An Event Study on the Impact of Sustainability Announcements: Evidence from Green and Brown Equity Portfolios

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ABSTRACT,
This thesis investigates how environmental sustainability announcements impact the stock performance of "green" vs "brown" companies. Focusing on Bank of America's unexpected exit from the Net-Zero Banking Alliance (NZBA) on December 31, 2024. This study uses an event study methodology to assess abnormal and cumulative abnormal returns (AR and CAR) across four event windows. The analysis compares two portfolios, each containing the 100 largest green and brown companies by market capitalisation. Results show clear asymmetry, brown firms exhibit statistically significant positive returns over short-term windows (5-day and 10-day), suggesting investors perceived BoA's exit as easing ESG-related pressure. On the other hand, the green portfolio shows no significant reaction, consistent with the idea that ESG-focused investors are less responsive to isolated events and more driven by long-term values. These findings align with the efficient market hypothesis and signalling theory and highlight how sustainability signals are interpreted differently across sectors, dependent on investor expectations. While limited by its focus on a single event and a 192-day estimation window, the study adds to the ESG finance literature by showing how sustainability announcements can differentially influence market outcomes.

AI statement

During the preparation of this work, the author (Mikael Johannes Mäki) used ChatGPT and Grammarly to assist in idea formulation and to refine the grammar and academic writing of the research paper. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

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Keywords

Sustainability announcement, event study, abnormal returns, ESG investing, green and brown firms, Bank of America, Net-Zero Banking Alliance.

1. INTRODUCTION

In today's world, environmental sustainability is an important concern for businesses across various industries, particularly "green" (environmentally friendly companies) and "brown" companies (traditional, environmentally unfriendly companies) (Friede et al., 2015). Many of the big firms in both categories have made grand sustainability commitments (Cleveland-Peck, 2024; Newman, 2020), including carbon neutrality promises, ethical sourcing, and investments in cleaner technologies. These decisions not only impact company strategy and public image but also significantly affect their stock values and the investment decisions of individual and institutional investors (Friede et al., 2015).

Prior research has explored the financial impact of ESG announcements, there is limited understanding of how sustainability announcements affect investor behaviour in green versus brown sectors. This thesis will research how sustainability-related announcements affect the stock market performance and investor sentiment for those companies.

The ESG principle is a framework which stems from responsible investment, which is defined as "a strategy and practice to incorporate environmental, social and governance (ESG) factors in investment decisions and active ownership" (Pri, 2024). Investors use these factors to analyse and decide their investment strategies. "ESG is usually a standard and strategy used by investors to evaluate corporate behaviour and future financial performance" (Li et al., 2021). As stated by Luneva et al. (2023), companies with good ESG scores face lower costs for loans and bonds. Luneva et al. (2023) also stated that brown companies borrow larger amounts from banks and smaller amounts from the public market. This means that having good ESG ratings is very important for green companies since they borrow more from the public market (where ESGs are an important aspect). Due to brown companies inherently having worse ESG scores than green ones, brown companies tend to borrow more from banks since banks are not as regulated (in terms of ESGs), meaning ESG scores have less of an impact on brown companies, but green companies rely more on the public market to raise funds, they must ensure their ESG scores are "good" since, as stated before, having low performing scores leads to more expensive debt.

The announcement that this paper will analyse is the surprise exit by Bank of America from the Net-Zero Banking Alliance (NZBA), on December 31st, 2024 (Reuters, 2025). This announcement is impactful since BoA is among the largest financial institutions in the U.S. The exit signalled a turning point in the financial sector's commitment to net-zero goals, leading to market uncertainty about ESG investments and sparking a domino effect of banks reconsidering their commitments.

Bank of America's (BoA) unexpected exit from the Net-Zero Banking Alliance (NZBA) represents a crucial turning point in corporate sustainability discourse and investor perception. As a founding member of the NZBA and one of the largest financial institutions in the United States, BoA's exit signalled potential institutional cutbacks from collective climate commitments (Reuters, 2025). Such actions raise concerns about the credibility and durability of voluntary sustainability frameworks, particularly when major actors publicly distance themselves from environmental coalitions (Gillan et al., 2021). From a capital markets perspective, the announcement offers a rare opportunity to observe how investors across different sectors respond to signals of ESG strategy reversal, particularly those with differing exposure to sustainability-related risks and reputational concerns (Krueger et al., 2019). The event's surprise nature, media visibility and implications for the future of climate-aligned finance make it an ideal candidate for an event study analysis. It serves not only as an indication of BoA's internal strategic shift but also as a broader signal about the changing balance between climate commitments and shareholder accountability. This is particularly important for sectors with differing ESG profiles, such as renewable energy and fossil fuel industries, allowing for meaningful comparison of market reactions between "green" and "brown" firms (Flammer, 2021).

By focusing on these two industries, this research will help to understand the economic impact of sustainability across different industries, helping both companies and investors gain deeper insights into the specific ways environmental sustainability initiatives/announcements can impact financial performance.

1.1 Research Question

In order to explore the relationship between environmental sustainability initiatives/announcements and their impact on financial markets. The central question for this thesis is:

"How do environmental sustainability initiatives and surprise announcements impact the stock market performance and investor sentiment of "green" and "brown" companies?"

In addressing this central question, the following sub-questions will aid in the research process:

1. *How do sustainability-related announcements affect the stock prices of "green" and "brown" companies?*
2. *What role do environmental, social, and governance (ESG) factors play in shaping the investment decisions of institutional and individual investors?*
3. *How do institutional investors adjust their strategies in response to surprise sustainability announcements?*

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Literature Review

Researchers have recently explored how announcements regarding sustainability initiatives, especially those that include environmental, social and governance (ESG) issues, affect investor behaviour and therefore stock price. A meta-analysis conducted on more than 2,000 empirical studies by Friede et al. (2015) found that ESG issues were typically positively correlated with corporate financial performance. Clark et al. (2014) found that firms with strong ESG ratings tended to have better stock price performance and a lower cost of capital.

A significant portion of research has been conducted on how markets respond to ESG-related news. Krüger (2015) finds that markets respond more strongly to negative ESG events than to positive ones, suggesting an asymmetry in how investors process sustainability-related information. Pyzhov et al. (2024) also show that while ESG news can trigger market reactions, these are often short-lived unless tied to broader systemic changes. These findings indicate that while ESG announcements can influence stock prices, their impact depends heavily on context, investor expectations, and the nature of the news.

In addition, there has been growing interest in differentiating between the behaviours of traditional and ESG-focused investors. Riedl and Smeets (2017) show that ESG investors tend to have lower portfolio turnover and are more committed to long-term holdings, driven by non-monetary motives. This behavioural pattern is supported by Pástor et al. (2020), who show that sustainable investors are willing to accept lower expected returns in exchange for holding green assets. These preferences suggest that ESG investors may react less strongly to

institutional decisions unless such moves reflect fundamental shifts in sustainability direction.

The role of ESGs in corporate finance is also well-researched. La Rosa et al. (2017) suggest that ESG performance influences a firm's ability to raise capital and its cost of debt. Luneva et al. (2023) suggest that ESG ratings affect a firm's credit spreads, investor base, and sensitivity to policy changes. These findings are necessary for understanding how surprise sustainability announcements might affect stock performance.

2.2 Theoretical Framework

This thesis uses three main theoretical frameworks to examine the effects of Bank of America's sustainability announcement on green and brown firms: signalling theory, the efficient market hypothesis (EMH), investor utility and preference theory in sustainable finance.

Signalling theory (Spence, 1973) states that firms send signals to the market through their corporate decisions, which investors interpret to update their expectations. In this context, BoA's withdrawal from the NZBA could be interpreted as a signal about future industry commitments to ESG targets, potentially influencing the perceived credibility of sustainability goals.

The efficient market hypothesis (Fama, 1970) suggests that financial markets quickly incorporate new information into asset prices. If BoA's announcement contained unexpected information, it should lead to significant abnormal returns around the event date. On the other hand, if the market had anticipated the move, price reactions would be muted.

Lastly, investor utility and preference theories provide a behavioural lens, which helps to understand how different types of investors respond to sustainability-related information. Investor utility theory suggests that some investors derive utility not just from financial returns, but also from the social or environmental impact of their investments (Pástor et al., 2020). In addition, investor preference theory suggests that ESG-oriented investors may actively choose assets aligned with their values, even when those assets offer lower expected returns. As such, these investors may be less sensitive to short-term market news, particularly when it does not alter the long-term sustainability profile of their investments (Riedl & Smeets, 2017).

These frameworks provide a foundation for interpreting market reactions to BoA's NZBA exit, highlighting the role of expectations, investor preferences, and information asymmetry in financial responses to sustainability signals.

2.3 Hypothesis

The framework hypothesises that the announcement of BoA's exit is likely to have an impact on the stock market performance of "green" and "brown" companies. The role of ESG factors is also crucial, as these factors may moderate the relationship between sustainability initiatives and stock market performance, particularly in how they influence investor decision-making.

Market efficiency theory suggests that if investors anticipate an event, stock prices will already reflect the information, and no abnormal returns will occur at the time of the announcement (Fama, 1970). However, if Bank of America's (BoA) exit from the Net-Zero Banking Alliance (NZBA) was unexpected, it could have undermined investor confidence in the credibility and momentum of voluntary climate coalitions. As one of the world's largest financial institutions and a founding member of the NZBA, BoA's departure may have signalled weakening institutional alignment with climate goals, which in turn could diminish expectations for future capital support and favourable financing terms for green firms. This perceived rollback of systemic commitment to sustainability could negatively affect the valuation of renewable energy companies, especially if investors believe the move reflects a broader trend of withdrawal from ESG commitments in the financial sector (Gillan et al., 2021). Additionally, such a withdrawal might trigger fears of a shift in regulatory or policy support, leading to short-term revaluation of green firms whose business models depend on sustained institutional backing. Therefore, the first hypothesis tests whether BoA's exit led to statistically significant negative abnormal returns for green firms, consistent with a market interpretation of the announcement as a reversal in ESG momentum.

- *H1: BoA's exit from the NZBA negatively and significantly affected green companies.*

On the other hand, brown companies are often more sensitive to changes in ESG regulations and public legitimacy. The exit of a major bank like BoA from a high-profile sustainability alliance may signal a weakening in the enforcement or adoption of environmental financing standards. For them, this could be seen as a reduction in future financing risk or regulatory pressures, increasing investor optimism and positive abnormal returns. Previous studies have shown that ESG-related announcements can have asymmetric effects depending on firm exposure to environmental performance benchmarks (Flammer, 2021; Krueger et al., 2020). The second hypothesis tests whether brown companies experienced a statistically significant positive market reaction to BoA's withdrawal, reflecting a perceived easing of ESG-related constraints.

- *H2: BoA's exit from the NZBA positively and significantly affected brown companies.*

3. METHODOLOGY

This paper will use an event study to test the hypotheses that were proposed earlier. The goal of the study is to analyse how surprise sustainability announcements, such as BoA's exit from the NZBA, affect the stock performance of "green" and "brown" companies. The event study is suited for this purpose as it helps to identify the abnormal returns (AR) surrounding the announcement event, as shown by Campbell et al. (2012). This helps evaluate whether the market reaction was significant, thereby determining if the event was expected or unexpected by investors and whether there are any effects on stock performance.

3.1 Research Design

The research is a quantitative, comparative event study based on secondary data. It compares the market reactions of environmentally friendly ("green") and environmentally unfriendly ("brown") companies in response to a single event, BoA's NZBA exit on December 31, 2024. The event is treated as a potential signal to investors, consistent with signalling theory and the efficient market hypothesis (EMH), which suggests that markets quickly incorporate new, relevant information (Connelly et al., 2010; Malkiel, 2003).

3.2 Sample Selection

The sample consists of 100 publicly listed "green" (renewable energies) and "brown" (primarily fossil fuels and transportation) companies. The selection was based on the market capitalisation rankings, taking the top 100 highest ranked "green" and "brown" companies, taken from the London Stock Exchange Group (LSEG) database (LSEG, 2025).

The green portfolio includes primarily companies operating in the solar, wind, hydroelectric, and other renewable energy sectors, while the brown portfolio includes firms involved in oil, gas, and coal extraction and traditional transport industries such as shipping, airlines, and automotive manufacturers focused on

internal combustion engines. This results in a sample size of 200 companies, which enhances the statistical validity and reliability of the analysis. By selecting the top 100 companies in each category based on market capitalisation, the study focuses on firms with the greatest market exposure, trading activity, and relevance to institutional and retail investors. These firms serve as the industry benchmarks, meaning their stock performance is more likely to reflect broader market trends and investor sentiment. As such, the sample is sufficiently representative to draw meaningful conclusions about the market-wide impacts of major sustainability-related announcements.

3.3 Data Collection

The historical stock price data was obtained from the London Stock Exchange Group (LSEG) database for each of the selected companies. All closing price data is in USD. In addition:

- Fama-French daily factor data were collected, including market excess returns (Mkt_RF) and risk-free rates (RF), from French (n.d.). These were used to compute expected returns using the market model approach.
- The surprise announcement (BoA's NZBA exit) was sourced from Reuters (2025), which confirmed the timing and market impact.

3.4 Estimation and Event Windows

The event study uses the following windows:

- The estimation window was 192 trading days before the event (25.04.24 – 30.12.24).
- The event windows were ±5, ±10, ±25 and ±35 days relative to the event

3.5 Calculating Abnormal Returns

The event study investigated whether there were any abnormal returns following the event. To calculate the abnormal returns, expected returns were calculated beforehand. Expected returns are estimated using the market model, where each firm's daily return is regressed against the market excess return (Mkt_RF), a method commonly used in daily return event studies (Brown & Warner, 1985). The abnormal return is defined as the difference between the actual return and the return predicted by this model:

$$R_{it} = \alpha_i + \beta_i\left(R_{mt} - R_{ft}\right) + \epsilon_{it}$$

Where:

- R_{it} is the return on security i at time t
- R_{ft} is the risk-free rate
- R_{mt} is the market return
- α_i, β_i are estimated from the regression during the estimation window
- ϵ_{it} is the error term

The abnormal returns (AR) were calculated as the residuals from this model. Cumulative Abnormal Returns (CARs) were calculated by summing ARs across each event window.

3.6 Statistical Analysis

To test the significance of the event, t-tests were performed on the average ARs and CARs across the sample. The analysis was conducted using RStudio, making use of packages such as dplyr, tidyverse, readxl, and eventstudies. The results help determine whether the announcement led to any statistically significant deviations from the expected returns in green versus brown companies.

3.7 Hypothesis Testing

This section evaluates the market reaction to BoA's exit from the NZBA by analysing abnormal returns (AR) and cumulative abnormal returns (CAR) for two distinct portfolios: green firms and brown firms. Each hypothesis is assessed based on the statistical significance of CARs within the event windows.

3.7.1 Hypothesis 1

BoA's exit from the NZBA negatively and significantly affected green companies

This hypothesis is grounded in the expectation that BoA's unexpected withdrawal may have undermined investor confidence in the long-term institutional support for environmental sustainability. If investors interpreted this as a signal of weakening in green finance, green firms could be expected to show negative abnormal returns. The hypothesis is supported if the CARs for green firms are significantly negative following the announcement.

3.7.2 Hypothesis 2:

BoA's exit from the NZBA positively and significantly affected brown companies.

This hypothesis assumes that BoA's exit was perceived as a reduction in ESG-related financing pressure or scrutiny on environmentally harmful sectors. Brown firms may have benefited from investor expectations of reduced future constraints, leading to short-term positive abnormal returns. The hypothesis is supported if the CARs for brown firms are significantly positive after the announcement.

3.8 Validity and Limitations

The use of a well-established event study design supports the internal validity of the analysis. The large and balanced sample helps ensure robustness and generalisability across different industries. However, there are some limitations, which are:

- The possibility of confounding events during the event window,
- Market efficiency assumption (Malkiel, 2003),
- Classifying companies strictly as green or brown based on the sector alone.

Despite these limitations, the event study is suitable for analysing the impact of sustainability-related announcements on financial markets.

4. DATA DESCRIPTION

4.1 Data Sources

The data used in this study were obtained from two primary sources. Daily stock closing prices for the top 100 "green" and top 100 "brown" companies (based on market capitalisation) were retrieved from the London Stock Exchange Group (LSEG) database. These prices are the basis for calculating daily logarithmic returns, which act as the primary input for the event study.

Additionally, daily market excess return and risk-free rate data were obtained from the Kenneth French Data Library (French, n.d.). These factors were used to estimate expected returns for each firm under the market model.

4.2 Data Period and Structure

The dataset spans the period from April 25, 2024, to January 31, 2025, with a frequency of daily observations. The estimation window comprises 192 trading days leading up to the event date (April 25, 2024 – December 30, 2024). The event date is defined as December 31, 2024, which marks Bank of America's public announcement of its exit from the Net-Zero Banking Alliance.

All the prices are denominated in U.S. dollars (USD). From the daily closing prices, logarithmic returns were computed using this formula:

$$Return_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

These returns are then used to calculate expected returns and abnormal returns as stated in the methodology section.

4.3 Time Series Plot

The figure below shows the average daily returns of the green and brown company portfolios. The blue vertical line indicates the event date (December 31, 2024), the green line represents the green portfolio returns, and the brown line represents the brown portfolio returns. This visual representation gives a view of the market behaviour before and after the announcement.

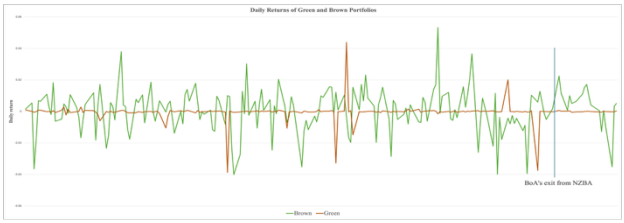

Figure 1. Average Daily Stock Returns for Green and Brown Portfolios

4.4 Descriptive Statistics

Descriptive statistics are shown in the tables below for each portfolio for the ±10-day window and the estimation window to further describe the dataset. These include the mean, standard deviation, minimum, maximum, skewness and kurtosis values of the daily stock returns. The tables also include results from the Jarque-Bera (JB) and Augmented Dickey-Fuller (ADF) tests.

Table 1. Descriptive Statistics of Daily Returns Over the ±10-Day Window

Metrics	*Green portfolio*	*Brown portfolio*
Mean	-0.13%	0.48%
Standard deviation	0.83%	1.05%
Minimum	-3.74%	-1.55%
Maximum	0.14%	2.41%
Skewness	-4.21	-0.08
Kurtosis	18.85	2.50
JB	0.00%	88.44%
ADF	25.36%	49.85%

Note. Metrics were calculated based on average daily log returns over the 10-day event window.

Table 2. Descriptive Statistics of Daily Returns Over the Estimation Window

Metrics	*Green portfolio*	*Brown portfolio*
Mean	-0.05%	0.06%
Standard deviation	0.60%	1.37%
Minimum	-3.95%	-4.09%
Maximum	4.29%	5.18%
Skewness	-1.53	-0.39
Kurtosis	37.50	4.84
JB	0.00%	0.00%
ADF	1.00%	1.00%

Note. Metrics were calculated based on average daily log returns over the estimation window.

The descriptive statistics for both the estimation and event windows provide important context for understanding the behaviour of the two portfolios before and after the announcement. In the ±10-day event window, the brown portfolio shows a higher mean return (0.48%) than the green portfolio (-0.13%), suggesting that brown companies, on average, experienced a positive return following BoA's exit from the NZBA, while green companies experienced a small loss. This aligns with the expectation that markets may interpret the exit as a weakening of environmental finance commitments, which could disadvantage green firms and benefit traditional brown companies.

The standard deviation is also higher for brown firms during the event window (1.05% > 0.83%), meaning greater volatility in their returns. This can reflect investor uncertainty in response to the policy signal from BoA. The green portfolio also shows extreme values on the lower end, with a minimum return of -3.74%, and highly negative skewness of -4.21 and excess kurtosis of 18.85, indicating the presence of large negative outliers and heavy tails. This aligns with Lashkaripour's (2022) findings that high-ESG stocks can exhibit greater tail risk during crises, likely due to panic selling or overreaction by sustainability-conscious investors.

The Jarque-Bera test strongly rejects normality for the green portfolio ($p < 0.1\%$), while the brown portfolio's returns appear more normally distributed during the event window ($p = 88.44\%$). However, both portfolios show stationarity over the ±10-day event window, as indicated by the Augmented Dickey-Fuller (ADF) p-values, which are above average (5%) (Dickey & Fuller, 1979).

Over the 192-day estimation window, both portfolios exhibit smaller mean returns and higher volatility, especially the brown portfolio, which shows more dispersed returns (SD = 1.37%). The green portfolio shows extreme kurtosis and skewness, even in the estimation window, consistent with the behaviour of ESG-sensitive assets under uncertainty (Pástor et al., 2020).

These results offer early indications that the BoA's exit announcement may have triggered differential market responses, where brown companies experienced a temporary performance boost and green companies faced downward pressure. Statistical testing of abnormal returns in the event study will be used to confirm the significance of these patterns. These findings will be discussed in the next section.

5. RESULTS

The results of the event study are presented below, based on the abnormal returns (AR) and cumulative abnormal returns (CAR) calculated for four event windows (± 5, ± 10, ± 25, ± 35 trading days) relative to the announcement of BoA's exit from the NZBA on December 31, 2024. The goal is to assess whether the event had a statistically significant impact on the stock performance of green and brown companies.

Table 3. P-values for Average Abnormal Returns and Cumulative Abnormal Returns Across Event Windows.

	Green portfolio		*Brown portfolio*	
Event windows	*AR*	*CAR*	*AR*	*CAR*
±5 days	42.26%	42.26%	1.93%	**1.93%**
±10 days	46.80%	46.80%	4.73%	**4.73%**
±25 days	89.75%	89.75%	62.93%	62.93%
±35 days	85.80%	85.80%	99.56%	99.56%

Note. Bolded p-values indicate statistical significance at the 5% level.

Table 4. Average ARs and CARs for Green and Brown Portfolios Across Different Event Windows

Event windows	*Metrics*	*Green portfolio*	*Brown portfolio*	*Difference*
±5 days				
	AR	-0.29%	0.73%	1.02%
	CAR	-3.18%	8.07%	11.25%
±10 days				
	AR	-0.13%	0.48%	0.62%
	CAR	-2.81%	10.16%	12.97%
±25 days				
	AR	0.01%	-0.10%	-0.12%
	CAR	0.56%	-4.71%	-5.27%
±35 days				
	AR	0.02%	0.00%	-0.02%
	CAR	0.78%	-0.06%	-0.83%

Note. Differences are calculated as Brown portfolio – Green portfolio. Some of the AR and CAR values have been rounded up for this table.

5.1 Green Portfolio

In the green portfolio, the p-values for both the AR and CAR are above the 5% significance threshold in all event windows (Table 3). As shown in Table 3, the ±5-day event window has a p-value of 42.26% for both AR and CAR, while the ±10-day window has a p-value of 46.80%. In the longer windows (±25-day and ±35-day), p-values grow even more, indicating no meaningful abnormal reactions to the announcement.

Looking at the return values in Table 4, the green firms experienced slightly negative AR and CAR values in the short-term windows, and small positive values in the longer ones. This could suggest muted investor concern, but the lack of significance implies that the markets either anticipated BoA's exit or considered it irrelevant to the prospects of green firms.

These results contradict the original hypothesis that the event would negatively and significantly affect green companies. This could be due to green investors being more long-term oriented and less reactive to short-term sustainability announcements, especially when they are not followed by policy changes (Pástor et al., 2020; Riedl & Smeets, 2017).

5.2 Brown Portfolio

The brown portfolio shows a significant short-term reaction to the announcement. As shown in Table 3, both AR and CAR are statistically significant in the ±5-day window (p =1.93%) and remain significant in the ±10-day window (p = 4.73%). These effects diminish in the ±25-day and ±35-day windows, with p-values rising over the 5% threshold. This suggests that the investors did not anticipate the announcement and that it had a significant effect on brown companies.

Table 4 confirms this reaction, with a CAR of 8.07% in the ±5-day window and 10.16% in the ±10-day window, both being positive and higher than the green values. These results support the second hypothesis, which predicted a positive and significant market response for brown companies.

5.3 Summary of Findings

The evidence supports a short-term asymmetric market reaction to BoA's exit from the NZBA. Brown firms showed statistically significant positive abnormal returns in the short-term windows, while green firms showed no measurable reaction. This suggests that the market viewed the announcement as a potential relaxation of ESG-related financial pressure, favouring brown industries in the immediate aftermath. The lack of significant green reaction may indicate that ESG-oriented investors either remained committed or had already expected institutional exits from alliances such as the NZBA.

5.4 Hypothesis Testing

The following subsections evaluate the hypotheses proposed earlier by testing the significance of abnormal returns for green and brown portfolios following the NZBA announcement.

5.4.1 Hypothesis 1: BoA's exit negatively and significantly affected green companies

The results do not support this hypothesis. Across all event windows, the green portfolio exhibited no statistically significant abnormal returns. Although, there were slightly negative ARs and CARs in the short-term windows, the p-values suggest that these changes are not significant. Therefore, it cannot be concluded that BoA's exit had a negative market impact on green firms. This may be due to the long-term orientation of ESG investors or the perception that BoA's exit was irrelevant to the future of green companies.

5.4.2 Hypothesis 2: BoA's exit positively and significantly affected brown companies

This hypothesis is supported by the evidence in both Table 3 and Table 4. In the ±5-day window, brown firms showed a CAR of 8.07% and an AR of 0.73% (Table 4), both of which are statistically significant with p-values of 1.93% (Table 3). The ±10-day window also shows a strong CAR of 10.16% and AR of 0.48%, with p-values of 4.73%. These results suggest a positive and significant market reaction to BoA's exit from the NZBA. However, beyond the 10-day window, the effect fades, as shown by the insignificant p-values in the ±25 and ±35-day windows. This indicates that while the market initially reacted positively to the announcement, the impact was short-lived.

5.4.3 Summary

The findings support Hypothesis 2, suggesting BoA's exit positively and significantly affected brown companies. The market reaction suggests the announcement was unexpected and interpreted as favourable for firms with lower ESG performance. Although the effect was temporary, it highlights how sustainability-related announcements can trigger asymmetric responses depending on investor expectations and firm profiles.

6. DISCUSSION

This study investigated how financial markets responded to Bank of America's surprise exit from the Net-Zero Banking Alliance, with a specific focus on the differential impact on green and brown companies. The findings reveal an asymmetric reaction: the green portfolio showed no significant abnormal returns, the brown portfolio exhibited short-term positive abnormal returns that were statistically significant in the ±5-day and ±10-day windows.

These results suggest that brown companies benefited in the immediate aftermath of BoA's announcement, possibly because the event was perceived by investors as signalling a temporary relaxation of ESG-related financial constraints. This interpretation aligns with signalling theory, which holds that corporate or institutional actions convey information to the market/investors beyond their direct economic content. Investors may have viewed BoA's exit as a signal that ESG-related financial commitments may weaken or become less binding, at least in the short term. Due to this, brown firms, usually more

exposed to climate regulation and ESG pressures, were temporarily revalued more positively.

The green portfolio's lack of significant abnormal returns suggests that BoA's exit did not materially shift investor expectations for these firms. One likely explanation is that green firms attract long-term, ESG-focused investors who are less sensitive to short-term institutional signals, especially when those signals are not backed by broader regulatory or structural change. Research by Riedl and Smeets (2017) shows that socially responsible investors tend to exhibit lower portfolio turnover and greater investment commitment, while Pástor et al. (2020) find that such investors are willing to accept lower expected returns in exchange for holding sustainable assets. These behavioural patterns reflect a preference for long-term impact over short-term performance and may explain the muted response in green stocks. This is also consistent with the efficient market hypothesis (EMH), which would suggest that the announcement either contained no new information or was already anticipated by ESG-aligned investors.

The return to normality/insignificance in longer windows for the brown portfolio supports the view that the market response was short-lived and likely driven by short-term sentiment or reallocation, rather than a reassessment of fundamental value. This observation aligns with prior event study research showing that markets often react temporarily to ESG signals, unless followed by broader structural or regulatory shifts. For example, Pyzhov et al. (2024) found that the impact of ESG-related media events declined over time, reinforcing the idea that without sustained or systemic change, such market reactions are short-lived.

The descriptive statistics offer additional insight into the returns of the two portfolios. The green portfolio displayed negative skewness and high kurtosis during the event window, suggesting the presence of outlier losses or downside risk, possibly due to overreaction by a small group of investors. The brown portfolio, in contrast, showed higher average returns and greater volatility in the same period, consistent with short-term price adjustment behaviour.

7. LIMITATIONS AND FUTURE RESEARCH

While this thesis provides valuable insights into the differential stock market responses of green and brown firms to a major sustainability announcement, several limitations should be acknowledged. First, the estimation window used to calculate expected returns was limited to 192 trading days. This period was chosen to balance the need for a robust number of observations with the risk of incorporating outdated market conditions. While a longer window could potentially improve the stability of parameter estimates, it also increases the likelihood of including structural breaks or unrelated events that may distort expected return calculations.

Second, the sample size, while relatively large at 200 firms, was restricted to the top 100 green and brown companies by market capitalisation. This approach was adopted to ensure the sample consisted of firms with the highest market relevance and liquidity, which are most likely to reflect investor sentiment and institutional trading behaviour. Including smaller or less frequently traded firms might have introduced additional volatility or noise, potentially complicating the analysis.

Additionally, the analysis was based on a single sustainability-related event, Bank of America's exit from the NZBA, limiting the ability to generalise findings across different types of ESG announcements, time periods or sectors.

Future research could address these limitations by incorporating multiple events, extending the estimation window, or using panel data across a wider array of firms and industries. Further analysis of investor heterogeneity, such as distinguishing between institutional and retail behaviour, and linking reactions to firm-specific ESG ratings or reputational metrics, could offer deeper insight into the mechanisms behind observed market responses.

8. CONCLUSION

This thesis investigated how sustainability-related announcements, particularly Bank of America's exit from the Net-Zero Banking Alliance, influence the stock performance of green and brown firms. Using an event study methodology, the analysis analysed abnormal and cumulative abnormal returns across different event windows, comparing market reactions between two portfolios comprised of the 100 largest green and brown firms by market capitalisation.

Addressing the first sub-question, the findings reveal that sustainability-related surprise announcements can have asymmetric effects on stock prices. The green portfolio showed no statistically significant abnormal returns across any event window, suggesting that the announcement did not change investor expectations in the green sector. On the other hand, the brown portfolio showed statistically significant positive abnormal returns in the ±5-day and ±10-day windows, indicating a short-term uplift in response to the announcement. This suggests that investors perceived BoA's withdrawal as a reduction in ESG-related pressure, temporarily favouring brown firms.

Concerning the second sub-question, the muted reaction of green stocks suggests the presence of committed ESG-oriented investors who are less likely to adjust their portfolios based on isolated announcements. This aligns with prior research indicating that ESG investors tend to have long-term utility preferences and are less reactive to short-term market noise (Riedl & Smeets, 2017; Pástor et al., 2020). These investors may prioritise environmental outcomes over financial returns, reducing the likelihood of panic selling or speculative trading in response to institutional decisions.

The third sub-question is addressed by evaluating short-term price movements in the brown portfolio. The observed positive abnormal returns imply that institutional investors may have strategically reallocated capital toward firms perceived to benefit from a weakening of sustainability enforcement. From a signalling theory perspective, BoA's exit was interpreted as a shift in the institutional ESG environment, potentially delaying climate-related transition risks. This reaction illustrates that institutional investors may be sensitive to signals that alter the regulatory or reputation of brown firms.

Thus, the research shows that sustainability announcements can have a differential impact on green and brown firms, with outcomes shaped by investor expectations, utility preferences, and perceived policy implications. These findings also support the efficient market hypothesis (EMH), as investors quickly incorporated the new information into stock prices and demonstrate that investor responses are dependent on sector-specific contexts and the perceived credibility of sustainability signals.

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11. APPENDIX

11.1 Cumulative Abnormal Returns Chart Output

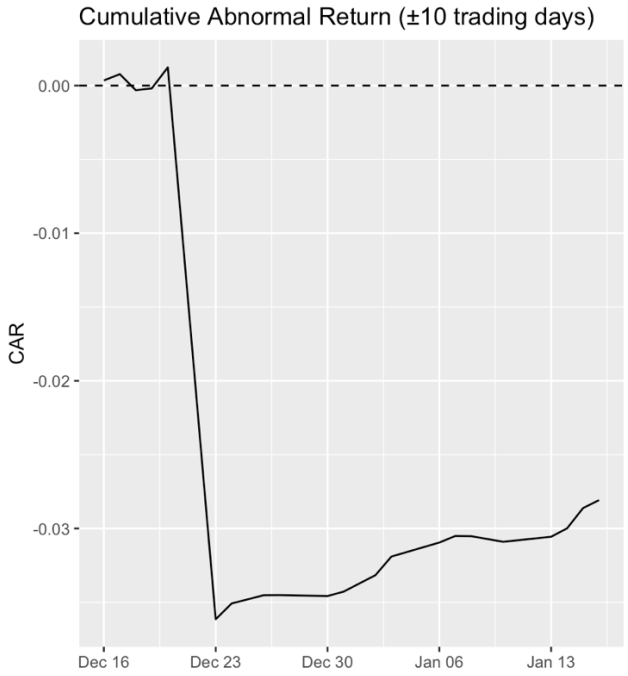

Figure 2. Cumulative Abnormal Returns Chart Output for the Green Portfolio

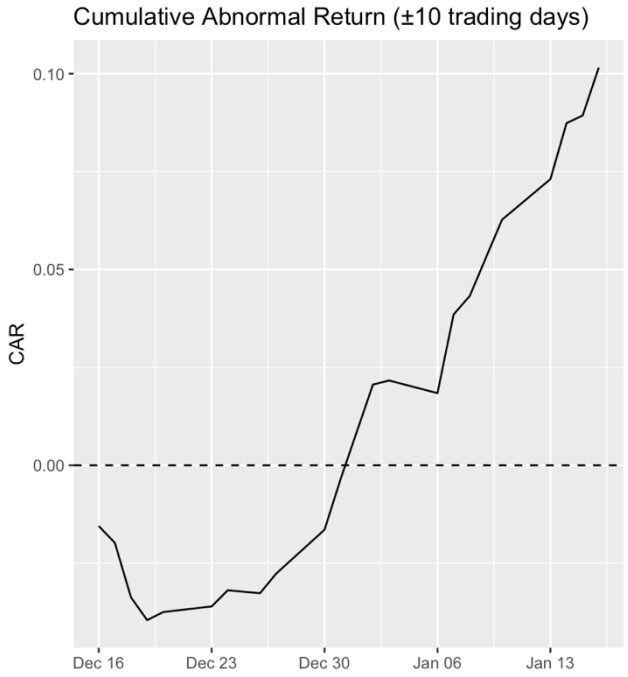

Figure 3. Cumulative Abnormal Returns Chart Output for the Brown Portfolio

11.2 Event Study Code Used in R-Studio

```r
# ------------------------------------------------
# Event Study with Market Model
# ------------------------------------------------

# 0. Load required libraries
library(readxl)
library(readr)
library(dplyr)
library(stringr)
library(tidyr)       # for drop_na()
library(ggplot2)

# 1. Load company prices
pricesg <- read_excel("~/Desktop/UNIVERSITY/THESIS/Green Companies Long.xlsx", skip = 1) %>%
  transmute(
    Date   = as.Date(Date),
    Price  = as.numeric(`Close price`)
  ) %>%
  arrange(Date) %>%
  mutate(
    Return = log(Price / lag(Price))
  ) %>%
  filter(!is.na(Return))

# 2. Load Fama-French factors
ff_file <- "~/Desktop/UNIVERSITY/THESIS/F-F_Research_Data_Factors_daily.txt"

# Find the first line that begins with an eight-digit YYYYMMDD
first_numeric <- which(str_detect(readLines(ff_file, n = 500), "^\\s*\\d{8}\\s"))[1] - 1

ff <- read_table(
  ff_file,
  skip       = first_numeric,
  col_names  = c("Date_raw", "Mkt_RF", "SMB", "HML", "RF"),
  col_types  = cols(
    Date_raw = col_character(),
    Mkt_RF   = col_double(),
    SMB      = col_double(),
    HML      = col_double(),
    RF       = col_double()
  ),
  comment = ""
) %>%
  filter(str_detect(Date_raw, "^\\d{8}$")) %>%
  mutate(
    Date = as.Date(Date_raw, "%Y%m%d"),
    across(Mkt_RF:RF, ~ .x / 100)
  ) %>%
  select(Date, Mkt_RF, RF)

# 3. Merge & compute excess returns
data <- pricesg %>%
  left_join(ff, by = "Date") %>%
  mutate(
    Excess_Return = Return - RF
  ) %>%
  drop_na(Mkt_RF, Excess_Return)

# 4. Helper functions
get_indices <- function(df, event_date, left, right) {
  t0 <- which(df$Date == event_date)
  if (!length(t0)) stop("Event date not found in data.")
  idx <- seq(t0 + left, t0 + right)
  idx[idx > 0 & idx <= nrow(df)]
}

calc_window <- function(df, event_date, win_vec) {
  est_idx   <- get_indices(df, event_date, -192, -1)
  event_idx <- get_indices(df, event_date,  win_vec[1], win_vec[2])

  est   <- df[est_idx, ]
  event <- df[event_idx, ]

  fit <- lm(Excess_Return ~ Mkt_RF, data = est)

  event <- event %>%
    mutate(
      Expected = predict(fit, newdata = event),
      AR       = Excess_Return - Expected,
      CAR      = cumsum(AR)
    )

  # Test for abnormal returns (AR)
  p_AR <- t.test(event$AR, mu = 0)$p.value

  # Manual t-test for final CAR
  n      <- nrow(event)
  sigma  <- sd(event$AR)
  se_CAR <- sigma * sqrt(n)
  t_car  <- tail(event$CAR, 1) / se_CAR
  p_CAR  <- 2 * pt(-abs(t_car), df = n - 1)

  list(data = event, p_AR = p_AR, p_CAR = p_CAR)
}

# 5. Define event date and windows
event_date <- as.Date("2024-12-31")

windows <- list(
  "35-day" = c(-30, 30),
  "25-day" = c(-25, 25),
  "10-day" = c(-10, 10),
  "5-day"  = c(-5, 5)
)

# 6. Run event-study for each window
resultsg <- lapply(windows, function(w) calc_window(data, event_date, w))

# 7. Print p-values for AR and CAR
for (nm in names(resultsg)) {
  cat("\n", nm,
      "\n   p-value AR  :", format(resultsg[[nm]]$p_AR,  digits = 4),
      "\n   p-value CAR :", format(resultsg[[nm]]$p_CAR, digits = 4))
}

# 8. Plot Cumulative Abnormal Return (±10 trading days)
ggplot(resultsg[["10-day"]]$data, aes(x = Date, y = CAR)) +
  geom_line() +
  geom_hline(yintercept = 0, linetype = "dashed") +
  labs(
    title = "Cumulative Abnormal Return (±10 trading days)",
    x     = "",
    y     = "CAR"
  )
```

Figure 4. Event Study Code

11.3 Average Daily Stock Returns for Green and Brown Companies Chart

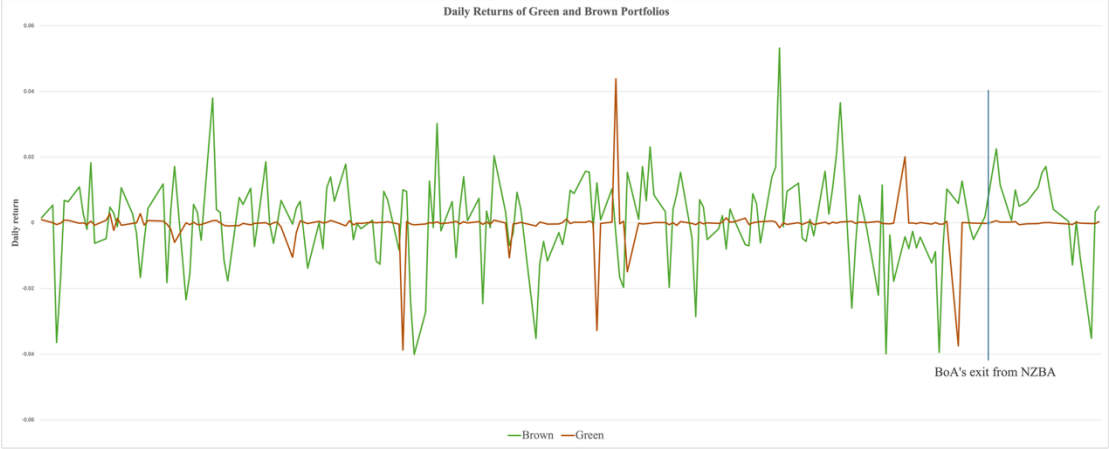

Figure 5. Average Daily Stock Returns for Green and Brown Companies