



An Event Study of the Impact of Negative ESG News on Stock Returns

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Abstract. Environmental, social and governance (ESG) has undergone heated discussion in recent years as the world is becoming more and more conscious about the impact of climate change and the urgent need to address this problem. ESG has profound effects on many sectors; the financial industry is particularly affected by it. The development of data analysis software enables this research to examine the relationship between negative ESG news and stock return. Applying the event study methodology, we analysed how stock returns of H&M, Tegen Group, Amazon, and Volkswagen reacted to different ESG news by using Stata to do simple linear regression analysis and establish the model. The preliminary results show that some stocks react significantly to negative ESG news, but some do not. One possible implication of this is that the extent to which negative ESG news influences stock return depends on many factors, such as company capitalisation, industry, and geographical location.

Keywords: Simple Linear Regression Analysis · Event study · ESG news · stock return

1 Introduction

The business world has become increasingly more conscious about environmental, social and governance (ESG) issues. For example, in the early 1990s, no more than 20 listed companies included ESG data in their reports, which had increased to nearly 6000 by 2014 [1]. Also, ESG considerations are gradually gaining significance as an impetus for financial investments [2]. About 30 trillion USD was invested using ESG criteria by the end of 2018 [2].

Given the substance of ESG-driven investments, investors need to evaluate the impact of ESG news, a kind of non-financial information, to make sensible investment decisions. Unfortunately, related studies are scarce; furthermore, their authors disagree. Thus, this event study examines whether negative ESG significantly impacts firms' stock return. In this study, we investigate four stock returns' reactions to four different negative ESG news. Using a standard event study methodology, we reach results showing that adverse developments do not necessarily significantly impact stock return. This somewhat contradictory result may be due to other factors, such as company capitalisation and geological location.

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2 Literature Review and Hypothesis Development

Numerous research has evidenced new information disclosure that can affect stock return [3–8]. Although a growing number of these research focus on ESG news and events in recent years, related research is scarce.

Several studies support that firms' ESG performance significantly impacts stakeholders' investment decision-making [9, 10]. In another sense, ESG news contains new information regarding firms' ESG performance. So, it could influence investors' valuation of the firms and investment behaviour [2, 11–14].

Besides the general conclusion, some authors find other factors that could determine how significant the impact of ESG news is. Smaller and less liquid firms are more susceptible to negative ESG news [12]. This finding aligns with extant literature concluding that this kind of firm is more likely to experience changes in stock prices [15–18]. Firms in specific industries (candy & soda, steel works, banking, and insurance) are significantly affected by negative ESG news, but those in the 'sin' triumvirate are not [12].

There are controversies among the authors regarding how much ESG reputation influences the extent to which a firm's stock return is impacted. For example, Capelle-Blancard and Petit [11] argue that Investors mainly react to negative ESG news. This argument complies with Wong and Zhang [12]. However, de Vincentiis [2] gives another result: investors interpret ESG news differently in different geographical regions. For example, European investors care more about bad news, while their American counterparts care more about good news. Furthermore, Capelle-Blancard and Petit [11] and Li [19] conclude that firms with good ESG reputation are less susceptible to ESG news, while de Vincentiis [2] holds that this kind of firms shows enhanced impact of ESG news.

This paper evaluates whether the four selected adverse ESG events negatively affect the companies' stock return. Thus, we propose our hypothesis:

H₀: Negative ESG events do not cause significant extra-return in stocks.

3 Methodology and Data

The primary interest of this paper is to determine whether Negative ESG news will bring negative extra-return for stocks. Therefore, we use the event study methodology pioneered by Fama, Fisher, Jensen and Roll [4] to study the impact of negative ESG news on stock return. This methodology is widely applied to measure how new public information affects investors' investment behaviour, influencing stock return. The underlying theory is the efficient market hypothesis proposed by Fama [20], who says, "security prices at any given time fully reflect all available information".

In applying the event study methodology, we conducted the study in the following structure laid out in Linton [21]:

First, we select four events of disclosure of negative ESG news:

1. H&M Group: On Sep 13th, 2022, Netherlands' Authority for Consumers and Markets (ACM) published on its website that H&M admitted its greenwashing deeds and that H&M would donate 500,000 euros to sustainability causes.

2. Tagen Group: On Oct 19th, 2022, Tagen Group, a construction company in China, was fined 20,000 RMB by the Shenzhen Ecology and Environment Administration for incompliance with the Atmospheric Pollution Prevention and Control Law of the PRC.
3. Amazon: On Sep 20th, 2019, more than 3000 Amazon employees and other tech workers walked out in Seattle, protesting the company's inaction on climate change.
4. Volkswagen: On Sep 18th, 2015, the US Environmental Protection Agency (EPA) Issued a Notice of Violation (NOV) of the Clean Air Act to Volkswagen. The NOV Alleges that Some Volkswagen and Audi Diesel Cars from Model years 2009–2015 Include Software that Circumvents EPA Emissions Standards for Certain Air Pollutants.

We use daily stock price data for this study because stock prices react immediately to the events, according to EMH. Data used in this study come from Yahoo Finance and Investing. Next, we choose the event window and estimation window. The event window varies from $[-5, +5]$ days to $[-40, +40]$ days around the event and the estimation window is about $[-400, -40]$ days to the event.

Second, using t from the estimation window, we calculate stock and market returns by their daily adjusted close price.

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (1)$$

Then, we estimate the market model using daily stock return and daily market return:

$$R_{it} = \alpha + \beta R_{mt} + \varepsilon_t \quad (2)$$

$$\text{Var}(\varepsilon_t) = \sigma^2 \quad (3)$$

where:

R_{it} = return for stock i on day t

α = idiosyncratic return of stock

β = systematic risk of stock

R_{mt} = market return on day t (measured by market index)

ε_t = residual

This model controls for the normal relation between the stock return and the market return, so we have predictions for the return of the stocks.

Third, using t from the event window with E days in total, we calculate the Abnormal Return (AR) in the event window, then add AR up for Cumulative Abnormal Return (CAR).

$$AR_{it} = R_{it} - (\alpha + \beta R_{mt}), t = 1, \dots, E \quad (4)$$

$$CAR_i(t) = \sum_{s=1}^t AR_{is}, t = 1, \dots, E \quad (5)$$

AR is the realised return minus the estimated return, without the effect of events of interest, if any. CAR is the sum of AR in the event window.

Finally, we do a robustness check in three ways to rule out biases and make the study more convincing.

Two-sided α -level test:

Under the null hypothesis of no effect:

$$AR_{it} = \varepsilon_t \sim N(0, \sigma^2), \quad t = 1, \dots, E \quad (6)$$

$$CAR_i(t) = \sum_{s=1}^t \varepsilon_s \sim N(0, t\sigma^2), \quad t = 1, \dots, E \quad (7)$$

So, we compare AR_{it} with $\pm z_{\alpha/2}\sigma$, and CAR_i with $\pm z_{\alpha/2}\sigma\sqrt{t}$ to determine whether the event has a significant effect on stock return.

Estimation windows with different lengths:

We try to estimate the market model with four different estimation windows for the Amazon event to see if the results are consistent.

Different market indexes as the market return:

For the Tagen Group event, we estimate two market models with different market indexes for surety for surety.

4 Empirical Analysis

The data of each of the four companies' daily stock price and stock exchange indices are the basis of this study. The data used in this article is collected from Yahoo Finance and Investing. We collected a total of 3734 records (date, volume, close price, adjusted close price) of H&M, Tagen Group, Amazon, and Volkswagen and five stock exchange indices. By using the Stata software, the data are analysed by simple linear regression analysis. Then the model established by the analysis is used to calculate cumulative abnormal return. The results are as follows.

4.1 H&M

In this case, the market return is measured by OMX Stockholm 30 Index as this index is a good representative for the market portfolio in Stockholm Stock Exchange, on which

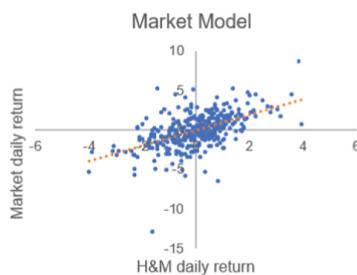


Fig. 1. H&M market model

Table 1. Statistics Summary 1

Days around event	AR	CAR	95% CI
-10	-1.256	-1.256	± 3.384
-9	0.848	-0.408	± 4.786
-8	1.508	1.100	± 5.862
-7	-0.076	1.024	± 6.769
-6	0.625	1.649	± 7.568
-5	1.176	2.825	± 8.290
-4	-1.994	0.831	± 8.954
-3	-1.907	-1.075	± 9.573
-2	1.289	0.214	± 10.153
-1	2.631	2.845	± 10.703
0	-2.049	0.796	± 11.225
1	1.653	2.449	± 11.724
2	-4.448	-1.999	± 12.203
3	2.234	0.235	± 12.664
4	1.433	1.668	± 13.108
5	-1.697	-0.028	± 13.538
6	-0.109	-0.137	± 13.955
7	1.424	1.287	± 14.359
8	-1.613	-0.326	± 14.753
9	0.594	0.267	± 15.136
10	1.012	1.280	± 15.510

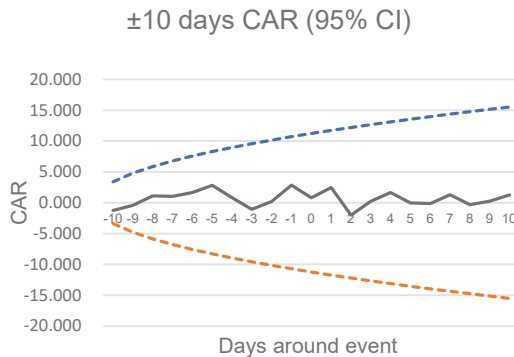


Fig. 2. H&M Event ± 10 Days CAR

H&M is listed. The estimation window is 400 trading days from 2021/1/5 to 2022/8/5. The event date is 2022/9/13.

From the regression, we get the following (Fig. 1):

$$R_{it} = -0.0487 + 0.982R_{mt}, R^2 = 0.3012, \sigma^2 = 2.9818 \quad (8)$$

Then, we calculate the 95% Confidence Interval, $[-15.51, 15.51]$, and draw a graph of ± 10 days CAR (Fig. 2). The CAR fluctuates around 0 and is insignificant. Table 1 shows the results.

There are several possible interpretations for this insignificant result. First, the ACM published the news on its website on Sep 13th, 2022. However, the investigation lasted for over a year. Therefore, it could be the case that investors recognised H&M's dubiousness in greenwashing issues; the stock price could have already reflected this information. Second, H&M donated 500,000 euros to sustainability causes immediately after its greenwashing issues were disclosed by the ACM. This positive news of this donation may offset the impact brought by the bad news.

Additionally, better ESG evaluation results of listed companies by Bloomberg and MSCI correlate with a lower stock price crash risk [19]. In other words, these companies are less impacted by negative ESG news. With an AA-level ESG rating by MSCI, H&M is among these companies. So, the company might suffer a mitigated impact from negative ESG news.

4.2 Tagen Group

In this case, the market return is measured by SZSE Component Index (399001.SZ) because this index is a good representative of the market portfolio in the Shenzhen Stock Exchange, on which Tagen Group is listed. The estimation window is 340 trading days from 2021/03/24 to 2022/08/15. The event date is 2022/10/19.

From the regression, we get the following (Fig. 3):

$$R_{it} = 0.0024 + 0.5234R_{mt}, R^2 = 0.1031, \sigma^2 = 4.1974 \quad (9)$$

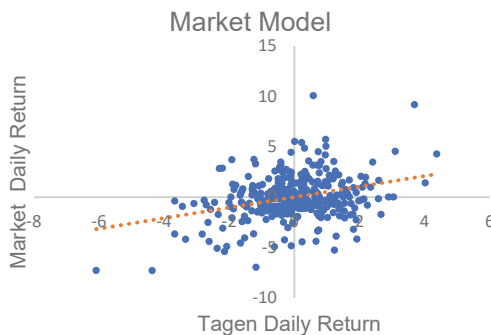


Fig. 3. Tagen Group market model (399001.SZ)

Then we draw a graph of ± 5 days CAR (Fig. 4). The CAR shows a decreasing trend after the event date and drops below the lower limit on a 90% confidence interval. Table 2 provides the ARs, CARs and limits on a 90% confidence interval.

Next, we estimate a market model with an index representing both Shanghai Stock Exchange and Shenzhen Stock Exchange, CSI 300 Index (000300.SS).

From the regression, we get the following (Fig. 5):

$$R_{it} = 0.0197 + 0.6081R_{mt}, R^2 = 0.1045, \sigma^2 = 4.1908 \quad (10)$$

Then, we draw a graph of ± 5 days CAR (Fig. 6). The CAR shows a decreasing trend similar to Fig. 4 but does not drop below the lower limit. Table 3 displays the ARs, CARs and limits on a 90% confidence interval.

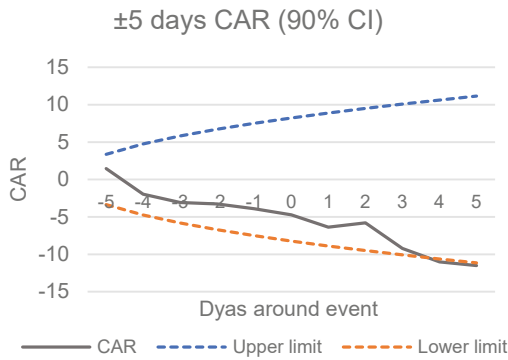


Fig. 4. Tagen Group Event ± 5 days CAR

Table 2. Statistics Summary 2

Days around event	AR	CAR	90% CI
-5	2.162	2.162	± 3.357
-4	-3.389	-1.227	± 4.748
-3	-1.104	-2.331	5.815
-2	0.059	-2.272	± 6.715
-1	-0.421	-2.693	± 7.507
0	-0.729	-3.421	± 8.224
1	-1.654	-5.075	± 8.883
2	0.586	-4.489	± 9.496
3	-2.610	-7.099	± 10.072
4	-2.151	-9.249	± 10.617
5	0.065	-9.184	± 11.135

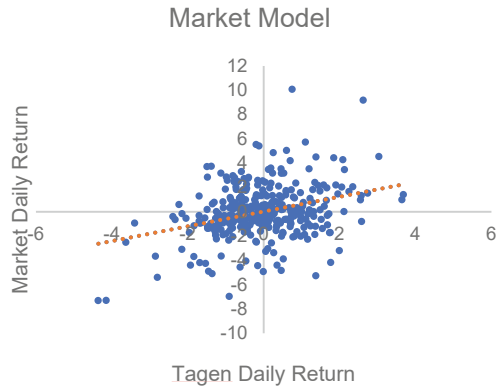


Fig. 5. Tagen Group market model (000300.SS)

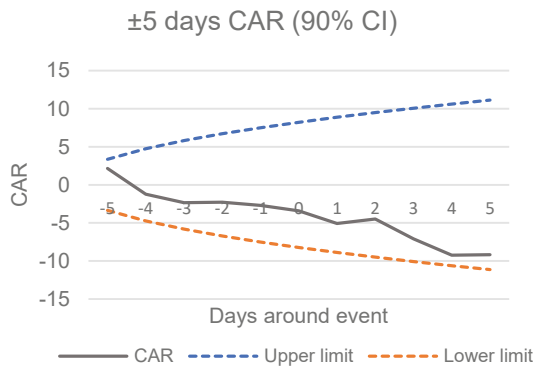


Fig. 6. Tagen Group Event ± 5 days CAR

Figure 4 and Fig. 6 are similar, but Fig. 4 illustrates a slightly more significant result. This disparity is explicable by a better representation of the market portfolio by the SZSE Component Index.

This news was published on the Shenzhen Ecology and Environment Administration's website but not widely covered by the media. So, it seems like inconsequential news, yet it still significantly affected Tagen Group's stock return. This result could be explained by Wong and Zhang [12], that smaller and less liquid firms are more susceptible to negative ESG news. The market capitalisation of Tagen Group is about 15.2 billion USD; thus, it's a relatively small company.

4.3 Amazon

In this case, the market return is measured by the NASDAQ Composite as Amazon on NASDAQ. The estimation window is 400 trading days from 2018/1/3 to 2019/8/6. The event date is 2019/9/20.

Table 3. Statistics Summary 3

Days around event	AR	CAR	90% CI
-5	1.457	1.457	± 3.36
-4	-3.414	-1.957	± 4.752
-3	-1.127	-3.084	± 5.82
-2	-0.193	-3.277	± 6.72
-1	-0.640	-3.917	± 7.513
0	-0.814	-4.731	± 8.23
1	-1.649	-6.379	± 8.89
2	0.579	-5.801	± 9.503
3	-3.407	-9.208	± 10.08
4	-1.798	-11.006	± 10.625
5	-0.497	-11.503	± 11.144

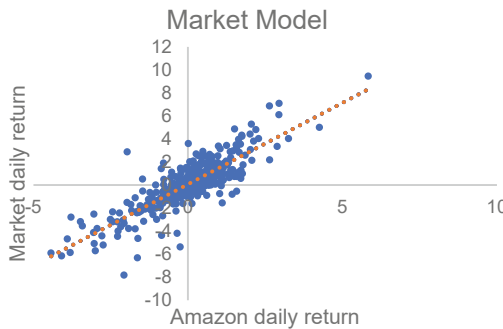


Fig. 7. Amazon market model

From the regression, we get the following (Fig. 7):

$$R_{it} = 0.0731 + 1.4137R_{mt}, R^2 = 0.6212, \sigma^2 = 1.2334 \tag{11}$$

Then we draw a graph of ± 5 days CAR (Fig. 8). There is a slight downward trend, but the CAR goes below the lower limit. Also, we chose several different estimation windows and did a linear regression and test. Table 4 shows the results.

According to Table 5, the results are insignificant in whatever estimation window we choose. Thus, we can conclude that the protest did not significantly impact Amazon’s stock return.

For a company of this magnitude, myriad updates about the company circulate daily, making it difficult to rule out the impact of news that is not of interest. For example, Jeff Bezos, CEO of Amazon, pledged to buy 100,000 electric-powered delivery trucks the day before the protest. This news might have mitigated the negative impact brought by the protest.

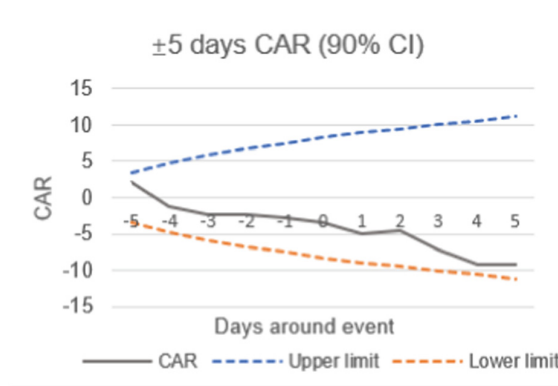


Fig. 8. Amazon Event ± 5 days CAR

Table 4. Statistics Summary 4

Days around event	AR	CAR	95% CI
-5	-1.384	0.006	± 2.177
-4	0.176	-1.378	± 3.078
-3	-0.203	-1.202	± 3.770
-2	0.054	-1.405	± 4.354
-1	-0.445	-1.351	± 4.867
0	-0.476	-1.796	± 5.332
1	-0.444	-2.272	± 5.759
2	-0.024	-2.716	± 6.157
3	-0.864	-2.740	± 6.530
4	0.706	-3.604	± 6.884
5	-1.384	-2.898	± 7.220

Table 5. Statistics Summary for different estimation window

Estimation Window	Trading days	α	β	σ^2	R^2	± 5 days CAR	95% CI
2018/1/3–2019/8/6	400	0.0731	1.4137	1.2334	0.6212	-2.898	± 7.2195
2017/8/10–2019/8/6	500	0.0699	1.4372	1.2819	0.6724	-2.8005	± 7.36
2017/3/20–2019/8/66	600	0.0657	1.4199	1.1826	0.6585	-2.8047	± 7.0692

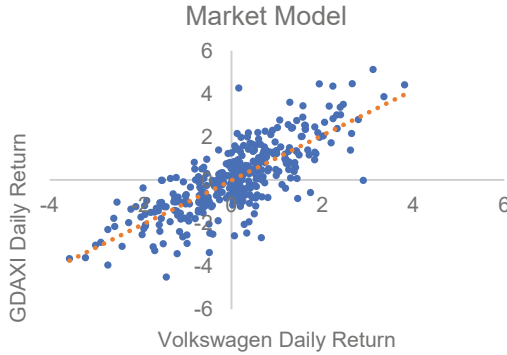


Fig. 9. Volkswagen market model

4.4 Volkswagen

In this case, the market return is measured by DAX PERFORMANCE-INDEX because this index is a good representative of the market portfolio in the Frankfurt Stock Exchange, where Volkswagen is listed. The estimation window is 357 trading days from 2014/3/11 to 2015/8/10. The event date is 2015/9/18.

From the regression, we get the following (Fig. 9):

$$R_{it} = -0.0193 + 1.0467R_{mt}, R^2 = 0.6114, \sigma^2 = 0.9638 \tag{12}$$

Then we draw a graph of ± 5 days CAR (Fig. 10) and a graph of ± 10 days CAR (Fig. 11). From both figures, we can observe that immediately after the news breaks, the CAR drops below the lower limit of 99% confidence interval. Thus, we can reject H_0 on a 99% confidence interval. Table 6 and Table 7 show the results of the two regressions, respectively.

This news spread explosively worldwide and became one of the most profound corporate scandals, usually called the “Volkswagen emissions scandal”. Volkswagen paid a heavy price for the mismanagement of company leaders. The results comply

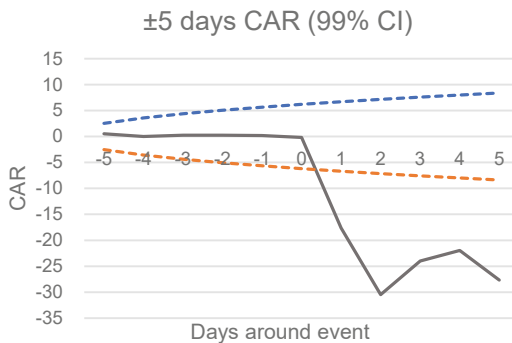


Fig. 10. Volkswagen Event ± 5 days CAR

Table 6. Statistical Summary 6

Days around event	AR	CAR	99% CI
-5	0.520	0.520	± 2.529
-4	-0.516	0.004	± 3.576
-3	0.252	0.257	± 4.380
-2	0.007	0.264	± 5.058
-1	-0.065	0.199	± 5.655
0	-0.388	-0.189	± 6.195
1	-17.459	-17.647	± 6.691
2	-12.834	-30.481	± 7.153
3	6.485	-23.997	± 7.587
4	2.034	-21.963	± 7.997
5	-5.695	-27.658	± 8.388

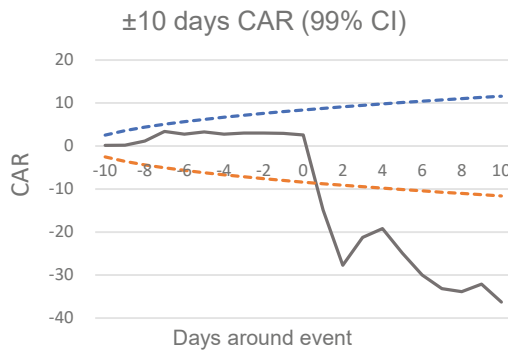


Fig. 11. Volkswagen Event ± 10 days CAR

Table 7. Statistical Summary 7

Days around event	AR	CAR	99% CI
-10	0.151	0.151	± 2.529
-9	0.034	0.185	± 3.576
-8	0.971	1.156	± 4.380
-7	2.235	3.391	± 5.058
-6	-0.631	2.760	± 5.655

(continued)

Table 7. (continued)

Days around event	AR	CAR	99% CI
-5	0.520	3.280	± 6.195
-4	-0.516	2.764	± 6.691
-3	0.252	3.016	± 7.153
-2	0.007	3.024	± 7.587
-1	-0.065	2.959	± 7.997
0	-0.388	2.571	± 8.388
1	-17.459	-14.888	± 8.760
2	-12.834	-27.722	± 9.118
3	6.485	-21.237	± 9.462
4	2.034	-19.203	± 9.795
5	-5.695	-24.898	± 10.116
6	-5.079	-29.977	± 10.427
7	-3.163	-33.140	± 10.729
8	-0.710	-33.850	± 11.023
9	1.753	-32.097	± 11.310
10	-4.176	-36.273	± 11.589

with our common sense that negative news with this far of a reach probably will cause significant impacts.

5 Conclusion

Simple linear regression analysis of these four events is used to predict the economic model. The development of computer technologies has enabled the advancement of statistical software such as Stata and made it possible to do complicated modelling and data visualization. The results show that in some cases, negative ESG news significantly negatively affects stock return, but not always. Moreover, there are a few possible explanations for our results if we look back into the extant literature. Factors including company's geographical location, industry, ESG reputation, and capitalisation can affect how susceptible a company is to negative ESG news. So, we took these factors into account for better explanations.

In conclusion, not all ESG revelations significantly affect companies' stock prices. Companies' market capitalisation, geological location, and the extent of the event are possible factors that could determine whether negative ESG news significantly affects a company's stock return.

This paper outlines both limitations and inspirations for further research. Several lines of inquiry can improve these results. First, this study investigates four single events as case studies, providing a small dataset. Future studies can focus on a larger group

of similar events to evaluate the overall impact of negative ESG news on stock return. Second, other factors, such as firm risk, board characteristics, shareholder structure, etc., can potentially influence how the news affects some stock returns. Investigations into these factors could reveal worthwhile findings.

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