

ESG AND EUROPEAN BANKS' PERFORMANCE

Word count: 12.111

Charles Demeyere
Student number : 01808431

Emille Bardyn
Student number : 01807468

Promotor / supervisor: Prof. Dr. Rudi Vander Vennet

Master's Dissertation submitted to obtain the degree of:

Master in Business Engineering: Finance

Academic year: 2022-2023

The authors and the supervisor grant permission to make this master's thesis available for consultation and to copy parts of the master's thesis for personal use. Any other use is subject to the limitations of copyright, particularly with regard to the obligation to explicitly mention the source when citing results from the master's thesis.

We declare that the research has been conducted in accordance with the rules governing scientific and academic integrity. We declare that we have been informed of, and have acted in accordance with, the ethical code of the faculty.

Summary

This study examines the relationship between Environmental, Social, and Governance (ESG) indicators and the performance of European banks. It investigates whether there is a connection between a bank's ESG performance and its overall financial performance, as well as the impact of ESG controversies on stock market returns. The research utilizes panel data from 2009 to 2021, encompassing 117 European banks. In the context of the banking sector, this study is one of the few that explores the relationship between ESG performance and financial outcomes. Two research methods are employed: regression analysis and event study. We examine the relation for the aggregate ESG score, together with its subcomponents: the separate E, S and G pillars. The regression analysis reveals that there are no significant relationships between a bank's ESG score and financial indicators such as stock market return and return on assets (ROA). Additionally, the research findings indicate a significant but economically negligible relationship between a bank's ESG score and stock market volatility. Furthermore, event study results show that ESG controversies have a significant negative effect on the stock market returns of banks in the anticipated event window [-3,0]. These findings contribute to the existing literature on the relationship between ESG performance and financial outcomes in the banking sector. Considering the increasing importance of ESG, these findings have implications for banks, investors, regulators, and policymakers. Although the relationship between the ESG score and financial performance is limited, addressing ESG controversies is crucial for maintaining positive stock market performance. This study highlights the need for further research and effective strategies to integrate ESG factors into banking practices.

Keywords: ESG, European banks, financial performance, ESG controversies, stock market returns, return on assets, stock market volatility.

Preface

It is with great pleasure and a sense of accomplishment that we present this thesis, the completion of our journey towards obtaining a Master's degree in Business Engineering. Over the past five years, we have immersed ourselves in a world of knowledge and exploration, unearthing our passions and constructing a solid academic groundwork.

First and foremost, we would like to express our gratitude to prof. dr. Rudi Vander Vennet and his assistant, Wolfgang Lefever, for their unwavering guidance and support throughout the development of this thesis. Their expertise and dedication have been instrumental in shaping our research and enriching our understanding of the subject matter.

In addition, we extend our sincere appreciation to our friends, who have infused our study breaks with laughter and camaraderie. Their presence has made the challenging journey more pleasant, offering us much-needed rest and motivation along the way.

Lastly, we owe an immeasurable debt of gratitude to our families and parents, whose unwavering faith in our abilities and relentless support have paved the way for our educational pursuits. Their sacrifices and encouragement have been the foundation upon which we have built our academic journey.

Table of contents

Summary	I
Preface	II
List of abbreviations.....	V
List of figures	VI
List of tables	VII
1. Introduction	1
2. Literature.....	3
2.1 ESG in general.....	3
2.2 ESG – Corporate financial performance.....	5
2.3 ESG – Banking performance.....	7
2.4 ESG – Controversies.....	11
2.4.1 ESG controversies and companies.....	11
2.4.2 ESG controversies and banks	12
3. Data and methodology.....	14
3.1 Sample selection	14
3.2 Independent variables	15
3.3 Dependent variables	17
3.4 Control variables	17
3.5 The models	19
3.5.1 Regression analysis.....	19
3.5.2 Event study	20
3.6 Descriptive statistics.....	22
3.6.1 Descriptive statistics: Regression analysis	22
3.6.2 Descriptive statistics: Event study.....	23
4. Findings and discussion	25
4.1 Regression analysis	25

4.1.1	Statistical tests.....	25
4.1.2	Panel regression results	26
4.2	Event study	33
4.2.1	Results.....	33
4.2.2	Robustness check	36
5.	Conclusion	38
6.	Limitations and further research	40
	References	VIII

List of abbreviations

ESG	Environmental, Social and Governance
PRI	Principles of Responsible Investing
NGO	Non-Governmental Organization
CSR	Corporate Social Responsibility
TARP	Troubled Asset Relief Program
ROA	Return on Assets
ROE	Return on Equity
COVID-19	Coronavirus Disease 2019
CSP	Corporate Social Performance
SNL	SNL Securities
S&P	Standard & Poor's
EUR	Euro
SR	Stock Market Return
VOL	Volatility
MR	Market Return
MSTDV	Standard deviation of the market return
CET1	Common Equity Tier 1
NIM	Net Interest Margin
DTA	Deposits-to-Assets ratio
LTA	Loans-to-Assets ratio
NPL	Non-performing Loans ratio
LTD	Loans-to-Deposits ratio
RWA	Risk-weighted Assets
GDP	Gross Domestic Product
PM	Performance Measure
AR	Abnormal Returns
CAPM	Capital Asset Pricing Model
SMB	Small Minus Big
HML	High Minus Low
AAR	Average Abnormal Returns
CAAR	Cumulative Average Abnormal Returns

List of figures

Figure 1: Geographical Distribution 15

Figure 2: Cumulative average abnormal return, event window [0]..... 34

Figure 3: Cumulative average abnormal return, event window [-3,0]..... 34

Figure 4: Cumulative average abnormal return, event window [0,+3]..... 35

Figure 5: Cumulative average abnormal return, event window [-3,+3]..... 35

Figure 6: Cumulative average abnormal return, event window [-3,0], robustness check
..... 37

Figure 7: Cumulative average abnormal return, event window [-3,+3], robustness
check 37

List of tables

Table 1: ESG pillars (Refinitiv, 2022)..... 16

Table 2: Descriptive Statistics..... 23

Table 3: Number of controversies per year and per category..... 24

Table 4: Statistical tests..... 26

Table 5: Pearson correlations..... 26

Table 6: Regression results with independent variable ESG_score 29

Table 7: Panel regression results with independent variables ESG pillars 32

Table 8: Event study results 33

Table 9: Event study results, robustness check..... 36

1. Introduction

In recent years, the importance of Environmental, Social and Governance (ESG) factors in the corporate world has gained significant recognition. Businesses across various industries are increasingly incorporating ESG considerations into their strategies, as they recognize the potential impact on long-term performance, risk management and sustainability. Among these industries, the banking sector plays a crucial role, as it acts as a financial intermediary, holds significant influence over economic activities and takes an important role in driving the shift toward a green economy. This study focuses on exploring the relationship between ESG indicators and the performance of European banks. Additionally, it examines the potential negative effects of ESG controversies on the stock market returns of these banks.

To address these questions, the following objectives have been established. The primary objective of this research is to examine the relationship between a bank's ESG score and its overall performance. By employing regression analysis, we estimate panel regressions with independent variables such as the stock market returns, ROA and volatility of the returns. The explanatory variables are the bank's aggregate ESG score as well as the individual ESG pillars. The secondary objective involves conducting an event study to assess the impact of ESG controversies on the stock market returns of banks.

To address the research objectives, this study employs a comprehensive dataset consisting of panel data from 2009 to 2021, covering 117 European banks. The sample selection criteria include geographical location (Europe), listing duration (at least one year) and a minimum total asset value of 10 billion EUR for at least one year. This rigorous sample selection ensures that the study includes banks with substantial financial resources and a significant market presence, which are important factors for conducting a comprehensive analysis.

The findings of this research hold significant implications for various stakeholders in the banking sector. Banks can gain insights into the potential benefits of incorporating ESG considerations into their operations, thereby enhancing their overall performance and reputation. Investors can utilize the findings to make more informed investment decisions, considering both financial and ESG performance. Regulators and policymakers can draw upon the results to develop effective frameworks that encourage responsible banking practices and sustainable financial systems.

The structure of this thesis is organized as follows: Section 2 provides a comprehensive literature review on ESG factors, examining the existing research on the relation between ESG performance and financial performance, the connection between ESG factors and banking performance and the implications of ESG controversies. Section 3 outlines the data and methodology employed in this study, including the sample selection criteria, the variables analysed and the panel regression and event study methodologies. Section 4 presents the findings and discussion, where the results of the regression analysis and event study are examined and interpreted. Section 5 concludes the thesis by summarizing the main findings and discussing their implications. Finally, Section 6 elaborates on the limitations and further research. Through this research, we aim to contribute to the growing body of knowledge on the relationship between ESG performance and financial performance in the banking sector. By providing empirical evidence and insights specific to European banks, this study aims to inform decision-making processes, foster sustainable banking practices and promote a more resilient and responsible financial system.

2. Literature

This literature review aims to explore the relationship between ESG indicators and corporate financial performance, with a specific focus on the banking industry. The review also delves into the controversies surrounding ESG considerations and their potential impact on bank performance. Given the growing importance of ESG considerations and their potential impact on business outcomes, a comprehensive literature review is necessary to explore the current state of knowledge. The insights gained from this review will provide a valuable foundation for our later research.

2.1 ESG in general

An ESG score is an objective measurement or evaluation of a given company, fund, or security's performance with respect to Environmental, Social, and Governance (ESG) issues (Miller, 2022). According to the Principles of Responsible Investing (PRI), ESG is defined as a framework that enables investors to enhance risk management and attain sustainable long-term returns (PRI, 2018). But we need to take into account that claims about ESG improving risk and/or return are contested in the literature. Investors utilize ESG scores along with various other analysis tools to evaluate a company's potential for sustainability and future financial performance.

We explain the three factors of ESG below (PRI, 2018).

The environmental factor

The environmental factor consists of how a company handles issues like resource depletion, climate change, waste, pollution and deforestation.

The social factor

The social factor includes how a company treats people and the community. Examples of social factors are modern slavery, child labour, working conditions, human rights and employee relations.

The governance factor

The governance factor considers how a company is led. The governance factor includes bribery and corruption, board diversity and structure, executive pay, political lobbying and donations, and the tax strategy.

The number of ESG data providers has increased significantly in recent years and this trend is likely to continue due to the growing demand for ESG data from investors and other stakeholders. The increasing recognition of the importance of ESG factors in investment decision-making has resulted in a corresponding increase in the number of ESG data providers offering a variety of ESG-related products and services (Kotsantonis et al., 2016). However, Berg et al. (2022) show that ESG ratings from different providers disagree substantially. They identified three distinct sources of divergence. Scope divergence refers to the situation where ratings are based on different sets of attributes. One rating agency may include lobbying activities, while another might not, causing the two ratings to diverge. Measurement divergence occurs when rating agencies utilize different indicators to measure the same attribute. Finally, weight divergence occurs when rating agencies take different views on the relative importance of attributes. They show that measurement divergence is the main driver of ESG rating divergence. This divergence of ratings poses a challenge for empirical research, as using one rate versus another may alter a study's results and conclusions. We acknowledge the fact that our choice of ESG source may affect our results, so we need to take this into account when interpreting our results and drawing conclusions. With the concept of ESG gradually becoming more popular, ESG has been widely examined, practiced and popularized in the practical field. It has gained the interest of scholars from all over the world. There are currently two primary theories that explain the relationship between ESG and financial performance: the stakeholder theory and trade-off theory. These theories offer contrary predictions and each is supported by empirical evidence. The stakeholder theory states that ESG activities should be a source of opportunity, competitive advantage and corporate innovation rather than a cost or charitable deed (Zhou, n.d.). The trade-off view of ESG activity is less positive and sees it as a potentially inefficient use of resources. This view argues that managers should maximize the firm's value and abstain from socially responsible initiatives to make the world a better place (Friedman, 1970). ESG is treated as an irrational pursuit (Devinney, 2009). Li et al. (2021) performed a study that presents an examination and comprehensive summary of progress in the research into ESG. They concluded that the theoretical basis of ESG research is mainly based on institutional theory and stakeholder theory. As we can see, Li et al. replaced the previous mentioned trade-off theory with the new institutional theory.

This theory suggests that for a company to be successful in sustainable development, it needs to behave in ways that are considered legitimate by society. ESG research focuses on how a company's behavior in areas such as environmental, social, and governance issues can impact its legitimacy and, in turn, its success in sustainable development. In terms of stakeholder theory, ESG research suggested that enterprises that respond better to the ESG requirements of stakeholders will perform better than irresponsible enterprises. It can also be observed that there are a considerable number of studies on the interaction between E, S, and G. Also, the research on the relationship between ESG and economic consequences is a hot topic. Moreover, scholars use various approaches to measure the sustainable development behavior of companies, and these can be categorized into four types: positive correlation, negative correlation, non-linear relationship, and indirect relationship. This means that some scholars find a strong link between sustainable behavior and company success, while others find the opposite. Some also find that the relationship is more complex and not straightforward. Lastly, the risk prevention role of ESG in business activities is also a research hotspot. Why and how do investors use ESG information? Amir & Serafeim (2018) documented that the vast majority of the surveyed investors are motivated by financial reasons rather than ethical reasons in using ESG data. They suggested that ESG information is material to investment performance, but which information is material varies systematically among countries, industries and company strategies. Also, a large number of investors use ESG information because of client demand or as part of their product development process. Limited knowledge exists regarding the utilization of ESG information by investors. Amir & Serafeim (2018) also found that ESG information is mainly used to engage with companies, integrated into valuation models and used for portfolio screening. Overall, almost 17% of their sample stated that they do not use ESG information at all in their investment processes.

2.2 ESG – Corporate financial performance

In contrast to the relation between ESG and banking performance, many studies have already been done on the relation between ESG and corporate financial performance. This is highly relevant as corporate performance directly affects the credit risk, which in turn influences the profitability of banks.

Scholars and investors have published numerous empirical studies and review studies on the relation between ESG and corporate financial performance. Whelan et al. (2021) examined the relationship between ESG and financial performance in more than 1,000 research papers from 2015-2020. They found a positive relationship between ESG and financial performance for 58% of the “corporate” studies focused on operation metrics with 13% showing neutral impact, 21% mixed results and only 8% showing a negative relationship.

Why would ESG improve corporate financial performance? According to Eccles & Serafeim (2013) a sustainable strategy that focuses on ESG can improve corporate financial performance by addressing the interests of all stakeholders: investors, employees, customers, governments, NGOs, and society at large. It requires companies to focus strategically on the most “material” ESG issues, the ones that have the greatest impact on the firm’s ability to create shareholder value.

These results are definitely relevant for banks. Carbone et al. (2021) show that high emissions, and thus a lower ESG score, tend to be associated with higher credit risk. However, disclosing emissions and setting a forward-looking target to cut emissions are both associated with lower credit risk. The effect of climate commitments tends to be stronger for more ambitious targets. These results are relevant for banks because they provide insight into how climate-related transition risk can affect a firm’s credit risk. Banks need to assess the credit risk of firms when deciding whether to lend to them or invest in them. If a firm has high emissions and is exposed to climate transition risk, it may have a higher likelihood of failing and therefore higher credit risk. On the other hand, if a firm discloses its emissions and sets a forward-looking target to cut emissions, it may have lower credit risk. This information can help banks make more informed decisions about lending and investing.

Houston et al. (2021) demonstrate that banks have a profound influence on firm ESG policies. They find that banks are significantly more likely to partner with borrowers that have similar ESG ratings. This result suggests that ESG policies influence the construction of bank lending relationships and that different banks have different attitudes toward borrower ESG policies. They also find that banks have a dynamic influence on their borrowers’ subsequent ESG performance. Notably, firms that borrow from banks with relatively better ESG profiles are more likely to improve their own ESG performance over time.

By examining the decisions on loan renewal, they show that borrowers who continue to engage in risky ESG practice are subject to costly disruptions in lending relationships.

Degryse et al. (2022) found that firms showing environmental consciousness enjoy more favourable terms of about 50-59bps compared to brown firms when borrowing from a green bank. The green-meets-green effect kicked in after the Paris Agreement, consistent with green banks price discriminating between green firms and brown firms. Green banks have incentives to pursue third-degree price discrimination between green and brown firms when public awareness of climate transition risk is sufficiently high. Their results show that (parts of) the banking systems may also be conducive to the transition as they are favourably pricing loans to green firms relative to brown firms. Also, according to Ardia et al. (2022) and Pastor et al. (2021), unexpected increases in climate change concerns have a differential impact on the stock prices of green and brown firms. Green firms experience a rise in stock prices, whereas brown firms witness a decline in stock prices. These effects are observed for both transition and physical climate change risks. Additionally, the study found that an unexpected increase in climate change concerns leads to an increase in the discount rate of brown firms and a decrease in the discount rate of green firms. This is relevant to our study as it indicates that banks with higher ESG scores, specifically those focusing on green initiatives, may benefit financially from growing climate change concerns, while banks with lower ESG scores could face adverse effects.

2.3 ESG – Banking performance

For some time there has been a focus in the literature on the influence of ESG on firms. In contrast, there hasn't been much research on the influence of ESG on bank's performance and risk. Despite this, we summarized the main findings of the academic world about those relationships.

We will first discuss the impact of overall ESG on financial performance of banks. Firstly, Azmi et al. (2021) find a non-linear relationship between ESG activity and bank value, the sample was restricted to countries that are defined as emerging markets by Bloomberg. Their results indicate that low levels of ESG activity positively impact bank value. However, there are diminishing returns to scale. Another remarkable finding of them is that ESG activity negatively affect the cost of equity while there is no effect on the cost of debt.

One possible explanation for these results is that bondholders care primarily about the bank's tail risk, while shareholders place greater importance on the upside potential of ESG activity.

Secondly, Buallay (2019) investigated the relationship between ESG and bank's operational (Return on Assets), financial (Return on Equity) and market performance (Tobin's Q). She notes a positive relationship between the ESG activity of European banks and their bank value. Nevertheless, the relationship between ESG disclosures will vary if measured at an individual level. She states that her results can be used to present a successful model for worldwide banks to concentrate on the role of ESG disclosure in performance.

We will now look deeper in the different pillars of ESG and will start with the environmental pillar. First of all, we will show the importance of the environmental pillar. Azmi et al. (2021) argue that environmentally friendly activities have the greatest effect on bank value hence this shows that it is important to separate this pillar in further research. Furthermore, Finger et al. (2018) examine the relationship between Equator principles, that provide banks with environmental guidelines for their financial projects and performance. They conclude that banks in developing countries adopt Equator principles for strategic reasons and developed countries do it as a form of greenwashing. Secondly, Alogoskoufis et al. (2021) state that the short-term costs of the transition disappear in comparison to the costs of climate change in the medium to long term. The early adoption of policies to support the transition to a zero-carbon economy also brings benefits in terms of investing and rolling out more efficient technologies. The ECB also introduced its climate stress test and its capital implications that come along with it, hence climate change is a major source of systemic risk that should be taken into account by banks. This is possible with the ESG score and more specific with the environmental pillar, hence this pillar will only gain greater traction in the future.

We will now have a look at the influence of the environmental pillar on bank performance. As previously indicated, there exists a scarcity of research about the influence of the environmental aspect on bank performance and the findings that do exist are inconclusive. Menicucci & Paolucci (2022) found no significant relationship between the environmental pillar and bank performance. Among its dimensions, only the indicator of emission and waste reduction has a significant positive relationship with bank performance (ROA and ROE).

This claim is supported by Scholtens & Dam (2007) who reported no significant impact on profitability between banks that did or did not adopt the Equator Principles. Nevertheless, a positive relationship was reported between the environmental pillar and a banks' ROA (Buallay et al., 2018). We should mention that this study only included Islamic banks. Due to the limited extent of research surrounding this particular pillar, we will have a closer look to its underlying components. Del Gaudio et al (2022) argue that a higher propensity to green lending is related to a lower profitability, higher default risk and a lower credit risk than banks with a less green investment approach. Important to mention is that this study uses syndicated loans. Secondly, more collateralization and duration of green lending increase bank performance while the larger syndicate size reduces profitability and risk. They suggest that banks are prone to invest in green projects (environmental pillar), but the risks may offset profitability requiring public support to encourage the role of the banking sector in boosting the ecological transition.

Lastly, banks price the risks of climate policy change relatively low given the material risk faced by their borrowers. Only carbon emissions directly caused by the firm are priced and not the overall carbon footprint including indirect emissions. "Green" banks do not appear to price carbon risk differently from other banks (Ehlers et al., 2021). This is against our intuition because we would expect that the environmental pillar is highly important for bank's performance and the credit risk they will face with this. Based on the summarized literature, it is evident that the environmental component of ESG and its association with bank performance has received limited academic attention. Therefore, our study aims to address this research gap, thereby making a significant contribution to the existing academic literature in this field.

We will now look deeper in the relationship between the social pillar and financial performance. Bolton (2013) reports that there is a positive relationship between CSR and operating performance. This result is most prevalent in large banks and is line with our stakeholder theory that we mentioned earlier. Additionally, some aspects of a bank's CSR environment were negatively related to whether or not the bank received assistance through TARP, the troubled asset relief program which was an American government program initiated in 2008 as a response to the financial crisis. The study suggests that banks with stronger core CSR activities were less likely to need TARP assistance and banks who boost their overall CSR scores with CSR initiatives that are not related to its core business were more likely to need TARP.

This has the implication that not all CSR activities are the same, hence bank would be well-advised to improve the CSR environment in meaningful ways that are directly related to their core operating activities. This finding can be meaningful because our research includes different crises.

Nevertheless, this positive relationship is only partly supported by El Khoury et al. (2023), who found a concave relationship between the social pillar and banks' ROA. On short-term basis, banks' investment in social areas indeed positively impact its performance while on long-term basis, incremental investment in non-lucrative social activities have a negative impact on performance. As we can see, the results present conflicting evidence, thus warranting the need for further investigation.

We will now have a look at the governance pillar and its effect on bank performance. It is important to include the governance pillar in our research because corporate governance in banks is a critical topic since shortcomings in the governance of banks can result in the transmission of problems across the banking system or it can even destabilize the financial system as a whole (Brogi & Lagasio, 2019). Based on the agency theory, we expect that a better corporate governance contributes to higher performance. This is confirmed by Aslam & Haron (2020), they stated that banks should improve their existing governance mechanism for better bank performance. They found that board size and risk management committee have a negative effect on bank performance. This study was only done for Islamic banks. Secondly, Bino & Tomar (2012) found that corporate governance has a strong positive impact on bank performance, more specific: ownership structure and board composition.

Nevertheless, Buallay (2019b) found that the relationship between ESG disclosures vary if measured individually. More specific, corporate governance disclosure affect the ROA, ROE negatively and the Tobin's Q positively. In addition, board size and existence of an audit committee in the board have a negative effect on bank performance, whereas bank size has a positive effect on bank performance (Fanta, 2013). Hence, the relationship between corporate governance and bank performance remains controversial so additional research is necessary.

There is little empirical evidence on the effect of ESG on banks during crises. We include this part because our sample period includes different crises, such as the covid-19 crisis. Chiaramonte et al. (2022) find that the total ESG score reduces the fragility of the banks during periods of financial distress. This effect holds strongly for bank with higher ESG ratings.

They also state that in times of financial turmoil, the benefits on stability are bigger when there is a longer duration of ESG disclosures. This implies that the level as well as the commitment of a bank's engagement matter even if disclosures become mandatory. In this paper they associate higher stability with a lower default risk.

We will now take a closer look to the relationship between ESG measures and bank volatility. Assous (2022) stated that environmental pillar positively affected Saudi banks' stock return volatility. However, the social score negatively impacted the volatility. He found that the social pillar was the most crucial variable in predicting stock return volatility. We find this rather unconventional as you should expect that investing in ESG should make banks more stable and hence should lower their volatility instead of showing a positive relationship. This is the only research, to the best of our knowledge, that examines the relationship between ESG and volatility. These findings are also in contrast with the literature of non-financial firms. Ashwin Kumar et al. (2016) showed that companies that incorporate ESG factors have a lower volatility in their stock performances than their peers in the same industry. These finding is in line of what Engelhardt et al. (2021) found. He stated that high ESG-rated European firms are associated with lower stock volatility. More specific, he found that after decomposing ESG into its pillars, the social score was the dominant driver of the results. It is noteworthy to mention that this study was conducted during the COVID-19 crisis.

H1. There is a relationship between the ESG indicators and European bank's performance.

2.4 ESG – Controversies

2.4.1 ESG controversies and companies

We will now investigate what is written in the academic literature regarding the impact of ESG controversies on bank performance.

De Franco (2020) showed that in Europe and the US, stocks that undergo severe controversies, significantly underperform their benchmarks and portfolios consisting of stocks with low or no controversy at all. The main reason for this is that markets tend to react strongly to changes in controversy levels and penalize stocks that experience ESG down-grades. Their results make a clear case for the potential benefits of excluding stock with high controversy levels from investment universes. However, their findings were not confirmed for the Asia-Pacific region, where the portfolio consisting of highly controversial stocks outperformed its benchmark.

If we look at the corporate controversies in the literature, a negative and significant relationship between corporate controversies and financial performance have been found. However, it was not possible to confirm the positive moderating effect of ESG practices on the relationship between controversies and financial performance (Nirino et al., 2021).

Secondly, DasGupta (2022) finds a strong positive influence of financial performance shortfall on firm ESG performance. However, when firms are also constrained by high ESG controversies, they do not indulge in higher ESG practices. Although such controversies would positively mediate the impact of lower financial performance on their ESG performance. Accordingly, firm-managers should show greater agility in managing these controversies to avoid any future bankruptcy threats. To build further on these findings, we find in the literature that Dorfleitner et al. (2020) found a significant outperformance for equally weighted worst ESG portfolios and best controversies strategies. He stated that this result was drive by low-rated smaller companies (“small sinners”) and clean-coated firms with regard to controversies (“silent saints”).

Contrary to what we have stated above, ESG controversies are associated with greater firm value, which is surprising. However, a more nuanced analysis revealed that ESG controversies alone do not directly affect firm value and that their relationship with firm value becomes significantly positive only whet the corporate social performance (CSP) score is taken into account, indicating the crucial role of CSP in offsetting any negative impact of ESG controversies on firm value (Aouadi & Marsat, 2018).

2.4.2 ESG controversies and banks

There is almost no research done to investigate the relationship between ESG controversies and bank’s financial performance. Looking at the impact of controversies on performance in the non-financial world, we would expect a negative relation. Therefore, the fact that Murè et al. (2021) get a positive sign between sanctions and ESG is even more striking. In fact, a sanction lowers the ESG index of a bank. This causal direction can be clarified by the following: receiving financial penalties is detrimental for banks reputations, therefore it’s necessary for banks to improve their reputation through the adoption of their ESG practices. It should me mentioned that the study only includes Italian banks.

Galletta et al. (2022) find evidence that bank operational risk is linked to the lagged ESGC score. ESG controversies impact bank balance sheets in subsequent years. This is because banks play a critical role in identifying timely, realistic, and cost-effective solutions to reduce climate change. Being involved in serious litigation can jeopardize banks' financial stability. This is why ESG controversies have a significant reputational impact as banks face increased scrutiny over the environmental effects of their operations, ESG scoring motivates the addition of reputational risk to the financial risk portfolio.

Galletta & Mazzù (2022) find that banks that increase their ESG controversies score are less risky. Since the ESG controversies' score is higher when firms are less involved in environmental, social or governance disputes. An increase in this score means a reduction in the number of controversies. This will allow banks to reduce the capital absorption and contribute to their stability in terms of the distance to default.

H2. ESG controversies have a negative effect on the stock market return of a bank.

3. Data and methodology

3.1 Sample selection

We constrain our sample to banks that are listed and located in Europe. We use the SNL/S&P Capital IQ database for the balance sheet and income statement data for the banks. The Refinitiv database is used for the daily return index data, the stock market data and ESG-score.

The final sample for this study comprises 117 banks, which are selected using specific procedures to meet the inclusion criteria. These procedures are designed to ensure the sample's representativeness, relevance and consistency of banks for this study. The following criteria have to be met by the banks in our initial dataset:

- Had to be located in Europe;
- Had to be listed for a minimum of one year between 2007 and 2021;
- Had to have a total asset value of at least 10 billion EUR for a minimum of one year between 2007 and 2021;
- Had to have been active during the period ranging from 2007 to 2021;

We start with collecting all banks that met these requirements. Secondly, we downsize our sample to banks that had at least one ESG score in the period ranging from 2009 to 2021. We select this period because as of 2009, a significant proportion of banks had an ESG-score available. Given that the ESG score operates on a relative scoring methodology, the number of banks included in the Refinitiv database is important for its accurate calculations. The selected period contains the latest available ESG scores (2021), ensuring the relevance of the sample. The final sample for examination comprises 117 banks and 781 bank-year observations from 2009 to 2021.

The selected criteria have several advantages for the research of the relationship between ESG dimensions and bank performance. Firstly, by focusing on European banks, we ensure that the study is focused on a specific geographical region with its unique economic, social and regulatory characteristics. This allows us to identify regional trends and differences. Our sample includes 25 different countries. The distribution of banks across the countries is not concentrated, as the highest percentage of banks in a single country is 13%. This can be seen in Figure 1 that shows the percentage of banks in each country in our sample.

Secondly, including stable and financially strong banks in the sample reduces the likelihood of spurious results and enables more accurate conclusions. Thirdly, the sample's relevance is guaranteed by selecting banks that are active during a specific period and with available ESG scores, providing the most recent and up-to-date information on ESG performance. Finally, the use of an accurate and reliable ESG score dataset enhances the validity of the study's results.

In our study, we include banks that can potentially be delisted, so we can eliminate the presence of survival bias in the sample selection process. However, it is possible that selection bias may still exist due to the specific criteria used to select the banks. To address this, we have decided to not generalize our conclusion to the entire banking sector.

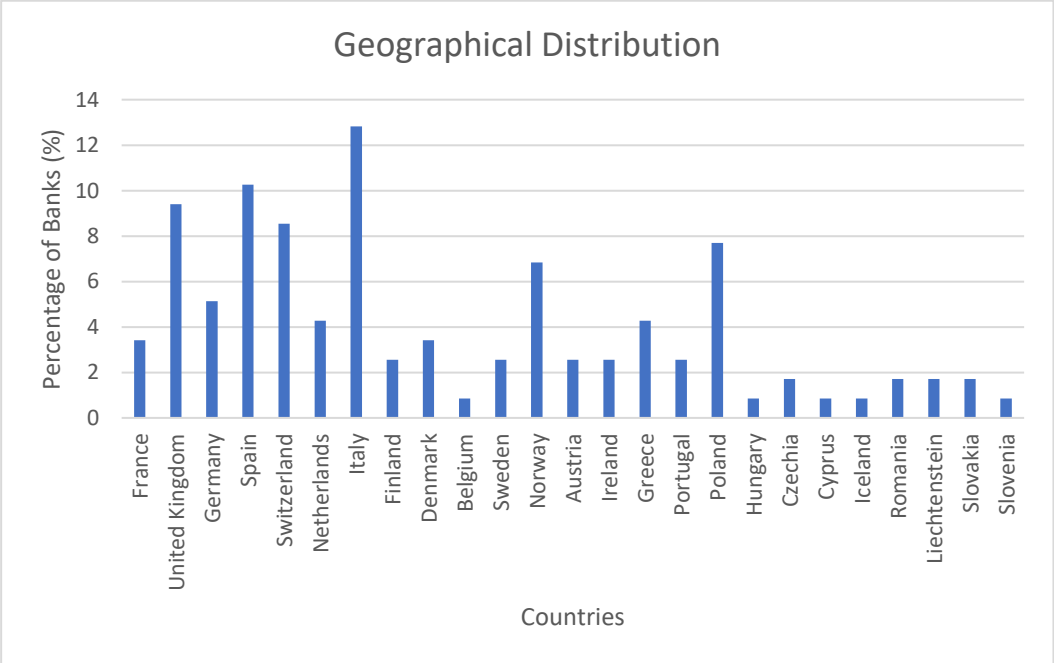


Figure 1: Geographical distribution

3.2 Independent variables

This study uses the Refinitiv ESG score. The Refinitiv ESG score is a tool utilized to evaluate a company's performance with respect to environmental, social, and governance (ESG) criteria. This evaluation is based on verifiable data that is publicly reported. In particular, over 630 ESG measures are calculated and analysed at the company level. A subset of these measures, consisting of 186 of the most comparable and material measures per industry, is utilized to determine the overall company assessment and scoring process.

The selection of these measures is based on various considerations, including comparability, impact, data availability, and industry relevance, which differ across industry groups (Refinitiv, 2022).

The measures are grouped into ten categories, which are then used to calculate three pillar scores and the final ESG score. These scores reflect the company's ESG performance, commitment, and effectiveness based on publicly reported information. The three pillar scores, environmental, social, and corporate governance, are derived by aggregating the category scores. The weights for the 'Environmental' and 'Social' categories vary by industry, resulting in different weightings for the respective pillar scores. Conversely, the weights for the 'Governance' category are constant across all industries. The ESG pillar score is calculated as a relative sum of the category weights (Refinitiv, 2022). An overview of the ESG pillars together with the corresponding categories and the ESG themes covered in each category can be found in Table 1.

Pillars	Categories	Themes
Environmental	Emissions	Emissions
		Waste
		Biodiversity
		Environmental management systems
	Innovation	Product innovation
		Green revenues, research and development (R&D) and capital expenditures (CapEx)
		Water
	Resource use	Energy
		Sustainable packaging
		Environmental supply chain
Social	Community	Equally important to all industry groups, hence a median weight of five is assigned to all
	Human rights	Human rights
	Product responsibility	Responsible marketing
		Product quality
		Data privacy
	Workforce	Diversity and inclusion
		Career development and training
Working conditions		
Governance	CSR strategy	Health and safety
		CSR strategy
	Management	ESG reporting and transparency
		Structure (independence, diversity, committees)
		Compensation
Shareholders	Shareholder rights	
	Takeover defenses	

Table 1: ESG pillars (Refinitiv, 2022)

In this study the independent variable is measured using three ESG pillars (i.e. the environmental pillar (E_score), the social pillar (S_score), the governance pillar(G_score)) and an overall indicator of them, the ESG score itself (ESG_score). Refinitiv also provides ESG controversies, this is a detailed overview of corporate controversies related to environmental, social, and governance issues. This dataset captures negative news events such as environmental disasters, human rights violations, labour disputes, corruption, and other ESG controversies that may impact a company's financial performance and reputation. The dataset includes both active and historical controversies, providing a comprehensive view of a company's ESG performance over time. The data is sourced from thousands of news articles, regulatory filings and other sources, providing a comprehensive and objective view of ESG controversies (Refinitiv, 2022).

3.3 Dependent variables

We use three dependent variables to measure banking performance by considering stock market return (SR), return on assets (ROA) and volatility (VOL) of the stock market return.

Stock market return (SR) is included to measure the market performance. It measures the change in return index over the analysed period. It is calculated as the return index at the end of time t_1 minus the return index at the end of time t_0 , divided by the return index at time t_0 .

Return on assets (ROA) is included to measure the operational performance. It measures the profitability of total assets and is calculated as the net income after taxes divided by average total assets.

Volatility (VOL) is included to gauge the level of risk or uncertainty associated with the stock market return. Volatility is calculated using the standard deviation of the stock's daily returns.

3.4 Control variables

The study takes into consideration the effect of market, bank and macroeconomic-specific variables to control the relationship between ESG and banking performance.

We consider two market-specific variables: market return (MR) and standard deviation of the market return (MSTDV). Market return (MR) is calculated as the STOXX 600 index at the end of time t_1 minus the STOXX 600 index at the end of time t_0 , divided by the STOXX 600 index at time t_0 .

Market return captures the effect of market-wide factors that may influence the returns of individual assets or portfolios. In addition, market return can help to account for macroeconomic variables that affect the returns of all stocks in the market (Fama & French, 1993). Standard deviation of the market return (MSTDV) is calculated as the standard deviation of the daily market return. Market volatility has been shown to be an important factor that affects stock volatility. Empirical studies have found evidence of a positive correlation between market volatility and stock volatility (Kim et al., 2004). Also, including market volatility as a control variable can improve the external validity of our findings. By accounting for market volatility, we can better generalize our results to different market conditions and across different time periods.

Secondly, we consider seven bank-specific variables: Common Equity Tier 1 (CET1), net interest margin (NIM), deposits-to-assets ratio (DTA), loans-to-assets ratio (LTA), non-performing loans ratio (NPL), size (SIZE) and loans-to-deposits ratio (LTD). Common Equity Tier 1 (CET1) is a measure of bank's capital adequacy, representing the highest quality of bank capital. It can account for differences in risk-taking behaviour across banks. Banks with higher CET1 ratios may be more risk-averse, while banks with lower CET1 ratios may be more willing to take on risk in pursuit of higher returns. (Abbas et al., 2021). CET1 is included as CET1/RWA because of multicollinearity issues as we will discuss later in the paper. Risk-weighted assets (RWA) are calculated by assigning different risk weights to different categories of assets. RWA is a variable that is commonly used in the finance industry. Net interest margin (NIM) is considered one of the most significant measures of bank profitability. Therefore, including NIM as a control variable can help to identify the relationship between profitability and other factors that may affect bank performance (Almaskati, 2022). The deposits-to-assets ratio (DTA) and the loans-to-deposit ratio (LTA) are included to control for different business models across the different banks. Including these variables can help to identify trends or patterns in bank performance that are specific to a particular segment of the industry. We use the impaired loans to total loans ratio as a proxy for the non-performing loans ratio (NPL), as impaired loans are also loans that have a higher risk of not being repaid in full. The ratio is included as a control variable because it can help to account for the effect of credit risk on bank performance. Size (SIZE) is measured as the natural logarithm of total assets. Large banks have an advantage in accessing affordable resources and capital due to their diversified portfolio and higher media scrutiny.

As a result, they have more funds available to invest in corporate social responsibility initiatives (Siueia et al., 2019). The loans-to-deposits ratio (LTD) represents the proportion of loans that are financed by deposits, it can help control for the effect of liquidity on bank performance (Marozva, 2015).

Finally, we consider one macroeconomic-specific variable: GDP growth (GDP) which is reported in fractions. GDP growth can be an important macroeconomic factor that affects bank performance. A growing economy generally leads to higher demand for credit and banking services, which can result in increased profits for banks (Calza et al., 2001).

3.5 The models

3.5.1 Regression analysis

We create five regression models to answer the question:

Q1: Can an ESG indicators be a predictor of European bank's performance?

To examine the relationship between ESG indicators and bank performance, we estimate the following econometric models that align with the relevant literature:

$$(1) \quad PM_{i,t} = \beta_0 + \beta_1/\beta_{1-3} \text{independent variable}(s)_{i,t-1} + \varepsilon_{i,t}$$

$$(2) \quad PM_{i,t} = \beta_0 + \beta_1/\beta_{1-3} \text{independent variable}(s)_{i,t-1} + \beta_{2-...}/\beta_{4-...} \text{control variables}_{i,t-1} + \varepsilon_{i,t}$$

$$(3) \quad PM_{i,t} = \beta_0 + \beta_1/\beta_{1-3} \text{independent variable}(s)_{i,t-1} + \beta_{2-...}/\beta_{4-...} \text{control variables}_{i,t-1} + FE(\text{Time}) + \varepsilon_{i,t}$$

$$(4) \quad PM_{i,t} = \beta_0 + \beta_1/\beta_{1-3} \text{independent variable}(s)_{i,t-1} + \beta_{2-...}/\beta_{4-...} \text{control variables}_{i,t-1} + FE(\text{Bank}) + \varepsilon_{i,t}$$

$$(5) \quad PM_{i,t} = \beta_0 + \beta_1/\beta_{1-3} \text{independent variable}(s)_{i,t-1} + \beta_{2-...}/\beta_{4-...} \text{control variables}_{i,t-1} + FE(\text{Time} + \text{Bank}) + \varepsilon_{i,t}$$

The models estimate PM (performance measure), which stands for the three dependent variables (SR, ROA and VOL) of bank (i) in year (t). Independent variable(s) is/are either the overall ESG score (ESG_score) or the three separate ESG pillars (E_score, S_score and G_score).

They are used as ESG performance measures of bank (i) in year (t-1), while control variables denotes MR, MSTDV, CET1, NIM, DTA, LTA, NPL, SIZE, LTD and GDP of bank (i) in year (t-1). The models include an intercept (β_0), coefficients ($\beta_{1\dots}$) for our predictors and control variables and an estimation error (ϵ). In order to address the concern of endogeneity, we use lagged ESG_score, ESG_pillars and control variables except for the control variables market return, market standard deviation and GDP.

Panel data modelling techniques are commonly used in many banking studies (Ahlklo & Lind, n.d.; Birindelli et al., 2018). The utilization of panel regression techniques, either fixed or random-effects models, offers the advantage of controlling for unobserved heterogeneity and analysing data over a longer period. When a model includes both time and individual bank fixed effects, it helps to control for unobserved heterogeneity that is specific to each bank over time. On the other hand, when the model includes only time fixed effect or individual bank fixed effects, some relevant factors that could influence bank performance may not be controlled for. The model with only individual bank fixed effects only controls for unobserved heterogeneity that is specific to each bank, but they do not account for common factors that affect all banks. Time fixed effects only control for time-specific factors but may not fully control for unobserved heterogeneity that is specific to each bank. We believe that models that include both time and individual bank fixed effects may be more precise than models that include only one or none of these fixed effects.

3.5.2 Event study

We perform an event study to answer the question:

Q2: What is the impact of ESG controversies on the stock market return of European banks?

An event study is a research method that is often used in the academic world to investigate the impact of a specific event on a particular market or firm. Here we use the ESG controversies, that was explained above, as the events. The goal of the event study is to analyse the effects of the controversies on the returns of the banks in our sample. We want to try to quantify an event's economic impact in so-called abnormal returns (AR). The calculation of abnormal returns involves deducting normal returns from the actual returns, where the latter can be directly observed. However, the normal returns need to be estimated. For this, expected return models are used. We chose to implement the Fama and French three-factor model.

This model is based on the idea that the estimated normal returns of stocks are determined not only by the market risk factor but also by two other factors, namely size and value. This model hence expands upon the traditional Capital Asset Pricing Model. The size factor captures the phenomenon that smaller firms tend to generate higher returns than larger firms, while the value factor reflects the tendency of stocks with low price-to-book ratios to earn higher returns than those with high ratios.

We perform a regression analysis that relates the stock returns (SR) to the market factor (MR), the size factor (SMB) and the value factor (HML). The resulting regression coefficients provide an estimation of the expected returns of the stocks based on their exposure to each of the three factors. The normal returns for a specific bank can then be calculated by multiplying the estimated factors loadings by the market returns and summing up the results. The period that we use for these calculations is called the estimation window. This contains 252 trading days, which is approximately one year. These calculations are done for each event of bank i for day t :

$$AR_{i,t} = SR_{i,t} - (\beta_{1,i}MR_t + \beta_{2,i}SMB_t + \beta_{3,i}HML_t)$$

The average abnormal returns (AAR) are calculated by summing up our abnormal returns and divide this by the number of events N :

$$AAR = \frac{1}{N} \sum_{i=1}^N AR_{i,t}$$

The measurement of the total impact of an event within a defined period, known as the event window, involves the calculation of cumulative average abnormal returns (CAAR). This is achieved by summing up the average abnormal returns of each bank i for that event window, where t_1 is the start of the event window and t_2 is the end of the event window:

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_{i,t}$$

After experimenting with the event window, we chose four different event windows: the event day [0], anticipated event window [-3,0], delayed event window [0, +3] and total event window [-3, +3]. There is a buffer of 10 days between the event window and the estimation window.

Each controversy belongs, according to Refinitiv, to either the environmental, the social or the governance pillar. In conducting the event study analysis, we examine the effect of all pillars (ESG) together during each event window as well as the effect of each individual pillar separately. This allows us to assess the overall impact of the events as well as to identify any specific effects that are unique to each pillar.

3.6 Descriptive statistics

3.6.1 Descriptive statistics: Regression analysis

After discussing a quantitative overview of the variables, our investigation now turns to an analysis of their qualitative characteristics.

Table 2 presents the descriptive statistics of our dependent, independent and control variables. It describes the minimum, maximum, mean, median and standard deviation for each variable.

After a thorough examination of the data, we proceed to eliminate any outliers that were identified in the dataset. This step was taken to ensure that our analysis is based on a more robust and accurate representation of the data. This can be seen in Table 2, where there are no longer large gaps between the minimum and maximum value.

The SR, VOL, and ESG measures (ESG score and the three ESG pillars) have a relatively high standard deviation. In finance, higher variability in return and volatility is expected and acceptable. The high standard deviation of the ESG measures is due to the measuring methodology of Refinitiv. The ESG measures are calculated as relative percentile score, therefore their distribution should be, in theory, flat. Each integer value of the score contains 1% of all banks hence this variability in the scores is a result of this particular calculation method.

Descriptive Statistics				
Statistic	Mean	St. Dev.	Min	Max
SR	0.017	0.347	-0.942	1.000
ROA	0.376	1.135	-1.961	2.870
VOL	0.024	0.014	0.005	0.102
ESG_score	57.273	20.822	2.360	94.810
E_score	63.749	28.067	0.000	99.000
S_score	58.291	22.861	1.410	97.670
G_score	56.418	22.980	2.750	97.000
MR	0.087	0.123	-0.102	0.276
MSTDV	0.010	0.004	0.005	0.017
CET1	0.139	0.037	0.054	0.415
NIM	1.815	1.017	0.213	6.903
DTA	0.641	0.172	0.207	0.988
LTA	0.606	0.167	0.024	0.925
NPL	0.062	0.077	0.001	0.505
SIZE	18.561	1.561	15.507	21.635
LTD	0.993	0.358	0.025	3.047
GDP	0.013	0.035	-0.113	0.244

Table 2: Descriptive statistics

3.6.2 Descriptive statistics: Event study

Our final sample consists of 444 controversies spanning from January 2017 to December 2022. A summary of the events that we use for our analysis is provided in Table 3. As reported in this table, there is a fairly even distribution of controversies across the sample period. Unfortunately, the distribution across the three pillars is uneven: 91,44% of the controversies belong to the social pillar; 6,76% to the governance pillar and only 1,80% is environmentally related. We were surprised that our sample has only 8 environmental controversies because environmental issues have gained substantial attention in recent years due to growing concerns about climate change and sustainability. We believe that the large proportion of social controversies is due to the categorization methodology of Refinitiv. One could argue that subcategories like ‘product quality’ and ‘data privacy’ shouldn’t be implemented in the social pillar.

We should be aware of the underrepresentation of environmental controversies in our dataset. This may limit our ability to draw robust conclusions about the relationship between environmental controversies and the bank returns.

Number of controversies							
	2017	2018	2019	2020	2021	2022	Total
E	0	0	0	0	6	2	8
S	31	59	91	86	85	54	406
G	3	4	6	10	3	4	30
Total	34	63	97	96	94	60	444

Table 3: Number of controversies per year and per category

Looking at the banks that have one or more controversies, we see that our sample consists of 57 banks from our original bank sample. Notably, Deutsche Bank Aktiengesellschaft accounts for 31,3% of the sample, indicating a significant presence and potential impact of this particular institution in our analysis. This finding highlights the importance of considering the unique characteristics and behavior of Deutsche Bank Aktiengesellschaft in relation to the overall trends and patterns observed across the broader sample of banks.

4. Findings and discussion

As stated above, this research paper includes two parts: the regression analysis and the event study. We start with the findings and discussion of the regression analysis where we examine the relevant statistical tests for the panel regression and then we will go deeper into the main estimation results of the impact of ESG variables on bank performance. The second part will be about analysing the results of the event study along with a comprehensive evaluation of the corresponding significance test.

4.1 Regression analysis

4.1.1 Statistical tests

The use of statistical tests for econometric modelling is a crucial aspect of empirical research. These tests enable us to evaluate the validity and reliability of our models and assess the robustness of our findings. We will perform different tests to examine correlation, heteroscedasticity and autocorrelation. The results can be found in Table 4.

Firstly, we employ the Hausman test to assess the adequacy of using either random effects or fixed effect in our model. The Hausman test is commonly used in econometric analyses to evaluate the validity of the random effect assumption which suggests that the unobserved heterogeneity is uncorrelated with the regressors.

Alternatively, the fixed effects assumption hold that the unobserved heterogeneity is correlated with the regressors. Our results indicate that fixed effects should be included in our models. We incorporate this in model (3), (4) and (5).

The Pearson correlation test is used to examine the correlation between variables. Initially, we construct our models with CET1 as one of the control variables. However, our Pearson correlation test revealed an unacceptably high value ($r = 0,9672$, not tabulated) between CET1 and size. Therefore, we decide to refine our models by replacing CET1 with CET1/Risk-Weighted Assets. After integrating CET1/RWA in our models, we conduct another Pearson correlation test. The results in Table 5 revealed that the correlation value is within an acceptable range, indicating that our modified models resolved the collinearity issue that was present in our initial models.

In order to test for heteroscedasticity and autocorrelation, we perform several tests. The Breusch-Pagan test was conducted to examine the presence of heteroscedasticity and the Durbin-Watson test was used to check for autocorrelation. The results from these tests indicated the presence of both issues in our model.

To address these issues, we implement Newey-West standard errors, the standard errors are hence clustered at the bank level. This approach is a common technique used to adjust for heteroskedasticity and autocorrelation. After using the Newey-West standard errors, a significant improvement was observed in the results of the statistical test.

	Dependent variable:					
	SR		ROA		VOL	
	ESG_score	E, S, G_score	ESG_score	E, S, G_score	ESG_score	E, S, G_score
Hausman χ^2	39.714***	25.268*	33.99***	31.468***	41.638***	44.298***
Breusch-Pagan	0.43326	0.42365	12.506***	13.189***	47.403***	47.765***
Durbin-Watson	2.2358	2.2363	1.8452*	1.8687*	1.8595*	1.8544*

Signif. Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4: Statistical tests

Pearson Correlations														
	ESG	E	S	G	MR	MSTDV	CET1	NIM	DTA	LTA	NPL	SIZE	LTD	GDP
ESG	1	0,80	0,92	0,78	0,04	-0,02	0,04	-0,18	-0,33	-0,32	-0,07	0,70	-0,01	-0,06
E	0,80	1	0,76	0,44	-0,09	-0,04	-0,07	-0,26	-0,40	-0,31	-0,02	0,73	0,02	-0,05
S	0,92	0,76	1	0,51	0,02	-0,02	0,02	-0,20	-0,31	-0,30	-0,06	0,65	-0,02	-0,08
G	0,78	0,44	0,51	1	0,05	-0,04	0,10	-0,01	-0,20	-0,23	-0,05	0,44	-0,02	0,01
MR	0,04	-0,09	0,02	0,05	1	-0,54	0,15	-0,06	0,04	-0,01	-0,07	-0,03	-0,03	0,27
MSTDV	-0,02	-0,04	-0,02	-0,04	-0,54	1	-0,09	0,02	-0,03	0,04	-0,01	-0,03	0,05	-0,50
CET1	0,04	-0,07	0,02	0,10	0,15	-0,09	1	-0,03	0,10	-0,01	-0,13	-0,24	0,05	0,19
NIM	-0,18	-0,26	-0,20	-0,01	-0,06	0,02	-0,03	1	0,45	0,33	0,31	-0,43	-0,13	0,09
DTA	-0,33	-0,40	-0,31	-0,20	0,04	-0,03	0,10	0,45	1	0,42	0,30	-0,59	-0,51	0,06
LTA	-0,32	-0,31	-0,30	-0,23	-0,01	0,04	-0,01	0,33	0,42	1	0,27	-0,51	0,48	-0,02
NPL	-0,07	-0,02	-0,06	-0,05	-0,07	-0,01	-0,13	0,31	0,30	0,27	1	-0,11	-0,07	-0,01
SIZE	0,70	0,73	0,65	0,44	-0,03	-0,03	-0,24	-0,43	-0,59	-0,51	-0,11	1	-0,01	-0,08
LTD	-0,01	0,02	-0,02	-0,02	-0,03	0,05	0,05	-0,13	-0,51	0,48	-0,07	-0,01	1	-0,06
GDP	-0,06	-0,05	-0,08	0,01	0,27	-0,50	0,19	0,09	0,06	-0,02	-0,01	-0,08	-0,06	1

Table 5: Pearson correlations

4.1.2 Panel regression results

In this section, we present the results of the panel regressions analysis that can be found in Table 6 and Table 7. We report on five incremental models that were estimated using panel data techniques: Table 6 contains the estimations using the overall ESG_score, Table 7 contains the estimations with the three separate ESG pillars. The main objective of this analysis is to provide a comprehensive understanding of the significance and direction of the effect of the ESG measures on bank performance, while also considering the impact of various control variables, individual bank fixed effects and time effects. We will first go through the different models with ESG_score as independent variable and will end with a discussion of the results with separate ESG pillars as independent variables.

The results with ESG_score as the independent variable can be found in Table 6. The results show that ESG_score in equation (1) is not a significant predictor of SR ($p = 0.14081$), ROA ($p = 0.16537$) and VOL ($p = 0.59663$).

Equation (5) includes multiple control variables and fixed effects (DATE and Bank), as stated above. Looking at this equation (5), The results highlight that ESG_score is a significant predictor of VOL at the significance level of 10% ($p = 0.07641$, $\beta = -0.000102$). However, ESG_score remains insignificant for SR ($p = 0.28812$) and ROA ($p = 0.6377450$). The ESG score negatively influences the volatility of the returns, which means that a higher ESG score results in more stable returns. This is in line with Ashwin Kumar et al. (2016) who found a significant negative relationship between ESG and stock market volatility. This study was conducted on non-financial companies over a two-year period, spanning from the beginning of 2014 to the end of 2015.

Engelhardt et al. (2021) stated that, after decomposing ESG into its separate components, the social score is the dominant driver of this result. This will be examined in our later models. It should be mentioned that this study was done for European firms during the COVID-19 crisis.

When taking a closer look at our variable VOL, we find that ESG_score only becomes significant when taking account both fixed effect: individual bank and time. Taking a closer look at equation (3) and (4), our dependent variable VOL is not significant when we separated the fixed effects, hence controlling for individual and time fixed effect is crucial. These results suggest that the fixed effects filter out variation in our data which could otherwise be attributed to our variables of interest. Consequently, this suggests that there is some unobserved heterogeneity across the individual banks and some time-specific factors that are influencing the relationship. We can suggest that the significant results are a consequence of the reduced bias that arises due to the unobserved heterogeneity.

As stated above, ESG_score is not significant in equation (5) for SR and ROA. If we examine the results of equation (3) that only includes time fixed effects. We find that ESG_score becomes a significant predictor for SR ($p = 0.064880$) and ROA ($p = 0.015425$). A possible explanation for the results is that the relationship between ESG_score and SR/ROA may vary over time. We know that fixed time effects capture shocks to the level of the dependent variables that are common to all banks. This means that they filter out the variation in the data caused by these shocks so that it cannot be erroneously attributed to ESG.

This enables ESG_score to have a more significant effect on SR/ROA. The baseline idea here is that including the time fixed effect filtered out some variation in the dependent variable which erroneously made the effect of ESG seem less significant. When we add the individual bank fixed effects in our final equation (5), this fixed effect then filter out additional variation which was erroneously attributed to ESG. This can explain why the significance of ESG_score is reduced in equation (5) relative to equation (3) that only include time effects.

	Dependent variable:														
	SR					ROA					VOL				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
ESG_score	0.001 (0.14081)	0.001 (0.2941)	0.001 (0.0649)	0.002 (0.3555)	0.002 (0.2881)	-0.003 (0.1654)	0.004 (0.0528)	0.005* (0.0154)	0.000 (0.9095)	0.002 (0.6377)	-0.000018 (0.59663)	0.000020 (0.5265)	-0.000003 (0.9322)	-0.000053 (0.3445)	-0.000102 (0.0764)
MR		1.423*** (0.0000)		1.422*** (0.0000)											
MSTDV												1.117012*** (0.0000)		1.176110*** (0.0000)	
CET1		0.451 (0.1786)	0.694* (0.0482)	0.365 (0.4142)	0.450 (0.5112)		4.210*** (0.0000)	4.403*** (0.0004)	1.920 (0.1025)	2.265 (0.0846)		-0.048308** (0.0039)	-0.044708* (0.0153)	-0.013658 (0.5493)	-0.003233 (0.8727)
NIM		0.022* (0.0434)	0.018 (0.0811)	-0.043 (0.1985)	-0.038 (0.2567)		0.344*** (0.0000)	0.323*** (0.0000)	0.307 (0.1301)	0.281 (0.1612)		-0.001870** (0.0013)	-0.001583** (0.0027)	-0.000239 (0.8478)	0.000133 (0.9208)
DTA		-0.248 (0.2017)	-0.154 (0.3941)	-0.220 (0.4299)	-0.036 (0.9133)		-0.414 (0.3610)	-0.340 (0.4749)	0.648 (0.3772)	0.853 (0.3329)		0.016727* (0.0233)	0.014389* (0.0477)	0.019469 (0.1097)	0.016513 (0.1692)
LTA		-0.170 (0.2546)	-0.150 (0.2651)	-0.286 (0.3265)	-0.090 (0.7556)		-0.246 (0.5350)	-0.267 (0.5012)	-0.074 (0.8892)	-0.424 (0.4145)		-0.005132 (0.3939)	-0.004375 (0.4478)	-0.009635 (0.0917)	-0.008034 (0.1919)
NPL		-0.793*** (0.0000)	-0.827*** (0.0000)	0.200 (0.4867)	-0.040 (0.8818)		-4.486*** (0.0000)	-4.542*** (0.0000)	-2.256** (0.0045)	-2.514** (0.0025)		0.090988*** (0.0000)	0.094388*** (0.0000)	0.019828 (0.2250)	0.030354 (0.0805)
SIZE		-0.023* (0.0493)	-0.024* (0.0486)	-0.219*** (0.0009)	-0.245*** (0.0006)		-0.146*** (0.0002)	-0.155 (0.0000)	-0.096 (0.4824)	0.017 (0.9123)		-0.000002 (0.9973)	0.000257 (0.6195)	0.001680 (0.5953)	0.001276 (0.7229)
LTD		-0.020 (0.0799)	0.001 (0.9878)	-0.082 (0.4042)	-0.032 (0.7384)		-0.161 (0.3458)	-0.147 (0.3996)	0.088 (0.6708)	0.115 (0.6267)		0.003800 (0.1420)	0.002909 (0.2495)	0.005311* (0.02737)	0.004194 (0.1083)
GDP		0.976*** (0.0004)	1.125** (0.0084)	0.862** (0.0072)	1.312** (0.0057)		-0.690 (0.1900)	0.863 (0.4057)	-0.714 (0.1506)	1.116 (0.2505)		-0.064562*** (0.0000)	-0.074936** (0.0084)	-0.051682 (0.0000)	-0.057393*** (0.0000)
Observations	723	723	723	723	723	776	723	723	723	723	781	723	723	723	723
Adjusted R ²	0.377	0.377	0.468	0.416	0.512	0.008	0.486	0.511	0.624	0.654	-3.689e-4	0.510	0.535	0.728	0.751
Within R ²			0.116	0.380	0.047		0.505	0.505	0.078	0.080		0.440	0.440	0.424	0.057
RMSE	0.268	0.268	0.246	0.240	0.218	0.718	0.516	0.499	0.408	0.388	0.012	0.009	0.009	0.006	0.006
Fixed effects	None	None	Time	Bank	Time + Bank	None	None	Time	Bank	Time + Bank	None	None	Time	Bank	Time + Bank

Signif. Codes: 0 **** 0.01 *** 0.05 ** 0.1 * 1, (p-value)

Table 6: Regression results with independent variable ESG_score

After analysing the relationship between the overall ESG score and banking performance, we examine the relationship between each of the three ESG pillars (E_score, S_score and G_score) and banking performance separately. This could reveal which specific pillars have the greatest impact on performance. The results of this can be found in Table 7.

When we interpret the results of equation (1), we found that E_score is a significant predictor for ROA at the 5% significance level ($p = 0.02347721$, $\beta = -0.00645$). However, E_score is not significant for SR and VOL. The S_score is not a significant predictor for any of the three dependent variables. At a significance level of 10%, the G_score is an important predictor of SR ($p = 0.065663$, $\beta = 0.001258$) and ROA ($p = 0.07084061$, $\beta = 0.004543$). We can suggest for this model that the governance pillar has a positive influence on both ROA and SR. This means that investing in corporate governance is beneficial for our bank performance. However, the estimated coefficient for the environmental pillar is negative. This seems rather remarkable but is in line with our previous literature study that the relationships between ESG dimensions and bank performance are mixed if measured individually. Further investigation is necessary, therefore we will have a look at the results of our final model.

The results of equation (5) in Table 7 show that none of the ESG pillars are significant for SR, ROA and VOL. We investigate why our environmental and governance pillars become insignificant by building up the model step by step. We will start to examine SR and will end with ROA. We do not further investigate the VOL variable as there is no significant relationship with the ESG pillars across all five equations. Our referencing point is equation (1).

Looking at equation (2) where we only add the control variables, we see that E_score and S_score becomes significant while G_score becomes insignificant for SR. A possible explanation is the omitted variable bias. This occurs when important variables that are correlated with both SR and the ESG pillars are left out of the model. This results in an incorrect estimation of the effect of the ESG pillars on SR. When we go a step further in our model, we can see that for equation (3) only the E-score remains significant. As stated earlier, this change of significance can be attributed to the fact that time effects filter out variation in the data so it cannot be linked to the ESG pillars. If we again start from our equation (2) with only the control variables and compare the results with equation (4) where the bank fixed effects are added, we see that the environmental pillar remains significant and governance pillar becomes significant.

The changes of significance across the different equations for SR implies that the significance of the estimated coefficients is largely driven by between-bank differences in their ESG pillars and SR or by yearly movements in their ESG score and SR. We take equation (2) as starting point, because it makes more sense than comparing the model with bank fixed effect to the model with time fixed effect.

When we take a closer look at the model with the dependent variable ROA in Table 7, we see by adding control variables that E_score becomes insignificant while G_score remains significant. As stated above, omitted variable bias is a logical explanation for this. When we separate the fixed effects in equation (3) and (4), we can see that the significance of the G_score disappears due to the individual fixed effect. We can conclude here that the estimated coefficients in the earlier model were mainly driven by the bank-specific, unobserved heterogeneity, rather than due to the relationship between ESG pillars and ROA.

	Dependent variable:														
	SR					ROA					VOL				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
E_score	-0.000 (0.7558)	0.002*** (0.0007)	0.001* (0.0400)	0.002 (0.0918)	0.000 (0.8494)	-0.006* (0.0235)	0.003 (0.1748)	0.003 (0.2084)	0.001 (0.4703)	0.001 (0.4703)	-0.000006 (0.86074)	-0.000012 (0.6845)	-0.000000 (0.9903)	-0.000027 (0.4031)	-0.000004 (0.8841)
S_score	-0.000 (0.8435)	-0.002* (0.0467)	-0.000 (0.6734)	-0.001 (0.4738)	0.001 (0.5597)	-0.000 (0.9889)	-0.000 (0.9740)	0.000 (0.9705)	-0.002 (0.6142)	-0.002 (0.6142)	0.000038 (0.50605)	0.000048 (0.2374)	0.000023 (0.5710)	-0.000036 (0.3916)	-0.000072 (0.1176)
G_score	0.001 (0.0657)	0.000 (0.3571)	0.000 (0.5917)	0.002* (0.0322)	0.001 (0.3218)	0.005 (0.0708)	0.003 (0.0949)	0.003 (0.0527)	0.003 (0.1459)	0.003 (0.1459)	-0.000060 (0.13475)	-0.000022 (0.4227)	-0.000025 (0.36127)	0.000002 (0.9544)	-0.000018 (0.5731)
MR		1.485*** (0.0000)		1.453*** (0.0000)											
MSTDV											1.117149*** (0.0000)			1.174216*** (0.0000)	
CET1	0.413 (0.2016)	0.636 (0.0589)	0.430 (0.3611)	0.460 (0.5040)	0.460 (0.5040)	4.161*** (0.0000)	4.205*** (0.0004)	1.833 (0.1224)	2.212 (0.0870)	2.212 (0.0870)	-0.047779** (0.0041)	-0.043404* (0.0148)	-0.011953 (0.6125)	-0.004098 (0.8405)	
NIM	0.022* (0.0311)	0.019* (0.0411)	-0.051 (0.1485)	-0.038 (0.2683)	-0.038 (0.2683)	0.339*** (0.0000)	0.320*** (0.0000)	0.301 (0.1318)	0.275 (0.1557)	0.275 (0.1557)	-0.001770** (0.0006)	-0.001521** (0.0018)	-0.000170 (0.8935)	0.000100 (0.9412)	
DTA	-0.196 (0.2891)	-0.126 (0.4819)	-0.262 (0.3151)	-0.037 (0.9072)	-0.037 (0.9072)	-0.389 (0.3925)	-0.345 (0.4717)	0.613 (0.3988)	0.695 (0.4637)	0.695 (0.4637)	0.016966* (0.0277)	0.015075* (0.0499)	0.018772 (0.1066)	0.014814 (0.2101)	
LTA	-0.206 (0.1299)	-0.180 (0.1674)	-0.292 (0.2901)	-0.093 (0.7475)	-0.093 (0.7475)	-0.245 (0.5469)	-0.271 (0.5076)	-0.079 (0.8787)	-0.419 (0.4344)	-0.419 (0.4344)	-0.005685 (0.3471)	-0.004998 (0.3899)	-0.009306 (0.1135)	-0.007784 (0.2165)	
NPL	-0.842*** (0.0000)	-0.028* (0.0152)	-0.844*** (0.0000)	-0.041 (0.8788)	-0.041 (0.8788)	-4.535*** (0.0000)	-4.554*** (0.0000)	-2.277** (0.0046)	-2.587** (0.0019)	-2.587** (0.0019)	0.091207*** (0.0000)	0.094193*** (0.0000)	0.020036 (0.2232)	0.029562 (0.09236)	
SIZE	-0.034** (0.0028)	-0.028* (0.0152)	-0.246*** (0.0001)	-0.244*** (0.0004)	-0.244*** (0.0004)	-0.157*** (0.0000)	-0.162*** (0.0000)	-0.123 (0.3759)	-0.014 (0.9281)	-0.014 (0.9281)	0.000041 (0.9317)	0.000200 (0.6876)	0.001923 (0.5266)	0.000967 (0.7858)	
LTD	-0.007 (0.9265)	0.011 (0.8703)	-0.101 (0.2330)	-0.033 (0.7233)	-0.033 (0.7233)	-0.162 (0.3375)	-0.154 (0.3744)	0.081 (0.6821)	0.061 (0.8063)	0.061 (0.8063)	0.004070 (0.1268)	0.003237 (0.2149)	0.004907* (0.0229)	0.003611 (0.1544)	
GDP	0.857** (0.0033)	1.148** (0.0087)	0.744* (0.0285)	1.321** (0.0049)	1.321** (0.0049)	-0.788 (0.1297)	0.860 (0.3909)	-0.749 (0.1296)	1.183 (0.2184)	1.183 (0.2184)	-0.063048*** (0.0000)	-0.073955** (0.0084)	-0.05157*** (0.0000)	-0.057111 (0.1511)	
Observations	781	723	723	723	723	776	723	723	723	723	781	723	723	723	723
Adjusted R ²	0.002	0.387	0.469	0.420	0.510	0.048	0.489	0.623	0.654	0.654	0.006	0.512	0.535	0.426	0.750
Within R ²			0.121	0.387	0.047		0.509	0.080	0.084	0.084		0.009	0.442	0.057	0.057
RMSE	0.341	0.265	0.245	0.239	0.218	0.702	0.514	0.408	0.388	0.388	0.012	0.009	0.009	0.006	0.006
Fixed Effects	None	None	Time	Bank	Time + Bank	None	None	Bank	Time + Bank	Time + Bank	None	None	Time	Bank	Time + Bank

Signif. Codes: 0 '***' 0.01 '**' 0.05 '*' 0.1 '.' 1. (p-value)

Table 7: Panel regression results with independent variables ESG pillars

4.2 Event study

4.2.1 Results

This section will include an examination of the results from our event study. We will discuss the cumulative average abnormal return and its significance across the four different event windows. The significance test that we use is the two-sided t-test with the alternative hypothesis that the CAAR is not equal to 0. We will start with discussing the event itself [0] followed by the anticipated event window [-3,0], delayed event window [0, +3] and end with the total effect [-3, +3]. The results of our event study can be found in Table 8. As mentioned above, we only have 8 environmental controversies so the sample size for this kind of controversies is probably too small to be able to do reliable inference.

Window	CAAR (p-value)			
	ESG	E	S	G
[0]	-0.08% (0.4928)	-0.36% (0.1835)	-0.10% (0.3988)	0.28% (0.6724)
[-3,0]	-0.43% (0.0835)	-3.22% (0.0029)	-0.16% (0.4732)	-3.28% (0.1035)
[0,+3]	0.19% (0.3946)	-1.08% (0.5386)	0.13% (0.5560)	1.43% (0.3747)
[-3,+3]	-0.15% (0.6042)	-3.95% (0.1143)	0.07% (0.7958)	-2.15% (0.2167)

Table 8: Event study results

Although Figure 2 reveals the presence of negative values for environmental, social, and overall CAAR, as well as a positive shift in the governance CAAR regarding the event under examination, none of these parameters demonstrate statistical significance. There are multiple explanations for this outcome. It is possible that the market has already incorporated the ESG controversies into the stock prices of the banks. Efficient markets quickly adjust stock prices to reflect all available information, including ESG-related news. If the market had already priced in the impact of the controversies, this may explain the lack of significant CAAR during this event window. It is also possible that this event window may not capture the full impact of the controversies on the bank returns.

The event window may be too narrow to capture any significant market reactions hence we will expand the event window to include a longer period surrounding the event to capture potential anticipated and delayed effects.

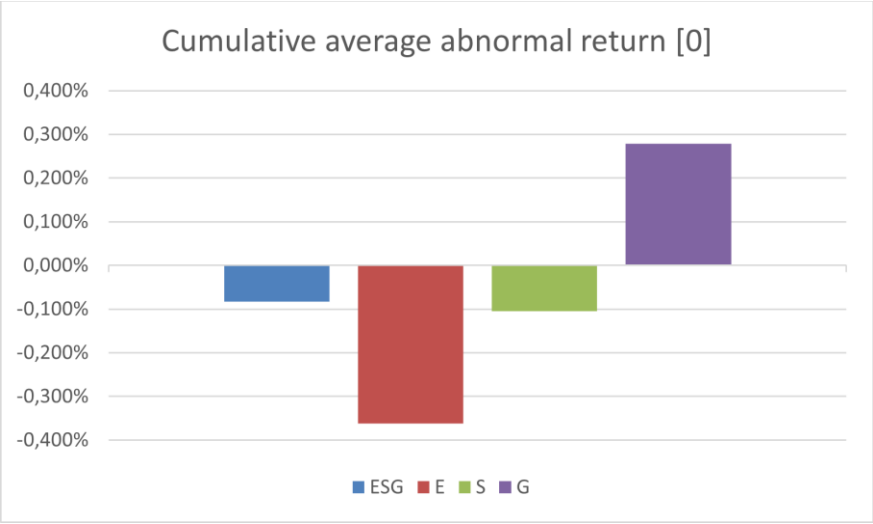


Figure 2: Cumulative average abnormal return, event window [0]

The results of the anticipated event window can be found in Figure 3. We find that the CAAR related to environmental pillar is negative (-3.22%) at significance level 1% ($p=0.0029$). The overall ESG CAAR is significant at level 10% with a negative CAAR of -0.43%. Despite these results, the social and governance CAAR are not significant. The results suggest that when a controversy occurs, particularly related to overall ESG CAAR, investors are sensitive to these issues and there is a negative effect on the stock market not only on the day of the event but also in the days preceding it. This could be due to potential leakage of information before the controversy.

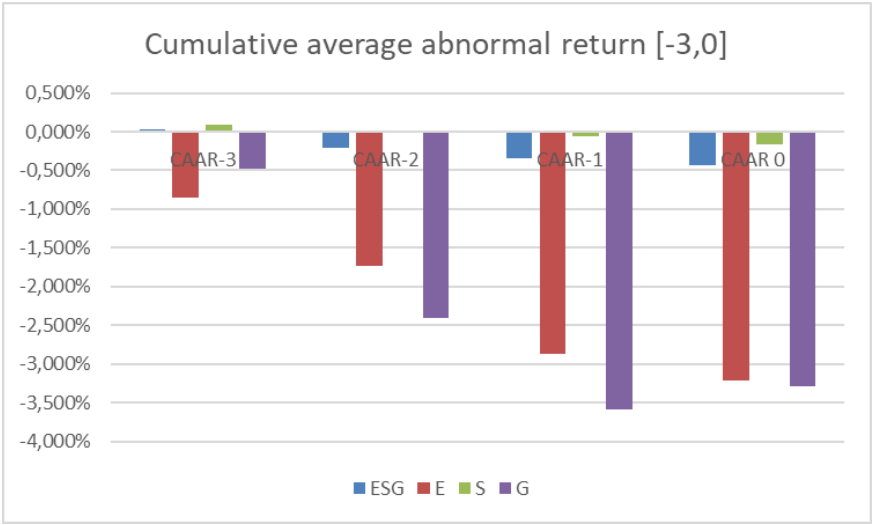


Figure 3: Cumulative average abnormal return, event window [-3,0]

We find no significant results for the delayed event window in Figure 4. This might suggest that any potential impact of the controversies on the bank’s stock performance has been absorbed by the market during the event or the anticipated period leading up to it.

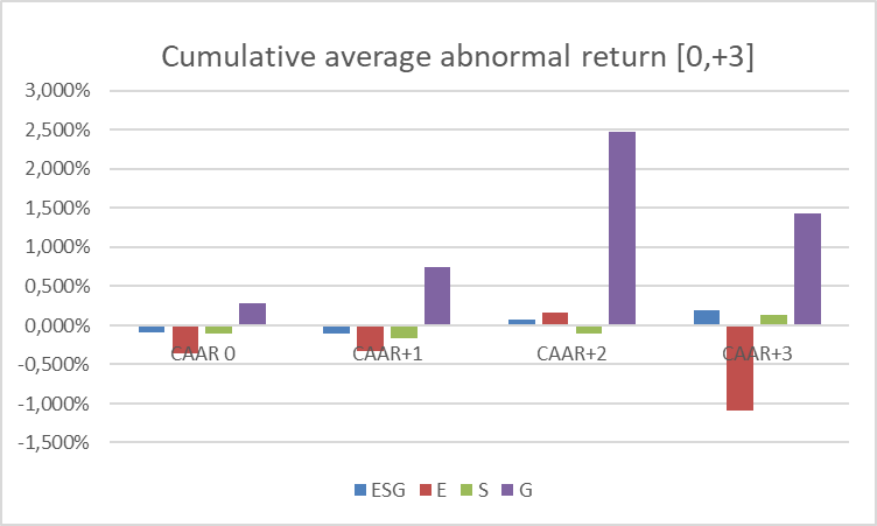


Figure 4: Cumulative average abnormal return, event window [0,+3]

Figure 5 contains the visual results of the last event window, here we examine the total effect: anticipated and delayed. We see in Table 8 that none of the CAARs are significant despite being all negative. As stated above, the lack of significant CAARs, despite negative returns, can suggest that the stock market may have efficiently incorporated the information related to the ESG controversies into the banks’ stock prices. In other words, investor may have already anticipated and priced in the potential negative effects of these controversies due to leakages.

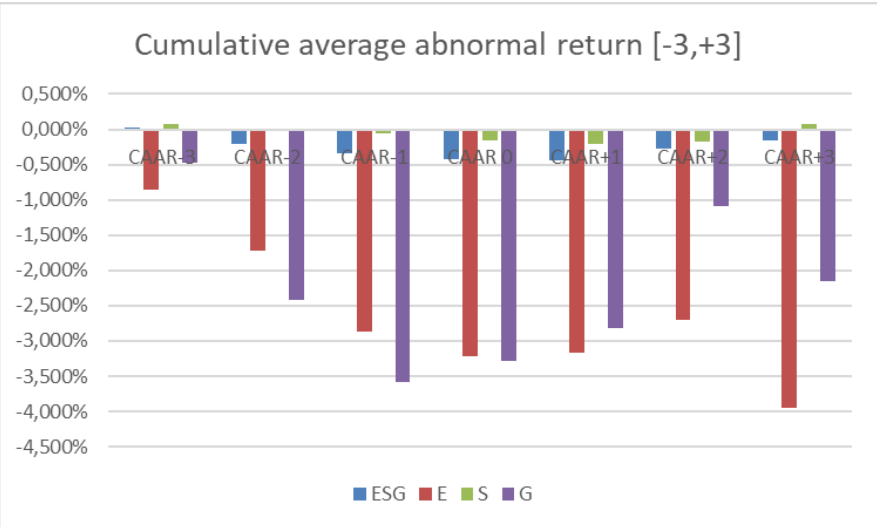


Figure 5: Cumulative average abnormal return, event window [-3,+3]

4.2.2 Robustness check

To control our model for robustness, we construct a new model where our normal return is replaced by the product between the estimated market beta of the bank from above and the daily market returns instead of estimating the normal return with the Fama–French three-factor model. The other calculations remain the same as in our previous, main model. By conducting a robustness check with our new model, we can gain confidence in the validity of our results and it makes our research more trustworthy and credible. All results can be found in Table 9. We chose to only visualise the anticipated and total event window as we only have notable results for these two windows. This can respectively be found in Figure 6 and Figure 7.

Window	CAAR (p-value)			
	ESG	E	S	G
[0]	-0.09% (0.4715)	-0.86% (0.0594)	-0.11% (0.4203)	0.29% (0.6648)
[-3,0]	-0.50% (0.0455)	-1.09% (0.1752)	-0.32% (0.1674)	-2.84% (0.1652)
[0,+3]	0.14% (0.5465)	0.81% (0.5829)	0.02% (0.9152)	1.57% (0.3692)
[-3,3]	-0.26% (0.3742)	0.57% (0.7290)	-0.18% (0.5332)	-1.57% (0.3929)

Table 9: Event study results, robustness check

We find in Table 9 that the overall CAAR remains significantly negative. While the significance of the environmental CAAR disappears. The results for the total event window in Table 9 show that all CAARs remain insignificant. No changes occur for the event window that only includes the event itself and the delayed event window. We can conclude from the robustness check that our model is robust for the overall, social and governance CAAR. The results for our environmental CAAR changes across some models, we believe that this is due to a lack of observations for this controversy. As stated above, we have only 8 environmental controversies which limits our research.

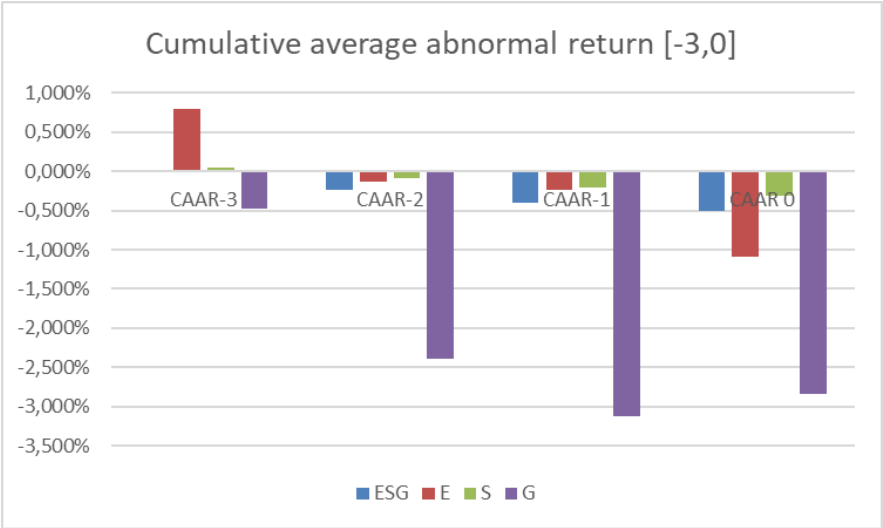


Figure 6: Cumulative average abnormal return, event window [-3,0], robustness check

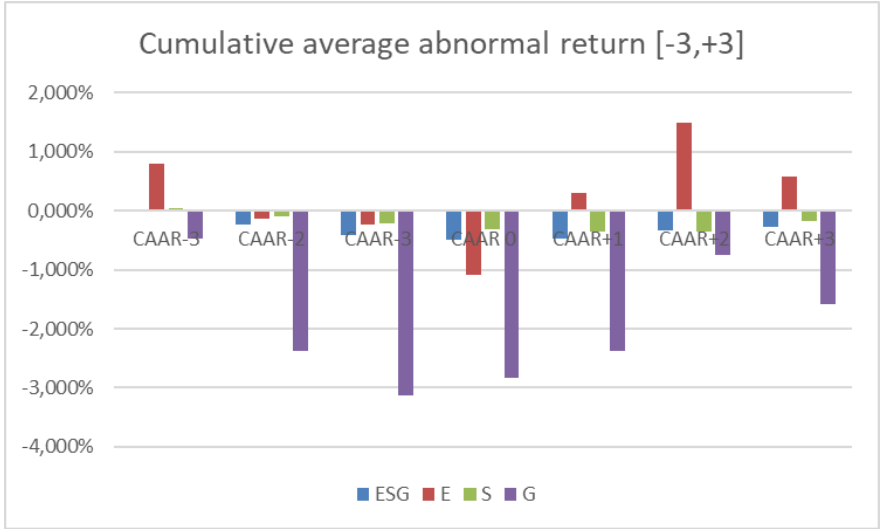


Figure 7: Cumulative average abnormal return, event window [-3,+3], robustness check

5. Conclusion

We can divide this research in two parts: the panel regression and the event study.

The first part of our study examines the relationship between ESG variables from the Refinitiv database and the performance of European listed banks. This was done for the period 2009-2021. To the best of our knowledge, this research is one of the first to examine the influence of ESG dimensions on stock returns, ROA, and volatility of listed European banks. We employ five econometric models to assess the predictive power of ESG and its pillars on bank performance, incorporating various bank- and country-specific control variables.

We find a significant negative relationship between the ESG score and bank volatility. This implicates that a marginal improvement in the relative position of a bank's ESG performance, in comparison to the other banks, will lead to more stable returns which is favorable. This is in line with the existing literature. Based on the analysis conducted, it can be determined that, for now, there were no other statistically significant findings, leading to the conclusion that the economic influence of an increased ESG variable is negligible. This is rather surprising as we expect, based on the theory, that better ESG performance is associated with higher stock returns. One of the theoretical motivations is that better ESG performance may indicate a company's ability to effectively manage environmental and social risks. By addressing these risks, companies can potentially reduce the likelihood of unexpected costs, regulatory penalties and reputation damage. This could lead to improved financial performance and hence higher stock returns. Another theoretical motivation is that as the market incorporates ESG factors into investment decisions, banks with strong ESG performance might enjoy greater investor interest and higher stock prices, resulting in higher returns. Nevertheless, we did not find such relationship. The reason for this can be manifold. Firstly, it can be that ESG and its pillars are not fully integrated in the world of financial services. The concept on its own is relatively new and it will need time to earn its acknowledgement that it deserves. Another reason can be that due to the absence, at this moment, of a regulatory framework for ESG integration can explain the lack of significant findings. A regulatory framework establishes norms, guidelines and rules that mandate financial institutions to incorporate ESG factors into their business strategies and decision-making processes.

The second part of our research included an event study to analyse the effects of the ESG controversies from Refinitiv database on the returns of the banks in our sample, that we discussed above. Each controversy belongs, according to Refinitiv, to either the environmental, the social or the governance pillar. We examined the effect of all pillars together as well as the effect of each pillar separately. We constructed four different event windows: event day, anticipated event window, delayed event window and total event window.

We found only significant results for the anticipated event window, where the overall ESG controversies have a negative relationship with the bank's returns. These results suggest that when a controversy occurs, investors are sensitive to these issues and there is a negative effect on the stock market. This is not only on the day of the event but also in the days preceding it. We believe that this is due to potential leakage of information before the controversy. To be comprehensive, it should be noted that the environmental ESG controversies also have a negative relationship with the bank's returns in the anticipated window. However, this finding is subject to dispute due to the low number of controversies. In addition, no other significant results were found neither for the other pillars nor for the other event windows. The lack of significance in the other event windows may be attributed to the market's prior anticipation. The market already incorporated the controversy in the stock market price.

6. Limitations and further research

We will first discuss the limitations and possible further research opportunities for the first part of our research that includes the panel regression. Subsequently a similar approach will be applied to our event study.

Firstly, we chose to work with the Refinitiv database for our panel regression, which can lead to a potential source of variation in comparison of using alternative databases due to the Refinitiv's utilization of a relative dimension approach. This means that Refinitiv's ESG scores reflect a company's performance compared to its sector-specific peer group, resulting in a distribution of scores ranging from the highest to the lowest across the sector. Secondly, our research included different crises such as the covid-19 crisis. This can have a significant effect on the results of our research. Lastly, caution should be exercised when generalizing the results to other banks or time periods as our research include severe criteria. Considering the dynamic nature of ESG factors, it is important to emphasize the need for further research in this area. Further research endeavors should aim to address the limitations identified in this study and delve deeper into the evolving role of ESG in shaping bank performance. Furthermore, expanding the scope of data sources beyond the Refinitiv database and employing alternative databases with different methodologies can provide a more comprehensive understanding of the ESG-bank performance relationship.

The potential limitations for our event study are mostly related to the descriptive statistics of our sample. First of all, we should be aware of the underrepresentation of environmental controversies in our dataset. This may limit our ability to draw robust conclusions about the relationship between environmental controversies and the bank returns. We were surprised that our sample has only 8 environmental controversies because environmental issues have gained substantial attention in recent years due to growing concerns about climate change and sustainability. Another limitation is that approximately one-third of our controversies is due to Deutsche Bank Aktiengesellschaft. This highlights the importance of considering the unique characteristics and behavior of this bank in relation to the overall trends and patterns observed across the broader sample of banks.

References

- Abbas, F., Masood, O., Ali, S., & Rizwan, S. (2021). How Do Capital Ratios Affect Bank Risk-Taking: New Evidence From the United States. *SAGE Open*, 11(1). <https://doi.org/10.1177/2158244020979678>
- Ahlklo, Y., & Lind, C. (n.d.). *E, S or G? A study of ESG score and financial performance*.
- Almaskati, N. (2022). The determinants of bank profitability and risk: A random forest approach. In *Cogent Economics and Finance* (Vol. 10, Issue 1). Cogent OA. <https://doi.org/10.1080/23322039.2021.2021479>
- Alogoskoufis, S., Dunz, N., Emambakhsh, T., Hennig, T., Kaijser, M., Kouratzoglou, C., Muñoz, M. A., Parisi, L., & Salleo, C. (2021). *Occasional Paper Series ECB economy-wide climate stress test Methodology and results*. <https://doi.org/10.2866/460490>
- Amir, A. Z., & Serafeim, G. (2018). Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, 74(3), 87–103. <https://doi.org/10.2469/faj.v74.n3.2>
- Aouadi, A., & Marsat, S. (2018). Do ESG Controversies Matter for Firm Value? Evidence from International Data. *Journal of Business Ethics*, 151(4), 1027–1047. <https://doi.org/10.1007/s10551-016-3213-8>
- Ardia, D., Bluteau, K., Boudt, K., & Inghelbrecht, K. (2022). Climate Change Concerns and the Performance of Green vs. Brown Stocks. *Management Science*. <https://doi.org/10.1287/mnsc.2022.4636>
- Ashwin Kumar, N. C., Smith, C., Badis, L., Wang, N., Ambrosy, P., & Tavares, R. (2016). ESG factors and risk-adjusted performance: a new quantitative model. *Journal of Sustainable Finance and Investment*, 6(4), 292–300. <https://doi.org/10.1080/20430795.2016.1234909>
- Aslam, E., & Haron, R. (2020). Does corporate governance affect the performance of Islamic banks? New insight into Islamic countries. *Corporate Governance (Bingley)*, 20(6), 1073–1090. <https://doi.org/10.1108/CG-11-2019-0350>

- Assous, H. F. (2022). Saudi Green Banks and Stock Return Volatility: GLE Algorithm and Neural Network Models. *Economies*, 10(10). <https://doi.org/10.3390/economies10100242>
- Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, 70. <https://doi.org/10.1016/j.intfin.2020.101277>
- Berg, F., Kölbel, J. F., Rigobon, R., Sloan, M., King, A., Orts, E., Jay, J., Kaminski, K., Goldberg, L., Bohnsack, R., Eccles, R., Ramelli, S., Lyon, T., Busch, T., Le, Y., Hsieh, J., Gori, A., Lu, A., Duddy, E., ... Dettwiler, N. (2022). *Aggregate Confusion: The Divergence of ESG Ratings* *. <https://ssrn.com/abstract=3438533>
- Bino, A., & Tomar, S. (2012). Corporate Governance and Bank Performance: Evidence from Jordanian Banking Industry Asset Liquidity, Stock Liquidity, and Ownership Concentration: Evidence from the ASE View project Firm value and investment policy around stock for stock mergers View project Corporate Governance and Bank Performance: Evidence from Jordanian Banking Industry. In *Jordan Journal of Business Administration* (Vol. 8, Issue 2). <https://www.researchgate.net/publication/265790731>
- Birindelli, G., Dell'Atti, S., Iannuzzi, A. P., & Savioli, M. (2018). Composition and activity of the board of directors: Impact on ESG performance in the banking system. *Sustainability (Switzerland)*, 10(12). <https://doi.org/10.3390/su10124699>
- Bolton, B. (2013). *Corporate Social Responsibility and Bank Performance*.
- Brogi, & Lagasio. (2019). *Do bank boards matter? A literature review on the characteristics of banks' board of directors*. <https://www.inderscience.com/jhome.php?jcode=ijbge>
- Buallay, A. (2019a). Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector. *Management of Environmental Quality: An International Journal*, 30(1), 98–115. <https://doi.org/10.1108/MEQ-12-2017-0149>
- Buallay, A. (2019b). Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector. *Management of Environmental*

Quality: An International Journal, 30(1), 98–115. <https://doi.org/10.1108/MEQ-12-2017-0149>

Buallay, A. ;, Wadi, R. ;, Kukreja, G. ;, & Hassan. (n.d.). *Evaluating Sustainable Performance of Islamic Banks: Evidence from the Organization of Islamic Cooperation Members*.

Calza, A., Gartner, C., & Sousa, J. (2001). *EUROPEAN CENTRAL BANK*.

Carbone, S., Giuzio, M., Kapadia, S., Krämer, J. S., Nyholm, K., & Vozian, K. (n.d.). *Working Paper Series The low-carbon transition, climate commitments and firm credit risk*. <https://doi.org/10.2866/56399>

Chiaramonte, L., Dreassi, A., Girardone, C., & Piserà, S. (2022). Do ESG strategies enhance bank stability during financial turmoil? Evidence from Europe. *European Journal of Finance*, 28(12), 1173–1211. <https://doi.org/10.1080/1351847X.2021.1964556>

De Franco, C. (2020). ESG controversies and their impact on performance. *Journal of Investing*, 29(2), 33–45. <https://doi.org/10.3905/joi.2019.1.106>

Degryse, H., Goncharenko, R., Theunisz, C., & Vadasz, T. (2022). *When Green Meets Green*. <https://ssrn.com/abstract=3724237>

Del Gaudio, B. L., Previtali, D., Sampagnaro, G., Verdoliva, V., & Vigne, S. (2022). Syndicated green lending and lead bank performance. *Journal of International Financial Management and Accounting*, 33(3), 412–427. <https://doi.org/10.1111/jifm.12151>

Dorfleitner, G., Kreuzer, C., & Sparrer, C. (2020). ESG controversies and controversial ESG: about silent saints and small sinners. *Journal of Asset Management*, 21(5), 393–412. <https://doi.org/10.1057/s41260-020-00178-x>

Eccles, R. G., & Serafeim, G. (2013, May). *The Performance Frontier: Innovating for a Sustainable Strategy*. <https://Hbr.Org/2013/05/the-Performance-Frontier-Innovating-for-a-Sustainable-Strategy>.

Ehlers, T., Packer, F., & De Greiff, K. (2021). *The pricing of carbon risk in syndicated loans: which risks are priced and why?* www.bis.org

- El Khoury, R., Nasrallah, N., & Alareeni, B. (2023). ESG and financial performance of banks in the MENAT region: concavity–convexity patterns. *Journal of Sustainable Finance and Investment*, 13(1), 406–430. <https://doi.org/10.1080/20430795.2021.1929807>
- Engelhardt, N., Ekkenga, J., & Posch, P. (2021). Esg ratings and stock performance during the covid-19 crisis. *Sustainability (Switzerland)*, 13(13). <https://doi.org/10.3390/su13137133>
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds*. In *Journal of Financial Economics* (Vol. 33).
- Fanta, A. B. (2013). Corporate Governance and impact on Bank Performance. *Journal of Finance and Accounting*, 1(1), 19. <https://doi.org/10.11648/j.jfa.20130101.12>
- Finger, M., Gavius, I., & Manos, R. (2018). Environmental risk management and financial performance in the banking industry: A cross-country comparison. *Journal of International Financial Markets, Institutions and Money*, 52, 240–261. <https://doi.org/10.1016/j.intfin.2017.09.019>
- Galletta, S., Goodell, J. W., Mazzù, S., & Paltrinieri, A. (2022). Bank reputation and operational risk: The impact of ESG. *Finance Research Letters*, 103494. <https://doi.org/10.1016/j.frl.2022.103494>
- Galletta, S., & Mazzù, S. (2022). ESG controversies and bank risk taking. *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.3129>
- Houston, J. F., Shan, H., Fernando, C., Hasan, I., James, C., Kim, S., Mackay, P., Megginson, W., Ritter, J., Udell, G., Velioglu, G., & Yan, X. (2021). *Corporate ESG Profiles and Banking Relationships* *. <https://ssrn.com/abstract=3331617>
- Kim, C.-J., Morley, J. C., & Nelson, C. R. (2004). Is There a Positive Relationship between Stock Market Volatility and the Equity Premium? In *Source: Journal of Money, Credit and Banking* (Vol. 36, Issue 3). <https://www.jstor.org/stable/3838977>
- Kotsantonis, S., Pinney, C., & Serafeim, G. (2016). ESG Integration in Investment Management: Myths and Realities. In SSRN. <https://doi.org/10.1111/jacf.12169>

- Li, T. T., Wang, K., Sueyoshi, T., & Wang, D. D. (2021). Esg: Research progress and future prospects. In *Sustainability (Switzerland)* (Vol. 13, Issue 21). MDPI. <https://doi.org/10.3390/su132111663>
- Marozva, G. (2015). Liquidity And Bank Performance. *International Business & Economics Research Journal (IBER)*, 14(3), 453. <https://doi.org/10.19030/iber.v14i3.9218>
- Menicucci, E., & Paolucci, G. (2022). ESG dimensions and bank performance: an empirical investigation in Italy. *Corporate Governance: The International Journal of Business in Society*. <https://doi.org/10.1108/CG-03-2022-0094>
- Miller, N. (2022, October 10). *ESG Score*. Corporatefinanceinstitute.Com.
- Murè, P., Spallone, M., Mango, F., Marzioni, S., & Bittucci, L. (2021). ESG and reputation: The case of sanctioned Italian banks. *Corporate Social Responsibility and Environmental Management*, 28(1), 265–277. <https://doi.org/10.1002/csr.2047>
- Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. *Technological Forecasting and Social Change*, 162. <https://doi.org/10.1016/j.techfore.2020.120341>
- Pastor, L., Stambaugh, R. F., Taylor, L. A., Edmans, A., Giglio, S., Hulbert, M., Koijen, R., Nagel, S., Sautner, Z., Seltzer, L., Smetters, K., Zerbib, D., & Zhang, L. (2021). *Mayo Center/ICI Virtual Asset Management Symposium; and seminar participants at the Bank of Italy*. <http://www.nber.org/papers/w28940>
- PRI. (2018). *WHAT IS RESPONSIBLE INVESTMENT?*
- Refinitiv. (2022). *Refinitiv | Environmental, social and governance scores from Refinitiv 2*.
- Scholtens, B., & Dam, L. (2007). Banking on the Equator. Are Banks that Adopted the Equator Principles Different from Non-Adopters? *World Development*, 35(8), 1307–1328. <https://doi.org/10.1016/j.worlddev.2006.10.013>
- Siueia, T. T., Wang, J., & Deladem, T. G. (2019). Corporate Social Responsibility and financial performance: A comparative study in the Sub-Saharan Africa banking

sector. *Journal of Cleaner Production*, 226, 658–668.
<https://doi.org/10.1016/j.jclepro.2019.04.027>

Whelan, T., Atz, U., & Clark, C. (2021). *ESG AND FINANCIAL PERFORMANCE: Uncovering the Relationship by Aggregating Evidence from 1,000 Plus Studies*.