



MASTER THESIS

ACQUIROR MARKET PERFORMANCE AND RETAIL INVESTOR REACTIONS FOLLOWING M&A ANNOUNCEMENT: THE ROLE OF TARGET ESG SCORES

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29 JUNE 2025



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1. Introduction

In recent years, there has been an increase in attention to concepts such as sustainability when it comes to global business (Nosratabadi et al., 2019). ESG (Environmental, Social, and Governance) considerations have become an integral part of corporate strategies, influencing various aspects of decision-making, including investment policies, risk management, and stakeholder relations. Companies are increasingly incorporating ESG factors into their operations to ensure long-term value creation, regulatory compliance, and reputational benefits. Moreover, ESG considerations play a critical role in financial decision-making, as investors and analysts assess firms based on their sustainability performance.

Given the growing importance of ESG across multiple business dimensions, its role in corporate transactions, particularly in M&A deals, has gained significant attention. The dimensions regarding ESG matters could help managers in their decision-making process during an M&A deal. With the rise of a greater interest in ESG scores, these scores have become a critical factor in the M&A process, as they indicate how stakeholders perceive companies' sustainable actions (Franklin, 2019). Galpin and de Vibe (2024) emphasize the importance of ESG scores, showing that companies that ignore ESG considerations during M&A processes risk not only losing potential value but also damaging their corporate reputation. Baratta et al. (2023) strengthen this by highlighting the growing corporate interest in aligning with the United Nations' Sustainable Development Goals (SDGs) for 2030.

Alongside the growth of interest in ESG scores and the increase in the average value per M&A deal¹. Another emerging phenomenon within the field of investing is the expanding role of retail investors. Avalos and Aramonte (2021) illustrate this shift, showing a notable increase in retail trading activity from 2006 to 2021. Retail investors are often influenced by non-fundamental factors, such as social media sentiment or trading news. Historically, this phenomenon emerged in early 2021, when retail investors responded to certain social media messages. For instance, the value of a company temporarily increased fivefold as investors misinterpreted a social media message as an endorsement of its stock (Avalos & Aramonte, 2021).

In short, these simultaneous developments (the growing importance of ESG, the rising value and frequency of M&A deals, and the increasing participation of retail investors) create a timely and relevant context for exploring how these factors interact.

Over the past decades, various studies have examined ESG and M&A. The existing knowledge provides a better understanding of these concepts and their relationship. In practice, businesses increasingly emphasize sustainability. This rising importance may be attributed to the growing awareness of the negative impacts of traditional capitalism, such as social problems and global climate issues (Edelman, 2020; Gillan et al., 2010). Furthermore, firms exhibit distinct characteristics in ESG implementation. Larger firms tend to score better on ESG factors, and the industrial sector receives the most attention for ESG practices (Baratta et al., 2023; Drempetic et al., 2020). Research shows that firms with high ESG scores tend to exhibit better financial performance than those with lower scores.

¹ Statista. (Mar 27, 2024). *Value of mergers and acquisition (M&A) transactions worldwide from 1985 to April 2023*. Statista Research Department. <https://www.statista.com/statistics/267369/volume-of-mergers-and-acquisitions-worldwide/#:~:text=The%20value%20of%20M%26A%20deals,to%203.4%20trillion%20U.S.%20dollars>.

² Statista. (May 8, 2024). *Number of merger and acquisition (M&A) transactions worldwide from 1985 to April 2024*. <https://www.statista.com/statistics/267368/number-of-mergers-and-acquisitions-worldwide-since-2005/#:~:text=Volume%20of%20M%26A%20deals%20globally%201985%2D2024&text=In%202023%2C%20nearly%2040%2C000%20merger,a%20decrease%20compared%20to%202021>.

In practice, this translates into outcomes such as better credit ratings and higher firm valuations (Aydoğmuş et al., 2022; Kim & Li, 2021). However, despite the positive impact of a high ESG score, research shows that ESG factors relate to certain risks. Firms with higher ESG scores generally have a lower cost of capital but also face lower returns (Cornell, 2021). The environmental and social pillars pose the highest risk. (Cohen, 2023) discusses that firms should pay attention to these factors to mitigate risk. Until now, existing knowledge has provided a clearer understanding of ESG and M&A concepts individually, but what is the relationship or impact of ESG within M&A? Various studies examine sustainability (often measured by ESG) in the context of M&A. The overall literature review suggests a positive relationship. Firms tend to perform better when their ESG scores are high. M&A does not seem to alter this dynamic, as evidence shows that acquirors perform better after acquiring a target company with a higher ESG score (Kim et al., 2022; Zheng et al., 2023). Furthermore, research indicates no significant differences in performance outcomes between domestic and cross-border M&A deals. Other studies analyse the effect of ESG on firm value. In modern business, higher ESG scores translate into higher market value and greater premiums paid by acquirors (Hussaini et al., 2021; Tampakoudis & Anagnostopoulou, 2020). Current knowledge also indicates that ESG scores significantly influence M&A deal probabilities. Firms with low environmental scores are less likely to be involved in takeovers, whether as acquirors or targets, and acquirors tend to avoid companies with lower reputations. The long-term impact of sustainability factors is more pronounced due to the complexities of integrating a sustainable corporate culture (Boone & Uysal, 2020; Caiazza et al., 2021; Gillan & Wei, 2020). From a market perspective, research shows a positive relationship (Engelhardt et al., 2021). However, Rzeźnik et al. (2022) add that a difference exists between retail and institutional investors, as retail investors appear less sophisticated and more vulnerable to misinterpreting ESG scores. Among ESG pillars, the social pillar is the most crucial for post-merger performance, having nearly twice the impact of the environmental and governance pillars (Caiazza et al., 2021).

While these findings indicate a positive relationship, contradictory outcomes emerge in other studies. For example, Feng (2021) examines ESG's role in acquirors' performance changes after M&A deals. The study finds that a target's ESG score negatively impacts the acquiror's return on investment. This finding aligns with later research by Jost et al. (2022), which finds that acquirors' CSR (measured by ESG factors) performance does not significantly impact M&A premia.

In the final part of the literature review, a third concept is analysed. While many studies examine ESG in M&A, little is known about the perspective of retail investors regarding ESG in M&A. Despite the limited studies incorporating retail investors' perspectives, some research provides insight into this concept. Existing knowledge suggests that retail investors prioritize the social pillar and mainly care about firms' social performance when investing. In practice, this preference translates into retail investors being willing to pay premiums or accept lower returns in exchange for impactful social performance. However, retail investors only make these trade-offs if they believe ESG implementation will improve financial performance (Isaksson & Mathews, 2023; Li et al., 2024; Siemroth & Hornuf, 2023). Thus, ESG-focused investments are not purely ESG-driven but also financially motivated. Despite some studies suggesting that retail investors care about ESG factors, others show contradictions. Moss et al. (2020) examine the irrelevance of ESG disclosure to retail investors. Their study, using the Robinhood database, finds that retail investors do not significantly alter their portfolios after ESG news disclosures. Furthermore, retail investors tend to follow their routine trading adjustments rather than respond specifically to ESG news.

Prior research has examined the relationship between ESG and M&A. However, while most research shows a significant positive relationship, contradictory findings also exist. This underscores the need for more comprehensive research to build stronger evidence on this relationship, as there is no unanimous outcome. Furthermore, the existing literature does not thoroughly explore retail investors' trading behaviour in relation to specific M&A deals. Although various studies analyse how ESG

factors impact retail investors, little to no research examines their trading behaviour in response to M&A. This notable gap needs to be addressed to extend knowledge on how retail investors behave concerning what they perceive as important.

To bridge the gap in the existing literature, this study formulates a twofold research question: How does the acquisition of a target company influence the acquiror's market performance around the announcement, and what is its impact on retail investors' trading behaviour?

2. Literature review

2.1 ESG factors in practice

ESG is the abbreviation of Environmental, Social and Governance ³. These dimensions could be used in order to look at a company's behaviours and policies. Environmental aspects of a company include its contributions to the environment. Examples of the range of this dimension are for example climate policies, energy use and the usage of waste. The social facets concern both the internal and external stakeholders of a company. A possible focus point regarding internal stakeholders is if the company provides a safe and healthy workplace for employees. On the other hand, with regard to external stakeholders, a possible focus point could be in the field of a company's contributions in for example charity plans. At last, the governance aspects focus on the systems and processes which the company uses as guidance. Focus points within this area could be the size of transparency, integrity or diversity in a company's management ⁴.

Over the past two decades, attention to ESG dimensions has increased in popularity (Gillan et al., 2010). From a survey in 2020, it was agreed that people think that capitalism, as it is known in today's businesses, does more harm than good in the world (Edelman, 2020). The harm translates itself to Environmental, Social or Governmental issues such as climate change or poverty (Arvidsson & Dumay, 2022). The urge to make more green investments reflects to the choices of investment funds. By looking at the investment portfolio of BlackRock, it can be seen that there has been a shift in strategy. The "new" strategy focuses more on sustainable investments. Besides the reason to invest in more green companies, investors recognize that a risk on one of the ESG factors equals risk on the investment⁵ (Edelman, 2020). The increase in awareness of the impact of businesses on, for example, the environment, is one of the causes investors nowadays seek more ESG performance information (Arvidsson & Dumay, 2022).

Several studies have examined how firm characteristics influence ESG scores. Drempetic et al. (2020) find that larger firms tend to score higher on ESG metrics due to greater resources and scalability. However, as Gold and Heikkurinen (2018) argue, transparency in ESG reporting does not always equate to better sustainability performance. Industry also plays a significant role, with certain sectors attracting more ESG scrutiny than others (Baratta et al., 2023). Appendix I shows the table that formed the basis for the ESG scores per industry ⁶.

Various empirical research show the relationship between ESG factors and the impact on businesses. Kim and Li (2021) find a positive and significant relationship between ESG factors and a firm's financial performance and also on their credit rating. This can be interpreted as firms perform better and receive a better credit rating when their ESG factors are good. However, the positive relationship, the split regression analysis shows variance in different variables. The researchers mention that the effect is influenced by the different ESG categories, strengths and weaknesses and firm size. For future

³ Nordea. (16-10-2023). *What is ESG?* Nordea. <https://www.nordea.com/en/news/what-is-esg#:~:text=ESG%20%E2%80%93%20Environmental%2C%20Social%20and%20Governance,services%20contribute%20to%20sustainable%20development>.

⁴ Investopedia. (March 21, 2-24). *What impact is your investment making?* Investopedia. <https://www.investopedia.com/terms/e/environmental-social-and-governance-esg-criteria.asp#:~:text=ESG%20stands%20for%20environmental%2C%20social,a%20company%20safeguards%20the%20environment>.

⁵ Fink, L. (2020). *A Fundamental Reshaping of Finance*. <https://www.blackrock.com/americas-offshore/en/larry-fink-ceo-letter>

⁶ Hoang, T. H. V., Przychodzen, W., Przychodzen, J., & Segbotangni, E. A. (2020). Does it pay to be green? A disaggregated analysis of US firms with green patents. *Business Strategy and the Environment*, 29(3), 1331-1361.

analysts, it is recommended to add more information with another dataset to extend the findings to new literature and the implementation of other market-based dependent variables, such as stock returns. When comparing these findings to the results of Aydoğmuş et al. (2022)'s study, there could be seen some overlap. Aydoğmuş et al. (2022) contribute to the existing knowledge that ESG factors (combined) also have a positive significant relationship with a firm's value. This can be interpreted as firms with better ESG scores being more valuable than those with lower ESG scores. From 2013 to 2021, cases were analysed in order to make conclusions about the relationship. During that period, there is both geopolitical as well as medical unrest, such as COVID-19, which causes volatility in markets. The positive relationship is also discussed and reflected in the study of Whelan et al. (2021). This research shows that investing in ESG tends to provide downside protection, especially in times of crisis. To extend the wide range of existing literature, Aydoğmuş et al. (2022) emphasize that they form a basis for future researchers to extend the results and suggest it might be interesting to study the causal relationship in why ESG triggers financial performance.

From an enterprise risk perspective, prior research consistently demonstrates a significant relationship between Environmental, Social, and Governance (ESG) factors and risk. In a 2020 study, Cornell (2021) examines the relationship between ESG preferences, risk, and return, highlighting that investors increasingly favour companies that perform well in sustainability, as such companies tend to benefit from lower capital costs. However, while the reduction in capital costs for firms with strong sustainability performance is advantageous, it is important to note that these firms typically exhibit lower returns. The majority of the risk associated with ESG performance is linked to the environmental and social pillars, a conclusion supported by (Cohen, 2023) study. Cohen's research, which analyses the ESG risks of firms in the S&P 500 and their impact on firm survival, underscores the need for companies to focus more on environmental and social issues, particularly in light of ongoing global climate and social challenges. It is noteworthy that the study's findings may be influenced by the period during which COVID-19 was present, a factor that could have affected the outcomes.

2.2 M&A in practice

Mergers and Acquisitions (M&A) undergo an increase in both the number of deals as well as the average value per deal⁷. M&A refers to the consolidation of a company's assets through a financial transaction between the acquiror company and the target company⁹. M&A deals involve two distinct forms. On the one hand, there are mergers. In a merger, at least two companies are merged (combined) together to form a new legal entity. On the other hand, there are acquisitions. In an acquisition, the acquiring firm takes over a target firm and gains control of more than 50% of the equity of the target firm (Piesse et al., 2022). In this paragraph, existing knowledge about M&A in practice is explained and interpreted.

Extensive research examines M&A in practice, starting with the different motives behind M&A deals.. The study conducted by Tamosiuniene and Duksaite (2009) reveals that a principal driver for undertaking a M&A deal, from the buyer's perspective, is the potential for growth that is anticipated upon acquiring a target company. Other motives in M&A are in the field of obtaining intangible assets (human capital or customer capital), the creation of synergies, and other financial motives. Because this study is outdated and only focuses on Lithuanian companies, the outcomes are compared to a similar study. The motives of both these studies are mostly in line with later research. For example, Piesse et al. (2022) names the possible motives of firms when choosing to undertake a M&A. A follow up study by Rani et al. (2020) uses the motives of Piesse et al. (2022) to study the effect of the long-term performance in M&A deals. Two event studies in which both the data of the acquiror and the target company are used in a regression analysis. The results indicate a higher significance level for M&A deals aimed at synergies compared to those driven by agency motives. Furthermore, they reveal a stronger positive effect of M&A motives on a firm's post-acquisition performance when the company demonstrates stronger firm-level governance.

Given the known impact of M&A deals and their motives, it is important to examine the factors that contribute to successful M&A transactions. Ai and Tan (2020) conduct multiple case studies to explore success factors in post-acquisitions. They emphasize the importance of social integration, where acquirors engage with the target company before the deal to foster a favourable atmosphere and encourage employees to transfer their knowledge. This reverse capability transfer serves as a key success factor in acquisitions. Wang (2023) further contributes to the understanding of M&A success factors. Based on real-world cases, the study highlights the pivotal role of financial stability, strategic alignment, cultural integration, and regulatory compliance in achieving successful M&A outcomes.

2.3 ESG factors in M&A deals and their market performance

To go back to the stage before an M&A deal might even happen, different studies have shown the relationship of ESG scores on the probability of a possible M&A deal and on which term this has an impact. With the increased importance of ESG scores in nowadays corporate investment decisions, the impact could be seen on deal probabilities (Gillan & Wei, 2020). In 2020, Boone and Uysal (2020) studied the relationship between environmental reputations and planning/structuring takeovers. The study found that firms with low scores on the environmental pillar are less likely to be involved in

⁷ Statista. (May 8, 2024). Number of merger and acquisition (M&A) transactions worldwide from 1985 to April 2024. <https://www.statista.com/statistics/267368/number-of-mergers-and-acquisitions-worldwide-since-2005/#:~:text=Volume%20of%20M%26A%20deals%20globally%201985%2D2024&text=In%202023%2C%20nearly%2040%2C000%20merger,a%20decrease%20compared%20to%202021.>

⁸ Statista. (Mar 27, 2024). *Value of mergers and acquisition (M&A) transactions worldwide from 1985 to April 2023*. Statista Research Department. <https://www.statista.com/statistics/267369/volume-of-mergers-and-acquisitions-worldwide/#:~:text=The%20value%20of%20M%26A%20deals,to%203.4%20trillion%20U.S.%20dollars.>

⁹ HAYES, A. (February 20, 2024). *Mergers and Acquisitions (M&A: Types, Structures, Valuations*. Investopedia. <https://www.investopedia.com/terms/m/mergersandacquisitions.asp#toc-types-of-mergers-and-acquisitions>

takeovers, either as acquirors or targets. Furthermore, acquirors are less likely to take over a company that scores lower on reputation than they do. The effect of these sustainability factors only have an influence on the long-term. A possible explanation for this is described in the paper of Caiazza et al. (2021). The study suggested that the short-term sustainability effects for the acquiror are negligible, since the complexity of the integration of the corporate sustainable culture. From the three ESG pillars, the pillar seems to be the most relevant for the performance of the post-merger. The analysis revealed that the social pillar had nearly twice the impact compared to the environmental and governance pillars.

Several researchers have explored the relationship between ESG factors and M&A deals. Not all have used the ESG factors as their independent variable. Instead, some studies examine corporate social responsibility (CSR) in M&A, with ESG factors serving as a proxy. For instance, Kim et al. (2022) examine the effect of ESG factors on the business performance of cross-border M&A. Their findings indicate a significant positive effect, suggesting that strong ESG engagement enhances business performance in cross-border deals. The study contributes to the existing literature by implementing the stakeholder theory. An interpretation of the support that was found for the positive role that ESG could play in the stakeholder theory is that engaging in ESG can serve as a tool to boost the efficiency in cross-border M&A. This approach helps protect the interests of all stakeholders and fosters a growing base of stakeholders.

A similar conclusion emerges in a study by Zheng et al. (2023), which demonstrates that an acquiror's ESG effort is paid back in the firm's M&A activity. In short, the finding of the study shows that acquirors with initial low ESG scores tend to have a significantly higher post-M&A performance when acquiring a target company with a higher ESG score. Both of these studies focus on the Asian market, whereas Kim et al. implemented cross-border deals, the study of Zheng limited its focus to the Chinese market.

Furthermore, Hussaini et al. (2021) shows a positive significant correlation between acquiror's Corporate Social Responsibility (CSR) performance and the premium paid in takeovers. The outcome suggests that acquirors that score well on CSR are more likely to pay premiums in takeovers. The measurement of CSR by the ESG factors makes the results relevant for this research. The findings mentioned earlier show similar outcomes in comparison to the study done by Tampakoudis and Anagnostopoulou (2020). They show that M&A deals have an effect on the performance related to ESG factors. Findings of the study suggest that the ESG score of the acquiror improves when it acquires a target with higher performance on ESG. Furthermore, the value of the company improves as well after the deal, since the improvements in ESG practices are noticed by investors, which eventually leads to a higher market value of the acquiror.

When solely focusing on the impact of an M&A deal on the acquiror's stock price, it seems like there is a limited number of studies which studied the effect on the stock price. However the limited amount of existing literature, Feng (2021) shows that there is no significant impact of ESG scores on the acquiror's stock price change and ROA before and after a deal was closed. The stock price change was measured by the acquiror's stock price change three months before and one month after a deal was announced. Besides, a short-term change was measured by analysing the stock price change one day before and one day after a deal was announced. Again, there is no evidence that ESG scores impact the acquiror's stock price change and ROA. This contradicts the findings of Salvi et al. (2018). Their findings prove that acquiring a firm with higher ESG scores (so-called "green targets") can increase the ROA of the acquiror. Feng (2021) mentions three possible explanations for the contradictory and non-significant outcome. Firstly, the contradictory findings could be due to the fact of data limitations. The study used a sample size of 124 deals, which might not be sufficient to come up with clear conclusions. Secondly, the influence of low and high ESG level acquirors might have influenced the

outcome, since both groups of acquirors might not be influenced in the same direction. At last, the use of different ESG proxies could have led to the contradictory outcomes. The study of Feng (2021) only uses the average ESG scores from the Thomsons Reuters' database.

A different approach to the effect of ESG scores' influence on stock returns is the study of Rzeźnik et al. (2022). Their study emphasizes ESG ratings could influence the stocks' return, but this impact is mainly due to the misinterpretation of retail investors. This conclusion was based on the analysis of different types of investors, such as retail investors and institutional investors. Retail investors tend to invest in stocks when they see an upgrade in the company's ESG rating and the other way around. This is because they have a misinterpretation of the relationship between ESG ratings and a firm's performance. This misinterpretation leads to different behaviour in comparison to, for example, more sophisticated investors, such as institutional investors. They make on average fewer adjustments to their portfolio in response to new ESG ratings (Rzeźnik et al., 2022). The influence of ESG on the abnormal returns of the stock prices is positively related. However, this positive finding, the researchers emphasise that the confusion about the ESG ratings can cause investors to trade wrongly. A certain higher abnormal return and lower stock volatility was also the conclusion based on an event study of the association between the ESG ratings and stock performance during COVID-19 (Engelhardt et al., 2021). The results of the study relate to evidence from the European market. Their findings are in line with the theoretical background of the study, which, for example, stated that firms with high CSR ratings tend to have higher stock performance. Previous studies show, there are differences between institutional investors and retail investors, there seem to be different outcomes across continents when it comes to the role of ESG factors on a firm's market performance. Pasquini-Descomps and Sahut (2014) show that news-based scores have a significant impact on the monthly stock performance of firms within the UK, while the results are not significant for the US and Switzerland.

In summary, the overall line of the relationship between ESG factors and M&A performance is positive. The existing studies provide stable outcomes in which the acquiror's performance is positively impacted after the acquisition of a target firm that scores higher on sustainability (measured by the ESG factors). Furthermore, it seems that there is also a positive impact on the market performance, since a higher abnormal return and lower stock volatility were the outcome of an earlier study. The only surprising contradiction was the outcome related to the acquiror's ROA and stock price return.

The existing studies examine the relationship between ESG factors in M&A activities. The overall line of the outcomes is that nowadays sustainability scores of a firm play a role in the probability of closing a deal. Companies tend to focus mostly on the social pillar when considering a merger or acquisition.

2.4 ESG factors, M&A and retail investors

Until now, the literature review has focused solely on the relationship and impact of ESG factors in M&A deals. This paragraph examines existing studies that also consider retail investors as a third variable. However, research on the potential relationship between ESG factors, M&A deals, and retail investors' trading behaviour remains limited.

Although few studies examine whether retail investors tend to invest in companies based on ESG preferences, some research aligns with this perspective. For example, Bazrafshan (2023) investigates the role of ESG rankings in the trading behaviour of retail and institutional investors. The findings indicate that textual reporting of ESG information has no significant effect on retail investors' trading activity. However, a more simplified version of ESG information does influence their trading behaviour. Similarly, Pelster et al. (2024) analyse the effect of ESG on retail investors' trading activities. Their study finds that the COP21 climate agreement in Paris (2021) positively impacts retail investors' engagement with ESG-related social media content and their ESG investments. A significant majority of retail investors in the sample who valued ESG held portfolios with higher investment-weighted ESG ratings.

Isaksson and Mathews (2023) compare institutional and retail investors regarding CSR preferences. Their analysis reveals a significant impact of the social (S) pillar on retail investors, suggesting that they primarily focus on a firm's social performance. Other studies further explore retail investors' perspectives, behaviour, and decision-making. Siemroth and Hornuf (2023) investigate why retail investors choose green investments through a lab-in-the-field experiment with 399 respondents. Their results show that most investors are willing to sacrifice higher returns if the environmental or social impact is sufficiently large. Additionally, those prioritizing environmental impact tend to invest more in green projects, indicating a positive outlook for sustainable investments. Li et al. (2024) report similar findings, showing that retail investors consider ESG factors when they believe these will affect a company's financial performance. Despite these insights, Rzeźnik et al. (2022) highlight a high potential for misinterpreting ESG ratings, particularly among retail investors, who are generally less sophisticated than institutional investors.

Surprisingly, studies by Moss et al. (2020) and Bazrafshan (2023) present contradictory findings. Their results suggest that retail investors do not react to ESG news disclosures. By analysing retail investors' decisions following ESG news and regular announcements, they find no significant portfolio adjustments beyond routine trading behaviour. While ESG information appears to influence institutional investors' trading decisions, it does not significantly impact retail investors' trading activity. However, simplifying ESG information may encourage greater engagement from retail investors.

The gap in the literature regarding the influence of ESG scores on retail investors' trading behaviour makes it challenging to base hypotheses on prior research that has not directly addressed this topic. Furthermore, existing studies offer conflicting results on the role of ESG in shaping investor behaviour. This study seeks to expand understanding by analysing the impact of target ESG scores on retail investors' trading behaviour, measured through Normalized Abnormal Trading Volume (Bajo, 2010).

2.5 Theoretical discussion

In this section of the literature review, various theories are further explained in the context of this study. In the first section of the literature review Rani et al. (2020) conclude that the agency's motives were one of the elements of his findings. They use the agency theory to analyse whether a certain M&A deal was completed to maximize the company's value or for personal interests. Speaking in terms of the relationship between M&A and ESG scores, the agency theory possibly could play a role. This is since the agency theory is connected to a possible situation where the agent does not act in the interest of the principal (Ross, 1973). The relationship between ESG scores and a certain M&A deal could possibly be influenced by the agency problem. The issue arises when a manager pursues an M&A deal involving the acquisition of a target company with high ESG scores to serve their own interests, which can create problems in the alignment of objectives within the relationship (Fung et al., 2009). An example of this problem might be when a manager pursues a certain M&A deal to boost his own image instead of boosting the firm's value. For this study, the agency theory might not directly influence the relationship between ESG in M&A, because this study focuses on the acquirors market performance. However, the agency theory might play a role in the decision-making process in M&A's.

Secondly, the stakeholder theory was mentioned in the literature review. The stakeholder theory refers to a certain view on capitalism in which the relationship between stakeholders is emphasized (Freeman et al., 2010). While the traditional shareholder theory focuses more on the relationship between shareholder and their interest, the stakeholder theory emphasises a broader range of stakeholders whose interests should be taken into account. For instance, the study of Kim et al. (2022) was analysed in the literature review. Their study took the stakeholder theory into account. The interpretation of the findings is that engaging in ESG could boost the efficiency in M&A, since more interests are possibly taken into account, rather than just the shareholders' interests. In the context of M&A, there seems to be a positive relationship between the stakeholder theory in certain deals. While most often maximization of a firm's value is the main objective, ESG activities could also play a role in an increase in a firm's performance, which eventually might lead to higher valuation (Caiazza et al., 2021). For this study, the stakeholder theory might not be totally relevant, since the relationship between ESG in M&A is examined. Hence, the results could contribute to the context of the stakeholder theory, since it seems that taking into account the interests of stakeholders could provide a better financial performance.

Different studies mention risk as a variable that is related to ESG and M&A. In the literature review, various studies examine the impact of ESG in M&A and also refer to risk. It is known that ESG in M&A overall has a positive impact on various elements of business, such as the mitigation of risk due to the management of the ESG factors, reduction of financial risk due to premiums paid in takeovers, and reputational risk since engaging in ESG seems to boost a firm's reputation. However, the positive aspects of ESG in M&A on risk are also a concern. As mentioned earlier, there might be an occasion where there is an increase in risk in the operational part of a company. The agency theory is an example of this, as managers might make decisions in an M&A process which for their own interest rather than in the interest of the company. This problem might not happen, but the risk of this moral hazard should be taken into account.

However, these theories might not be directly relevant for this study, they could play a role as they provide a deeper understanding of the dynamics in the relationship of ESG in M&A deals. Since this study's focus lies on the acquirors market performance, studies which might be directly related to this area are, for example, the studies of Kim and Li (2021), Kim et al. (2022) and Rani et al. (2020). These studies all examine relationships in the scope of ESG in M&A and implement the financial aspect of it. By looking at their theory and methodology, an overlap is noticeable in the same research direction. All three studies examined the financial impact and performance after a certain M&A deal. None of these studies implemented specific theories that could validate their relationship, but there

was an overlap in variables that could possibly play a role in their studies. Rani et al. (2020), for example, mention that variables such as size, leverage and industry could possibly also play a role in the study on financial performance. Whereas Kim et al. (2022) also use Tobin's Q to measure the valuation of the company. At last, Zheng et al. (2023) use the market-to-book value to create a view on the company's value related to its assets. While these studies do not make use of specific theories, like for example, the agency theory, the studies mention interesting variables which could also play a role in the relationship between ESG in M&A.

A possible theory that could indeed be directly associated with ESG and M&A is the Resource-Based Theory. This theory outlines a firm's competitive advantage, which comes from factors that are directly related to the business rather than external factors. There are several reasons for companies to get involved in an M&A deal. The Resource-Based Theory states that a company gains its competitive advantage from internal factors (Barney, 1996). Since this research focuses on the impact of the targets' ESG score on the acquirors' market performance in M&A, it is possible that the M&A deal happened in the first place, because the acquiror company aimed to score higher on the ESG measures. If this is the case, the purpose of the deal might not be financial gain, but obtaining a better imago. In that case the concept of "greenwashing" comes apart. When an acquiror acquires a target company with higher ESG figures aiming to better their imago (misleading impression), people generally speak of the greenwashing concept (Nguyen et al., 2022).

2.6 Gap and hypothesis development

2.6.1 Gap

So far, existing knowledge gives a view on the relationship between ESG and M&A. It is proven that overall, ESG could play a pivotal role before and after a M&A deal. However, in several studies, researchers emphasized the growing importance and interest in sustainable businesses and found that the implementation of ESG practices could lead to, for example, higher firm value, financial performance and reduce risk. Nonetheless, there are some contradictions in other studies. Besides, more knowledge about the relationship between ESG and M&A will strengthen the current knowledge about the topic. At last, there is a limited amount of literature and studies that implemented the perspective of retail investors as a third variable.

The contribution of this study is to extend the current knowledge about ESG in M&A and to address the gap that represents the impact on retail investors. Therefore, the objective of this study is to answer the following question: How does the acquisition of a target company with high ESG performance influence the acquiror's market performance, and what impact does it have on retail investors?

2.6.2 Hypothesis development

For the hypothesis development, prior research forms the basis for formulating hypotheses. From existing knowledge can be learnt that performing well on the ESG factors could lead to higher firm performance and value. This knowledge forms the basis for the first hypothesis.

The objective of this study is double-sided. In the first place, this study aims to examine the relationship between the ESG factors and M&A deals. Existing literature and prior studies found an overall positive relationship between ESG factors and M&A deals. Implementing, investing and being transparent in sustainability results in higher scores on the ESG factors. This leads to a better firm's performance, which eventually has an effect on the value and possible premiums attached to it.

Acquiring companies that pursue deals with target firms exhibiting higher ESG scores tend to gain multiple advantages, including increased firm value and improved financial performance. (Hussaini et al., 2021; Tampakoudis & Anagnostopoulou, 2020; Zheng et al., 2023). A firm's financial performance could be measured by different measurement methods. The study of Kim et al. (2022) examined the impact of ESG in diversification discount under cross-border M&A. In their regression model, the researchers measure the sample's business performance using Return on Assets (ROA). Additionally, they control for the effect using Cumulative Abnormal Return (CAR), leverage, Return on Sales (ROS), and Tobin's q, which assesses the relationship between market valuation and intrinsic value. Rani et al. (2020) uses the Operating Cash Flow Return (now called OCFR) to measure the long-term performance of a firm. This has been done by analysing the OCFR three years before and three years after the deal happened.

Feng (2021) examines the role of ESG in the acquiror's performance following an M&A deal. The study measures firm performance using two approaches: Return on Assets (ROA), comparing one year before and one year after the M&A announcement, and stock price changes, measured from three months before to one month after the deal announcement. Given that ROA is widely used in existing literature to assess financial performance, this study also adopts ROA instead of Return on Equity (ROE). Additionally, since debt is often used to finance M&A transactions (Groh & Gottschalg, 2011), ROA provides a more stable measure than ROE, which is more sensitive to leverage effects.

Acquirors that acquire target companies with higher ESG scores may experience improvements in their own ESG performance. (Tampakoudis & Anagnostopoulou, 2020) argue that an acquiring firm can integrate the target's ESG practices, leading to an enhanced ESG score post-acquisition. To assess

this effect, this study examines changes in the acquiror's ESG score one year before and one year after the deal, assuming that at least one year is required for ESG integration.

Despite the growing focus on ESG, there is limited evidence on how M&A transactions impact the acquiror's stock price. Feng (2021) investigates this effect by analysing stock price changes three months before and one month after deal closure, as well as one day before and after the deal announcement. The results indicate no significant influence of M&A transactions on the acquiror's stock price performance. However, Rani et al. (2020) use the Cumulative Abnormal Return (CAR) to measure stock price changes by comparing actual and predicted returns. While Feng (2021) reports non-significant findings, prior literature suggests that M&A deals generally lead to improved firm performance. This discrepancy highlights the need to further examine the potential effects of ESG factors in M&A transactions.

Building on these findings, this study hypothesizes that ESG factors play a crucial role in determining the acquiror's market performance:

H1: *A target company's ESG performance has a significant positive influence on the acquiror's market performance following the M&A announcement*

Limited knowledge is present regarding the relationship between ESG factors in M&A and how retail investors react in their trading behaviour. It is known that of the three ESG factors, retail investors mostly focus on the social pillar (Isaksson & Mathews, 2023). In practice, this finding translates to retail investors' trading behaviour by showing that they are willing to accept lower financial return as long as the environmental and social impact is large enough (Siemroth & Hornuf, 2023). However, the researchers found this, still they mentioned a large variation in interpretation of the amount of impact the investment needs to generate. Additionally, retail investors who prioritize the environmental pillar tend to invest more in "green" projects. A contradiction was found in the study of Moss et al. (2020) which found that retail investors did not make significant adjustments to their portfolios after ESG information was disclosed. The evidence suggests that retail investors are likely to invest in firms based on their own ESG priorities and that they are willing to pay a premium for this.

The literature review described different studies on retail investors' perspective on ESG factors. The studies of Siemroth and Hornuf (2023) and Li et al. (2024) suggested that retail investors are affected by the disclosure of ESG news. The study of Siemroth and Hornuf (2023) further suggested that retail investors are willing to pay a premium as long as the E- and the S-pillar are large enough. Despite negative sign of the relationship coming from the study of Moss et al. (2020) the following hypothesis has been developed:

H2: *The ESG performance of target companies has a significant positive effect on retail investors' trading behaviour around M&A announcement*

For a short overview of the hypotheses, the variables and the expected sign can be found in [Appendix II](#).

3 Research Method

3.1 Sample and Data Collection

This study focused on mergers and acquisitions (M&A) deals in the United States within the period from 2010 to 2020. This timeframe was determined based on data availability, ensuring a sufficient sample size for the study. Data was obtained from the Refinitiv Eikon database to examine the first hypothesis. The sample selection criteria included several conditions: the announcement date of the M&A deal had to fall within the 2010–2020 period, the deal had to be completed, and only transactions with a disclosed dollar value were included. Additionally, the target companies had to have public status, the deal value needed to exceed 1 million dollars, the acquiror had to obtain more than 50% ownership post-transaction, and the transaction had to be classified under the United States. Applying these criteria resulted in an initial sample of 2,261 M&A deals.

Data from the Refinitiv Eikon ESG database was also used to approach the environmental, social, and governance (ESG) factors in the analysis. The financial data of both the target and acquiring firms were merged with the ESG information to ensure a comprehensive dataset. Once the dataset was compiled, a manual review was conducted to remove transactions that did not meet the study's requirements. The following paragraphs provide a detailed explanation of the data preparation process for analysing the relationship between ESG factors in M&A deals and their impact on retail investors' trading behaviour.

3.2 Data Preparation

In the following subsections, the data preparations for both relationships are explained separately.

3.2.1 M&A Deals

Following the sample selection process, the initial dataset comprised 2,261 M&A deals. This dataset primarily contained deal characteristics and the full names of both the acquirors and targets. To integrate stock price and ESG data, company tickers and Reuters Instrument Codes (RICs) were required. A secondary dataset was created, containing the full names, RICs, and tickers of all publicly traded U.S. companies. Eventually, the Fuzzy Lookup add-in was used to match the company's name in dataset 1 to the RIC codes and ticker names available in dataset 2. The purpose of this matching technique was to obtain a dataset in which the company names are connected to a RIC code and ticker code. This formed the basis for further data preparation, since the ticker symbols made it available to retrieve the corresponding ESG scores, while the RIC codes could be used to retrieve the matching stock prices. Initially, the matching process was based on a threshold of 75% which led to a high amount of mismatches. To secure a reliable dataset, the threshold was set to 85% similarity, which led to a more reliable sample size. However, there were still mismatches present, a manually check of the data resulted in the discovery of several mismatches. Eventually, the manual exclusion of these “bad” data resulted in a sample size of 490 deals. Continuing to prepare the data for analysis, both the RIC code and the ticker names were used to retrieve the corresponding ESG scores as well as the stock prices. Noticeably, after retrieving these data was a limited availability of ESG scores. This led to a further refinement of the dataset by addressing incomplete data due to the availability of stock prices and ESG scores. Exclusion of M&A cases where one of the data variables was missing resulted in a reduction of 109 identical M&A deals for analysis containing both stock price data and ESG data for the period 2010 to 2020.

In order to calculate the cumulative abnormal returns per case, the stock prices were used to compute the returns of the acquirors' stock prices. The daily return was calculated by the price of the stock on a certain day (called: P_t) subtracted by the price of the stock the day before (called: $P_{-(t-1)}$). This outcome was divided by the price of the stock the day before. The returns were calculated by hand, as seen in equation (1):

$$\text{Daily return} = \left(\frac{P_t - P_{-(t-1)}}{P_{-(t-1)}} \right) \quad (1)$$

To compute normal returns, historical market data for the estimation window was required. This study used the S&P 500 index as a market return proxy, with daily price data retrieved from Investing.com for the period between 2010 and 2020. The S&P 500 index tracks the 500 largest publicly traded companies in the United States¹⁰. This makes it a reliable indicator of market trends, since this study also focuses on US publicly traded companies. This data linked to the market was merged with the M&A dataset. The market return represents the difference between the prices of the S&P 500. The market returns were calculated by hand using the same formula as for the stock price returns.

Once return calculations were completed, the dataset was further refined by calculating normal returns for the estimation period, followed by the computation of abnormal returns and cumulative abnormal returns (CARs) within the event window. Conducting the event study necessitated the removal of several deals for which required data were unavailable within the event or estimation period. As a result, the final analysed sample used in this study consisted of 98 M&A deals.

¹⁰ U.S. Market Cap. (2025). S&P global. <https://www.spglobal.com/spdji/en/indices/equity/sp-500/#overview>

3.2.2 Retail Investors

The dataset on retail investors' trading behaviour was derived from Robintrack's popularity history database¹¹. The downloaded dataset contained 8,597 separate CSV files, each corresponding to a specific company for the period 2018 to 2020. To facilitate analysis, these files were merged into a single dataset using RStudio. The final dataset included timestamps and user holdings for each company, providing a time-series overview of retail investor activity. Specifically, the dataset captured the number of Robinhood users holding a given stock at different points in time. The "user holding" column represented the number of Robinhood users who held a specific stock at each recorded timestamp.

After completing data preparation for both M&A transactions and retail investor activity, the datasets were ready for further empirical analysis. An event study was conducted in RStudio to study the impact of ESG scores on the acquirors' market return and the impact on retail investors' trading behaviour around a specific event (M&A deal). The 109 identical cases (base for hypothesis 1), formed the foundation for the study of the impact on retail investors' trading behaviour. Filtering the cases for a shorter period of time (due to availability of data), resulted in a reduction of the sample size to 48 identical cases.

3.3 Methodology

The aim of the study is to test the impact of ESG factors on the performance of acquirors in M&A deals and the impact on retail investors' trading behaviour. In order to come up with answers, hypotheses are developed. These hypotheses are all tested against the null hypothesis in which it is states that there is no significant correlation between the variables. Several regression equations have been developed in order to assist in testing the hypotheses.

3.3.1 Methodology for event study

In order to analyse the impact of a certain M&A deal on the acquiror's market performance/retail investors' trading behaviour around a specific event, a method called the event study was used. An event study is a method to evaluate the impact of a certain event (Abhishta, 2019). The following steps will be followed in order to analyse the relationship Abhishta (2019):

Step 1: Define the event period(s)

Step 2: Using the data in the estimation period to compute a model for the prediction of the acquiror's market performance and the retail investors' trading behaviour

Step 3: Define the null-hypothesis

Step 4: Calculate values of cumulative abnormal return/abnormal trading volume in the estimation period

Step 5: Generate an empirical distribution

Step 6: Use the empirical distribution for hypothesis testing.

The analysis period, spanning from 2010 to 2020 and from 2018 to 2020, was selected to study the impact of ESG scores on the acquirors' stock market return and the impact on retail investors' trading behaviour around a deal was announced. This timeframe corresponds to the availability of the M&A

¹¹ J, A. C. P. A. (2020). *Full Robintrack Database Download*. <https://www.robintrack.net/data-download>

dataset (2010 to 2020) as well as the dataset corresponding to the retail investors (2018 to 2020). Based on the availability of the data, the market performance of the acquiror is analysed by the CAR, and the retail investors' trading behaviour by the abnormal trading volume. The stock prices form the basis for calculating the CAR. In order to calculate the CAR, the timeframe for the event study needs to be clarified. In the figure below, the event study timeline is presented (MacKinlay, 1997).

Figure 1 shows the estimation window between time point one and time point two. This period of time is prior a period before the event and during which there are no relevant factors which could influence the event. The time period for the estimation timepoints is set from 280 days and 31 days before the event (Schneider & Spalt, 2021) . Besides, the estimation window is used to calculate the normal expected return of a certain company. The right-hand side of the figure shows the event window. Here, the event is shown (in this case, the deal announcement). To calculate the abnormal return, the stock prices of a certain company (one day before and one day after the deal was announced (Schneider & Spalt, 2021)) is used. The S&P 500 index forms the foundation for the calculation of the market return. The methodology of MacKinlay (1997) forms the basis for the formula to calculate the normal expected return and the market return.

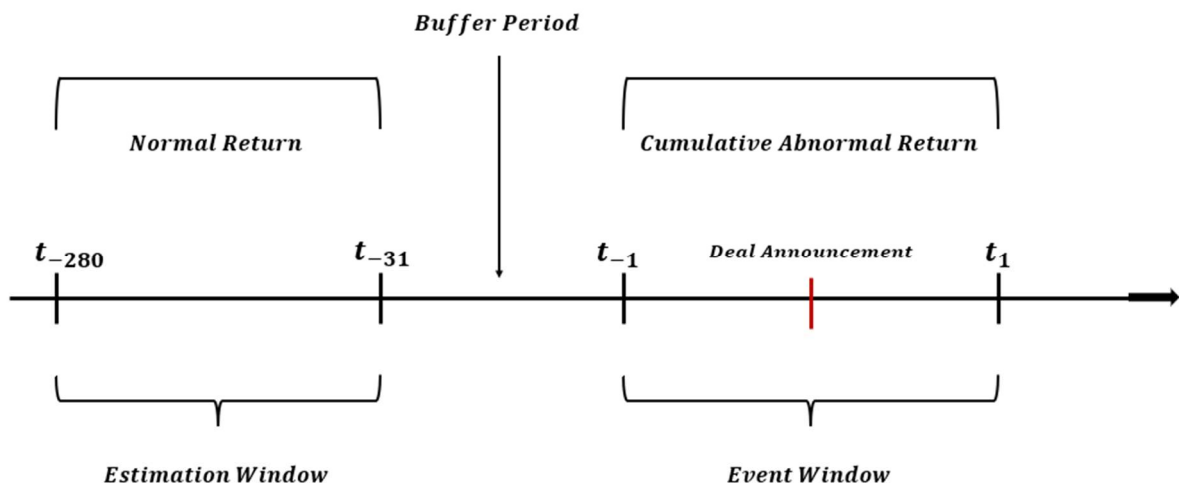


Figure 1. Illustration of event study M&A.

In order to test the impact of ESG in M&A and retail investors' trading behaviour, the following null-hypotheses were developed:

H_0 : *A target company's ESG performance has no significant influence on the acquiror's market performance.*

H_0 : *The ESG performance of target companies has no significant effect on retail investors' trading behaviour around M&A events*

Following the formulation of the null hypotheses, the dataset was further processed to compute abnormal returns and cumulative abnormal returns. Although the event date in this study was defined as the day before, the day of, and the day after the deal announcement, the event window in RStudio was extended to a range of ten days before and ten days after the announcement. This broader timeframe allowed for a more comprehensive dataset, enabling the analysis of different event windows.

The next step in the event study involved estimating normal returns. As previously defined, the estimation window preceded the event window. A market model was applied to each deal using a for-loop within a linear regression framework. The Capital Asset Pricing Model (CAPM) served as the basis for this estimation (equation (2) (Fama & French, 2004), whereas R_i represents the return of a certain stock, α as the intercept term, βR_m as the beta, which shows the sensitivity of a certain stock and ϵ, i, t as the error term. To obtain the alpha and beta coefficients, the linear regression model was executed.

$$R_i = \alpha + \beta R_m + \epsilon, i, t \quad (2)$$

The expected returns served as the foundation for calculating abnormal returns. Abnormal returns of a certain stock at a certain moment ($AR_{i,t}$) were determined by subtracting the actual returns (calculated manually) from the expected returns. Once the abnormal returns were calculated, the final step involved summing these abnormal returns to obtain the cumulative abnormal returns.

$$CAR_i = \sum_{t=T1}^{T2} AR_{i,t} \quad (3)$$

Equation (3) presents how the CAR of a certain company during the event window was calculated. T1 and T2 represent the start and the end of the event window. In order to obtain a wider range of data, the event window was set on 10 days before and 10 days after a deal was announced. Following the calculation of cumulative abnormal returns (CAR), a filtering process was applied to extract CAR values for different event windows, specifically three-day, five-day, and seven-day periods. More precisely, the three-day CAR captures the cumulative abnormal returns from the day before, the event day, and the day after the announcement. This methodology was similarly applied to the five-day and seven-day event windows. The final data was merged with the deal characteristics.

The last part of the analysis was testing against the null-hypothesis by implementing a linear regression model.

The same steps were taken to measure the retail investors' abnormal trading volume. Therefore, the time window of measurement was set to the years 2018 to 2020; this is due to the limited number of years available in the Robintrack database. In Figure 2, the same event study timeline was presented for the retail investors' abnormal trading volume.

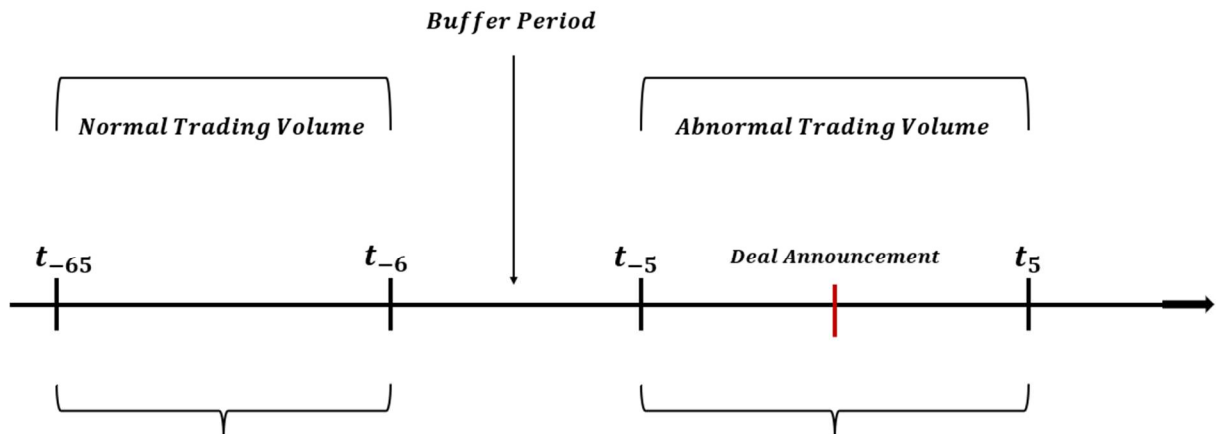


Figure 2. Illustration of event study for impact on retail investors' trading behaviour

The theory behind the scheme is the same as earlier explained for the M&A deals, but only the time period for the estimation and the event window was changed. Both the time periods were based on a similar event study, which was based its periods on the study of Bajo (2010). These prior studies formed the decision to follow these time periods, namely: 65 days before and 6 days before the event and 5 days before and 5 days after the event.

To prepare the data for observing the retail investors' trading behaviour, the M&A dataset (as used for H1) was merged with the already prepared dataset connected to the retail investors (see paragraph 3.2.2 for specification on this preparation process). After both datasets were merged, the dataset was filtered by the event window parameters. Continuing the process, the impact on retail investors' trading behaviour was measured by calculating the Abnormal Trading Volume.

Calculations for the abnormal trading volume were based on the methodology used by Wright and Swidler (2023). They derived the abnormal trading volume using the normalized abnormal trading volume, a concept initially introduced by Jarrel and Poulsen (1989). The normalized abnormal trading volume is presented in Formula 4, while its construction is outlined in Formulas 5 and 6. A detailed specification of the formula is provided below.

Equation (4) represents the calculation of the Normalized Abnormal Trading Volume (NATV) for a given company (i) over a specific time period (t). The NATV is derived by subtracting the mean trading volume (μ) from the actual trading volume (TV), and subsequently dividing the result by the standard deviation (σ) of trading volume. The mean trading volume (μ) is defined as the average trading volume over the preceding 59 trading days for a particular company's stock, providing a benchmark for assessing deviations in trading activity.

$$NATV_{i,t} = \frac{TV_{i,t} - \mu_{i,t}}{\sigma_{i,t}} \quad (4)$$

$$\mu_{i,t} = \frac{1}{59} \sum_{i=1}^{59} TV_{i,t} \quad (5)$$

$$\sigma_{i,t} = \sqrt{\frac{1}{59} \sum_{i=1}^{59} (TV_{i,t} - \mu_{i,t})^2} \quad (6)$$

The final results were stored in the final dataset and merged with the deal characteristics.

3.3.2 Hypothesis equations

The first hypothesis states the relationship between the acquiror's market performance after the acquisition of a target company with lower ESG scores. This dependent variable represents the acquiror's market performance by the measurement of the Cumulative Abnormal Return. This measure intends to measure the acquiror's financial performance. The independent variable of this study is the targets' ESG score, whereas the ESG scores were filtered on the year in wherein the M&A deal happened. Furthermore, the control variables control the hypotheses by taking into account other variables which might be influencing the relationship. Prior studies formed the basis for choosing the control variables.

In order to control the relationship between the target's ESG score and the impact on the acquiror's market performance, other variables which might have an influence on this relationship should be taken into account. Therefore, theories derived from prior studies have been analysed, which came up with different variables to take into account. The study of Schneider and Spalt (2021) used a similar dependent variable compared to this study, namely the CAR for the bidder and target company. Besides the independent variables, the model also includes control variables such as bidder Return on Assets (ROA), which measures the firm's profitability; bidder Book-to-Market (BM) ratio, indicating the firm's valuation; and deal characteristics such as payment method (cash or stock), deal structure (tender offer or hostile bid), industry classification (new economy), and the total number of deals. Based on the fact that this study showed strong similarities compared to this study, the decision is made to use these control variables. Comparing these control variables with other studies, such as the study of Engelhardt et al. (2021) and Zheng et al. (2023) show similarities in the used variables.

In the hypothesis, the ESG factors for a certain company "i" within a time period between 2018 and 2020 are reflected in the company's performance. For the analysis, the ESG score of a certain company was analysed in the previous year before the deal. As shown, the CAR represents the market performance of the acquiror after a certain deal has happened. The CAR is measured in a similar way Rani et al. (2020) did, by (manually) calculating the difference between the actual return and the predicted return, by using the stock price data for the data. To conduct proper inference, the earlier-mentioned control variables are included. A complete description of the variables can be found in Appendix III. The error term in the equation (ci) is added to capture the impact on the dependent variable which are not included in the model.

$$CAR [-1 + 1]_i = \beta_0 + \beta_1 * Targets' ESG_i + \beta_2 * Target ROA_i + \beta_3 * Target BM Ratio_i + \beta_4 * Cash + \beta_5 * Stock_i + \beta_6 * Tender + \beta_7 * Hostile + \beta_8 * Industry + \varepsilon_i$$

The second hypothesis takes the retail investors' perspective into account. Siemroth and Hornuf (2023), Bazrafshan (2023) and Li et al. (2024) studied the relationship between ESG and retail investors' trading behaviour. Whereas Siemroth and Hornuf (2023) use a survey to analyse retail investors' behaviour, Li et al. (2024) measured the trading behaviour in the Trade And Quote database (now called TAQ) and the Robinhood database. Using the TAQ database as the approach to measure retail investors' trading behaviour was chosen based on prior research done by Boehmer et al. (2021), who measured retail investors' trading activity by the TAQ database. Besides the TAQ database, the Robinhood database was used as an alternative measure of retail trading. Li et al. (2024) mentioned different advantages of using the Robinhood database over the TAQ database. For example, the Robinhood database provides direct retail data, leading to more precise data and mitigation of inaccuracies. Another advantage is that the Robinhood sample provides a better setting to test retail investors' ESG preferences since investors who use Robinhood tend to be younger and therefore might have less pecuniary preferences (non-financial) (Li et al., 2024). To set the time period of analysis of the abnormal trading volume, the study of Moss et al. (2020) is used. Their study analysed the trading behaviour of retail investors for days before and after a deal was published. Therefore, this study analyses the abnormal trading behaviour by analysing the trading behaviour seven days before and after a deal happened. At last, Bazrafshan (2023) compared retail investors' trading behaviour with the trading behaviour of institutional investors (both depending on ESG ranking). Relevant for this study is its first hypothesis, where it is stated that retail investors pay more/less attention to ESG reporting and increase/decrease their trading activity (measured from the TAQ database). Comparing the theory and methodology behind the studies, the study of Bazrafshan (2023) shows the most similarities to this study. Therefore, the variables of this study will be used to conduct this research. To measure the retail investors' trading behaviour, the aggregate retail volume is used as the dependent variable. Since the target's ESG score has a chance to impact the retail investors' trading volume, this will be the independent variable. To control the relationship, the following variables will be used: lag stock

returns, trading intensity, abnormal trading volume, firm size and book-to-market ratio. Since the theory of this study focuses on a special event wherein a deal is completed between the acquiror and the target company, the hypothesis equation will replace the aggregate retail volume with the abnormal trading volume. This results in the following hypothesis:

$$\text{Normalized_abnormal_Trading_Volume } [-5 + 5]_i = \beta_0 + \beta_1 * \text{Targets' ESG}_i + \beta_2 * \text{Target ROA}_i + \beta_3 * \text{Target BM Ratio}_i + \beta_4 * \text{Cash} + \beta_5 * \text{Stock}_i + \beta_6 * \text{Tender} + \beta_7 * \text{Hostile} + \beta_8 * \text{Industry} + \varepsilon_i$$

Limited existing knowledge, within the area of retail investors' trading behaviour and ESG scores, is the challenge to which this study contributes. Since there is no study which examined the same hypothesis, the control variables are based on the influence that ESG has on retail investors' behaviour. The aim of this part of the study is to obtain more knowledge about the impact of an M&A deal in which the acquiror takes over a target company with higher ESG scores on retail investors' trading behaviour. By using the abnormal trading volume, the retail investors' trading behaviour could be measured. As Aydoğmuş et al. (2022) and Kim and Li (2021) found that high ESG scores are positively related to a firm's financial performance, Isaksson and Mathews (2023) and Siemroth and Hornuf (2023) related to a similar finding in the direction of retail investors. They emphasized that a firm's financial performance is important in the decision whether a lower return is acceptable in exchange for better ESG scores. Therefore, the behaviour of retail investors might be influenced by the firm's financial performance instead of only the ESG scores. Where the Retail investors' trading behaviour on a specific firm depends on the target's ESG score.

Furthermore, in the regression equation above, the dependent variable is the abnormal trading volume of retail investors. These data will be derived from the database of Robintrack¹². As hypothesized, it is expected that the companies which perform good on the ESG prioritizations of retail investors are positively correlated with retail investors' trading behaviour.

3.3.3 Inferential statistics

In order to conduct proper inference and examine the provided hypotheses, several aspects should be secured. First of all, the data will be checked to see whether it is normally distributed and whether there are any outliers noticeable. To check this, the Shapiro-Wilk test will be conducted (Shapiro & Wilk, 1965). When the outcome of the test shows a significant p-value, this indicates that the data is most likely not normal distributed. The outcome of the Shapiro-Wilk test is important for the further inference of this study. If the data is not normal distributed, a nonparametric statistical test will be used, such as a Welch-ANOVA, Kruskal-Wallis, Welch-two-sample t-test and the Mann-Whitney-Wilcoxon-test (depending on the hypotheses) (Kruskal & Wallis, 1952; Mann & Whitney, 1947; Welch, 1951). If the data is normal distributed, a parametric test will be performed to test significance. Dependent on the hypothesis, a normal t-test, ANOVA, Breusch Pagan test or a multiple regression will be used. The software that will be used for the tests is R..

The usage of statistical tests depends on whether the data is normally distributed. All the hypothesis are tested against the null-hypothesis. This means that when the statistical test shows a p-value below 0.05, the null-hypothesis could be rejected. The power of the statistical test depends on the value of the p-value (the lower the p-value, the more power the statistical significance has). To analyse the statistical power of the controlled relationship, the PLM function in R Studio will be used to implement the fixed effects panel regression.

¹² Robintrack. (2024). *Full Robintrack Database Download*. <https://www.robintrack.net/data-download>

Both hypotheses are tested against the null-hypothesis, which states that there is no significant relationship between taking over a target company with a higher ESG score, together with the control variables on the CAR and the Abnormal Trading Volume. Therefore, for these hypotheses, the null-hypothesis could be stated as:

$$H_0: \beta_1 = 0$$

This means that the target's ESG score (beta 1) has no significant influence.

For the second hypothesis, the same approach counts as for the first hypothesis. In this hypothesis, retail investors' trading behaviour is tested by the abnormal trading volume. In this case the null-hypothesis could be stated as:

$$H_0: \beta_1 = 0$$

Beta 1 refers to the targets' ESG . When no significant relationship is found, the null-hypothesis could not be rejected, which means that there is no significant impact of a certain M&A deal on retail investors trading behaviour.

4 Data description

4.1 Data inspection

Inspecting the data before running the regression is important in order to decide which test is most suitable for a study. The first step in choosing the right test is to determine the level of the data. In other words, what type of data is used to describe the study (binary, nominal, ordinal or interval/ratio). After determining which type of data is used, it is necessary to declare the number of groups that are available in the study. While these steps are being undergone, the third step in the process is reached. This step ensures that the researcher is clear about the independence of the data. In the last step, the distribution of the data is analysed, which informs about the degree of normality within the sample (Marshall & Jonker, 2011).

4.1.1 Level of data

This study examines the relationship between the acquiror's cumulative abnormal return and the target's ESG score after completing a deal. Besides the analysis of the CAR, this study also investigated the impact on retail investors' trading behaviour measured by NATV. All variables (CAR, NATV and ESG scores) were numeric and therefore the level of the data was measured as ratio variables, which were continuous and differences are measurable.

4.1.2 Number of groups

There are groups available in this study, namely: the acquiror's CAR and the target's ESG score and the NATV (representing the normalized abnormal trading volume of retail investors). Since the analysis associated with the M&A as well as the analysis associated with the retail investors both use the ESG scores as the independent variable. For both analysis directions, the number of groups is a total of two groups. The continuous difference between the variables was tested by using regression or correlation.

4.1.3 Data independence

All data within the sample is retrieved from Refinitiv Eikon and robintrack. The dataset associated with the M&A contained out of 98 observations and the dataset associated with the retail investors contained out 41 observations. Both datasets contained of all identical observations and there were no

repeated measurements for more than one deal presents. This makes groups within the data independent.

4.1.4 Data distribution associated with M&A

Data could be distributed in different ways. In order to get to know how this study's data is distributed, a visualization of the data is done. Figure 3 illustrates the distribution of the residuals against the independent variable of the data, which belongs to the M&A deals. The residuals in the figure appear to be scattered around the horizontal line, which implies that the relationship between the dependent variable and the independent variable is captured well by the model. Furthermore, by analysing the distance between the horizontal zero line and the residuals, most of the residuals lie close to this point. This indicates that the model is not over- or underpredicting across different values of the targets' ESG scores.

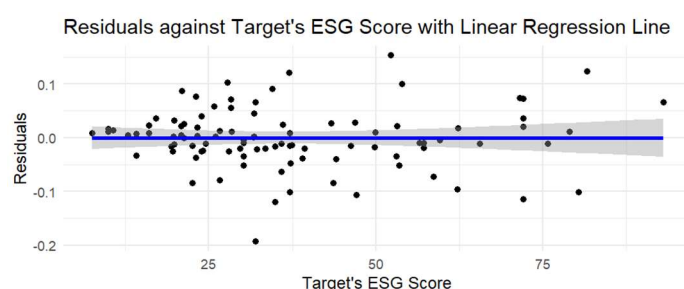


Figure 3: residuals against the targets' ESG scores

To see whether the data is normally distributed, a visualisation by plotting a histogram is performed. Figure 4 illustrates the residuals within a histogram. A roughly normal distribution could be read from the illustration, as well as two slight outliers on the left-hand side and the right-hand side. To draw conclusions about the normality, the Shapiro-Wilk test is performed. The outcomes of the test showed a significant p-value (0.02374 at a confidence level of 5%), which means that it could be rejected that the residuals are normal distributed. A w-value of 0.96987 indicates that the model is close to a normal distribution (which confirms what could be seen in the figure)

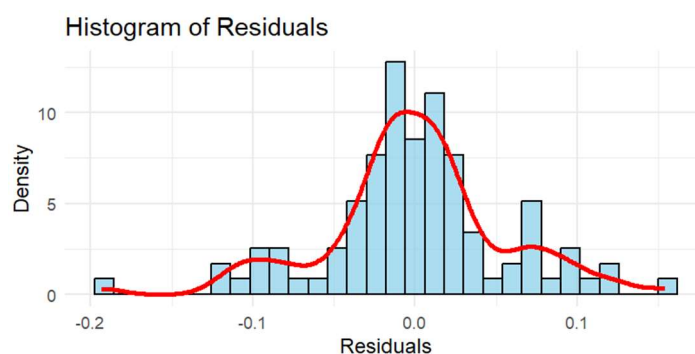


Figure 4: residuals for M&A sample

Figure 5 illustrates the distribution of the residuals against the independent variable. However, this figure shows the same independent variables, but the outcome is not the same because of the smaller sample size. Noticeable from the scatterplot is that the residuals are relatively constant across the zero line with no clear pattern. This suggests that the model does not explain the dependent variable properly. Besides, the dots that are consistent across the zero line suggest equal variance, which is important to do inference.

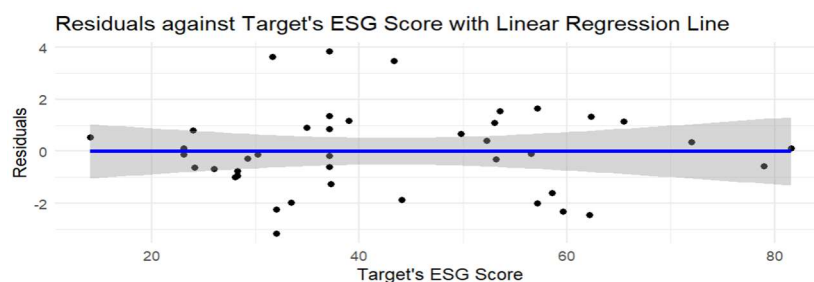


Figure 5: residuals against the targets' ESG scores

To conclude whether this data is normally distributed, both a histogram (to visualize) and the Shapiro-Wilk test are performed. Figure 6 shows a histogram of the residuals. From this histogram, it could be seen that the data is roughly normally distributed with a slight skewness to the right. This visualization is confirmed by the Shapiro-Wilk test, which gave a p-value of 0.2725. Since the p-value is larger than the 0.05 threshold, the null hypothesis could not be rejected. This states that the data is normally distributed.

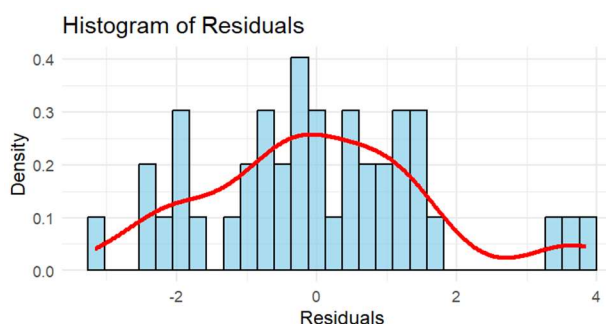


Figure 6: residuals for M&A sample

4.2 Summary statistics

This paragraph contains the summary statistics of both datasets.

Figure 7 illustrates the distribution of deals per year. Noticeably is a trend can be seen where there is a growing number of deals per year. Also, the table shows that the majority of deals took place between 2016 and 2020, which might be due to market sentiments or other macro-economic trends.



Figure 7: number of M&A deals per year

Figure 8 illustrates the number of deals wherein the acquiror's ESG score was smaller than the target's ESG score and otherwise. This histogram is important to see if there is a possibility of greenwashing. If there is a majority of deals wherein the ESG score of the target company is higher than that of the acquiror, it could suggest that acquirors are taking over the target company because of the higher ESG

scores. In this case there are more cases wherein the ESG score of the acquiror is bigger than the ESG score of the target company which roughly says that there is no suspicion of greenwashing.

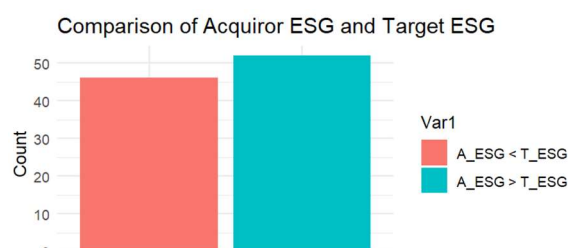


Figure 8: Comparison of Acquiror ESG and Target ESG

4.3 Descriptive statistics

4.3.1 Descriptive statistics associated with M&A

Table 1 provides an overview of the descriptive statistics for the M&A dataset. The term N represents the number of unique deals included in this study. As shown in the table, a total of 98 M&A cases were observed. The Cumulative Abnormal Return (CAR) was calculated for different event windows, specifically three, five, and seven days. These CAR values capture the returns of acquiror companies within the specified event windows.

The S&P 500 index served as the benchmark for the market model, with an estimation window set from [-280, -31] days. This study examined the effect of a target company's ESG score on an acquiror's market performance. The Target's ESG Score and Acquiror's ESG Score represent the ESG scores of the respective firms. For both acquirors and target companies, ESG scores were further subdivided into the three ESG pillars: Environmental, Social, and Governance.

Rank Value denotes the transaction value of a given M&A deal, including the net debt of the target company. The total transaction value is expressed in millions, with the United States Dollar as the currency. Lastly, the Book-to-Market Ratio reflects the relationship between a company's market value and its book value per share. In this study, the market-to-book value was assessed four weeks prior to the announcement of the deal.

Besides the variables present in the descriptive statistics, control variables are used to control the relationship. Friendly is a dummy variable of the deal attitude. It indicates whether the deal was a friendly of attitude or Other Than Friendly. The last control variable is a dummy variable which gives information about the acquisition technique. This dummy tells whether the deal was done by a Tender Offer (acquiror purchases shares directly from the shareholders of the target company) or something different from a tender offer.

Tabel 1: Descriptive statistics data associated with M&A

Descriptive statistics					
Statistic	N	Mean	St. Dev.	Min	Max
CAR Three Days	98	-0.004	0.1	-0.2	0.2
CAR Five Days	98	0.001	0.1	-0.2	0.3
CAR Seven Days	98	0.002	0.1	-0.3	0.3
Target ESG Score	98	37.0	19.1	7.6	93.0
Target Environmental Score	98	23.2	25.9	0.0	87.0
Target Social Score	98	37.1	21.4	1.6	97.9
Target Governmental Score	98	46.5	21.6	9.5	94.0
Acquiror ESG Score	98	43.5	19.4	10.7	88.3
Acquiror Environmental Score	98	27.1	29.1	0.0	87.4
Acquiror Social Score	98	44.6	21.9	5.1	94.0
Acquiror Governmental Score	98	52.1	21.3	3.5	97.4
Deal Value	55	320.6	317.7	5.8	977.0
Return on Assets	88	-14.9	32.1	-168.4	13.9
Book to Market	73	3.8	8.9	0.1	68.0

An examination of the variables associated with the dependent variable (CAR for three, five, and seven days) revealed that the mean values were close to zero. While the mean CAR for the three-day window was negative, the mean CAR for both the five-day and seven-day windows was positive. Additionally, the standard deviations were relatively small, indicating limited variation in the data.

The ESG scores served as the independent variables in this analysis. Notably, the average ESG scores of acquirors were higher than those of target companies. Furthermore, among the three ESG pillars, the Governance pillar exhibited the highest mean scores for both acquirors and target companies, whereas the Environmental pillar showed the lowest mean scores. This suggested that, within the sample, firms tended to perform best in terms of governance.

Lastly, an interesting observation emerged from the mean return on assets (ROA). The results indicated that the mean ROA for target companies was -14.9%, suggesting that, on average, these firms were unprofitable prior to being acquired.

4.4 Descriptive statistics associated with retail investors

Table 2 presents the descriptive statistics of the data related to retail investors. The N term shows the total number of deals analysed to examine the relationship between the targets' ESG scores and retail investors' trading behaviour (measured by Normalized Abnormal Trading Volume (NATV)). The

sample used for this analysis was derived from the dataset associated with M&A deals. However, while this dataset formed the foundation, the dataset related to retail investors was significantly smaller. This reduction was due to the availability of data on retail investors' trading behaviour, which was only accessible for the period 2018–2020. Consequently, the final analysis was based on 41 unique deals. The control variables remained consistent with those in Table 1. To control the impact on retail investors' trading behaviour, the same control variables are used as elaborated in paragraph 4.3.1.

Tabel 2: Descriptive statistics associated with Retail Investors

Descriptive Statistics					
Statistic	N	Mean	St. Dev.	Min	Max
NATV	41	0.8	1.6	-2.3	4.7
Target ESG Score	41	43.0	16.4	14.1	81.6
Target Environmental Score	41	25.1	29.3	0.0	86.0
Target Social Score	41	42.7	20.9	17.3	94.3
Target Governmental Score	41	53.7	18.9	9.5	94.0
Acquiror ESG Score	41	41.0	16.9	15.5	86.2
Acquiror Environmental Score	41	19.2	26.8	0.0	80.9
Acquiror Social Score	41	43.1	20.2	13.3	93.8
Acquiror Governmental Score	41	49.8	21.2	3.5	97.2
Deal value	26	261.2	306.9	20.8	976.5
Return on Assets	37	-17.7	31.0	-148.1	11.3
Book to Market	27	3.3	6.6	0.6	34.5

Analysis of both the dependent variable and the independent variable gives a better understanding of their meaning. Starting with the NATV, the mean value of the 41 cases shows a small positive value of 0.8. The NATV captures the deviations between buying, holding or selling a certain asset. The slightly positive NATV indicates that retail investors slightly bought more shares as usual after a deal was closed. In case of a negative NATV, the other way around is applicable. A notable aspect of the statistics in Table 2 was the values associated with NATV. The mean value was 0.8, with a standard deviation of 1.6. The minimum value of -2.3 and the maximum value of 4.7 suggested that while some firms experienced a significant increase in trading volume, others encountered a substantial decrease. By analysing the ESG scores, it could be seen that the average ESG scores of the target companies are slightly higher than those of the acquirors. Furthermore, it is noticeable that the Governmental pillar was the pillar with the highest average value.

4.5 Size distribution

The following tables (3 and 4) present a breakdown of the industry size distribution for the acquiror and the target companies. Both figures reveal that there is a strong concentration in certain sectors; the financial sector is the acquiror and the target companies the dominant sector (accounting for nearly 40% of acquirors and 30% of targets). The second largest observations were present in the Energy and Power (20,4% of acquirors and 25.2% for targets) sector. Observations in the Healthcare sector took the third place of the total (18,4% of acquirors and 16.3% for targets). These three company sectors accounted for a total of 78,6% of all observed M&A deals.

Tabel 3: Size distribution of Acquiror Macro Industry

Acquiror Macro Industry	Count	Percentage
Financials	39	39.8
Energy and Power	20	20.41
Healthcare	18	18.37
High Technology	6	6.12
Industrials	4	4.08
Materials	3	3.06
Media and Entertainment	2	2.04
Real Estate	2	2.04
Consumer Products and Services	1	1.02
Consumer Staples	1	1.02
Retail	1	1.02
Telecommunications	1	1.02
Total	98	100

Tabel 4: Size distribution of Target Macro Industry

Target Macro Industry	Count	Percentage
Financials	30	30.61
Energy and Power	25	25.51
Healthcare	16	16.33
High Technology	8	8.16
Industrials	5	5.1
Materials	3	3.06
Real Estate	3	3.06
Consumer Products and Services	2	2.04
Media and Entertainment	2	2.04
Retail	2	2.04
Consumer Staples	1	1.02
Telecommunications	1	1.02

5 Results

Tables 5 and 6 present the regression associated with the M&A data. Table 5 reports results using the combined Target ESG Score as the main independent variable, while Table 6 examines the separated effects of ESG pillars. Tables 7 and 8 replicate this structure for retail investor data. Table 7 presents the results using the combined ESG scores, and Table 8 provides results for each ESG dimension separately. This approach allows for a comparison of how both combined and individual ESG factors influence M&A activity and retail investor behaviour.

Table 5: Regression Results associated with M&A data with Target ESG Scores Combined

	Baseline CAR Three Day	Controlled CAR Three Day	Panel Linear Model CAR Three Day	Baseline CAR Five Day	Controlled CAR Five Day	Panel Linear Model CAR Five Day	Baseline CAR Seven Day	Controlled CAR Seven Day	Panel Linear Model CAR Seven Day
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Target ESG Score	0.0002 (0.0003)	0.0004 (0.001)	0.0004 (0.001)	0.0001 (0.0004)	0.001 (0.001)	0.001 (0.001)	0.0003 (0.0004)	0.001 (0.001)	0.001 (0.001)
Deal Value		0.00002 (0.00003)	0.00002 (0.00003)		-0.00000 (0.00003)	-0.00000 (0.00003)		-0.00002 (0.00004)	-0.00002 (0.00004)
Return on Assets		-0.001 (0.001)	-0.001 (0.001)		-0.001 (0.001)	-0.001 (0.001)		-0.001 (0.001)	-0.001 (0.001)
Book to Market		-0.001 (0.002)	-0.001 (0.002)		-0.002 (0.002)	-0.002 (0.002)		-0.003 (0.003)	-0.003 (0.003)
Hostile		-0.040 (0.063)	-0.040 (0.063)		0.044 (0.065)	0.044 (0.065)		0.026 (0.088)	0.026 (0.088)
Tender		0.024 (0.033)	0.024 (0.033)		0.027 (0.034)	0.027 (0.034)		0.021 (0.046)	0.021 (0.046)
Constant	-0.009 (0.013)	-0.052 (0.063)	-0.052 (0.063)	-0.001 (0.015)	-0.011 (0.065)	-0.011 (0.065)	-0.010 (0.017)	0.00003 (0.088)	0.00003 (0.088)
Observations	98	40	40	98	40	40	98	40	40
Industry and year FE	No	No	Yes	No	No	Yes	No	No	Yes
R ²	0.003	0.288	0.288	0.0002	0.371	0.371	0.006	0.370	0.370
Adjusted R ²	-0.008	-0.261	-0.261	-0.010	-0.114	-0.114	-0.004	-0.117	-0.117
Residual Std. Error	0.057 (df = 96)	0.054 (df = 22)		0.070 (df = 96)	0.056 (df = 22)		0.077 (df = 96)	0.076 (df = 22)	
F Statistic	0.264 (df = 1; 96)	0.525 (df = 17; 22)	0.525 (df = 17; 22)	0.021 (df = 1; 96)	0.764 (df = 17; 22)	0.764 (df = 17; 22)	0.584 (df = 1; 96)	0.760 (df = 17; 22)	0.760 (df = 17; 22)

Note:

Dependent variable: CAR
Pooled OLS models. Standard errors in parentheses.

Table 6: Regression Results associated with M&A data with Target ESG Scores Seperated

	Baseline CAR Three Day (1)	Controlled CAR Three Day (2)	Panel Linear Model CAR Three Day (3)	Baseline CAR Five Day (4)	Controlled CAR Five Day (5)	Panel Linear Model CAR Five Day (6)	Baseline CAR Seven Day (7)	Controlled CAR Seven Day (8)	Panel Linear Model CAR Seven Day (9)
Target Environmental Score	0.0002 (0.0003)	-0.0004 (0.001)	-0.0004 (0.001)	0.0003 (0.0004)	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.0005)	-0.001 (0.001)	-0.001 (0.001)
Target Social Score	0.00001 (0.0004)	0.002 (0.001)	0.002 (0.001)	-0.0002 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.0004 (0.001)	0.002 (0.002)	0.002 (0.002)
Target Governmental Score	-0.00004 (0.0003)	-0.001 (0.001)	-0.001 (0.001)	-0.0001 (0.0004)	-0.0002 (0.001)	-0.0002 (0.001)	0.0001 (0.0004)	-0.00001 (0.001)	-0.00001 (0.001)
Deal Value		0.00000 (0.00003)	0.00000 (0.00003)		-0.00001 (0.00004)	-0.00001 (0.00004)		-0.00004 (0.00005)	-0.00004 (0.00005)
Return on Assets		-0.001 (0.001)	-0.001 (0.001)		-0.001 (0.001)	-0.001 (0.001)		-0.001 (0.001)	-0.001 (0.001)
Book to Market		-0.003 (0.003)	-0.003 (0.003)		-0.003 (0.003)	-0.003 (0.003)		-0.004 (0.004)	-0.004 (0.004)
Hostile		-0.058 (0.066)	-0.058 (0.066)		0.033 (0.069)	0.033 (0.069)		0.012 (0.092)	0.012 (0.092)
Tender		0.018 (0.034)	0.018 (0.034)		0.021 (0.035)	0.021 (0.035)		0.011 (0.047)	0.011 (0.047)
Constant	-0.006 (0.015)	-0.035 (0.066)	-0.035 (0.066)	0.007 (0.018)	0.006 (0.069)	0.006 (0.069)	-0.002 (0.020)	0.026 (0.092)	0.026 (0.092)
Observations	98	40	40	98	40	40	98	40	40
Industry and year FE	No	No	Yes	No	No	Yes	No	No	Yes
R ²	0.005	0.331	0.331	0.005	0.401	0.401	0.016	0.417	0.417
Adjusted R ²	-0.027	-0.305	-0.305	-0.026	-0.168	-0.168	-0.015	-0.136	-0.136
Residual Std. Error	0.057 (df = 94)	0.055 (df = 20)		0.070 (df = 94)	0.057 (df = 20)		0.077 (df = 94)	0.077 (df = 20)	
F Statistic	0.142 (df = 3; 94)	0.520 (df = 19; 20)	0.520 (df = 19; 20)	0.168 (df = 3; 94)	0.705 (df = 19; 20)	0.705 (df = 19; 20)	0.507 (df = 3; 94)	0.754 (df = 19; 20)	0.754 (df = 19; 20)

Note:

Dependent variable: CAR
Pooled OLS models. Standard errors in parentheses.

Table 7: Regression Results associated with Retail Investors with Target ESG Scores Combined

	Baseline Model (1)	Baseline Model Controlled (2)	Panel Linear Model (3)
Target ESG Score	0.002 (0.016)	0.014 (0.025)	0.079 (0.080)
Deal Value			-0.0004 (0.001)
Return on Assets		-0.014 (0.028)	-0.155 (0.097)
Book to Market		-0.073 (0.082)	-0.301 (0.199)
Hostile			
Tender		-0.375 (1.503)	-3.786 (2.980)
Constant	0.748 (0.715)	0.678 (1.114)	-0.601 (2.781)
Observations	41	17	17
Industry and year FE	No	No	Yes
R ²	0.001	0.052	0.727
Adjusted R ²	-0.025	-0.121	0.271
Residual Std. Error	1.617 (df = 39)	1.803 (df = 22)	
F Statistic	0.022 (df = 1; 39)	0.301 (df = 4; 22)	1.595 (df = 10; 6)

Note:

Dependent variable: NATV

Pooled OLS models. Standard errors in parentheses.

Table 8: Regression Results associated with Retail Investors with Target ESG Scores Separated

	Baseline Model	Baseline Model Controlled	Panel Linear Model
	(1)	(2)	(3)
Target Environmental Score	0.001 (0.017)	-0.049 (0.033)	-0.215 (0.469)
Target Social Score	0.003 (0.023)	0.063 (0.093)	0.182 (0.463)
Target Governmental Score	-0.009 (0.014)	0.029 (0.079)	-0.047 (0.353)
Deal Value		-0.001 (0.002)	-0.002 (0.007)
Return on Assets		-0.118 (0.076)	-0.154 (0.115)
Book to Market		-0.167 (0.164)	-0.102 (0.758)
Hostile			
Tender		-5.022 (3.902)	-1.519 (8.817)
Constant	1.168 (1.076)	-1.582 (3.453)	-0.427 (9.311)
Observations	41	17	17
Industry and year FE	No	No	Yes
R ²	0.012	0.459	0.738
Adjusted R ²	-0.068	0.038	-0.048
Residual Std. Error	1.651 (df = 37)	1.725 (df = 9)	
F Statistic	0.149 (df = 3; 37)	1.091 (df = 7; 9)	0.939 (df = 12; 4)

Note:

Dependent variable: NATV

Pooled OLS models. Standard errors in parentheses.

5.1 CAR outcomes with combined ESG scores

Table 5 presents the regression results for models using the combined ESG score of the target firm as the main independent variable. Across all event windows (three-day, five-day, and seven-day), there is no statistically significant relationship between the ESG score and cumulative abnormal returns.

In the three-day window, the coefficient for the ESG score is 0.0002 (SE = 0.0003) in the baseline model, and increases to 0.0004 (SE = 0.001) in both the controlled model and the panel linear model. In the five-day window, the coefficient is 0.0001 (SE = 0.0004) in the baseline model, 0.001 (SE = 0.001) in the controlled model, and 0.001 (SE = 0.001) in the panel model. In the seven-day window, the coefficient is 0.0003 (SE = 0.0004) in the baseline model, 0.001 (SE = 0.001) in the controlled model, and 0.001 (SE = 0.001) in the panel model. Across all models, the coefficient values are small and not statistically significant.

Also, the implementation of control variables shows no consistent or significant effects across the models. In the seven-day panel model, the Deal Value has a coefficient of -0.00002 (SE = 0.00004), Return on Assets -0.001 (SE = 0.001), and Book to Market -0.003 (SE = 0.003). Hostile takeovers showed a coefficient of 0.026 (SE = 0.088) in the controlled model, and 0.021 (SE = 0.046) for Tender offers in the panel model, neither of them showed a statistically significant outcome.

The fit of the model does not improve when fixed effects are included. In the three-day window, the R^2 remains 0.288 in the controlled model also 0.288 in the panel model. In the five-day and seven-day windows, R^2 values reach 0.371 and 0.370, respectively. However, adjusted R^2 values remain negative in most models, and the values of the F-statistics remain below the significance thresholds.

5.2 CAR outcomes with separated ESG scores

Table 6 reports the regression results for the individual ESG dimensions. Again, across all models and event windows, the Environmental, Social, and Governance scores are not significantly associated with CAR.

In the three-day event window, the coefficient for the Environmental Score is 0.0002 (SE = 0.0003) in the baseline model, and -0.0004 (SE = 0.001) in both the controlled and panel models. The Social Score shows a coefficient of 0.002 (SE = 0.001) in both the controlled and panel models, while the Governance Score is -0.001 (SE = 0.001) in the panel model. In the five-day window, coefficients range from 0.003 (SE = 0.0004) for the Environmental Score in the baseline model to 0.001 (SE = 0.001) for the Social Score in the panel model, though none of these results are statistically significant. Similar values are observed in the seven-day window, where all ESG pillars remain insignificant with coefficients ranging between -0.00001 and 0.002.

The implementation of control variables does not provide meaningful explanatory value. In the seven-day panel model, Return on Assets is -0.001 (SE = 0.001), Book-to-Market is -0.004 (SE = 0.004), and Deal Value is -0.0003 (SE = 0.001). The Tender dummy is associated with a coefficient of -0.011 (SE = 0.047), and the Hostile dummy with 0.012 (SE = 0.092), though neither of the estimates is statistically significant.

Again, the model fit remains weak. The highest R^2 is observed in the seven-day panel model at 0.417, while baseline models show considerably lower values (e.g., 0.005). Adjusted R^2 values remain negative across all models. The F-statistic in the final model is 0.754 (df = 19; 20), providing no evidence of overall model significance.

5.3 NATV outcomes with combined ESG scores

Table 7 reports the results of regressions using the combined ESG score of the target firm as the independent variable. Across all three model specifications, the coefficient of the Target ESG Score remains positive but statistically insignificant. In the baseline model, the coefficient is 0.002 with a standard error of 0.016. The coefficient increases to 0.014 (SE = 0.025) in the controlled model, and reaches 0.079 (SE = 0.080) in the panel linear model. However, there is an upward trend in the coefficients; the results are not statistically significant.

The implementation of control variables does not show significant explanatory power, since there are still no significant outcomes. In the panel model (fixed effect included for year and industry), the coefficient for Deal Value is -0.0004 (SE = 0.001), and for Return on Assets it is -0.155 (SE = 0.097). The Book-to-Market ratio has a coefficient of -0.301 (SE = 0.199) in the panel model, while the Tender Offer dummy is associated with a large negative effect (-3.786 , SE = 2.980).

All models show a weak model fit, since all the R^2 values are low (e.g. 0.001 for the baseline model and 0.052 for the controlled model). Also, the adjusted R^2 values for all three models are negative, which indicates that the explanatory power of the model is weak.

5.4 NATV outcomes with separated ESG scores

Table 8 presents the regression results for the individual ESG dimensions. Across all three model specifications, none of the ESG pillars is significantly associated with NATV. In the panel linear model, the coefficient for the Environmental Score is -0.215 with a standard error of 0.469, for the Social Score 0.182 (SE = 0.463), and for the Governance Score -0.0447 (SE = 0.353). All estimates are statistically insignificant.

Similar results are present in the baseline and controlled models. In the controlled model, the coefficient for the Social Score is 0.063 (SE = 0.093), which is slightly larger than the other ESG dimensions, but still not statistically significant. The Governance Score shows a coefficient of 0.029 (SE = 0.079), and the Environmental Score is -0.049 (SE = 0.033). Also, here the outcomes are very small and insignificant.

Control variables show no significant relationships with NATV. In the panel model, the coefficient for Return on Assets is -0.154 (SE = 0.115), for Book-to-Market -0.102 (SE = 0.758), and for Deal Value -0.002 (SE = 0.007). The Tender dummy shows a large negative coefficient of -1.519 (SE = 8.817).

The model fit is limited since the R^2 in the panel model is 0.738, indicating a modest improvement over the baseline models. However, the adjusted R^2 remains negative at -0.048 , and the F-statistic is 0.939 (df = 12; 4).

6 Conclusion

This study examined the relationship between targets' ESG scores and acquirors' market performance and the reaction of retail investors after a certain M&A deal. While the outcomes of the regression showed that there is a consistent positive relationship for the acquirors' CAR (for different time periods). However, the results did not show any significance in outcome (even when ESG scores were separated), it could not be said that this relationship is statistically significant. By means of no significance, the null hypothesis could not be rejected, which eventually tells us that a target's ESG score has no significant impact on the acquiror's market performance. As also the regression results associated with retail investors' trading behaviour also showed insignificant results. Therefore, the null hypothesis could not be rejected. This means that there is no evidence found that says a target's ESG score impacts a retail investor's trading behaviour.

While there are no significant results found in both relationships, the findings are still relevant to the body of literature. The outcomes give more information about the relationships. Since there was no significant evidence found in this case, means that there is no evidence that the targets' ESG score plays a role in both the market performance and retail investors' trading behaviour. It suggests that there might be other factors that play a more significant role in those relationships, which is an avenue for new research.

7 Discussion

This study examined the relationship between the ESG scores of target companies and their impact on acquirors' market performance and retail investors' trading behaviour. The regression results showed no statistically significant relationship between the Target ESG Score (for both the market performance as well as the retail investors' trading behaviour) and all the model control variables. The insignificant results suggest that a target's ESG score does not have a systematic influence on market reactions to M&A announcements or on retail investors' trading behaviour.

Prior literature has shown that ESG in practice could play a pivotal role in a firm's financial performance, although contradictory findings have emerged. From the perspective of retail investors, limited research has been done, but the amount that has been done, for example, showed that investors are willing to take lower returns when certain pillar scores are high enough. While these were the overall findings over prior literature, the results of this study showed insignificant outcomes for both relationships. In short, this means no evidence was found to suggest that a target's ESG score has a significant impact on the acquiror's market performance and retail investors trading behaviour.

The insignificance of the results implies that other factors might have a greater influence on an acquiror's market performance than the target companies' ESG score. A comparison of this outcome with studies reviewed in the literature (e.g., Feng, 2021) aligns with findings that show no significant evidence of ESG's impact on acquiror's stock returns. While this result aligns with the literature, it contradicts the expected outcome. Based on prior studies, a positive and significant impact was anticipated. From another perspective, the non-significant results are reasonable, given that the literature also highlighted varying and sometimes contradictory findings.

Similarly, the outcome of the regression analysis associated with the retail investors' trading behaviour showed no significant effect. It was known beforehand that there is a gap in the literature regarding the relationship between ESG factors and retail investors' trading behaviour. Although this study aimed to contribute to this gap, existing literature, such as the studies by Isaksson and Mathews (2023) or Siemroth and Hornuf (2023) questioned the role of ESG factors in investment behaviours, concluding that (retail) investors primarily prioritize the Environmental and Social pillar in their investment decisions. Surprisingly, the interpretation of both the descriptive statistics illustrated that the Governance pillar was the pillar which had the highest score. Questionable now is that (retail) investors seem to prioritise both the environmental and social pillars, but firms in the United States seem to score the best on the Governmental pillar. While this study's outcome contradicts the outcome of several prior studies, it seems to be more in line with studies which conclude that ESG (disclosure) has no influence on retail investors' trading activity (Moss et al., 2020). Their explanation was that ESG considerations are not prioritized over financial performance unless the ESG-related factors lead to a higher value. Lastly, retail investors might not be interpreting the ESG scores correctly, which possibly leads to no consideration when investing. This possible explanation is based on the research of Rzeźnik et al. (2022) which found that retail investors might misinterpret ESG ratings, because it is too sophisticated.

On one hand, the findings contradict most conclusions in prior research. On the other hand, the findings are in line with the fact that there is not always consistency in the outcome of prior studies. Despite this, several reasons may explain the insignificance of the results. First, the relatively small sample size may have influenced the significance power of the results. In the period 2010 to 2020, 2261 public deals were made (after the filters were applied). The final sample size (109 deals and 41 for fixed effects panel regression), which was analysed, was much smaller than the initial sample size. This may mean that the analysed sample size was insufficient to represent all deals and thus unable to detect meaningful insights. This issue may also apply to the analysis of retail investors' behaviour,

where only 41 (and 17 for fixed effects panel regression) identical cases were analysed due to limited data availability (2018–2020).

The time frame and market conditions could also have influenced the insignificant results. From the 109 deals, the majority occurred in 2018 and 2019. Overall, most deals found were concentrated between 2016 and 2020. A possible explanation of insignificant results could be that the period 2010 to 2016 contained economic rebuilding (the period after the financial crisis in 2008). In this period, the economic growth, relatively low interest rates and increased amount of private equity investments could have caused a more financially gain-oriented view on investments rather than taking ESG factors into account. Furthermore, since the term “ESG” was officially introduced in 2004¹³. The ESG framework has evolved, and ESG considerations likely gained importance only in the years following its introduction. A possible problem could be that the sample is not (fully) capturing the influence of ESG in M&A, while the ESG framework and considerations by (retail) investors have not fully evolved.

To dive deeper into the limitations due to the reduction of observations, the result of this could impact the study’s meaning in two ways. First of all, the drastic reduction of the observations due implementation of the fixed effect might also cause a reduction in statistical power. Lower sample sizes are more vulnerable to Type II errors (false negatives) (McNeish & Stapleton, 2016). Second, the outcomes are difficult to generalize, because only a small number of observations represent a significantly larger total.

Lastly, this study only focuses on M&A deals in the United States. It is possible that ESG factors have no significant impact on acquirors’ market performance in the US, but there may be differences across countries in terms of ESG frameworks. Comparisons of ESG frameworks and the implementation across different countries show that there are differences in implementation and weighted importance of the ESG framework across firms in different countries. To elaborate more on these differences, European companies seem to perform (Norway, Sweden, Denmark, Finland, United Kingdom, Belgium and France) well on their level of ESG framework development; whereas Germany, Italy, USA, Australia, Switzerland, Canada, Japan, Brazil and South Africa are sub sectioned under the category “Rapidly improving ESG framework”. These outcomes suggest that there are indeed differences in ESG frameworks across countries (Singhania & Saini, 2021).

While the relatively small sample size, time frame and country-specific factors have led to insignificant outcomes, it would be interesting to extend this study to address these limitations. For instance, conducting a cross-country study to analyse the impact of ESG on acquirors’ market performance and the influence on retail investors’ trading behaviour, the sample size could be increased. Besides the increase in sample size, more countries will be analysed, which will cause an increase in country-specific factors. At last, trying to have a longer time range in which the retail investors’ trading activity could be analysed will possibly contribute to a better understanding of how retail investors behave. To obtain a better understanding of the influence of ESG factors and how retail investors behave, a possible future research avenue in the direction of cross-country analysis could deliver this.

¹³ Annan, S.-G. K. (24 June 2004). *The Global Compact Leaders Summit - Final Report*. United Nations Global Compact

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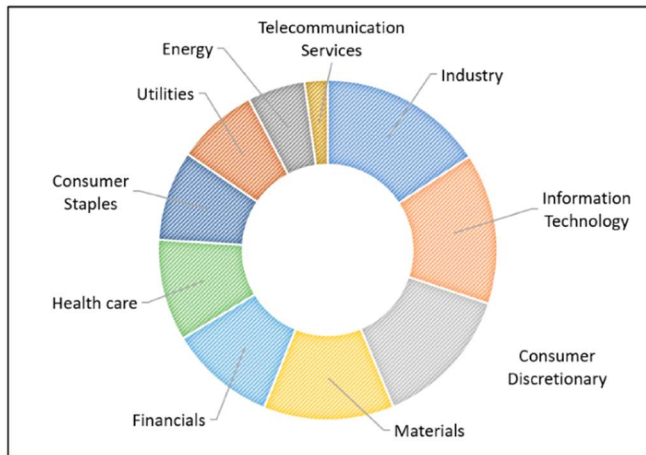
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Appendices

Appendix I – ESG score importance per industry



Appendix II – Overview of variables

Overview of variables			
	Variable	Meaning	Expected sign
Dependent variable	Acquirors' stock market performance	Measured by the Cumulative Abnormal Return (CAR)	+
Independent variable	Target ESG score	The ESG score which contains the Environmental, Social and Governmental domains	+
Control variables	Target ROA (Return on Assets of the target) Target BM Ratio (Book-to-Market Ratio of the target) Cash Stock Tender (Indicates whether the deal is a tender offer) Hostile (Indicates whether the deal is hostile)	Might influence the relationship between the dependent and independent variable	
Dependent variable	Normalized Abnormal Trading Volume (NATV)	Trading behaviour of retail investors (only stocks)	+
Independent variable	Target ESG score	The ESG score which contains the Environmental, Social and Governmental domains	+

Appendix III – Description of variables

Description of variables			
	Variable	Definition	Source
Dependent variable	Acquirors' stock market performance	Measured by the Cumulative Abnormal Return (CAR) $CAR_i = \sum_{t=T_1}^{T_2} AR_{i,t}$	
Dependent variable	Normalized Abnormal Trading Volume (NATV)	Trading behaviour of retail investors (only stocks) $NATV_{i,t} = \frac{TV_{i,t} - \mu_{i,t}}{\sigma_{i,t}}$	
Independent variable	Target ESG score	The ESG score which contains the Environmental, Social and Governmental domains	
Control variables	Rank Value	Net Debt	
	Target Mid/Macro Industry	Nominal variable which labels the target company's industry	
	Acquiror Macro Industry	Nominal variable which labels the acquiror company's industry (measured by fixed effects)	
	Deal Type	Dummy variable which tells if a deal was a tender offer or not	
	Deal Attitude	Dummy variable which tells if a deal was hostile or not	
	Acquisition Technique	Dummy variable which tells if a deal was paid by stock or not	
	Target Return on Assets last 12 months	Ratio variable which measures the target company's profitability relative to its average total assets over the last 12 months	
	Target Ratio of Market price to Book Value (4 week before announcement)	Ratio variable measures the ratio of the target company's market price per share to its book value per share, calculated 4 weeks prior to the M&A announcement	

