Non-financial firms' Environmental, Social, and Governance (ESG) scores and their financial performance

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ABSTRACT,

Climate change, pollution, inequality, and various other sustainability-related issues are driving the increasing importance of sustainable finance. Initiatives like the European Green Deal are driving firms towards increased sustainability, compelling them to embrace more sustainable practices. Related to firms being more and more sustainable, this paper aims to investigate if there is a significant relationship between the sustainability (ESG) score and financial performance (ROE, ROA, and Tobin's Q) of non-financial firms included in the European Stoxx 600 index over a period of three years (2020 – 2022). The study uses financial performance as the dependent variable and ESG score as an independent variable while controlling for leverage, market-to-book ratio, firm size, and GICS sectors. The panel data regression analysis in this paper unveils a positive significant influence of ESG score on ROE, whereas it shows a positive insignificant influence on ROA and a negative significant influence on Tobin's Q. The study also provides a sectorial-specific regression analysis on the different GICS sectors. These findings unveil that the communication services and utilities sector show a significant positive influence of ESG score on two of the three financial performance measures, whereas the health care and materials sector show a negative significant influence. The industrials sector shows mixed results (positive and negative significant influence). The other GICS sectors do not show any significant influence of ESG scores on financial performance at all. The findings in this paper indicate that there is no definitive conclusion that firms with stronger sustainable performance also necessarily exhibit superior financial performance.

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1. INTRODUCTION

Sustainability transition is a well-discussed topic in the world nowadays. Climate change mitigation, pollution prevention, biodiversity preservation, but also inequality issues, inclusiveness, and human rights issues, are all related to sustainability issues.

This is why the European Green Deal was introduced in December 2019 (European Commission, 2019). This European Green Deal is a comprehensive plan to overcome the most important and difficult sustainability challenges. The plan contains very progressive goals, such as: no net emissions of greenhouse gases by 2050, at least 55% less net greenhouse gas emissions by 2030, compared to 1990 levels and in line with the EU biodiversity strategy, at least 3 billion additional trees will be planted by 2030 (European Commission, n.d.). With this plan, the well-being and health of European citizens and future generations will be improved.

Financial and non-financial firms play an essential role in this sustainability transition. This is where Sustainable Finance (SF) starts to play a role. Investment decisions that consider the environmental, social, and governance (ESG) aspects of an economic activity or project are what define sustainable finance (Bakken, 2021). The Chartered Financial Analyst (CFA) Institute describes the environmental factor as the "Conservation of the natural world". Some examples of the environmental aspect are climate change and carbon emissions, air and water pollution, waste management, etc. The Social aspect is described as: "Consideration of people & relationships". Essential factors included in this aspect, according to the CFA Institute are: "Customer satisfaction, labor standards, and gender and diversity". The final ESG measure is on the governance level. The CFA Institute defines governance as "The standards for running a company". This includes factors such as Board composition, bribery and corruption, and executive compensation" (CFA Institute , n.d.). So, sustainable finance supports economic growth while reducing pressures on the environment and taking into account social and governance aspects.

The goal of this research is to give better insights into how the ESG score of non-financial firms influences the financial performance of such companies. Nowadays, companies use non-financial information as a legalized tool for improved financial outcomes. The provision of transparent ESG scores proves that companies are actively taking environmental, social, and governance responsibilities, and thereby enhancing their reputation. This increased reputation will eventually lead to the possibility of accessing capital at a lower cost (lower cost of capital) and improving their competitive advantage against firms not implementing ESG regulations (Bofinger, Heyden, & Rock, 2022) (Starks, 2021).

So this paper will include information about what the purpose of the ESG scores are, how they are determined, and what the effect on the financial performance of non-financial firms is. This is essential to understand the impact of this ratio on the financial performance of firms. Also, it is of great importance for the firms to know whether it is financially attractive to sharpen their regulations regarding ESG. On top of that, the paper is also relevant for (potential) shareholders and stakeholders (Freeman, 2010).

So following from this, the general question(s) in this paper include the effect of ESG scores on financial performance, as stated below:

How do ESG scores affect the financial performance of non-financial firms?

How does this impact differ for various sectors? Health care, manufacturing, energy, etc.

2. CONCEPTUAL FRAMEWORK

2.1 Theoretical concept: ESG

In the 1990s, John Elkington's book introduced the concept of the triple bottom line (John, 1999). The triple bottom line was the first concept that tries to capture the necessity that firms should commit to measuring their financial performance as a result of social and environmental factors (Miller, 2020). According to Miller (2020), the concept of the triple bottom line can be deconstructed into three distinct components. These components are also known as the "three P's", and they consist of profit, people, and planet. However, unfortunately, this concept was not relevant for a long time. In 2003 the concept of ESG was introduced. This word appeared for the first time in the United Nations Environment Program Finance Initiative (Han & Yang, 2023).

ESG consists of three pillars, the environmental pillar, the social pillar, and the governance pillar. The environmental pillar of ESG focuses on how an organization performs concerning reducing waste, going net-zero, reusing raw materials, switching to renewable energy, and lowering pollution (Cherkasova & Nenuzhenko, 2022). As the number of crises impacting our planet continues to grow and environmental risks become increasingly serious, the environmental component of ESG becomes more and more relevant (McCarthy, 2022).

According to Cherkasova & Nenuzhenko (2022), the social aspect is how the business treats its workers and suppliers regarding working facilities and safety precautions. Diversity and human rights are well-discussed topics nowadays. On top of that, a good social pillar in a firm ensures that people are treated fairly and advocates for an unbiased and fair employment process.

Brightest (n.d.) argues that while environmental and social issues such as the greenhouse effect and diversity typically receive more public attention, how a company operates regarding ESG and other facets of its business is ultimately determined by its governance. The main issues reported for the governance component include how shareholder rights are viewed and honored, shareholder's compensation and how this is aligned with the company's sustainability goals and performances, and the types of internal controls that exist to promote transparency and accountability on the part of leadership (Peterdy, 2023).

To get a more overarching view of global sustainability developments, there are 17 Sustainable Development Goals (SDGs) introduced by the United Nations. The United Nations (2018) argue that these 17 SDGs are an urgent call for all countries involved in the mutual blueprint for peace and prosperity for people and planet, now and into the future. The UN's general mission is to inform the business community and society about the importance of acting on these 17 SDGs, such as providing good health and well-being, striving for gender equality, providing access to clean water, developing renewable energy, and all other ESG factors which contribute to a sustainable world.

These Sustainable Development Goals have been matched to the corresponding environmental, social, and governance factors by one of Europe's leading privately owned banks (Berenberg, 2018). Since many of Berenberg's clients make impact investments ("investments made with the intention to generate a positive social and environmental impact alongside a financial return") connecting these SDGs to the ESG factors would be very helpful. The research is designed to create a better understanding of the views of the clients and partners on making impact investments concerning the ESG's. "96% of the respondents indicated that sustainability is part of their investment philosophy" and "85% of the respondents indicated that they are aware of the SDGs" (Berenberg, 2018). Berenberg (2018) argues that it is hard to measure impact nowadays. The organization proposes that presenting businesses with a framework that aligns relevant SDGs with the three ESG factors, environmental, social, and governance, will increase the management team's awareness of the essential goals that need to be taken into account (see Figure 8-1 in Appendix).

2.2 Theories of ESG

2.2.1 Stakeholder theory

Stakeholder theory shows that the market value of an enterprise largely depends on the ability to meet stakeholders' requirements (Shakil, 2021). Stakeholders encompass internal stakeholders, such as the management, employees, and shareholders. On top of that, external stakeholders, such as consumers, suppliers, communities, and governments are included in stakeholder theory (Freeman, 2010). Freeman (2010) argues that implementing a stakeholder-oriented approach to the management principles of a firm can result in profitability and value creation for all stakeholders instead of only for the shareholders. There is literature available that demonstrates how prioritizing stakeholder interests can either result in the creation or destruction of shareholder value. According to Godfrey (2005) focusing on the interests of stakeholders can improve companies' reputation and foster goodwill, which will most likely lead to increased revenue generation.

Previous studies showed that corporate disclosure of ESG information reduces the cost of capital (Eichholtz, Holtermans, & Nils, 2019), financial risks for investors in ESG-disclosed firms (Banerjee, Gupta, & Mudalige, 2020), and price volatility of stocks (Bofinger, Heyden, & Rock, 2022). This can be linked to stakeholder theory, with as main contribution the shareholders. Referring back to Shakil (2021) at the beginning of this paragraph, it could be concluded that ESG disclosure indeed contributes to meeting stakeholders' (in this case shareholders') requirements.

However, a contradicting theory to this stakeholder theory is the shareholder primacy theory (also called Friedman Doctrine). The debate between these contradicting theories has been going on for a long time already (Corporate Finance Institute , 2023). Shareholder primacy theory proposes that shareholders are the most important stakeholders of the firm, and thus the company's only goal is to maximize shareholders' returns (Friedman, 1970). One of the reasons for people to support the shareholder primacy theory over the stakeholder theory is the possibility that managers may use Corporate Social Responsibility (CSR) investments to seek personal gain. In this way, conflicts between managers and shareholders arise (Barnea & Rubin, 2010).

2.2.2 Legitimacy theory

For organizations, it is of great importance to be perceived as legitimate by stakeholders. One of the main pillars to sustain legitimacy for a firm is the disclosure of information (Marwala & Moloi, 2020). Guthrie (2006) states that the legitimacy theory is closely related to the concept of organizational legitimacy. This suggests that organizations strive to be viewed as legitimate by their stakeholders. Many years ago, Dowling & Pfeffer (1975) defined the comprehensive meaning of this organizational legitimacy as follows: "Organizations seek to establish congruence between the social values associated with or implied by their activities and the norms of acceptable behavior in the larger social system of which they are a part. Insofar as these two value systems are congruent we can speak of organizational legitimacy. When an actual or potential disparity exists between the two value systems, there will exist a threat to organizational legitimacy." Cook (2021) argues that both ESG and Corporate Social Responsibility (CSR) are both concerned with a company's impact on society and the environment. Generally, a commonly held assumption is that organizations' actions are following a socially constructed framework of expectations, norms, values, and beliefs (Suchman, 1995). So, organizations have social agreements with the society in which they operate. In relation to this, stakeholders in this society also have expectations of these companies (Meyer & Rowan). As argued by Comyns & Figge (2015), firms operating in a more social and environmental manner, provide more CSR information to legitimize their business operations. Also, these firms that have higher CSR ratings strive to gain a competitive advantage by offering more comprehensive and relevant information regarding their CSR activities (Garcia-Sanchez & Prado-Lorenzo, 2010). Firms that have lower CSR performance avoid publishing these ratings, since this will negatively impact their brand reputation (Garcia-Sanchez & Prado-Lorenzo, 2010). Therefore, legitimacy theory suggests that firms with poor CSR performance tend to face greater social and political pressure related to their social and environmental impact (Patten, 2002).

2.3 Hypotheses

2.3.1 Theoretical arguments:

The resource-based view examines the relationship between the resources owned by a firm and their performance (Branco & Rodrigues, 2006). Valuable, rare, imperfectly imitable, and non-substitutable (VRIN) resources enable companies to gain a competitive advantage, leading to superior performance over time in comparison to their competitors (Barney, 1991). Branco & Rodrigues (2006) argue that firms engage in CSR, and thus in ESG disclosure because they consider that this will provide them with some kind of competitive advantage, which can lead to increased financial performance. Bhandari, Ranta & Salo's (2021) study results suggest that firms with higher ESG scores are likely to possess more valuable and rare resources, which contributes to the creation of competitive advantages and better financial performance. So they conclude that firms should use their ESG performance as a strategic asset to create and sustain a competitive advantage.

Next to using ESG performance as a valuable strategic asset (supported by RBV theory), there are many more theoretical arguments on the relationship between ESG score and financial performance. Henisz, Koller & Nuttall (2019) argue that a strong ESG proposition links to value creation in a couple essential ways.

The "Top-line growth" theory is the first variant of value creation caused by a strong ESG proposition. It is argued that a strong ESG proposition helps companies to operate in new markets and to expand into existing ones. When authorities trust acting companies, they are more likely to grant them the permission, approvals, and certifications that provide new chances for expansion. ESG can also have a positive impact on consumer

preferences. A research conducted by McKinsey has shown that customers are actually willing to pay for "green" products. More than 70 percent of consumers surveyed on purchases in the automotive, building, electronics, and packaging industries, said they would pay an additional 5 percent for a green product, with as only condition that it should meet the same performance standards as a nongreen alternative. A different study on the most important factor why firms would act sustainably, showed that for almost half (44 percent) of the firms surveyed, growth opportunities are the main drivers of sustainable actions.

Cost reduction is mentioned as the second way of value creation (Henisz, Koller, & Nuttall, 2019). A strong ESG proposition can help reduce operating expenses (such as raw-material costs, and the true cost of water and carbon) by as much as 60 percent, according to McKinsey research. In this same research a metric is created, showing the relationship between the amount of energy, water and waste used in relation to revenue. With this metric, a significant correlation between resource efficiency and financial performance has been found.

Reduced regulatory and legal interventions is the third way of value creation, according to Henisz, Koller & Nuttall (2019). Several studies across different sectors and geographics have proven that an increasing ESG score helps reduce companies' risk of adverse government action (Henisz, Koller, & Nuttall, 2019). On top of this, a strong ESG score can even cause extra government support. On average, one-third of corporate profits are at stake from external engagement, and thus at risk from state intervention. However, this percentage varies widely across different industries (Figure 8-2 in appendix). So, it can be concluded that it is essential to minimize adverse government action, in order to receive good government support.

Employee productivity uplift is another way of value creation using ESG impact, according to Henisz, Koller & Nuttall (2019). According to a study on 2833 A-share listed Chinese firms between 2016 and 2020, a higher ESG rating tends to result in higher corporate productivity (Deng, Li, & Ren, 2023). This can be supported by the fact that a strong ESG proposition can help companies attract and retain quality employees. Nowadays sustainability and responsibility are important factors for young people since it will impact their future. This results in companies attracting talent through greater social credibility. A study executed by a London Business School student on job satisfaction and firm value found that over a period of more than 25 years, companies included in *Fortune's* "100 Best Companies to Work for" list generated 2.3 percent to 3.8 percent higher stock returns than their competitors (Edmans, 2012). So satisfied employees, in the end, lead to more satisfied shareholders too.

As firms operate within communities that consist of diverse stakeholders, they employ legitimacy theory to ensure their actions align with societal norms and expectations, thereby aiming to win the trust and confidence of stakeholders through responsible and ethical activities (Maama, 2021). When a firm successfully manages to build an outstanding brand reputation through responsible and ethical activities, it leads to favorable perceptions of the firm among stakeholders (Deegan, 2002). This increasing stakeholder confidence, results in being able to attract more capital and favorable business engagements, particularly from suppliers, customers, and investors. Eventually, this will positively impact the firm's financial performance (Maama, 2021). This implementation of the legitimacy theory corresponds to the objectives of the stakeholder theory in a way that focusing on the interests of stakeholders can improve firms' reputation and foster goodwill. Thus the ability to meet stakeholder's requirements, will eventually also lead to better financial performance (Shakil, 2021) (Godfrey, 2005).

2.3.2 Empirical evidence
Rockefeller Asset Management (2021) firm researched ESG and financial performance. In this study, 1,000 plus studies have been taken into account, to analyze the relationship between ESG scores and financial performance. The study covers only studies written between 2015 and 2020, whereas lots of other articles were written before 2015. Most of these articles found positive correlations between ESG performance and stock performance. On top of that, Rockefeller's study also concluded a positive relationship between ESG and financial performance. 58% of the "corporate" studies – focused on ROE, ROA, or stock price – found a positive relationship between ESG and financial performance. As this 58% might be seen as a small percentage, it does not mean that the other 42% show a contradicting result. 13% show a neutral impact, 21% mixed results (the same study showing positive, neutral or negative outcomes), and only 8% show a negative relationship (Atz, Clark, van Holt, & Whelan, 2021).

However, many studies only include the environmental and social aspects of firms when exploring the relationship between ESG and financial performance (Ahmad, Mobarek, & Roni, 2021). Ahmad, Mobarek & Roni (2021) investigate, using static and dynamic data analysis, the impact of ESG on the financial performance of PTSE350 UK firms. This study shows that the individual ESG factors (environmental, social and governance performance) have a positive impact on market value and earnings per share (EPS). The results of the static analysis (dependency analysis using correlation and variance inflation factor), using a dummy variable showing 20% of high ESG scores and a dummy variable showing 20% of the low ESG scores, show that high ESG firms have a positive and significant impact on their market value and earnings per share, whereas low ESG firms have a significantly negative impact on their market value and earnings per share. From the dynamic analysis could be concluded that the total ESG performance has a positive significant effect on the market value and earnings per share of a firm (Ahmad, Mobarek, & Roni, 2021).

Elmarzouky, Fagernes, Giannopoulos, & Hossain (2022) performed a research on ESG disclosure and financial performance of Norwegian listed firms. ESG is measured through the Thomson Reuters Eikon ESG disclosure score and financial performance is measured through ROA and Tobin's Q. Based on panel data regression analysis and these two proxies for financial performance, the study shows mixed results. Findings suggest a strong significant relationship between ESG initiatives and financial performance. The regression model with ROA as dependent variable suggests that ESG initiatives have a clear negative impact. However, on the other hand, Tobin's Q tend to increase as a result of an increasing ESG score . (Elmarzouky, Fagernes, Giannopoulos, & Hossain, 2022).

So based on prior relevant literature and theories, the following hypothesis has been drawn:

Hypothesis 1: The ESG performance of a firm significantly and positively impacts its financial performance.

2.3.3 Different sectors and financial performance
The research of Baldissarro, Bruni, Lazzolino, & Morea (2023) analyzed data from 1979 listed European Companies. Using a DEA model with input: total assets and total equity and with output: Earnings Before Interest Tax Depreciation Amortization (EBITDA), revenues and ESG scores. Based on the findings of this research, it can be concluded that the impact of ESG varies across the sectors examined in this study. So this shows that some sectors are more sensitive to ESG factors than others. From this

paper can be concluded that the energy, materials, consumer and technology sectors are very sensitive to ESG factors. Financial, healthcare, industrial and utilities sectors are less sensitive to ESG factors, based on Baldissarro, Bruni, Lazzolino, & Morea (2023).

The study conducted by Pacelli, Pampurini, & Quaranta (2022) included data from 30 firms per sector. A correlation analysis has been done to investigate the relationship between Total Return (TR) and ESG score for European countries in the different Thomson Reuters Business Classification (TRBC) sectors (Consumer, Communication, Energy, Financial, Health, Industrial, IT, Materials, Real Estate and Utilities). The financial and utilities sector show a strong negative relationship between the ESG score and TR, concluded from the correlation analysis. On the other hand, the communication and materials sectors show a substantially positive relationship for ESG score and TR. Health, IT, Real Estate and Energy show a weak link for the relationship between ESG score and TR. However, the single E, S and G factors show different relationships for its score and TR.

Hypothesis 2: The impact of ESG score on financial performance differs significantly across various sectors.

3. DATA AND METHODOLOGY
3.1 Data selection
To investigate the relationship between ESG scores and financial performance, it is necessary to have access to company financial data. This study relies on quantitative data, so databases providing numerical and factual data are being used. Financial performance data can be gathered via many financial databases, such as Bloomberg, Reuters, Yahoo Finance, Refinitiv, etc. For this paper, information from Refinitiv Eikon is being used. Eikon is a financial platform, developed by Refinitiv. Refinitiv Eikon (2023) provides a lot of different types of information, such as news, and trading tools to professionals, but more importantly for this research, real-time market data and financial analytics. So, to investigate the relationship between ESG scores and financial performance, most of the relevant information is gathered via the financial database, Refinitiv Eikon.

3.2 Methodology
To get a better insight into the underlying meaning of the variables discussed in the following sections, see Table 8-1 in the Appendix.

3.2.1 Independent variable: ESG score
ESG scores are just, simply explained, a numerical measure of how a certain organization performs on the three ESG factors, environmental, social and governance topics (Penta, 2021). Refinitiv Eikon (2023) is an organization providing financial market professionals with top-tier financial data. It provides access to a wide variety of financial data, fundamental data, news, analytics, trading and messaging tools. Refinitiv's Eikon database is one of the world's leading financial databases. Eikon database also provides ESG score data.

To understand where these ESG scores come from, it is good to take a closer look at the framework for ESG reporting practices. Refinitiv (2022) claims to "offer one of the most comprehensive ESG databases in the industry, covering over 85% of the global market cap, across more than 630 different ESG metrics, with history dating back to 2022" (Refinitiv , 2022). The ESG scores cover 10 main themes including resource use, workforce, human rights, CSR strategy, etc. "The scores are based on the relative performance of ESG factors with the company's sector (for environmental and social) and country of incorporation (for governance)" (Refinitiv , 2022). Refinitiv analysts process 630

ESG measures for each company they inspect. From these 630 measures, a subset of the 186 most comparable metrics is taken. To guarantee that the outcome is comparable across the entire range of companies analyzed, each measure is being standardized in a complex standardizing process. To strive for 100% data quality, a combination of both algorithmic and human processes is used (Refinitiv , 2022).

The independent variable of this study is the ESG score/rating. As already mentioned in the literature review, the ESG score/rating is based on the sustainability performance in a particular given year. Developed markets, such as Europe and the USA, implemented mandatory ESG reporting guidelines in 2017 (Aggarwal & Kalia, 2023). There are lots of variables that contribute to ESG scores (Refinitiv , 2022). All these variables can be categorized as respectively an environmental, social or governance measure. So for these three different measures, there are also different scores, an environmental score (E_Score), a social score (S_Score), and a governance score (G_Score). These three scores combined make the total average ESG score of a firm.

3.2.2 Dependent variable: firm financial performance
According to previous literature by Buallay, Hamdan, Zureigat (2017) and Elmarzouky, Fagernes, Giannopoulos, & Hossain (2022), firm performance is measured using Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q. ROA and ROE are widely used accounting-based measures for firm performance, while Tobin's Q is a market-based measure. ROA and ROE are the most widely used accounting-based variables of financial performance. ROA represents the profitability of a firm concerning its total assets (Velte, 2017). Return on Equity is, like Return on Assets, an accounting-based measure. This financial ratio shows how well a company is managing the capital that shareholders have invested in a particular firm. This makes it the most important management performance indicator for (potential) investors (Atan, Alam, Said, & Zamri, 2018). As mentioned earlier, Tobin's Q is a market-based measurement. It is the measure of firm value. If this outcome is greater than 1.0, the market value exceeds the replacement value so it can be concluded that the firm is overvalued, and thus if the outcome is less than 1,0 the firm is undervalued (Hayes, 2021).

3.2.3 Control variables
In line with prior studies conducted by Aggarwal & Kalia (2023), Elmarzouky, Fagernes, Giannopoulos, & Hossain (2022), Atan, Alam, Said, & Zamri (2018), we control for market value to book ratio, firm size and financial leverage. In line with a study conducted by Velte (2017), the fourth control variable represents the different sectors. The market value to book ratio is a financial measure used to assess the market value of a firm in relation to its book value (CFI Team, 2018). Previous studies prove a positive relationship between Firm size and ESG disclosure (Clarkson, Li, Richardson, & Vasvari, 2008) (Atan, Alam, Said, & Zamri, 2018). Because of the effect on a firm's financial performance, leverage is also considered as a control variable (Elmarzouky, Fagernes, Giannopoulos, & Hossain, 2022). Finally, the ESG scores and financial performances might differ significantly among different sectors. Because of this, the study controls for the different GICS sectors.

3.2.3.1 Data sources
Refinitiv Eikon is used for gaining data. For this study, 600 European firms are analyzed for a period of three years, 2020-2022. To be more specific, financial information from the constituents of the Stoxx 600 index over a time span of three years have been used to investigate the relationship between ESG score and financial performance.

However, eventually this sample included missing data (missing ESG scores for example). So this data have been filtered out for the analysis. Since the study is about non-financial firms, all financial firms have also been removed from the dataset. After removing these data, 487 of the 600 firms remained as sample for the analysis. Firm sectors have been identified based on the Global Industry Classification Standards (GICS) sector names.

3.2.3.2 Applicable models

To estimate the hypotheses, this study uses panel regression (Aggarwal & Kalia, 2023) (Atan, Alam, Said, & Zamri, 2018) (Elmarzouky, Fagernes, Giannopoulos, & Hossain, 2022). Based on Aggarwal & Kalia (2023), we use a multivariate regression model to estimate the hypotheses. Specifically, the pooled ordinary least square multivariate regression framework have been applied.

The primary model is estimated as follows:

$$FP_{it} = \beta0 + \beta1 * \text{ESG score}_{it} + \beta2 * \text{Firm size}_{it} + \beta3 * \text{Market value to book ratio}_{it} + \beta4 * \text{financial leverage}_{it} + \beta5 * \text{Sector}_{it} + \varepsilon_{it}$$

Financial Performance is defined with ROA, ROE and Tobin's Q. We use the ESG score and control variables which may influence the firm's financial performance. The key coefficient is $\beta1$ and it is expected to be positive and significant. Since a time-series of three years have been analyzed, this is included in the model as "t". Next to this, "i" is included to represent the different firms.

4. EMPIRICAL RESULTS

4.1 Descriptive statistics

The descriptive statistics of the used variables are visualized in Table 4-1. When analyzing the descriptive statistics, outliers were observed in the dependent variables, as well as in the leverage and market-to-book ratio variables. To temper the impact of these outliers, the winsorizing method have been applied. This method involves replacing extreme values with less extreme values to ensure a more robust and reliable analysis. By winsorizing these variables, the impact of outliers was mitigated. The various variables have been winsorized for variable-specific percentiles. ROA and ROE have been winsorized at the 1% and 99% level and Tobin's Q have been winsorized at the 97% level. ESG score and firm size did not show significant outliers. However, leverage and market-to-book ratio data did show significant outliers. Leverage has been winsorized on the 1% and 98% level and market-to-book ratio on the 1% and 97% level. This winsorization technique allows for a more accurate representation of the majority of the data and reduces the potential bias caused by these extreme values. This technique ensures that statistical analysis is not unduly influenced by outliers and it facilitates a more meaningful interpretation of the results.

The mean (median) for ROE and ROA are 14% (13%) and 5% (5%). For ROE, the mean is slightly higher than the median, which implies that there is a positive skew. For ROA, the mean and median are equal, which implies that the mean value exactly separates the lower 50% of the data from the upper 50%. The mean (median) for Tobin's Q is 1,94 (0,99). Tobin's Q above 1 implies that a stock is overvalued. So in this case, it can be concluded that approximately half of the stocks are undervalued and overvalued, respectively. Because the mean is greater than the median, it implies that there are relatively larger values at the higher end of the distribution, pulling the mean upwards. This

implies a longer tail on the right side, which means that the distribution is positively skewed. For the ESG score, the mean (median) is 70,74 (73,82). For the control variables Leverage, Market-to-book ratio, Firm size and the raw total assets, the mean (median) values are 0,91 (0,66), 5,42 (2,71), 23,37 (23,28) and 38,08 billion € (12,91 billion €), respectively.

The mean and median scores of ROA and Tobin's Q are corresponding with prior literature, even though these papers use different samples and periods (Elmarzouky, Fagernes, Giannopoulos, & Hossain, 2022) and (Velte, 2017). The mean ROE corresponds with Bartlett, Pazienza & De Lucia (2020). Upon comparing the ESG score to prior literature, it can be concluded that the mean and median ESG scores presented in this paper significantly exceed those reported in other studies. There are some potential reasons for this disparity, including the general trend of ESG scores increasing over time. Considering that this study is the most recent one, it would be logical to expect that the ESG scores reported here surpass those the scores of prior literature. The mean and median of control variable firm size also exceeds prior studies. This can be supported by the fact that this study uses very large European firms, whereas a comparable prior study only used Norwegian firms. This study shows corresponding mean and median leverage compared to Aggarwal & Kalia (2023). The market-to-book ratio in this study differs significantly from the paper written by Aggarwal & Kalia (2023).

	n	min	Mean	median	sd	max
Independent variable						
ESG Score	1437	8,46	70,74	73,82	14,91	95,99
Dependent variables						
ROE	1437	-56%	14%	13%	18%	81%
ROA	1437	-17%	5%	5%	7%	26%
Tobin's Q	1437	0,03	1,94	0,99	2,54	11,46
Control variables						
Leverage	1437	0	0,91	0,66	0,87	5,33
Market-to-book ratio	1437	0,10	4,83	2,71	6,08	29,48
Ln (Firm size)	1437	18,44	23,37	23,28	1,46	27,17
Firm size (billions in €)	1437	0,102	38,08	12,91	65,1	629

Table 4-1: Descriptive statistics

4.2 Correlation matrix

Table 4-2 presents the Pearson correlation matrix for the dependent, independent and control variables. ESG score is only significantly correlated with two of the three dependent variables. ROA and Tobin's Q are both negative significantly correlated with ESG score (-0,11** and -0,27** respectively), whereas ROE and ESG score are not significantly correlated. ROA and ROE are strongly positive correlated, which is caused by the fact that both ratio's use overlapping data (net income for example). As mentioned earlier, we control for firm size because

of the positive relationship with ESG score. This significant positive relationship (0,41**) can be confirmed with the Pearson correlation matrix for this sample. Because of the effect on firm financial performance, leverage have been chosen as a control variable initially. From this Pearson correlation matrix can be concluded that leverage indeed has a significant effect on all three financial performance measures.

Variable	1	2	3	4	5	6
1. ESG Score						
2. ROE	-.02					
3. ROA	-.11**	.76**				
4. Tobin's Q	-.27**	.29**	.46**			
5. Leverage	.12**	-.10**	-.30**	-.25**		
6.Market-to-book ratio	-.22**	.30**	.36**	.90**	.01	
7. Firm size	.41**	-.11**	-.25**	-.40**	.21**	-.32**

Note. * indicates p < 0,05 and ** indicate p < 0,01.

Table 4-2: Correlation matrix

4.3 Regression analysis

4.3.1 Multicollinearity assumption test

Table 4-3 shows no multicollinearity problems by calculating the variance inflation factor (VIF), as the highest correlation coefficient is 1,32. The VIF index measures how much the variance of an estimated regression coefficient is increased due to collinearity (Appolloni, Azad, & Tarighi, 2022). Multicollinearity occurs when independent variables in a model are highly correlated. There are no strict boundaries, however generally a VIF above 4 might indicate that multicollinearity exist and when VIF is above 10, there is significant multicollinearity (CFI Team, 2022). So it can be concluded that the linearity problem does not exist in this study.

Variable	VIF
ESG Score	1,30
Leverage	1,23
Market-to-book ratio	1,25
Firm size	1,40

Table 4-3: VIF values for independent variables

4.3.2 Independence assumption test

When doing a regression analysis for panel data, it is of great importance to check if there is autocorrelation in the residuals of the regression model. To test whether the residuals of this regression model are correlated, the Durbin-Watson test for autocorrelation has been carried out. The Durbin-Watson test calculates a test statistic that measures the degree of

autocorrelation for the residuals. The test statistic is based on the differences between consecutive residuals in the model. The formula for this test is defined as (Kenton, 2023):

$$DW = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})^2}{\sum_{t=1}^{T} e_t{}^2}$$

Where:

- T: Total number of observations
- e_t: The tth residual from the regression model

A Durbin-Watson test outcome close to 2 shows no autocorrelation, whereas an outcome $0 < DW < 2$ shows a positive autocorrelation (residuals are positively correlated), and an outcome $2 < DW < 4$ explains a negative autocorrelation (residuals are negatively correlated). A rule of thumb is that a DW test outcome between 1,5 and 2,5 is relatively normal in practice (Kenton, 2023).

As explained earlier, this study uses financial panel data. Based on this data, the Durbin-Watson test has been performed. Table 4-4 visualizes the outcomes of the autocorrelation test. The ROE model shows a test outcome of 1,53, which implies, according to the rule of thumb, that there is a relatively "normal" level of autocorrelation in the residuals of the model. The ROA and Tobin's Q models show a test outcome of 1,43 and 0,89, respectively, which means that there is positive autocorrelation in the models.

	ROE	ROA	Tobin's Q
DW-score	1,53	1,43	0,89

Table 4-4: Durbin-Watson test

4.3.3 Heteroskedasticity test

Ordinary least squares regression makes the assumption that the residuals have constant variance in the model (CFI Team, 2020). If there is equal variance of the residuals, this is called homoscedasticity. If there is no equal variance of the residuals, there is heteroscedasticity. To check for equal variance in the model, the Breusch-Pagan test has been performed. Table 4-5 shows the outcome of the test. For every financial performance indicator (ROE, ROA, and Tobin's Q), the p-value is less than 0,01, which means that we have enough evidence to reject the null hypothesis (Zach, 2020). So we can conclude that there is heteroscedasticity in the model. Heteroscedasticity does not impact the regression coefficients, but it can lead to biased and inefficient parameter estimates, and therefore it is important to deal with heteroscedasticity problems (Choueiry, n.d.).

	ROE	ROA	Tobin's Q
BP-score	179,04	80,53	195,14
p-value	(< 0,01)	(<0,01)	(< 0,01)

Table 4-5: Breusch-Pagan test

4.3.4 Normality assumption test

Figure 4-1, Figure 4-2 and Figure 4-3 show histograms of the residuals to check if the data is normally distributed. Figure 4-1 and Figure 4-2 show a relatively clear belly-shaped residuals graph, which implies that the residuals of the regression model are normally distributed (Zach, 2021). Figure 4-3 shows that the residuals in the Tobin's Q model have a more extreme maximum and minimum value, compared to the ROA and ROE models. Even though that the histogram for Tobin's Q looks a bit less perfect, the residuals are still normally distributed.
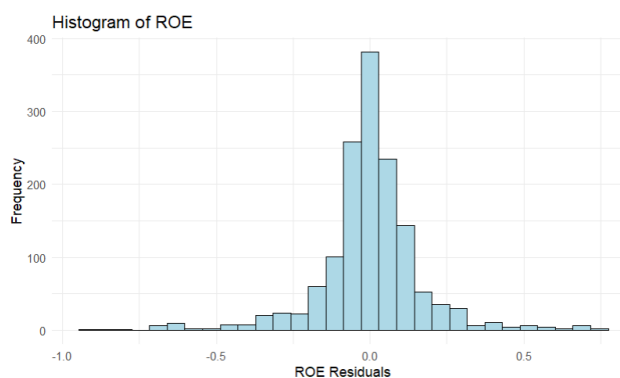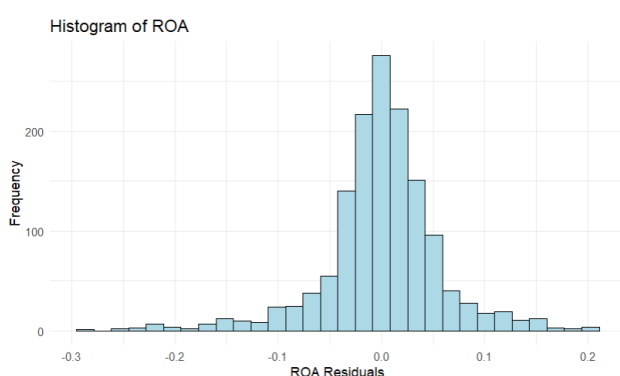
Figure 4-1: ROE residuals histogram

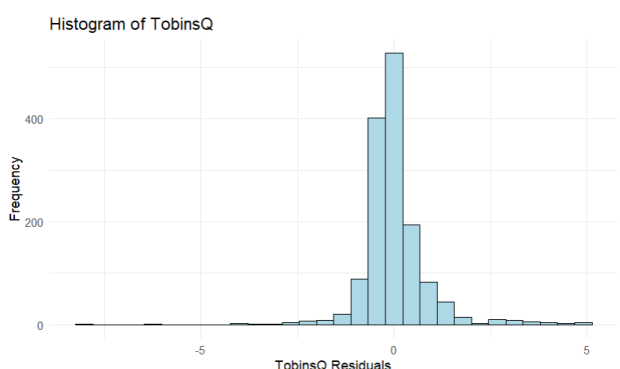**Figure 4-2: ROA residuals histogram**

Figure 4-3: Tobin's Q residuals histogram

4.3.5 Return on Equity regression results

The regression results in Table 4-6 show a positive and significant relationship between the dependent variable (ROE) and independent variable (ESG Score) at a significance level of 1% (p-value is 0,009). The coefficient of ESG Score is 0,001, which means that if the ESG score increases by 1 unit, ROE will increase by 0,001 (0,1%), when all other variables are considered in the model. Thus this confirms the hypothesis test. Leverage shows a negative (-0,029) significant (0,01) effect on ROE, Market-to-book ratio shows a positive (0,009) significant (< 0,01) effect on ROE and Firm size shows a negative (-0,003) insignificant (0,482) effect on ROE. In this study, the adjusted R-squared have been used instead of the R-squared in order to explain what percentage of the variance from the dependent variable can be predicted by the corresponding model. The adjusted R-squared takes into account the complexity of the model by adjusting for the number of variables included in the model. Because of this, the adjusted R-squared value only increases when the extra variable significantly improves the

model fit (Frost, 2017). Based on the adjusted R-squared, 10,4% of the variance of ROE can be predicted by the model.

4.3.6 Return on Assets regression results

The regression results in Table 4-6 show a positive and insignificant relationship between the dependent variable (ROA) and independent variable (ESG Score). The p-value (0,431) shows insignificance at the 5% level. The coefficient of 0,0001 show that if the ESG score increases with 1 unit, ROA will increase by 0,0001 (0,01%), when all variables are considered in the model. Leverage shows a negative (-0,025) significant (< 0,01) effect on ROA, Market-to-book ratio shows a positive (0,004) significant (< 0,01) effect on ROA and Firm size show a negative (-0,004) significant (0,039) effect on ROA. Based on the adjusted R-squared, 22,8% of the variance of ROA can be predicted by the model.

4.3.7 Tobin's Q regression results

The regression results in Table 4-6 show a negative and significant relationship between the dependent variable (Tobin's Q) and the independent variable (ESG Score). The p-value (0,0419) shows significance at the 5% level. The coefficient of ESG Score is -0,006, which implies that if ESG score increases with 1 unit, Tobin's Q will decrease by 0,006, when all other variables are considered in the model. Leverage shows a negative (-0,836) significant (< 0,01) effect on Tobin's Q, Market-to-book ratio shows a positive (0,366) significant (< 0,01) effect on Tobin's Q and Firm size show a negative (-0,099) significant (0,003) effect on Tobin's Q. Based on the adjusted R-squared, 88,5% of the variance of Tobin's Q can be predicted by the model.

	ROE	ROA	Tobin's Q
Constant	0,125	0,140**	3,68***
	(1,449)	(3,12)	(4,51)
ESG Score	0,001**	0,0001	-0,006*
	(2,606)	(0,787)	(-2,037)
Leverage	-0,029**	-0,025***	-0,836***
	(-2,59)	(-7,57)	(-9,73)
Market-to-book ratio	0,009***	0,004***	0,366***
	(7,38)	(6,74)	(38,73)
Firm size	-0,003	-0,004**	-0,099**
	(-0,703)	(-2,06)	(-2,98)
Adj. R-Squared	0,104	0,228	0,885
No. of Obs.	1437	1437	1437

Note.* Signif. Codes: '' 0,001 '**' 0,01 '*' 0,05 ; t-values are in parentheses.**

Table 4-6: Regression output

4.3.8 Sector-specific regression results

Table 8-2 in Appendix shows the output of the sectorial regression analysis. The table only shows the regression results for the ESG score independent variable. The outcomes without formatting show homoscedastic and non-autocorrelated values. The bold values in the table represent autocorrelation and heteroskedasticity robust outcomes, whereas the underlined values represent only heteroskedasticity robust values. In general, the model shows few significant outcomes compared to the general model. For the communication services sector and utilities sector, the ESG scores show a positive and significant influence on two of the three financial performance measures. The industrials and information technology sectors show a

significant positive influence for only one financial performance measure, ROE and ROA, respectively. Consumer discretionary, consumer staples, energy and real estate sectors do not show a significant influence at all. For the health care, materials and industrial sector, there is a significant negative influence of ESG score on one of the three financial performance measures. For the health care and industrials sector, ESG score negatively influences Tobin's Q, whereas for the materials sector ESG score negatively influences ROA.

5. DISCUSSION AND LIMITATIONS

In regression analysis with autocorrelation, it is of great importance to deal with this in the right way. So this study provides autocorrelation-robust outcomes for the ROA and Tobin's Q model, whereas it is not needed to do so for the ROE model. Heteroskedasticity tests showed that there are, next to autocorrelation problems, also significant heteroskedasticity problems in the model. Because of this, it was needed to deal with autocorrelation problems as well as heteroskedasticity problems. One way to deal with these problems is to calculate heteroscedasticity and/or autocorrelation consistent (HAC) covariance matrix estimations in r, instead of relying on the non-robust outcomes of the OLS model (Vogelsang, 2012). As explained, for the ROE model only heteroscedasticity consistent covariance matrix estimations have been made, whereas for the ROA and Tobin's Q model heteroscedasticity and autocorrelation consistent covariance matrix estimations have been applied. So by using robust standard errors, it is still possible to make valid statistical conclusions, even though heteroscedasticity and/or autocorrelation exist in the model. This heteroscedasticity and autocorrelation-robust standard errors method have been used to calculate the regression results for the study.

5.1.1 Hypothesis 1 (ROE)

The adjusted R-squared of 0,104 (10,4%) implies that 10,4% of the variance of ROE can be predicted by the model. Thus this relatively low percentage implies that the model slightly predicts the outcome of the analysis (Turney, 2022). This outcome is in line with a previous study on the effect of ESG scores on ROE. The study conducted by Aggarwal & Kalia (2023) shows that for the relationship between ESG score and ROE of 468 healthcare firms, the ESG score has a positive significant effect on ROE at the 1% level. As mentioned earlier, Rockefeller Asset Management performed research studying 1,000 plus studies from 2015 - 2020 to analyze the relationship between ESG scores and financial performance (Atz, Clark, van Holt, & Whelan, 2021). The outcome of this study showed that most of the studies (58%) considered in the analysis, showed a positive effect of ESG score on financial performance (ROE and ROA) (Atz, Clark, van Holt, & Whelan, 2021). So the findings in this study align with the previous studies used to substantiate the hypothesis. Because of this, it can be stated that the results of this study match previous literature, and as a result of that, the hypothesis (for the ROE dependent variable).

5.1.2 Hypothesis 1 (ROA)

The ROA regression model shows an adjusted R-squared of 0,228 (22,8%), which implies that 22,8% of the variance of ROA can be predicted by the model. In general, this would be seen as a low percentage, which would imply that the model slightly predicts the outcome of the analysis (Turney, 2022). However, this percentage seems high if we compare it to the ROE model. So compared to the ROE model, a high percentage of the variance of ROA can be predicted by the model. Since the relationship is not significant, the outcome does not support the hypothesis even though the regression analysis shows a positive

influence of ESG score on ROA. Thus, it can be concluded that this outcome is not in line with the used literature. As mentioned earlier, Atz, Clark, van Holt, & Whelan (2021) showed that 58% of the studies that investigate the relationship between sustainability scores and financial performance (ROE and ROA), show a significant positive relationship between ESG score and financial performance. Next to that research, the papers written by: Aggarwal & Kalia (2023), Aydoğmuş, Ergun, & Gülay (2022) and Velte (2017) also show a significant positive influence of ESG score on ROA. Though, there are lots of arguments to explain the difference between this research and prior literature outcomes. The first, and probably most important factor is the sample. The prior literature papers used other samples than this report. For example, Aggarwal & Kalia (2023) uses only healthcare firms as sample, the sample investigated by Elmarzouky, Fagernes, Giannopoulos, & Hossain (2022) included only Norwegian firms and Velte's (2017) paper is based on German firms only. The sample in this paper includes 487 firms from different sectors all-over Europe, which makes it differ significantly from prior literature. Another important factor that could cause this unexpected outcome can be the sample period. Aggarwal & Kalia (2023) only used data from financial year 2020, Elmarzouky, Fagernes, Giannopoulos, & Hossain (2022) used data from 2010-2019 and Velte (2017) observed a period of five years (2010-2014), whereas this sample have been analyzed over a period of three years (2020-2022). Not only the duration of the period, but also the period in time plays a significant role. During the sample period of this paper, the corona pandemic made a huge impact on almost every firm around the world. So another possible clarification for this different outcome could be that the corona pandemic has had a significant impact on the ROA of firms. On top of all these potential causes, this unexpected outcome can be caused by general limitations of the study. This study's limitations can be found in the "5.2 limitations" section.

5.1.3 Hypothesis 1 (Tobin's Q)

The Tobin's Q regression model shows an adjusted R-squared of 0,885 (88,5%), which implies that 88,5% of the variance can be predicted by the model. Contradicting the adjusted R-squares from the ROA and ROE models, the Tobin's Q model predicts the outcome of the model really well. When the adjusted R-squared gets closer to 1, it implies that the model predicts the outcome of the analysis better and better. The results of the regression analysis invalidate the hypothesis. From this it can be concluded that the outcome of this research is not in line with prior literature. Similarly to the arguments for the unexpected outcome in the ROE model, this unexpected outcome can be caused by a difference in sample data or by the time/period of the data. Another possible causation could be, like the ROE model, that the corona pandemic have had a significant impact on either the ESG score of Stoxx 600 firms or on the Tobin's Q variables of these firms. More possible causations can be found in the "5.2 limitations" section as well.

5.1.4 Hypothesis 2: Sectorial analysis

The findings of our sector-specific regression analysis indicate that the influence of ESG scores on financial performance varies across different sectors. This supports the second hypothesis. However, it is worth noting that the findings in this study do not entirely align with prior literature. The study presents mixed evidence regarding the direction and significance of the relationship between ESG scores and financial performance in different sectors. An industry-wise analysis of Indian firms in a developing economy authored by Hasan, Kashirimka, & Sing (2022), shows that consumer goods, consumer services, and heavy engineering firms show a positive significant association between corporate social responsibility disclosure and financial

performance, whereas this study finds that communication services and utilities sector show a positive significant influence. The results from this study show a negative significant influence of ESG score on financial performance for firms operating in the health care, materials and industrial sector, whereas the study conducted by Hasan, Kashiramka and Singh (2022) show a negative influence for firms operating in the health care, utility and energy sectors. This analysis suggests that the impact of ESG scores on financial performance exhibits variability not only among different sectors but also across various regions/countries/continents. Consequently, the outcomes observed in this sample cannot be generalized for other samples. To illustrate this point, companies belonging to the utilities sector within the Europe Stoxx 600 index demonstrate a significant and positive regression influence, whereas Indian firms operating within the utilities sector display a negative influence of ESG scores on financial performance.

5.2 Limitations

5.2.1 Winsorization
The sample used in this study included, as mentioned earlier, some significant outliers. To obtain the most reliable outcome, the most extreme outliers have been winsorized. This does not mean that all these observations have been deleted from the analysis, though these observations have been replaced for less extreme values. Currently, there are no strict guidelines for identifying certain values as outliers/extreme values. This forced the researchers to perform winsorization based on different techniques and their own experiences. To get a good insight, the raw data have been analyzed in Excel eventually. After this, r has been used to obtain descriptive statistics and boxplots. Based on the minimum and maximum values in the descriptive statistics and the outliers in the boxplots, winsorization decisions have been made. Due to the absence of clear winsorization guidelines, the process becomes subjective. It is of great importance to keep this in mind when using the outcomes of this study.

5.2.2 Low adjusted R-squared
When interpreting the results of this study, one needs to keep in mind that the ROA and ROE model shows low adjusted R-squared, which implies that the model slightly predicts the outcome of the analysis (Turney, 2022). For future research, it can be useful to reconsider the ROA and ROE models.

5.2.3 Time-series period
To get an even more reliable outcome of the general relationship between financial performance and ESG score, considering a longer time period would be a good option. Two of the three financial years included were during the corona pandemic in Europe. This period has had a huge impact on the performance of many European firms, which may impact the representativeness of the outcome of the study.

6. CONCLUSION
This paper aimed to make a valuable contribution to the existing body of literature concerning the impact of sustainability levels on financial performance. Extensive investigation has been conducted to examine the influence of ESG scores on various financial performance indicators. The analysis takes into consideration crucial factors such as leverage, market-to-book ratio, firm size and GICS sector names. Specifically, this examination focuses on the Europe Stoxx 600 index, excluding financial firms. Additionally, a sectorial analysis has been undertaken to examine the impact within the specific GICS sectors included in the index.

The panel regression analysis showed that there is a positive and significant influence of ESG score on ROE. A higher level of sustainability corresponds to a more effective management of the capital invested by shareholders. However, The analysis showed a positive insignificant impact of ESG score on ROA. Thus it can be concluded that there is not a significant impact of ESG score on how efficiently the sample firms uses its assets to generate profits. For the last financial performance measure, Tobin's Q, the panel regression showed a negative significant impact of ESG score. It can be concluded that more sustainable firms tend to have lower Tobin's Q, which implies that more sustainable firms are more likely to be undervalued (the costs to replace a firm's assets is greater than the value of the stock). So to conclude, the first hypothesis can be confirmed for the ROE financial measure, whereas it can be rejected for ROA and Tobin's Q.

The sectorial panel regression analysis showed mixed results across different sectors. This finding aligns with prior literature, which already highlighted substantial variations among sectors. However, it is worth noting that the mixed outcomes per sector in prior literature differ substantially from this study. Nevertheless, based on the results obtained from the sectorial panel regression analysis, it can be confirmed that the impact of ESG score on financial performance differs significantly for the various sectors included in the sample. Stating this, the second hypothesis can be confirmed.

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8. APPENDIX

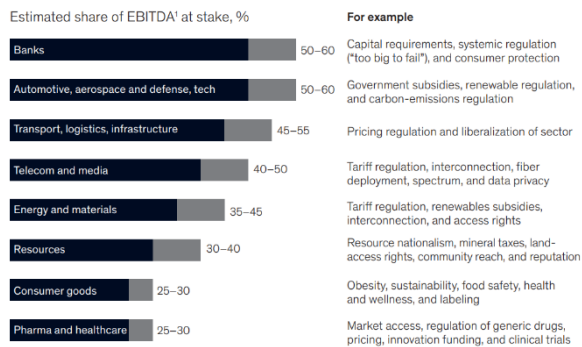Figure 13: Mapping the SDGs across the three ESG factors

Figure 8-1: Mapping the 17 SDGs among the three ESG factors

Figure 8-2: Percentage of stake from external engagement across different industries

Variables	Explanation
Independent Variable	
ESG Score	The combined score of Environmental, Social and Governance scores.
Dependent Variables	
ROE	$\dfrac{Net\ income\ after\ tax}{(Total\ assets - Total\ liabilities)}$
ROA	$\dfrac{Net\ income\ after\ tax}{Total\ assets}$
Tobin's Q	$\dfrac{Market\ value}{Total\ assets}$
Control Variables	
Leverage	$\dfrac{Total\ debt}{(Total\ assets - Total\ liabilities)}$
Market-to-book ratio	$\dfrac{Market\ value}{(Total\ assets - Total\ liabilities)}$
Firm size	Natural logarithm of Total assets
Sector	Based on the GICS sectors

Table 8-1: Variables of the study

	ROE	ROA	Tobin's Q
Communication Services	0,004	**0,004***	**0,063***
	(1,74)	**(2,30)**	**(2,01)**
Adj. R-Squared	0,595	0,671	0,869
No of Obs.	99	99	99
Consumer Discretionary	**-0,000**	**-0,001**	**-0,001**
	(-0,086)	**(-0,92)**	**(-0,25)**
Adj. R-Squared	0,359	0,139	0,912
No of Obs.	195	195	195
Consumer Staples	**0,000**	**0,000**	**-0,001**
	(-0,029)	**(0,097)**	**(-0,27)**
Adj. R-Squared	0,134	0,089	0,972
No of Obs.	135	135	135
Energy	-0,002	-0,000	**-0,049**
	(-0,458)	(-0,15)	**(-1,81)**
Adj. R-Squared	0,004	0,208	0,807
No of Obs.	53	53	53
Health Care	0,002	**0,002**	**-0,038***
	(0,75)	**(1,48)**	**(-2,26)**
Adj. R-Squared	0,051	0,249	0,848
No of Obs.	159	159	159
Industrials	**0,002***	**0,000**	**-0,012***
	(2,58)	**(0,93)**	**(-3,17)**
Adj. R-Squared	0,148	0,232	0,839
No of Obs.	355	355	355
Information Technology	0,001	0,001*	**0,003**
	(1,46)	(2,39)	**(0,14)**
Adj. R-Squared	0,152	0,372	0,960
No of Obs.	92	92	92
Materials	-0,001	-0,001*	**-0,008**
	(-0,94)	(-2,44)	**(-1,07)**
Adj. R-Squared	0,041	0,195	0,951
No of Obs.	153	153	153
Real estate	-0,001	-0,000	**-0,000**
	(-1,21)	(-0,65)	**(-0,96)**
Adj. R-Squared	0,077	0,086	0,956
No of Obs.	99	99	99
Utilities	0,002*	0,001*	**-0,000**
	(2,37)	(2,30)	**(-0,14)**
Adj. R-Squared	0,039	0,178	0,605
No of Obs.	97	97	97
Note. Signif. Codes: '**' 0,01 '*' 0,05			

Table 8-2: Sector-specific regression output