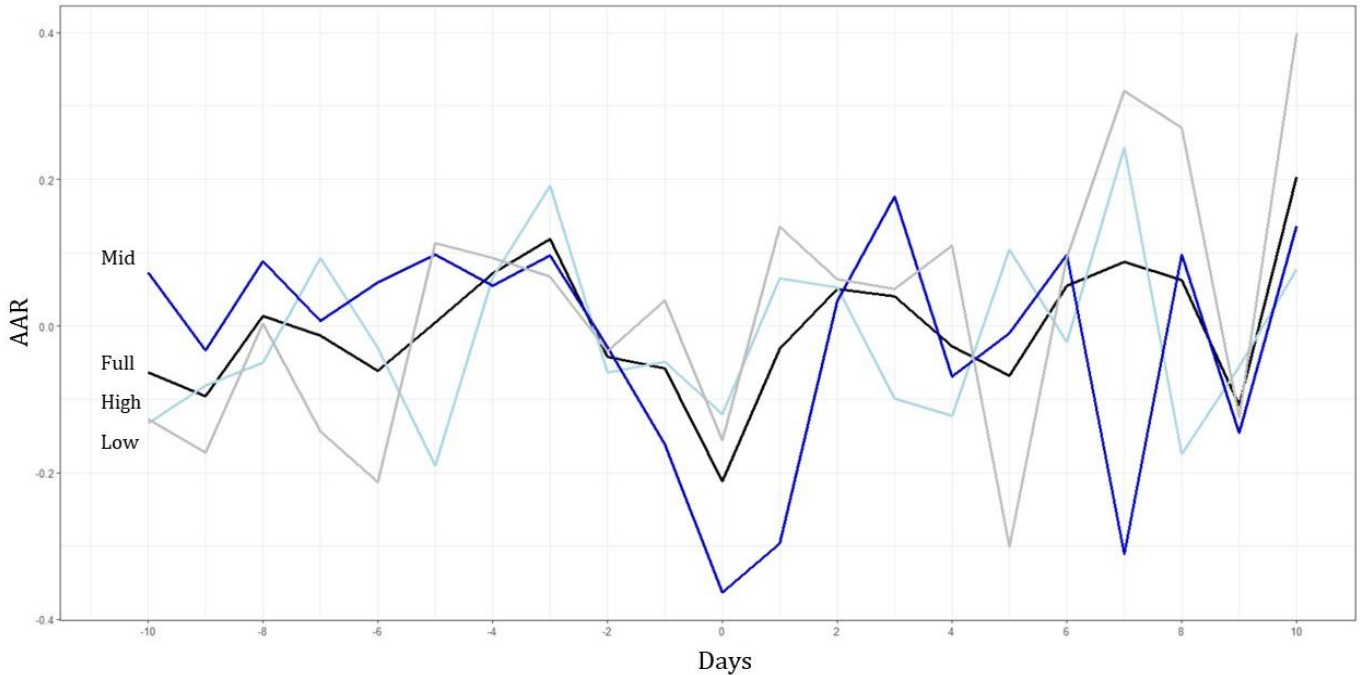
Day Index	FULL SAMPLE [N=353]			HIGH MARKET CAP [N=120]			MID MARKET CAP [N=116]			LOW MARKET CAP [N=117]		
	AAR	t-Stat	p-Value	AAR	t-Stat	p-Value	AAR	t-Stat	p-Value	AAR	t-Stat	p-Value
-10	-0.06288	-0.53357	0.59398	-0.13230	-0.80894	0.42016	0.07303	0.37206	0.71054	-0.12643	-0.51438	0.60796
-9	-0.09552	-0.81051	0.41820	-0.08143	-0.49785	0.61951	-0.03270	-0.16659	0.86798	-0.17226	-0.70081	0.48482
-8	0.01347	0.11430	0.90907	-0.04958	-0.30316	0.76230	0.08847	0.45072	0.65304	0.00378	0.01536	0.98777
-7	-0.01336	-0.11332	0.90984	0.09347	0.57151	0.56873	0.00701	0.03570	0.97158	-0.14311	-0.58224	0.56154
-6	-0.06106	-0.51810	0.60472	-0.02990	-0.18280	0.85526	0.05939	0.30253	0.76279	-0.21243	-0.86427	0.38922
-5	0.00493	0.04182	0.96666	-0.19039	-1.16409	0.24672	0.09746	0.49648	0.62050	0.11352	0.46185	0.64506
-4	0.07125	0.60459	0.54584	0.06575	0.40200	0.68840	0.05480	0.27916	0.78062	0.09321	0.37922	0.70522
-3	0.11920	1.01143	0.31251	0.19096	1.16758	0.24531	0.09689	0.49361	0.62253	0.06771	0.27547	0.78344
-2	-0.04199	-0.35630	0.72183	-0.06273	-0.38357	0.70198	-0.02890	-0.14723	0.88321	-0.03370	-0.13709	0.89120
-1	-0.05772	-0.48974	0.62462	-0.04834	-0.29557	0.76807	-0.16122	-0.82130	0.41317	0.03528	0.14355	0.88611
0	-0.21151	-1.79468	0.07356	-0.11957	-0.73107	0.46618	-0.36311	-1.84981	0.06691	-0.15549	-0.63262	0.52823
1	-0.03030	-0.25713	0.79722	0.06477	0.39603	0.69279	-0.29592	-1.50755	0.13441	0.13553	0.55141	0.58241
2	0.05064	0.42973	0.66765	0.05304	0.32432	0.74627	0.03433	0.17488	0.86149	0.06436	0.26186	0.79389
3	0.04102	0.34809	0.72798	-0.09856	-0.60260	0.54792	0.17612	0.89724	0.37147	0.05024	0.20438	0.83841
4	-0.02783	-0.23614	0.81346	-0.12212	-0.74666	0.45674	-0.06860	-0.34948	0.72737	0.10930	0.44468	0.65738
5	-0.06758	-0.57346	0.56670	0.10367	0.63385	0.52739	-0.00985	-0.05019	0.96006	-0.30046	-1.22242	0.22403
6	0.05559	0.47170	0.63744	-0.02202	-0.13465	0.89311	0.09748	0.49662	0.62040	0.09366	0.38104	0.70387
7	0.08717	0.73970	0.45997	0.24372	1.49018	0.13882	-0.31053	-1.58195	0.11641	0.32092	1.30564	0.19426
8	0.06231	0.52873	0.59733	-0.17529	-1.07175	0.28600	0.09790	0.49874	0.61891	0.27072	1.10140	0.27300
9	-0.10832	-0.91914	0.35865	-0.05560	-0.33995	0.73449	-0.14598	-0.74369	0.45858	-0.12506	-0.50879	0.61187
10	0.20323	1.72447	0.08550	0.07778	0.47554	0.63528	0.13617	0.69369	0.48928	0.39839	1.62085	0.10777

capitalization of each company (High, Mid and Low Market Cap). The “Low” portfolio consists of 117 stocks, the “Mid” portfolio of 116 stocks and the “High” portfolio of 120 stocks.

When dividing the sample into the three portfolios, differentiation in the effect of the event on AAR during the event day can be observed. For the high and low portfolios, the event day effect now becomes non-significant, while a stronger significance can be observed in the mid portfolio. The high and low portfolios have a p-value of 0.466 and 0.522 respectively, while the mid portfolio has a p-value of 0.067. As such, there seems to be no clear link between market capitalization and the AAR on the event day. It also seems like the statistically

Figure III

This figure graphically illustrates the values and changes over time of Average Abnormal Returns in the 21-day event window for the full sample (black), “High” (light blue), “Mid” (dark blue) and “Low” (gray) portfolios. The Y-axis shows average abnormal returns in per cent, the X-axis shows days from event window in days.



significant effect on day 10 is mainly driven by the low portfolio, suggesting some exogenous factor that disproportionately affects smaller firms.

Figure III illustrates the fluctuations of the AAR during the [-10:10] event window across all days, for the full sample as well as the portfolios. Here, the seemingly random fluctuation of the AAR becomes more visible. While all samples experience a clear drop during the event day, the effect is quickly compensated for by the following days. That effect seems to be persistent across the entire event window, where large spikes (drops) are quickly followed by a corresponding drop (spike).

In order to paint a clearer picture of the (non)persistence of the AAR over time, an analysis is conducted on the cumulative average abnormal returns across different event window lengths. As shown by Table III, the CAAR is negative over all event window lengths for the full sample, but the magnitude is decreasing with the length of the event window, and none of the event windows are significant.

With regards to the portfolios, some divergent patterns can be observed. Just as with the full sample, the high and mid portfolios both experience negative CAAR, but the magnitude is increasing with event window length in the high portfolio, while the opposite is true for the mid portfolio. Moreover, the negative CAAR for the mid portfolio's [-2:2] event

Table III

This table reports the Cumulative Average Abnormal Returns, t-statistic and p-value for the full sample, “High”, “Mid”, and “Low” portfolios based on the market capitalization for the fiscal year of 2022. Their sample sizes are 353, 120, 116 and 117 respectively. The table also reports these statistics for the event window lengths [-2:2], [-5:5] and [-10:10].

Event Window Length	CAAR	t-Stat	p_Value
Full Sample [N=353]			
[-2:2]	-0.2908723	-1.1037781	0.2704434
[-5:5]	-0.1498829	-0.3834601	0.7016101
[-10:10]	-0.0692421	-0.1282110	0.8980552
High Market Cap [N=120]			
[-2:2]	-0.1128284	-0.3085136	0.7582310
[-5:5]	-0.1635165	-0.3014436	0.7636024
[-10:10]	-0.2946668	-0.3931538	0.6949094
Mid Market Cap [N=116]			
[-2:2]	-0.8148228	-1.8563912	0.0659574
[-5:5]	-0.4680055	-0.7188627	0.4736837
[-10:10]	-0.3977661	-0.4421905	0.6591819
Low Market Cap [N=117]			
[-2:2]	0.0459909	0.0836788	0.9334561
[-5:5]	0.1795038	0.2201941	0.8261071
[-10:10]	0.4876787	0.4329646	0.6658445

window is statistically significant on the 90% level, which is mostly attributable to the large drop in AAR during the event day. Interestingly, the CAAR for the low portfolio are positive, and increasing in the event window length.

Because of the general non-significance of the results, no more conclusions can be drawn from these patterns, other than that it opens up for possible interesting discussions for future research regarding ESG-related events and firm-size.

The main finding of the analysis is thereby that the commitment to the SBTi does not have a significant effect on the cumulative average abnormal returns. There is a statistically significant effect on the average abnormal returns the event day, but this does not have a material impact on the cumulative average abnormal returns other than the [-2:2] event window for the mid portfolios. Therefore, a rejection of the null hypothesis that a commitment to SBTi will not result in short-term abnormal returns cannot be made.

V. Discussion & Concluding Remarks

A. Discussion

The findings of the analysis seem to suggest that investors do not make investment decisions in the short term based on the information that the firm has committed to the SBTi. One simple explanation could be that SBTi commitment is not a piece of information that investors take into consideration while making their investment decisions. However, due to the observable drop in AAR on the event day, another possible explanation is that investors are reacting to the commitment in one way or another, but that they do not see it as something that

should affect the value of the security in any meaningful way. While both explanations are possible, some discussion around the economic rationale behind the latter will be presented below.

One hypothesis is that investors perceive great uncertainty as to whether or not a commitment to the SBTi will lead to a validation of the commitment within the 24-month submission period. Recently, more than 60 firms have been classified as "commitment removed" due to not submitting their targets in time (Business Green 2023). Furthermore, according to the SBTi database, 106 firms of a total of 8547 have the status "expired commitment during the time-period 2015-06-01 until 2023-04-13. Given the very low frequency of removed commitments, this hypothesis seems unlikely.

Another hypothesis could be that investors perceive a high uncertainty with regards to whether an SBTi-validation will result in material efforts to reduce GHG-emissions. Gieseke et al. (2021) finds that more than half of the SBTi-validated firms included in the study underperform with regards to at least one of the targets that have been set. In addition to this, firm reporting practices were highly variable and often of poor quality. This suggests that the implications of SBTi-commitment might be difficult for investors to assess, and that they might be prudent when taking this information into account.

Lastly, this study does not differentiate the committed firms based on industry nor level of GHG emissions. It is reasonable to assume that strategic decisions that affect GHG emissions will be viewed differently by investors depending on how dependent the firm in question is on said emissions. A manufacturing firm will most likely experience a different effect on their stock price from environment-related commitments than a consulting firm heavily reliant on intangible assets. Excluding the possibility that investors simply do not value SBTi-commitment, this hypothesis to be the most likely with regards to the lack of results in the analysis.

Worth mentioning is that the findings of this paper are fairly in line with the original findings of Krüger (2015), where positive ESG news only have an incremental effect on returns, whereas negative ESG news have a much larger impact. As was previously discussed, a commitment to the SBTi could be classified as a positive news announcement and should according to previous research not have a significant impact on returns. While the results of this paper are non-significant, a trend of negative abnormal returns can be observed for the full sample, as well as the high and mid portfolios.

While these hypotheses give some insight into possible explanations of the results, they do not provide any final proof of why there is no statistically significant effect. Important to acknowledge is the fact that there might simply not be an effect at all and that there are no hypotheses that can ultimately explain this phenomenon. A firm's commitment to the Science Based Targets Initiative might not be material enough to have an effect on the cumulative

average abnormal return. What the long-term effects will be is an entirely different discussion in itself and requires further research with different statistical methods of analysis.

B. Limitations and opportunities for future research

This paper examines the effect of a commitment to the Science Based Targets Initiative on abnormal returns around the date of commitment. While the methods used in this paper are robust, there are some minor shortcomings that should be acknowledged. For example, the portfolios used for analysis are not perfectly divided due to the removal of three firms based on data availability. A reweighting of the portfolios would however only have a very marginal effect on the results and should not alter the findings of the analysis, as the likely consequence is that only a select few firms would change portfolio.

While the paper follows the conventional event-study methodology, the literature does suggest adjustments to it to increase the robustness of the results. For example, Patell and Wolfson (1979) find an increase in variance during the days around an event containing information that affects stock prices, resulting in too high of a frequency of null hypothesis-rejection by test-statistics that do not account for this. In response to this, Boehmer, Musumeci and Poulsen (1991) proposed a test-statistic that accounts for both event-induced variance as well as cross-sectional dependence. This adjusted test-statistic has not been used in this paper, but with that said, the expected consequence would have been an even weaker significance of the results. As such, the main conclusions would likely not have been affected.

As discussed above, industry type and emission levels are not controlled for in this study, and there are reasons to assume that these factors have an effect on how investors view the announcement of SBTi-commitment. With this in mind, an analysis with these factors included would be able to validate whether the hypothesis that these factors have an effect on AAR and CAAR is reasonable or not.

The Science Based Targets Initiative does, at the time of the publication of this article, not provide any data on the date of validation of firms. An analysis similar to the one conducted here, but with the event being the validation of the commitment, could shed further light on the likelihood of the hypotheses discussed above, as the validation might act as a more credible announcement than a mere commitment. Furthermore, a similar analysis could be conducted on firms that have been excluded from the SBTi if this data were to be released from the initiative in the future. At the time of the publication of this paper however, there are not enough companies to conduct such an analysis and no data on the dates of when the exclusions became public knowledge exist. For both these analyzes, the event dates would have to be manually retrieved.

C. Conclusion

In this paper, the effect of SBTi commitment on the daily stock returns of publicly listed firms were studied. To conduct the analysis, an event study methodology was used, where

abnormal returns were calculated using the market model as the estimation model. The main analysis was done on average abnormal returns (AAR) and cumulative average abnormal returns (CAAR). For the full sample, a statistically significant AAR was found at the 90% level on the event day, but otherwise no results could be observed. When dividing the sample into three portfolios based on market capitalization, it became evident that the drivers for the significant result on the event day were the firms included in the mid portfolio.

With regards to CAAR, a negative trend could be observed, where shorter event windows resulted in larger negative cumulative average abnormal returns. When conducting the analysis on the different portfolios however, no such clear pattern could be observed. While the causes of these results are impossible to decipher from this study, some hypotheses have been presented, where the two that seem most likely are that investors either do not take SBTi commitment into account when deciding on their investment strategy, or the fact that this study does not differentiate between different types of firms with regards to industry and emission-levels. Future research on the topic is needed to be able to confirm or dispute these hypotheses.

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