UNIVERISTY OF LJUBLJANA

SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

THE IMPACT OF ENVIRONMENTAL, SOCIAL, AND CORPORATE GOVERNANCE FACTORS ON COMPANY VALUE

Ljubljana, February 2024 ARMANDO OSTOJIĆ

AUTHORSHIP STATEMENT

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CSR – Corporate Social Responsibility

E – Environmental factor of ESG score

ESG – Environmental, social, and governance

FPE – Forward Price to Earnings ratio

FTSE 100 Index - Financial Times Stock Exchange 100 Index

G – Governance factor of ESG score

MTB – Market to Book ratio

ROA – Return on Assets

S – Social factor of ESG score

1 INTRODUCTION

The growing interest of investors and global awareness regarding risks, particularly those related to the environment and other non-financial factors like social responsibility and sound governance, is compelling companies to intensify their efforts and focus on these non-financial aspects of their operations. Investors, employees, suppliers, customers, and government bodies increasingly expect companies to be proactive in addressing these issues, implementing necessary risk mitigation measures, and providing effective reporting.

Companies typically communicate their performance in managing these risks through three broad categories: Environment, Social, and Governance or popularly as acronym ESG. Those factors have become part of the agenda of every corporate board meeting as the shareholders and potentially new investors are taking into account how a company is implementing ESG in its activities. To back this claim up regarding growing interest in ESG factors, in Figure 2 is presented Google Trends chart for “Environmental, Social, and Governance” in the last ten years which shows exponential rise in interest for ESG in the whole world, especially since 2020. The global economies have been significantly disrupted by COVID-19, similar to the impact of the Great Depression. Apart from the magnitude of the economic downturn and its worldwide scope, what sets this economic turmoil apart is the widespread attention given to environmental sustainability, on par with the emphasis on economic recovery strategies. Unprecedentedly, there's discussion about a "green recovery" and assessments of how the suggested actions will influence environmental stability (Gusheva & de Gooyert, 2021). However, from the company's viewpoint, taking action in these areas often involves making investments. Consequently, a pivotal question raised in board meetings and relevant committees is whether the required investments and resources make financial sense.

As there is growing evidence that companies that tend to prioritize ESG issues achieve better long-term performance in various aspects such as increased sales growth, higher return on equity, and even outperforming the market measured with alpha (Bradley, 2021), I have decided to examine in this paper in what way the ESG factors have impact on valuation of a company.

Numerous researchers have explored the connection between ESG factors and a company's financial performance. While recent studies predominantly report positive outcomes, there is still a significant body of research with negative results which emphasize the primary objective of firms is maximizing shareholder profit. This paper contributes further insights to this ongoing debate.

The primary goal of the study is to examine the relationship between the overall ESG scores, and three financial performance metrics, namely Return on Assets (ROA), Market to Book

ratio (MTB), and Forward Price to Earnings ratio (FPE). Each metric serves as a dependent variable in my models, allowing me to gauge the impact of ESG factors on distinct facets of financial performance. Return on Assets is used as proxy indicator for profitability of a company whereas Market to Book ratio and Forward Price to Earnings ratio are used as indicators of value. Beside the overall ESG score, individual pillars – Environmental, Social, and Governance – are used as explanatory variables in the other regression models, too. These pillars represented the core components of ESG, representing the environmental sustainability, social responsibility, and corporate governance aspects of firms. By assessing the effects of each pillar individually, it is aimed to discern the specific contributions of these dimensions to financial performance. The objectives include identifying whether higher ESG scores are linked to higher ROA, MTB, and FPE which would suggest a positive impact, or if there's a negative relationship.

In this paper, the research will be based on quantitative analysis using data obtained from Refinitiv Workspace. It provides ESG scores to transparently and objectively test companies' ESG performance based on financial reports that are publicly reported. These scores will be used in order to assess impact of ESG scores, and ESG individual pillars, on Return on Assets, Market to Book ratio, and Forward Price to Earnings ratio of companies which are part of the Financial Times Stock Exchange 100 Index – a share index of the 100 companies listed on the London Stock Exchange with the highest market capitalization.

FTSE 100 Index includes some of the UK's most prominent and influential companies for which high-quality data for ESG scores and financial metrics might be more readily available due to their prominence and regulatory requirements. Also, larger companies often face higher levels of scrutiny from investors and stakeholders regarding their ESG practices. However, there are potential limitations such as performance of the constitutes is influenced by factors beyond ESG factors due to regulatory change, and larger companies might have more resources to invest in ESG initiatives which impacts the strength of the relationship. Overall, studying this index could offer valuable insights into how ESG practices influence the financial performance of significant players in the market which are under increased attention of the stakeholders.

Therefore, the research questions are:

RQ1: What is the relationship between a company's ESG score and its Return on Assets?

RQ2: What is the relationship between a company's ESG score and its Market to Book ratio?

RQ3: What is the relationship between a company's ESG score and its Forward Price to Earnings ratio?

RQ4: What is the relationship between a company's individual pillar score and its Return on Assets?

RQ5: What is the relationship between a company's individual pillar score and its Market to Book ratio?

RQ6: What is the relationship between a company's individual pillar score and its Forward Price to Earnings ratio?

In pursuit of these objectives, I have conducted an extensive empirical analysis employing fixed effects regression models. My ultimate goal is to provide nuanced insights into the role of ESG considerations in shaping financial outcomes. Recognizing the potential moderating role of firm size, I have introduced market capitalization quartiles as a moderating factor. The intention of adding quartiles is to find out how the interaction between ESG factors and firm size influences financial performance. By segmenting firms into quartiles based on their market capitalization, I tried to capture variations that might be masked in aggregate analyses. Firm size, represented by the natural logarithm of market capitalization (SIZE), is included as a control variable. I recognized that variations in firm size could confound the relationships between ESG factors and financial performance metrics. By including SIZE as a control variable, I wanted to isolate the influence of ESG factors on financial outcomes.

The research was characterized by methodological steps which I took in order to address potential statistical issues that could affect the validity of my conclusions. As the sample is made up of one hundred different companies from 2013 to 2021, panel data is present and before the regression analysis is run, suitable tests will be performed in order to find the most convenient model to get the results. Similar is done by Duah-Boateng and Twumasi-Ankrah in order to seek out is pooled, fixed effects or random effects model the most suitable (2019).

To ensure the time-series data's stationarity, I conducted the Augmented Dickey-Fuller (ADF) test. Stationarity is a crucial assumption for time-series analysis, and our ADF test results confirmed the presence of stationarity in my data sample which was made of FTSE 100 Index, reinforcing the robustness of our analysis.

The Variance Inflation Factor (VIF) test was instrumental in detecting multicollinearity among independent variables which were abovementioned. High multicollinearity can distort regression results and interpretations. The VIF test results provided assurance that multicollinearity was not a significant concern in our analysis, enhancing the reliability of my findings.

Further investigation uncovered heteroskedasticity in the data through the Breusch-Pagan LM test. Heteroskedasticity can lead to biased standard errors and compromised statistical inferences. In response, I have adopted Newey-West standard errors which is a recognized

technique in econometrics, to correct for heteroskedasticity. This measure increased the robustness of the regression results.

The Breusch-Godfrey LM test revealed the presence of autocorrelation in the data. Autocorrelation can violate the independence assumption of regression analysis, jeopardizing the validity of results. I took corrective measures, applying Newey-West standard errors to account for autocorrelation which is abovementioned in addressing the issues with heteroskedasticity.

The strength of this analysis lies in the extensive dataset and up-to-date ESG scores, enabling me to conduct a robust examination of this relationship. Accurately measuring ESG performance poses a challenge, and to enhance data quality, I have utilized Refinitiv ESG scores. Refinitiv operates one of the world's most extensive ESG data collection and analysis operations, aggregating and processing publicly available information to provide current and comprehensive ESG coverage. Sustainability data and ESG scores are readily accessible through Refinitiv's website, except for non-compliance notes. With Refinitiv's assessment methodology, sustainability assessment, traditionally conducted once a year, has become a continuous process, yielding up-to-date ESG data throughout the year. This continuity offers flexibility for our analysis.

Notably, we discover that ESG performance exhibits a negative and highly significant relationship with firm value (MTB), and profitability (ROA) as indicated by coefficients of -0.1973, and -0.0010 respectively. For the other value indicator, FPE, coefficient is positive, 0.0109, but it is not statistically significant and therefore we cannot use it as the coefficients for MTB and ROA in forming conclusions.

After the results are obtained, they are interpreted and conclusion are drawn before stressing out potential suggestions which could be further implemented in order to achieve better final output.

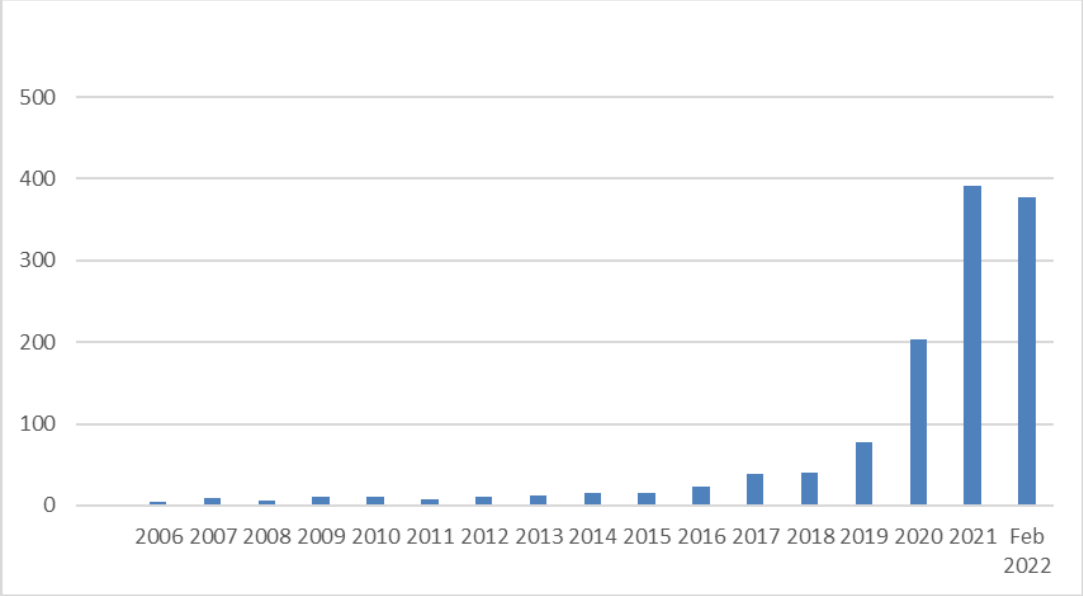
The structure of the paper is as follows: Chapter 1 discusses theoretical background and goes through prior researches. Chapter 2 outlines data, variables and methodology. Chapter 3 presents the results of the regression analysis. Chapter 4 provides concluding remarks and suggestions for the future research.

2 LITERATURE REVIEW

2.1 ESG Background

The term ESG was firstly used in 2004 in an initiative organized by the United Nations and Swiss Federal Department of Foreign Affairs called Who Cares Wins. It was endorsed by numerous financial institutions among which were names as Morgan Stanley, Goldman Sachs, Deutsche Bank, and HSBC to name a few. The main point of the initiative was to make recommendations how to better implement environmental, social, and governance issues in analysis, asset management and securities brokerage (Global Compact, 2004). Since then, ESG investing has started to grow tremendously, and according to available data, the value of assets allocated to global ESG ETF funds in 2022 totals 378 billion dollars.

Figure 1: Global ESG ETF assets from 2006 to February 2022 (in billions of dollars)



Source: Statista (2023).

When it comes to the environmental aspect of ESG it is primarily concerned with issues which are threatening to moisten the economic growth such as water scarcity, carbon emissions or extreme temperature where the condition of the surrounding environment can greatly impact a company's competitive positioning. Failure to protect against environmental incidents like oil spills or mining accidents can result in governmental sanctions, regulatory penalties, criminal prosecution, and damage to reputation, all of which can harm shareholder's value. Thus, taking care of environmental factors has become crucial element of the ESG framework. It takes into consideration how a company is using its natural resources and how its operations are affecting

the environment, both through internal processes and across its supply chain (S&P Global, 2019).

In the last decade, due to evolving business landscape of the 21st century which is characterized by increased interconnectedness and interdependence among businesses and markets around the world, the scope of the social factor in ESG framework has expanded. Beside human rights, working conditions, employee safety and health, the social factor now encompasses the impact of modern supply-chain systems and the adoption of technology across all business sectors (Neilan, Reily, Fitzpatrick, 2020). Moreover, the potential for financial gain provides an additional incentive to assess the social impact and responsibility of a company and its operations – market is prone to favor companies that minimize, for example, involvement in the sale of controversial products or does not rely on material from politically unstable regions (S&P Global, 2020).

Figure 2: Google Trends for "Environmental, Social and Governance" from 2013 to 2023

Source: own work based on Google Trends (2023).

The "G" in ESG refers to governance factors in decision-making, encompassing policies set by governments, as well as the distribution of rights and responsibilities among various participants in corporations, including boards of directors, managers, shareholders, and stakeholders (S&P Global, 2020). Governance factors encompass the regulations and protocols dictating the operations of corporations, enabling investors to evaluate suitable governance practices, akin to their assessments of environmental and social factors. Essential components of corporate governance structures include a company's mission, the responsibilities and makeup of boards of directors, shareholder entitlements, and the methodologies employed to gauge corporate performance. (S&P Global, 2020).

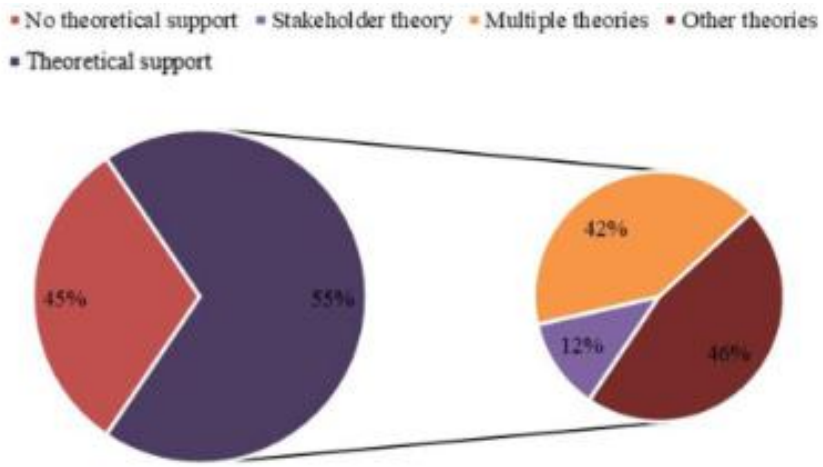
Figure 3: Pillars of ESG framework

Environmental	Social	Governance
• Climate change • Water usage • Energy efficiency • Pollution • Resource scarcity • Environmental hazards	• Employee safety and health • Working conditions • Diversity • Inclusion • Equity	• Preventing bribery • Executive compensation • Cybersecurity • Privacy practices • Management Structure

Source: own work based on S&P Global (2020).

As corporate social responsibility becomes increasingly integrated into organizational strategies, it is imperative for both academia and industry to gain a better understanding of how it is put into practice. To address this need, Fatima and Elbanna (2022, p. 109) have conducted a systematic review of 122 empirical studies on corporate social responsibility implementation. In research of trends of its implementation they find that theoretical foundation is still in the early stages of development. Notably, a significant portion of the empirical literature, approximately 45%, lacked a solid theoretical basis. The presence of a robust theory is crucial for effectively explaining complex concepts, thus highlighting the need for future research to have stronger theoretical support.

Figure 4: Theoretical orientations in corporate social responsibility implementation literature



Source: Abdi, Li, Càmara-Turull (2021).

Among the remaining 67 research studies that did incorporate theoretical support a substantial proportion, 42%, employed multiple theories to underpin their proposed frameworks. The most frequently utilized theory was stakeholder theory, and it was often used in conjunction with

other theories to reinforce the foundations of these frameworks. Finally, as presented in Figure 4, the remaining 31 research studies drew upon a diverse array of theories from various disciplines, such as psychology (i.e. theory of planned behavior, balance theory, attribution theory, and social identity theory), communications (including diffusion theory and inoculation theory), sociology (including systems theory, social exchange theory, and social identity theory), and biology (specifically signaling theory). There are several key takeaways from their paper, and one is that in terms of theoretical implications there has been a relatively limited number of studies examining non-organizational consequences conducting field studies, or engaging in longitudinal case studies to explore the complete implementation of CSR strategies. Secondly, since organizations prioritize different stakeholders to varying degrees, it is challenging to find a one-size-fits-all approach for stakeholder prioritization. Lastly, most of theory regarding implementation of corporate social responsibility has focused on analyzing how it impacts outcomes such as reputation and performance (Fatima & Elbanna, 2022, p. 116). However, they find most of research studies to be restricted to micro- and meso-level without taking into the consideration country-level impacts as economic development and increase in sustainability index (Fatima & Elbanna, 2022, p. 116).

2.2 ESG and Company Valuation: Theoretical Perspective

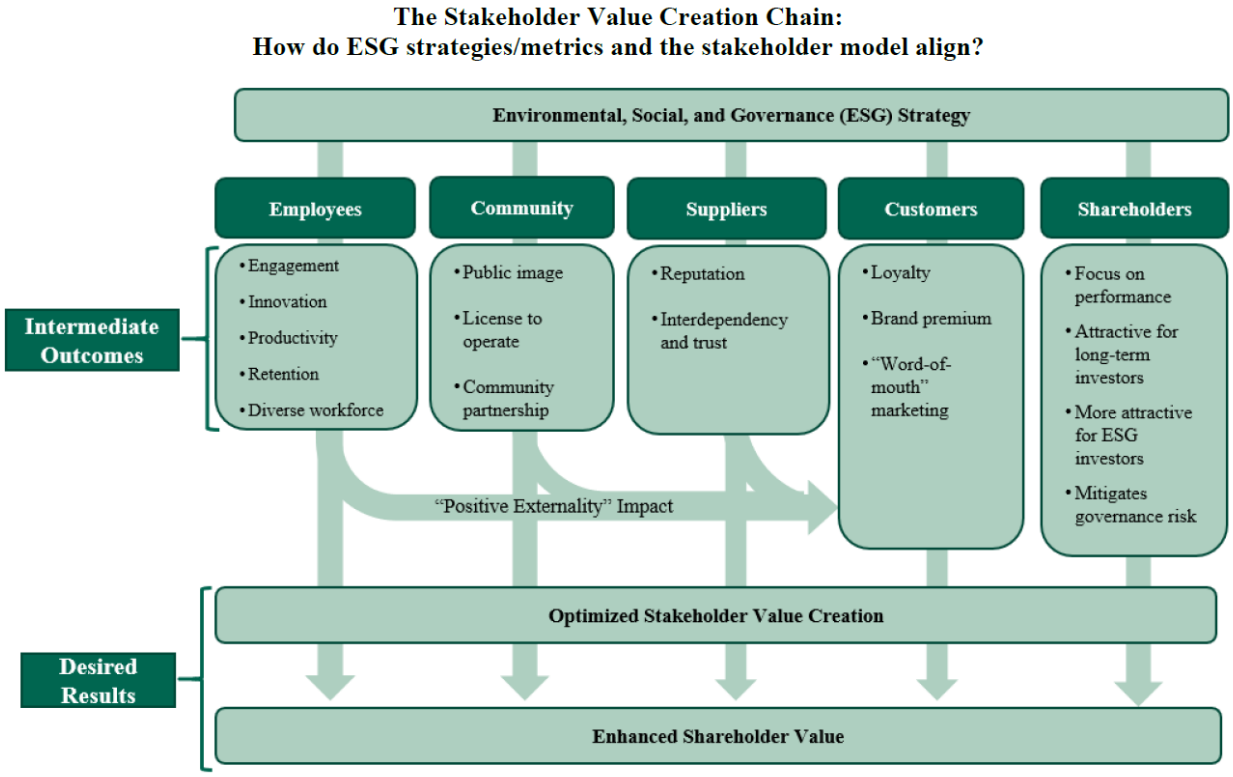
Stakeholder theory (Freeman, 2010) introduces the concept that successful companies have the ability to align the interests of all their stakeholders, making them more sustainable. These companies not only prioritize the profit-maximizing interests of shareholders but also take into consideration the interests of other stakeholders associated with the firm. For instance, the Business Roundtable, an organization that unites CEOs from prominent U.S. companies, declared their endorsement of the stakeholder model. According to this model, a corporation's objective should extend beyond serving just its shareholders; it should also cater to the interests of various stakeholders, including customers, employees, communities, the environment, and suppliers.

In the context of shaping a company's vision, ESG metrics have emerged as a strategic model. They assess a company's performance and its stance on a wide range of issues that are of significance to a broader group of stakeholders, much like how financial metrics evaluate a company's performance for shareholders, as outlined by Martin et al. (2020).

In Figure 5 above is presented model that depicts the convergence of ESG strategy, the stakeholder model, and the creation of firm value. This model encapsulates the synergistic ripple effect of stakeholders' contributions to the company's economic prosperity. For instance, a "positive externality" could be that many employees prefer to work for environmentally responsible companies, and their heightened commitment can enhance productivity, customer satisfaction, and other aspects. It is essential for all companies to strike a balance between the

interests of their various stakeholders, including shareholders, while also considering long-term goals.

Figure 5: Stakeholder value creation chain



Source: Martin et al. (2020).

In recent years, ESG disclosures have gained popularity among publicly traded companies. This surge in interest is driven by various factors, including the desire to involve stakeholders, respond to investor demands, establish credibility, and address crises and competitive pressures within their respective industries (Olsen et al., 2021). Some companies view sustainability as a means to attain a competitive advantage, while others regard it as a routine procedure. Regardless, the adoption of sustainability is an evolving and intricate process that unfolds over time (Ioannou & Serafeim, 2019, p. 19). Corporations worldwide are increasingly embracing ESG practices on a voluntary basis, indicating that they may be reaping economic benefits from these endeavors (Yoon et al., 2018).

Moreover, international organizations, sector-specific institutions, and governments are actively promoting a sustainable global economy. For instance, the United Nations Sustainable Stock Exchange Initiative collaborates with stock exchanges to promote sustainability

objectives. According to it, 66 out of 120 members of stock exchanges have issued ESG reporting guidelines for companies (Sustainable Stock Exchange, 2022).

Both companies and investors are increasingly taking into account ESG issues when making their decisions (Eccles & Youmans, 2015, p. 15). The influence of ESG performance on a company's value and profitability has been a subject of academic and business research for quite some time. Traditionally, many studies focused on how corporate governance affects stock price performance.

In response to the escalating apprehension regarding climate change, the circular economy, and biodiversity, studies have initiated an exploration into the correlation between ecological efficacy and stock market performance (Aydoğmuş et al., 2022). Moreover, prompted by the COVID-19 pandemic and its worldwide ramifications on public health, there has been a notable upsurge in curiosity regarding the influence of shifting demographics and societal concerns on stock yields. This encompasses a particular focus on elements like health, safety, welfare, alongside factors pertaining to human resources management such as employee contentment, diversity, and inclusivity, which have garnered substantial interest (Yoon et al., 2018).

There are valid explanations for both the superior and inferior performance of ESG investing compared to traditional investing. In a broad sense, the primary rationale supporting the outperformance of ESG-based strategies essentially suggests that the stock market does not react adequately to ESG-related information. In other words, positive ESG developments do not receive the full recognition they deserve in the stock market, resulting in undervaluation of companies associated with such events. Consequently, a strategy that invests in these undervalued firms can yield exceptionally high returns (Hvidkjær, 2017).

ESG outperformance due to underreaction of the market holds merit given that there are evidences in the past that support the theory in various scenarios. Notably, post-earnings announcement drift (Bernard & Thomas, 1989) and momentum (Jegadeesh & Titman, 1993) represent some of the most robust evidences against market efficiency, and they align with the concept of market underreaction. Furthermore, there is a reasonable proposition that the stock market undervalues certain intangible assets. Intangibles are typically more uncertain in their valuation compared to tangible assets, and often, they do not appear directly on a company's balance sheet. Consequently, intangibles may be less salient to investors. This notion is supported by evidence of underreaction to intangibles, such as research and development costs, patent citations, advertising expenses, and software development costs (Edmans, 2011). Likewise, ESG investments made by firms are typically categorized as intangible assets, and it is plausible that the stock market may underreact to the information related to ESG initiatives.

Also, due to its increasing popularity over time with investors, firms with high ESG scores may outperform the market. In other words, an increasing desire for specific stocks can drive their prices higher, even if no new fundamental information regarding the stocks' value becomes available.

However, demand effects also present a key explanation for why high ESG stocks might exhibit underperformance compared to low ESG stocks. In its work, Merton (1987) highlights that when a substantial group of investors neglect specific stocks, such as low ESG stocks, these stocks can become undervalued. While this initially leads to lower returns, over time, these undervalued stocks are likely to yield higher returns in comparison to high ESG stocks. Even in the scenario where undervaluation is a long-term condition, a low stock price implies a higher dividend to price ratio, consequently resulting in elevated returns (Hvidkjær, 2017).

Additionally, companies operating in industries that are often avoided by ESG investors, such as tobacco and weapons sectors, have strong motivations to adopt conservative accounting practices (Hvidkjær, 2017). This is because these industries face significant scrutiny from regulatory authorities (Hong & Kaperczyk, 2009). If investors fail to account for this aspect, it can result in underreaction and subsequently lead to higher returns. Low ESG-rated firms might react to declining investor interest and the consequent drop in their stock prices by altering their behavior. Heinkel et al. (2001) examine such a scenario in a theoretical model. If firms can lower their cost of capital by attracting more ESG-conscious investors through behavioral changes, this would mitigate the impact on the cost of capital and, consequently, expected returns. Such actions could include making more environmentally friendly investments or improving employees' working conditions.

There have been conducted numerous researches that show how implementation of ESG can positively impact a firm in a direct and indirect way which ultimately increases shareholders value. For instance, attempts to install ethics codes, and ethics trainings are positively linked to employees' job satisfaction which is why socially responsible companies, which are perceived as ethical entities, should prompt similar employee job responses (Valentine & Fleischman, 2007).

The main idea behind growing interest in ESG investing is that it is gaining recognition for its ability to enhance the performance of managed portfolios, decrease risks, and boost returns (Fengt et al., 2022).

Looking from perspective of elasticity of demand, almost perfectly elastic demand curves would result in neither underperformance nor overperformance of high ESG stocks. The impact of ESG investing on prices might not be substantial if it's not widely adopted. Alternatively, arbitrageurs could counterbalance any influence of ESG investors by engaging in counteractive trading. Nevertheless, in cases where arbitrage involves significant costs, we

should not anticipate a complete offsetting effect, as arbitrageurs require compensation for their efforts (Grossman & Stiglitz, 1980).

Nonetheless, even if ESG investing has no impact on prices, Hvidkjær (2017) states that individual investors could still face adverse financial consequences for two reasons. First, a fundamental principle in finance, as outlined by Markowitz (1959), emphasizes that diversification allows for risk reduction without sacrificing expected returns. Therefore, investing in a wide-ranging portfolio of assets provides the optimal trade-off between risk and return, and any limitation on the pool of investable options results in an inferior trade-off. In the absence of pricing effects, the negative consequences of reduced diversification would be most pronounced when entire industries are excluded, as opposed to simply excluding the poorest ESG performers within an industry. Secondly, subpar returns from ESG investing, in the absence of price effects, can be attributed to the high costs associated with ESG screening. This issue is particularly relevant for passive, cost-conscious investors. Given the diversification argument and the existence of an almost informationally efficient market, a valuable lesson from finance is that the majority of investors should adopt a passive, cost-effective strategy. This approach entails acquiring the most economical exposure to a specific asset class. However, ESG requirements can be incongruent with this objective as they necessitate the selection of individual stocks.

In the long term, if we assume that ESG investing reaches a substantial and enduring level of adoption among investors, Hvidkjær (2017) concludes that it becomes challenging to envision how sustained outperformance could persist for three primary reasons. Firstly, the phenomenon of underreacting to intangible ESG information would diminish as more investors adopt strategies based on such information. This is akin to any strategy grounded in the premise that other investors overlook value-relevant information. Secondly, the argument for outperformance driven by popularity is intrinsically linked to the growth in demand, and thus it's inherently temporary. Thirdly, the Merton argument (1987), which claims that ignored stocks gain relevance as the number of investors pursuing ESG strategies increases, suggests that the higher the level of ESG strategy adoption among investors, the more likely there is to be underperformance.

The above presented arguments are mostly assuming that the investors are active, but passive in their ownership. Opposing to them, activist owners directly interact with a company's management to instigate changes in various areas, including those related to ESG matters. This active engagement allows them to have a direct influence on a company's value, rather than merely identifying undervalued firms. One potential avenue for creating value is addressing managerial short-sightedness. In other words, issues stemming from the principal-agent relationship, such as managers being overly focused on short-term results to the detriment of long-term value creation, can be alleviated through the active involvement of investors. This

engagement can encourage management to adopt a more long-term perspective. ESG investing is closely associated with Corporate Social Responsibility (CSR), which, in turn, is connected to the ongoing debate between shareholder value and stakeholder welfare. Often, effective stakeholder management aligns perfectly with the shareholder criterion. However, there are evident principal-agent challenges within CSR, as managers may engage in CSR activities for personal gain or driven by personal social preferences, rather than prioritizing the maximization of shareholder value. Good corporate governance is essential in aligning CSR with maximization of shareholder value. Problems related to the principal-agent relationship can result in managers displaying short-sightedness, which may deter them from investing in ESG initiatives that create value. Conversely, these same issues can also lead to ESG investments that destroy value. Consequently, Governance pillar investing coupled with active ownership aimed at fostering sound corporate governance likely constitutes the foundation for effective ESG investing.

2.3 Prior Empirical Studies on ESG and Company Valuation

The relationship between Environmental, Social, and Governance (ESG) factors and company valuation has emerged as a subject of considerable interest and debate in recent years. Investors and researchers alike have sought to understand the extent to which ESG initiatives influence the financial performance and valuation of companies. This chapter delves into a review of prior empirical studies on the relationship between ESG factors and company valuation. The aim is to present a comprehensive overview of the findings from a diverse range of studies, spanning those that have identified a positive relationship between ESG practices and valuation, those indicating a negative relationship, and those reporting no discernible relationship. This analysis will help shed light on the complex dynamics that underpin the interaction between ESG performance and company valuation, ultimately providing a nuanced perspective on this critical issue for both investors and corporate decision-makers.

2.3.1 Papers with findings of positive relationship between ESG performance and firm value

Velte (2017) in his paper evaluates impact of ESG performance on financial performance of companies which are listed on the German Prime Standard for the period from 2010 to 2014. Return on Assets and Tobin's Q are used as dependent variables which are accounting and market-based measures of financial performance. Overall ESG score together with individual components of it are used as independent variables while control variables are research and development expenses, beta as systemic risk measure whereas the ratio of total debt to total assets is used as proxy for unsystematic risk. Finally, natural logarithm of total assets is

included as firm size component due to large firms often achieve economies of scale and scope. What his results from regression analysis suggest is that ESG performance has a positive impact on ROA with coefficient 0.049 while individual pillars are also positively and significantly influence ROA. In terms of utilizing Tobin's Q as the market-based indicator of financial performance, he finds non-significant positive link.

To expand research from developed economies to emerging ones, too, Yoon et al. (2018) investigate the extent to which a company's corporate social responsibility contributes to enhancing its market worth within South Korea. By utilizing ESG scores they assess corporate social responsibility performance and explore how these scores influence the company's valuation. Beside companies which are listed on the Korean Stock Exchange, they also perform a regression analysis on *chaebols* which are large conglomerates owned and run by family which has founded it and it is still run by it. Results from their study show that total ESG score has a positive, significant influence on the stock price of a firms which are listed on the Korean Stock Exchange with coefficient 0.1027. Individual pillars, environment and social, exhibit also positive and significant impact on the price of a stock. The favorable impact on valuation resulting from ESG is even more pronounced among *chaebols*. Specifically, their findings indicate that governance practices have a notably positive influence on valuation of *chaebols*, whereas for ordinary Korean firms, the effect is either negative or insignificant. The significant impact of ESG on the valuation of *chaebol* affiliates offers an economic rationale for the involvement of South Korean government in reforming their corporate governance structure (Yoon et al., 2018).

Beside looking at ESG scores, Fatemi et al. (2018) decided to analyze how the valuation of a company could be collectively influenced by both ESG activities, and the extent of ESG-related disclosure. Their hypothesis is that the connection between a company's ESG initiatives and its valuation is contingent on the level of disclosure related to those initiatives. One might anticipate a positive impact, as disclosure diminishes information asymmetry and assists investors in gaining a better understanding of the company's ESG strengths or shortcomings. Alternatively, ESG disclosure could potentially harm a company's value if investors perceive such disclosure as insincere or mere "greenwashing". Their research reveals that firms who usually perform low in ESG scores will benefit from increase in ESG-related disclosure.

It is also worth to address sector-focused study conducted by Abdi et al. (2021) in which they use ESG scores to test their impact on the value and financial performance of companies in the airline industry. The study also examines whether the size and age of these companies play a moderating role in clarifying their relationships in this context. Specifically, the analysis explores the interaction effects for two categories of firms: full-service and low-cost carriers. Drawing from data collected from 38 global airlines between 2009 and 2019, they observed that involvement in governance initiatives enhances a company's market-to-book ratio.

Moreover, engaging in social and environmental activities is associated with a positive and significant improvement in financial efficiency. Furthermore, the size of the company plays a crucial role in how sustainability disclosure affects both company value and financial performance in the aviation industry. As a result, they suggest that companies should adapt their participation in these initiatives based on their total assets, which serve as a proxy for company size. In regard to firm age, they did not find it to be a significant moderator.

In their paper Berg et al. (2022), test how does ESG performance affect stock returns, but with addressing attenuation bias due to noise in ESG ratings as there are different providers of ESG ratings, and each has its own unique methodology. Consequently, model coefficients become biased toward 0. In order to address the bias, they propose two methods to reduce noise in ESG ratings by incorporating ratings from the other ESG rating agencies, similar to how errors-in-variables problem is handled in classical statistics. The adjusted results show the impact of ESG performance on stock returns is stronger than previously believed. After accounting for the attenuation bias, the coefficients, on average, increase by a factor of 2.6, indicating an average noise-to-signal ratio of 61.7%.

In his recent work, Berg et al. (2023), investigate the influence of ESG ratings on funds holdings, stock returns, and firm behavior. They observe that downgrades in the MSCI ESG rating result in significant reduction in firm's ownership by US funds with an ESG focus, while upgrades lead to increase. However, these ownership responses occur gradually over a period of up to two years, indicating that fund managers primarily use ESG rating to comply with ESG mandates rather than viewing them as updates to firms' fundamentals. Consequently, they also discover a slow and persistent reaction in stock returns. Downgrades in ESG rating result in abnormal return of -2.37% while upgrades have a weaker effect for a one-year holding period.

Notion that enhancing ESG factors can lead to increased investment returns by improving the overall health of companies is estimated by Mercereau et al. (2022). They have developed a formal framework to capture this notion, analyzing the influence of eight key E, S, and G variables on firm valuation. With extensive dataset which includes over 2200 companies worldwide, they find that these variables have a significant impact, with variations observed across sectors. Improving ESG practices can unlock substantial shareholder value, with firms that adopt top decile practices in all eight variables experiencing an average increase of 35% in equity valuation. The specific ESG areas that can generate the most significant share price improvements depend on individual firms, as more than half of the gains stem from one or two ESG variables. The research enables to identify these areas of improvement for each company, facilitating the prioritization of ESG engagement. At the end they conclude that by focusing on creating shareholder value, it can engage firms more effectively, creating a positive cycle that aligns impact and returns (Mercereau et al, 2022).

Beside ESG factors impact on returns, in the recent years there have been numerous works regarding their influence on volatility and risk. Ouchen (2021) in his study seeks to empirically examine whether the returns of an ESG portfolio exhibit less volatility than those of a benchmark market portfolio. To test this hypothesis, he employes Markov-switching GARCH models to analyze the daily return series of the ESG portfolio 'MSCI USA ESG Select' and the market benchmark portfolio 'S&P 500' during the period from June 1, 2005, to December 31, 2020, both including and excluding the COVID-19 crisis from June 1, 2005, to October 29, 2019. The findings suggest that the ESG portfolio 'MSCI USA ESG Select' experiences relatively less turbulence compared to the market benchmark portfolio 'S&P 500' (Ouchen, 2021).

Moreover, it is discussed in paper written by Cornell (2020) that there are two primary factors that influence the expected returns for companies with high ESG scores – investor preferences and risk. He observes that while investor preferences for highly rated ESG companies can decrease cost of capital, the downside is that it leads to lower expected returns for investor. He concludes, that the increasing emphasis on ESG in investment is likely to generate social advantages, the inclination of investors towards companies with strong ESG ratings can result in reduced cost of equity, fostering investments in sustainable technologies, but these benefits entail a trade-off as they come at the expense of lower anticipated returns for investors.

Possible risk mitigation from the inclusion of ESG information is discussed in Kaiser's paper (2020) where he offers insights into the financial benefits of integrating ESG factors into mainstream active investment approaches. He considers factors such as firm size, industry, and country effects when assessing ESG scores, and introduces the concept of ESG risk materiality. Empirical findings demonstrate that both the US and European investors can enhance their portfolios while simultaneously improving risk-adjustment performance which challenges the perception that ESG integration poses a burden on conventional investment strategies.

2.3.2 Papers with findings of negative relationship between ESG performance and firm value

As opposite to the previously mentioned works in which positive impact of ESG performance on firm's value, Brammer et al. (2006) in their study investigates the correlation between corporate social performance and stock returns in the UK. They thoroughly assess the connections between social and financial performance using a set of individual social performance indicators for the environment, employment, and community engagement, instead of relying on a single composite measure. They find that companies with higher social performance scores typically attain lower returns, whereas those with the lowest possible scores of zero outperformed the market. Also, they stress that the environmental and community indicators show a negative correlation with returns, whereas the employment

indicator exhibits a weak positive relationship. Consequently, they conclude that it's necessary to analyze the different facets of corporate social behavior independently to obtain a precise understanding of their effects on returns.

In the light of emergence of COVID-19 pandemic, the world has encountered economic and social vulnerability, necessitating alternative approaches to steer towards sustainable outcomes. While recent research has demonstrated the resilience of responsible investments during economic crises like the one triggered by COVID-19, there has been limited exploration regarding exchange-traded funds. Utilizing ANOVA and multivariate regression models, Folger-Laronde et al. (2020) have conducted an analysis to examine the distinctions and the relationship between the financial returns of exchange-traded funds and their Eco-fund ratings during the financial market crash associated with the COVID-19 pandemic. Their findings indicate that, despite having higher sustainability performance ratings, exchange-traded funds do not offer protection against financial losses during a severe market downturn. These results contribute to the body of research by revealing the limitations of existing sustainability scores and rating methodologies, providing an initial evaluation of RI during the COVID-19 pandemic.

Nollet et al. (2016) investigate the correlation between Corporate Social Performance and Corporate Financial Performance, employing both accounting-based metrics such as Return on Assets and Return on Capital, as well as market-based indicators like Excess Stock Returns. The analysis relies on Bloomberg's Environmental, Social, and Governance Disclosure score, covering S&P 500 companies over the period from 2007 to 2011., enabling the exploration of both linear and nonlinear associations. The outcomes from the linear model indicate a noteworthy adverse link between Corporate Social Performance and Return on Capital. Notably, when they break down the ESG Disclosure score into its environmental, social, and governance components, they find that the U-shaped relationship exists only between the governance component and Corporate Financial Performance. The fact that governance is the primary factor influencing the relationship suggests that CSR investments should be focused on enhancing governance practices. The governance that prioritizes Corporate Social Responsibility can have a dual advantage for the company. Firstly, it can incorporate Corporate Social Responsibility initiatives into the company's value chain, thereby contributing to value creation. Secondly, it serves as a means of signaling the firm's commitment to CSR to stakeholders.

Landi and Sciarelli (2019) discuss the influence of the environmental, social, and governance (ESG) framework on the unusual returns exhibited by Italian companies listed on the Financial Times Stock Exchange Milano Indice di Borsa (FTSE MIB) Index. They undertake a panel data analysis spanning from 2007 to 2015 to explore this relationship which indicates that despite investors incorporating ESG factors into their stock selection strategies the adoption of

socially responsible investment (SRI) did not lead to a positive and statistically meaningful effect on market premiums.

Beside focusing only on the one market, there are several studies that incorporate multi-country data into investigation of the relationship between ESG performance and firm value which report negative relationship as well. Duque-Griasles and Aguilera-Caracuel (2019) examine whether the financial performance of multinational firms in Latin America's emerging markets is linked to their performance in environmental, social, and governance scores. Return on Assets is used as a proxy for the firm's financial performance. The dataset covers information on 104 multinational companies operating in Brazil, Chile, Colombia, Mexico, and Peru during the period from 2011 to 2015. The findings indicate a statistically significant negative relationship between the ESG score and financial performance. Moreover, when examining the environmental, social, and governance aspects separately to assess each variable's connection with the financial performance of these multinational firms, the results reveal negative associations in all cases. Additionally, the empirical analysis demonstrates that financial slack and geographic international diversification have a moderating effect on the relationship between ESG dimensions and firms' financial performance.

Garcia and Orsato (2020) take into account the variations in institutions, cultures, and regulations among different countries, and in their study explore the connection between environmental, social, and governance performance and the financial performance of companies operating in both emerging and developed countries. Discounted Cash Flows is a proxy of market-based performance while Return on Assets is a proxy of accounting-based performance. The Institutional Difference Hypothesis proposes that institutional weaknesses in emerging markets influence the relationship between financial performance and corporate social performance of companies (Garcia & Orsato, 2020). This is because, in such circumstances, firms are more inclined to prioritize capital accumulation over recognizing the potential strategic advantages of socially responsible investments. To investigate this hypothesis, Garcia and Orsato conducted a regression analysis of a panel data study that encompassed 2,165 companies from both developed and emerging countries (2020). The study covered the period from 2007 to 2014. Their findings suggest that the institutional environment plays a significant role in shaping the financial and ESG performances of companies, aligning with the rationale of the Institutional Difference Hypothesis as the relation between ESG and financial performance, whether assessed through market-based or accounting-based indicator, was statistically significant but displayed a negative correlation.

2.3.3 Paper with findings of mixed relationship between ESG performance and firm value

Beside papers which have found positive and negative relationship between ESG performance and firm value, in this chapter will be presented studies in which researchers found mixed

relationship. Han et al. (2016), investigate the relationship between corporate social responsibility and corporate profitability by analyzing the impact of ESG performance scores on financial performance for companies listed on the Korea Stock Market during the period from 2008 to 2014. Measures of financial performance include Return on Equity, Market to Book ratio, and stock returns. The findings reveal that ESG disclosure scores for Korean firms show varied results. Specifically, the environmental score exhibits a negative relationship with proxies for financial performance, while the governance score demonstrates a positive relationship. On the other hand, no statistically significant evidence is found to support a relationship between the social responsibility performance score and financial performance.

Saygili et al. (2020) investigate the influence of ESG disclosures on corporate financial performance at Turkish companies listed on the Borsa Istanbul Corporate Governance Index. More precisely, study is investigating the impact of twenty distinct variables, all derived from company disclosures, on corporate financial outcomes in the context of an emerging market. Return on Assets and Tobin's Q are used as proxies for financial performance in this paper. The findings suggest that environmental disclosures have an adverse effect on financial performance. In the social dimension of ESG, involving stakeholders in corporate management enhances operational efficiency. Moreover, provisions related to shareholder rights and board of directors have a positive impact on financial performance within the governance dimension. These provisions encompass aspects like exercise of shareholder rights, voting rights, transfer of shares, Board of Directors meetings, committees formed within the Board of Directors, and director remuneration. For the exercise of shareholder rights dimension, factors such as the investor relations department, update reports, and corporate website disclosures play a significant role. These outcomes offer a fresh perspective on the varying results found in previous research. Notably, the analysis reveals that, among the ESG dimensions, governance-related disclosures exert a more substantial influence on corporate financial performance.

Despite being a relatively small country, Norway is a leader in sustainability efforts. Additionally, a significant amount of research has been conducted on Norwegian firms in the context of Corporate Social Responsibility and sustainability. However, none of this research has investigated the financial benefits of sustainability practices. As a result, even though the sample size is limited, in the research of Giannopoulos et al. (2022), it is explored the impact of ESG on financial performance of companies listed in Norway. The dataset includes data from 20 companies over the period from 2010 to 2019. To investigate the research objective and hypothesis, a panel data regression model is employed, using Return on Assets and Tobin's Q as the dependent variables. The results indicate how the greater investment in ESG initiatives has a negative impact on Return on Assets while exerting a positive influence on Tobin's Q. It's worth noting that ROA is a gauge of short-term financial performance, whereas Tobin's Q serves as an indicator of growth and long-term performance.

Bae et al., 2021 have investigated he connection between corporate social responsibility (CSR) and stock market performance throughout the market crash caused by the COVID-19 pandemic and the subsequent recovery period. Employing a dataset of 1750 U.S. companies and two primary sources of CSR evaluations, they do not find any proof indicating that CSR influenced stock returns amid the crash phase. That outcome remains consistent across various sensitivity assessments, and conclude that CSR initiatives in the pre-crisis period do not effectively safeguard shareholder value from the adverse impacts of a crisis, implying a potential disconnection between a firm's CSR orientation (ratings) and its actual practices.

The impact of the relationship between ESG and corporate financial performance varies depending on the specific economy, industry, and institutional framework due to differences in legal structures, social contexts, and stakeholder expectations. In study by Behl et al. (2021) they seek to examine the reciprocal causality and autoregression effects between ESG disclosures and the firm value of companies in the Indian energy sector. The analysis uses a four-wave cross-lagged panel structural equation modeling approach. The results indicate that the relationship is not bidirectional when considering both the overall ESG score and individual ESG components concerning firm value. Autoregression effects are found to be consistent, with a negative association in the first two lags and a positive association in the final lag.

3 DATA COLLECTION AND METHODOLOGY

3.1 Data Sources and Variables

The data used in this research are obtained from a variety of trustworthy and extensive databases including - financial databases, ESG rating provider, and market indices, among others. For financial data, S&P Capital IQ Pro is being used as it is a major financial platform for accessing information regarding both publicly traded and privately held enterprises, investment entities, capital dealings, and individuals. It is encompassing financial details for more than 88,000 publicly traded corporations and 825,000 private firms. Also, it has been used in previous studies like those of Liu et al. (2023), and Hossain et al. (2023).

ESG ratings provider in this research is Refinitiv Workspace which provides scores that assess a company’s ESG performance, dedication, and efficacy across ten primary themes in a transparent and objective manner. It relies on publicly available and verifiable data to ensure credibility and accountability. Scores are calculated for more than 12,500 companies around the world, including over 2,500 for the companies headquartered in Europe (Refinitiv, 2023). Beside the aggregate ESG score, Refinitiv presents scores for each pillar individually, too. The scoring range for the companies’ ESG rating goes from 0 to 100 while being divided in four quartiles as presented below in the Table 1.

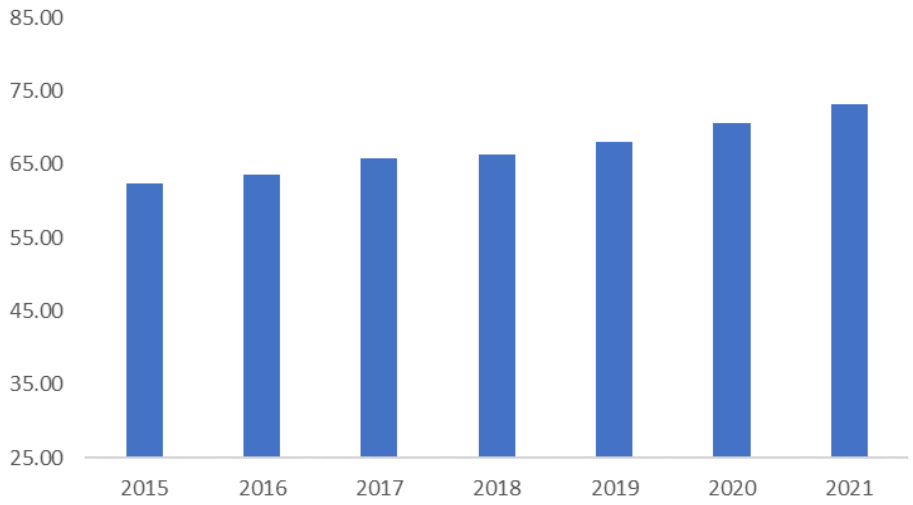
Table 1: Scoring range

Score range	Quartile	Description
0 to 25	First Quartile	Poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly.
>25 to 50	Second Quartile	Satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly.
>50 to 75	Third Quartile	Good relative ESG performance and above average degree of transparency in reporting material ESG data publicly.
>75 to 100	Fourth Quartile	Excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly.

Source: Refinitiv (2023).

In the Figure 6 below is presented how the average ESG score of the current constitutes of FTSE 100 Index has changed through the years. It can be seen that there is a constant upward trend in the ESG scores indicating that companies are year on year increasing their commitment to the corporate social responsibility. At the of 2021 the average score was 73.16 which would be just enough for fourth quartile of Refinitiv's scoring range. Investors and stakeholders often view high ESG scores favorably because they can imply better risk management, sustainability, and corporate responsibility.

Figure 6: Average ESG Score through the years of the constitutes of FTSE 100 Index



Source: own work based on Refinitiv (2023).

Moreover, if we look at the individual pillars – Environmental, Social, Governance – we can also see the similar trend as in the overall ESG score. Based on Refinitiv Workspace database, Environmental pillar is in 2021 68.57 which would be indicating good relative ESG performance and above degree of transparency in reporting material ESG data publicly based on Refinitiv scoring range presented in Table 1.

When the average of the Social pillar is analyzed, its score has increased significantly since 2017 when there was a huge rise in it as presented in Figure 6. In 2021 Social pillar totaled 72.54, and it would be indicating good relative ESG performance as same as the Environmental pillar.

Finally, third pillar, Governance, shows the same growth as the previously presented individual pillars Environmental, and Social. In 2021, Governance pillar, reached 76.59, representing the highest value among all three individual components of the ESG. In conclusion, all three pillars individually show a rising trend in Refinitiv's results, with the Governance result being the highest, while the Environmental result is the lowest. This is not surprising, considering the changes in Governance at the management level can have the immediate impact on a company whereas environmental investments and decision made by the company requires the longest period for their effects to be seen.

3.2 Regression Analysis: Methodological Framework

Regression analysis is a quantitative technique used to model the relationship between one or more independent variables (predictors) and a dependent variable (outcome or response). The main objective of regression analysis is to understand and quantify the relationship between variables, make predictions, and identify factors that influence the dependent variable (Chase, 2013, p. 159). Simple regression model is one in which a single dependent variable is regressed on a one independent, explanatory variable. Such model can be presented as:

$$\hat{y} = \alpha + b * X \quad (1)$$

where:

- α = intercept
- b = slope of line

As in this paper impact of individual pillars of ESG will be regressed in order to assess their impact on ROA, MTB, and FPE multiple regression method will be used. Similar as in the (1) there is one dependent variable which will be predicted. However, in multiple regression there is two or more independent variables. General form of multiple regression is:

$$\hat{y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n \quad (2)$$

where:

- β_0 = constant or intercept (α in equation (1))
- β_n = coefficient
- X_n = independent variable

In this paper data sample consists of constitutes of FTSE 100 Index which are observed over nine-year period making it a longitudinal, or panel, data. It offers several advantages in comparation over cross-sectional or time-series data as it provides a large number of data points, increasing degrees of freedom and reducing collinearity between independent variables. Ultimately, it makes estimates of regression representative (Hsiao, 2003). In order to test the relationship between ESG scores, and company performance, panel data regression model will be used.

When it comes to panel data there are three types of static linear panel data models – pooled, random effects, and fixed effects (Aydoğmuş et al., 2022). In fixed effects model the effects of omitted individual-specific variables are treated as fixed constants over time whereas in random effects models such variables are treated as random (Hsiao, 2003). Pooled regression model does not account for group-specific effects or unobserved heterogeneity among the groups. Instead, it treats all observations as if they come from a single, large group (Hsiao, 2003).

However, before deciding which panel data regression model will be used it is important to check the stationarity of time-series variables in regression analysis. A stationary time-series variable has a constant mean over time, a constant variance over time, and there is a correlation coefficient between the variable and its lagged values. If any of the aforementioned conditions are not met, the time-series will lack stationarity. Non-stationarity can create challenges for time-series models, often leading to biased estimates of the relationship between variables. Such situation is called spurious regression as the primary explanatory variable and the outcome are related at least due to concurrent temporal changes (Arkes, 2023).

3.2.1 Augmented Dickey-Fuller test

The most common approach to test stationarity is the Dickey-Fuller test (Dickey & Fuller, 1979). This test aims to ascertain if there is enough evidence to conclude that in autoregressive model without intercept:

$$Y_t = \beta Y_{t-1} + \varepsilon_i \quad (3)$$

|β| is lower than 1, which would suggest that time-series variable is stationary (Arkes, 2023).

When $Y_{(t-1)}$ is subtracted from both sides of the equation then model can be presented:

$$Y_t - Y_{t-1} = (\beta - 1)Y_{t-1} + \varepsilon_t \quad (4)$$

or:

$$\Delta Y_t = \gamma Y_{t-1} + \varepsilon_t \quad (5)$$

In which γ is equal to β-1. In such model if γ = 0 then non-stationarity is present while γ < 0 can be sign of stationarity in the variables (Arkes, 2023).

Augmented Dickey-Fuller test can be also used for models with more than one lag. In ADF test, which has been conducted in R, test statistics were higher than critical values for Dickey-Fuller t-distribution making all variables stationary. Consequently, the variables can be used in their original form without need for additional transformation which would be necessary if the they were exhibiting non-stationarity.

Table 2: Augmented Dickey-Fuller test

Variable	Test statistic	P-value	Decision
ROA	-6.609	0.01	Stationary
MTB	-8.355	0.01	Stationary
FPE	-2.772	0.01	Stationary

Source: own work based on dataset from Refinitiv; S&P Capital IQ (2023).

3.2.2 Multicollinearity

In multiple regression models there are two or more independent variables which at the times can be strongly linearly related. Such condition where is present strong relation between explanatory variables is called multicollinearity. In this situation, one can struggle to interpret results of regression analysis as it would be impossible to distinguish the effects of each independent variable on dependent variable (Kacapyr, 2022).

Perfect multicollinearity requires that the explanatory variables of the model are perfectly linearly related in the form:

$$\lambda_1 x_1 + \lambda_2 x_2 + \cdots + \lambda_k x_k = 0 \quad (6)$$

When the independent variables in a model are perfectly collinear then the structural parameters are undefined (Kacapyr, 2022). Multicollinearity involves strong, but not perfect linear relation between the independent variables which can impact standard errors in a sense they will be larger than if there are no such high linear relation.

Table 3: Variance inflation factor

Independent Variable	VIF
ESG	1.596
Environmental	2.279
Social	2.501
Governance	1.318
Size	1.655

Source: own work based on dataset from Refinitiv; S&P Capital IQ (2023).

To assess multicollinearity in my model, I used the variance inflation factor (VIF), which reflects the impact of multicollinearity on the standard error of the regression coefficient estimate. Specifically, it quantifies the effect that independent variables have on the variance of the regression coefficient that is related to the tolerance level (Chase, 2013, p. 186). Each explanatory variable is regressed against the rest of the independent variables within a model. Usually, if the VIF is equal to 1 then it can be concluded that there is no multicollinearity while the commonly accepted rule in practice is that we have a multicollinearity problem if the VIF exceeds 10 (Chase, 2013, p. 186). As we can see in Table 3 all independent variables have VIFs which are below 10 with the highest VIF calculated on Social and Environmental explanatory variables which total 2.501, and 2.279 respectively. To sum up, it can be concluded with confidence that there is no multicollinearity between independent variables.

3.2.3 Heteroskedasticity

In time-series data which does not need any correction before regression, the multiple regressions model can be presented as:

$$y_t = a_1 + a_2 x_{2t} + \cdots + a_k x_{kt} + e_t \quad (7)$$

Where one of the classic assumptions is that $\mathrm{Var}(e_t) = \mathrm{Var}(y_t) = \sigma^2$.

If such assumption is violated, when the variance is not constant within a sample, then errors are said to be heteroskedastic (Vu, 2017, p. 69). When there is a presence of heteroskedasticity in a dataset it brings problems of overstatement or understatement of standard errors computed for the coefficients together with tendency of model to generate fitted values with differing scope of average errors in different points within sample (Welc & Rodriguez, 2018, p. 90). Overall, statistical inferences are untrustworthy together with impacting the variance.

A Lagrange Multiplier test is the most convenient way to test variance function which will provide results that can assess does heteroscedasticity problem exist within the model. As there are numerous Lagrange Multiplier tests in this paper the Breusch-Pagan version is used. The test works by first estimating the regression model and saving the residuals then, it regresses the squared residuals on the independent variables included in the model. The test statistic is typically calculated as the R-squared from this auxiliary regression, and it follows a chi-squared distribution under the null hypothesis. If the calculated chi-squared value exceeds a critical value, it suggests that there is heteroscedasticity in the model, and the null hypothesis of homoscedasticity is rejected. In other words, the presence of a significant chi-squared statistic indicates that the errors in the regression model do not have constant variance, and heteroscedasticity is present (Aydoğmuş et al., 2022). The results of the Breusch-Pagan Lagrange Multiplier test for all three dependent variables are presented in Table 4.

Table 4: Breusch-Pagan Lagrange Multiplier test

Variable	Test statistic	P-value
ROA	1693.4	<0.01
MTB	1141.7	<0.01
FPE	526.4	<0.01

Source: own work.

Calculated chi-squared values, labeled Test statistic in Table 4, are for all three dependent variables above the critical values with p-value that is less than 0.05 which indicates that the null hypothesis of homoscedasticity is rejected. In other words, the Breusch-Pagan Lagrange Multiplier test suggests that there is evidence of heteroscedasticity in regression models.

When heteroscedasticity is present, it can lead to inefficient and biased parameter estimates which will be addressed by using White's robust standard errors.

3.2.4 Autocorrelation

If in the multiple regressions model (5) when $Cov(e_t, e_z) = 0$ for $t \neq z$ assumption is violated then it can be concluded that the model is dynamic with lag values of the error. Such problem is called autocorrelation or serial correlation (Vu, 2017, p. 80). Consequences of autocorrelation are similar to those which are presented in heteroskedasticity – standard errors are incorrect and the estimator's variance is high (Vu, 2017, p. 81).

In order to detect if there is a presence of autocorrelation in the dataset, Breusch-Godfrey LM test will be used. The null hypothesis of the test is that there is no autocorrelation in the residuals, meaning that the residuals are independent of each other. In other words, the error

terms are not correlated over time or across observations. The alternative hypothesis suggests that there is autocorrelation in the residuals, indicating that the error terms are correlated (Lee & Yu, 2019).

Table 5: Breusch-Godfrey LM test

Variable	Test statistic	p-Value
ROA	650.3	<0.01
MTB	508.1	<0.01
FPE	220.5	<0.01

Source: own work.

Based on the results provided in Table 5, the null hypothesis can be rejected in favor of the alternative hypothesis. In other words, there is strong evidence to suggest that there is serial correlation in the residuals of the model. The autocorrelation of the residuals is statistically significant.

Based on tests which have been conducted to test for heteroscedasticity and autocorrelation it is concluded that both are present in this research dataset. To address these issues Newey-West standard errors will be introduced as they correct both problems simultaneously while at the same time stay consistent for autocorrelated errors in all forms and due to that do not require a specification of a dynamic error model as it would be in the case of heteroscedasticity problem. The new standard errors are called heteroscedasticity and autocorrelation consistent or abbreviated HAC (Vu, 2017, p. 84).

3.2.5 Panel data regression analysis model

Panel data regression analysis is sound decision to use as the observed data is longitudinal – it is collected over nine-year period for the same one hundred companies. Additionally, data used changes over time and exhibits time variation which can be effectively captured using panel regression. Prior to conducting the panel data regressions, our initial step involves identifying the most appropriate panel data model. Among the available choices are three static linear panel data models: pooled, random effects, and fixed effects. We administer pertinent tests to determine the model that the best suits the analysis.

Pooled OLS regression is a technique employed with panel data to assess the correlation between a dependent variable and independent variables while considering the connections among observations within entities or individuals. This method assumes uniform relationships between the dependent and independent variables across all entities within the panel (Savrs, 1989).

Pooled OLS regression consolidates the variations present both across different time periods and among various entities to determine the parameters of the regression model. By merging data across entities and time intervals, this approach performs a single OLS regression analysis on the combined dataset (Sayrs, 1989).

Fixed effects model operates similarly to incorporating a series of dummy variables representing the controlled categories. Indeed, apart from specific instances, a fixed-effects model is essentially equivalent to including a set of dummy variables. A few minor benefits of the fixed effects model in comparison to solely employing dummy variables are that, in scenarios with numerous categories, you can evade the need to generate all these variables, maintaining a smaller dataset, and avoid having many non-useful coefficient estimates stemming from numerous dummy variables (Arkes, 2023).

Based on research done by Aydoğmuş et al. (2022), F-test is applied to compare pooled OLS model and fixed effects model. The null hypothesis of the F-test suggests that there are no significant fixed effects in panel data while alternative hypothesis indicate there are significant individual-specific effects. In Table 3 are presented results of F-test, which is run R.

Table 6: F-test

Variable	Test statistic	P-value	Decision
ROA	73.011	< 0.001	Fixed effects
MTB	23.781	< 0.001	Fixed effects
FPE	17.413	< 0.001	Fixed effects

Source: own work based on dataset from Refinitiv; S&P Capital IQ (2023).

In the case of the relationship between ROA as dependent variable, and all the independent variables, the p-value is low which indicates that the effect of total ESG score, and individual pillars, on Return on Assets is statistically significant and it improves the fit of the model. Also, test statistic value of 73.011 is significantly larger than the critical value, indicating that there is a difference between the fixed effects model and the pooled OLS model. Therefore, we can reject the null hypothesis meaning that fixed effects model is more suitable than pooled OLS model.

When it comes to the MTB as dependent variable, the value of test statistic is 23.781 and the p-value is less than 0.001. The p-value indicates strong evidence that against the null hypothesis. Since F-statistic is larger than the critical value, the null hypothesis can be rejected which implies that the fixed effects model is significant.

As it is in the case of ROA and MTB, for FPE as dependent variable and its relationship with the independent variables, p-value is less than 0.001 which suggests that null hypothesis can be rejected, and that fixed effects model is more appropriate than a pooled model.

A random effects model serves as a substitute for fixed effects and, in certain instances, may yield reduced standard errors. To employ a random effects model, a condition must be met wherein the variability in subject-specific effects is random in relation to the other explanatory variables (Arkes, 2023). In order to compare fixed effects and random effects, Hausman test will be conducted. The test compares the estimated coefficients of these two models and assesses whether there is a significant difference between them. Given the significance level of 0.05, one would typically reject the null hypothesis, fixed effects model is preferred, if the p-value is less than 0.05. Conversely, one would fail to reject the null hypothesis, random effects model is preferred, if the p-value is greater than or equal to 0.05. The test statistic is a measure of the difference between the estimated coefficients of the random effects and fixed effects models which if it is above 2 indicates that null hypothesis can be rejected same as if the p-value is less than 0.05.

Table 7: Hausman test

Dependent variable	Test statistic	p-value	Test result
ROA	31.591	< 0.001	Fixed effects
MTB	7.639	0.137	Fixed effects
FPE	32.411	< 0.001	Fixed effects

Source: own work based on dataset from Refinitiv; S&P Capital IQ.

In the case of ROA as dependent variable, the p-value is less than 0.05. This suggests that we can reject the null hypothesis, indicating that the fixed effects model is preferable compared to random effects.

When it comes to MTB ratio as dependent variable, p-value is 0.137 which is greater than 0.05 suggesting that there is no significant difference between random effects and fixed effects with Market to Book ratio as dependent variable. However, as test statistic is higher than 2, and due to other two dependent variables in this paper – Return on Assets, and Forward Price to Earnings ratio, I have decided that fixed effects model is preferred.

Lastly, p-value in Hausman test for regression in which dependent variable is FPE is less than 0.05 based on which we can conclude that there are statistically significant differences between random effects model and fixed effects model when comparing the two.

In summary, the results of the Hausman test suggest that the fixed effects model is more appropriate for my data compared to the random effects model.

Taking everything into consideration, panel data regression models will look like this:

$$ROA_{it} = \beta_0 + \beta_1 * ESG_{it} + \beta_2 * SIZE_{it} + \varepsilon_{it} \quad (8)$$

$$ROA_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * SIZE_{it} + \beta_5 * E_{it} * Quartile + \beta_6 * S_{it} * Quartile + \beta_7 * G_{it} * Quartile + \varepsilon_{it} \quad (9)$$

$$ROA_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * E_{it} * Quartile + \beta_5 * S_{it} * Quartile + \beta_6 * G_{it} * Quartile + \varepsilon_{it} \quad (10)$$

$$MTB_{it} = \beta_0 + \beta_1 * ESG_{it} + \beta_2 * SIZE_{it} + \varepsilon_{it} \quad (11)$$

$$MTB_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * SIZE_{it} + \beta_5 * E_{it} * Quartile + \beta_6 * S_{it} * Quartile + \beta_7 * G_{it} * Quartile + \varepsilon_{it} \quad (12)$$

$$MTB_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * E_{it} * Quartile + \beta_5 * S_{it} * Quartile + \beta_6 * G_{it} * Quartile + \varepsilon_{it} \quad (13)$$

$$FPE_{it} = \beta_0 + \beta_1 * ESG_{it} + \beta_2 * SIZE_{it} + \varepsilon_{it} \quad (14)$$

$$FPE_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * SIZE_{it} + \beta_5 * E_{it} * Quartile + \beta_6 * S_{it} * Quartile + \beta_7 * G_{it} * Quartile + \varepsilon_{it} \quad (15)$$

$$FPE_{it} = \beta_0 + \beta_1 * E_{it} + \beta_2 * S_{it} + \beta_3 * G_{it} + \beta_4 * E_{it} * Quartile + \beta_5 * S_{it} * Quartile + \beta_6 * G_{it} * Quartile + \varepsilon_{it} \quad (16)$$

where ROA_{it} , $MTB_{it,}$ and FPE_{it} are dependent variables, $ESG_{it,}$ E_{it}, S_{it}, and G_{it} are independent variables, $SIZE_{it}$ is a control variable while Quartile is a quartile indicator variable for market capitalization. Finally, ε_{it} is the error term.

We can see that there will be nine fixed effects panel data regression models which are employed to examine the research objectives of the paper – three of them for Return on Asset as dependent variable, three for Market to Book ratio as dependent variable and the last three for Forward Price to Earnings ratio as the dependent variable.

3.3 Model Specification and Variable Selection

Dependent, independent, and control variables are presented in Table 6 together with their description.

Table 8: Variables description

Variables	Abbreviation	Description
Return on Assets	ROA	Return on Assets, calculated as Net Income over Total Assets (dependent variable)
Market-to-Book ratio	MTB	Market value of a company's equity over its book value of equity (dependent variable)
Forward Price to Earnings ratio	FPE	Current price of a company's stock over its predicted earnings ratio (dependent variable)
Total Environmental, Social and Governance Score	ESG	Total ESG for a company (independent variable)
Environmental Score	E	Environmental score (independent variable)
Social Score	S	Social score (independent variable)
Governance Score	G	Governance score (independent variable)
Log of Market Capitalization	SIZE	Natural logarithm of company's market capitalization (control variable)
Quartile	Q	Quartile indicator variable for natural logarithm of company's market capitalization
Coefficients	β	Coefficients of intercept, independent and control variables
Error term	ε	Unexplained variation or error in the model

Source: own work.

There are three response variables in the regression analysis – Return on Assets, Market to Book ratio, and Forward Price to Earnings ratio.

Return on Assets (ROA) is a financial ratio that measures a company's profitability in relation to its total assets. It provides insight into how effectively a company is generating profit from its available resources. It is calculated as Net Income of a company over its Total Assets. A higher ROA indicates that a company is generating more profit for each unit of assets it possesses, which is generally considered a positive sign of efficient asset utilization. Conversely, a lower ROA could suggest that the company is not effectively using its assets to generate earnings. It is used in numerous studies as dependent variable in order to assess performance of a company (Rahman et al., 2023; Wen et al., 2022; Aydoğmuş et al., 2022)

The other dependent variable is Market to Book ratio. It is a financial metric that compares a company's market value, as determined by its stock price, to its book value, which is the value of its net assets recorded on its balance sheet. MTB greater than 1 indicates that the company's market value is higher than its book value. This could suggest that investors have a positive outlook on the company's future earnings potential and growth prospects. MTB ratio which is less than 1 would imply that the market values the company's assets at less than their book value. This might indicate that investors have a more conservative view or that the company is

facing challenges. MTB will be used as dependent variable which will present market performance of a company while ROA will be used as corporate performance.

Forward Price to Earnings ratio is the third dependent variable that will be used in this research paper. It is a metric that is similar to the traditional Price to Earnings ratio, but differs with it in a sense that in the denominator it uses estimated or projected earnings for a future period rather than historical earnings. It is used by investors to assess whether a stock is overvalued, undervalued, or fairly valued based on anticipated future earnings. High FPE ratio suggest that investors are paying a premium for the stock relative to its expected future earnings making it overvalued and vice versa. There is evidence that it explains stock prices better than financial rations that are calculated using historical values, and thus presents interesting choice for this analysis (Wu, 2007).

Independent variable in the regression analysis is ESG scores which are obtained via Refinitiv. Refinitiv created the ESG scores with the intention of transparently and objectively measure company's relative ESG performance, dedication, and efficacy across ten primary themes, utilizing publicly accessible and verifiable information (Refinitiv, 2023). Individual pillar's scores have been also obtained from Refinitiv.

Natural logarithm of market capitalization will be used as control variable in regression analysis. Market capitalization is the total value of a company's outstanding shares of stock in the market. It's calculated by multiplying the current market price of a single share by the total number of shares outstanding. Market capitalization is a commonly used metric to gauge the size and valuation of a publicly traded company. By including market capitalization as a control variable, the effect of ESG practices on ROA can be isolated while controlling for company size (Ni & Sun, 2023; Rao et al., 2023; Ignatov, 2023).

4 ESG PERFORMANCE AND COMPANY VALUATION

4.1 Sample selection

Sample that is used in this paper is the Financial Times Stock Exchange 100 Index from 2013 to 2021. It is an index that was introduced in 1984 to provide a benchmark for the United Kingdom stock market's performance. Over the years it has become one of the most followed and referenced stock market indices globally. It serves as a key indicator of the health and performance of the UK equity market and is considered a crucial barometer for investors and analysts. The index consists of 100 companies with the highest market capitalization that are listed on the London Stock Exchange. Constitutes of the LSE are obliged to meet several requirements such as free float, liquidity, and tests on nationality. This sample provides numerous advantages in order to test the impact of ESG scores on company performance as it

includes companies from various sectors and industries making it a diverse set of companies to study. It includes companies from communications, energy, financial, health care, information technology, real estate and many other sectors. Moreover, regulatory requirements and overall growing stakeholders' interest in ESG performance lead FTSE 100 constitutes to provide extensive financial and ESG data which is crucial for conducting robust research. Finally, utilizing the FTSE 100 as a benchmark facilitates comparisons with the broader market performance, offering a contextual backdrop for analyzing the connection between ESG and company performance.

However, it is necessary to stress out how despite having handful of advantages, which are presented above, there are some limitations in choosing the FTSE 100 as a sample for testing the relationship between ESG factors and company performance. One limitation is market capitalization bias as it is inclined towards larger companies, potentially leading to an inadequate representation of the performance of smaller and medium-companies. Other limitation is regional bias as FTSE 100 consists of UK-listed companies and the relationship could differ in other countries or regions. Also, it is important to take into the account how composition of FTSE 100 changes over time due to companies entering or exiting the index due to market capitalization differences year from year and this dynamic may affect sample's continuity.

Companies which were constitutes of FTSE 100 Index at the time this analysis is conducted are presented in Appendix 1.

4.2 Descriptive Analysis of ESG Scores and Financial Metrics

The dataset consists of 100 firms which are constitutes of FTSE 100 Index from 2013 to 2021 making in total 842 firm year observations. As there are missing values in dataset, unbalanced panel data is present in the analysis. Dependent and control variables, ROA, MTB, FPE and Market Capitalization, are obtained from S&P Capital IQ. ESG scores and individual pillar scores which are independent variable in this regression analysis, are got from Refinitiv.

In Table 7 descriptive statistics are provided. The mean for ROA is 7.1% with standard deviation of 0.165. It indicates that on average the companies in the sample generate return of 7.1% on their assets while standard deviation suggests that there is a variation in the ROA across the companies. Return on Assets is a profitability ratio based on which one can make an assessment if a company is efficiently generating profit for its assets. Usually, Return on Assets which is higher than 5% is considered desirable (Aydoğmuş et al., 2022). Mean of ROA in the amount of 7.1% suggests that companies in this dataset are efficiently generating profits. The range of ROA is from -0.163 to 1.868 indicating variation in the dataset between companies which experience losses and those which are highly profitable. Mean for MTB is 6.05 with

standard deviation of 18.064. A Market to Book ratio above 1 means that the company's stock is overvalued whereas ratio below 1 can be interpreted as undervalued stock. Consequently, it can be concluded that the companies in the sample are overvalued as they are valued six times their book value. Standard deviation of 18.064 indicates wide variation in MTB across the companies. The range of MTB ratios is from 0.37 to 255.36. Such range implies how some companies may be undervalued or overvalued in the market. The average FPE in the sample is 19.25 which indicates that on average investors are willing to pay about 19.25 time the expected earnings for stocks in sample. The standard deviation of FPE is 16.71 which shows the variability in FPE ratio across the stocks. The minimum FPE ratio is 4.15, suggesting that some stocks have lower forward P/E ratios making them undervalued. The maximum FPE ratio is 257.12, indicating that some stocks have very high FPE ratios, possibly reflecting high expectations for future earnings growth.

Table 9: Descriptive statistics

	N	Mean	St. Dev	Min	Median	Max
Dependent Variables						
ROA	872	0.07	0.16	-0.16	0.04	1.868
MTB	842	6.04	18.06	0.3	2.56	255.36
FPE	836	19.25	16.71	4.15	16.4	257.12
Independent Variables						
ESG	860	65.86	17.49	5.97	69.21	95.95
Environmental	861	62.75	23.91	0.01	69.20	97.41
Social	861	66.84	19.80	2.44	70.60	97.32
Governance	861	66.86	20.41	6.11	70.47	98.60
Control Variable						
SIZE	866	9.36	1.11	5.10	9.10	12.33

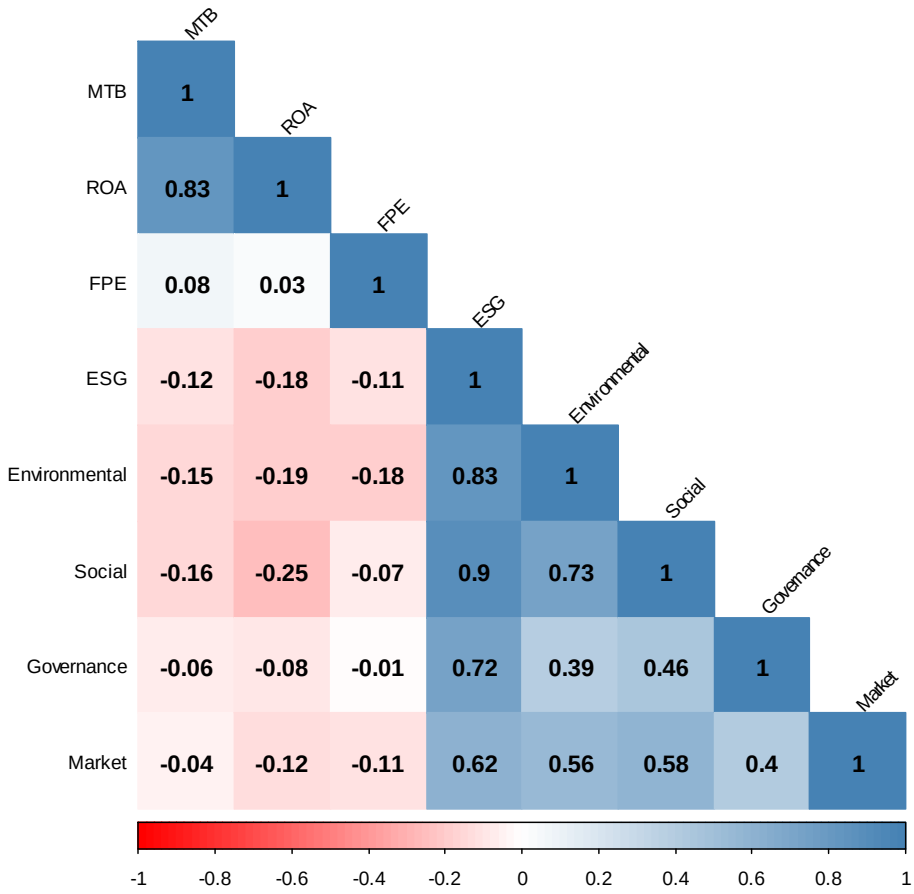
Source: own work.

When it comes to independent variable, ESG Score, its mean is 65.86 with a standard deviation of 17.5. The range of ESG scores is from 5.977 to 95.955. When we look at individual pillars, Environmental pillar has mean of 62.75, standard deviation of 23.91 and it ranges from 0.01 to 97.41. Social pillar has mean of 66.84, standard deviation of 19.80 and its minimum is 2.44 and maximum is 97.32. At the end, looking at the mean of governance pillar it totals 66.86, standard deviation is 20.41, and it ranges from 6.11 to 98.60. For control variable, natural logarithm of Market Capitalization, there are 866 observations with the mean value of 9.36 and standard deviation of 1.12. The range of it values is from 5.10 to 12.33.

4.3 Correlation Analysis: Relationship between ESG Performance and Valuation Measures

In table 8 it is provided the Pearson correlation matrix which presents Pearson correlation coefficients between variables in the analysis. Those coefficients quantify the magnitude and direction of the linear relationship between two continuous variables. The range of the coefficient is from -1 to 1 where positive coefficient suggests positive linear relationship – if one variable increases, the other increases, too; if the coefficient is negative then when one variable increases, the other decreases proportionally; if the coefficient is equal to 0, it means that there is no linear relationship between the variables. The diagonal elements of the matrix always have a correlation coefficient of 1 since the variable is perfectly correlated with itself. Using the matrix is helpful to explore the relationships among multiple variables in a way to identify patterns and dependencies among variables.

Figure 7: Correlation matrix heatmap



Source: own work.

Looking at the presented correlation coefficients in Figure 8, we can conclude that there is a negative correlation between total ESG score and the dependent variables in this research. Correlation coefficient between ESG and ROA is -0.18 which indicates that higher ESG scores are associated with lower ROA. Also, ESG score has a negative correlation between MTB, -0.12, and FPE, -0.11. However, ESG is positively correlated with Environmental, Social, and Governance which should not come as surprise as those are the pillars of the whole score. Higher values of ESG scores are associated with higher values of these pillars. Similar as with the overall score, individual pillars – Environmental, Social, and Governance – have negative coefficients with the dependent variables. Although I would stress that Social pillar does not have strong negative relationship with FPE as the coefficient totals -0.07 so it will be interesting to observe the results of it in the models with FPE as dependent variable. Moreover, similar situation is with Governance pillar where its correlation coefficients with Market to Book ratio and Forward Price to Earnings ratio are -0.06, and -0.01 respectively. Individual pillars are of course positively correlated between each other and with the overall ESG score which is already mentioned before. If we observe dependent variables, ROA is positively correlated with MTB which indicates that higher ROA is associated with higher MTB. ROA and FPE have weak positive correlation of 0.03. Control variable Market is negatively correlated with dependent variables, too. It indicates that higher market capitalization values are associated with lower values of ROA, MTB, and FPE. At the same time, it is positively correlated with ESG and its individual pillars.

4.4 Regression Analysis: Impact of ESG on Company Valuation

In the following tables, results of the fixed effects regression analysis, which have been done in R, are presented. For each dependent variable - ROA, MTB and FPE - there are three regression analysis which have been conducted.

4.4.1 Regression Analysis: Return on Assets

For Return on Assets, fixed effect panel data regression analysis is conducted on models (8), (9), and (10) which are presented in chapter 2.3.5. The overview of those results is in Tables 10, 11, and 12.

Table 10 shows the results of the fixed effects regression analysis between the overall ESG score as independent variable, natural logarithm of market capitalization, SIZE, as control variable and ROA as dependent variable. Robust standard errors are specified under variable coefficients.

Table 10: Return on Assets fixed effects regression model (8)

	ROA
ESG	-0.0010***
	(0.0002)
SIZE	0.0135***
	(0.0051)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=845; R^2=0.0271*

Source: own work.

The coefficient estimate for ESG is -0.0010, and it is highly statistically significant with a very small p-value – less than 0.01. This suggests that the overall ESG has a negative effect on the dependent variable ROA. Precisely, for every one unit increase in the overall ESG score of LTSE 100 Index constitutes, ROA decreases by approximately 0.0010 units.

Control variable, SIZE, is also statistically significant and the coefficient estimate is 0.0135. It can be interpreted that for every one unit increase in SIZE, Return on Assets increases for 0.0135 units.

The results of model (9) in which instead of the overall ESG score, individual pillars are used as independent variables together with interactions with quartiles which are assigned to each firm based on market capitalization in every year. Hence, the independent variables in Table 11 EQ, SQ, and GQ. The coefficient for Environmental pillar is approximately -0.0016. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately 0.0016 units in the dependent variable ROA. This effect is highly statistically significant with p-value less than 0.01. The coefficients for Social pillar is 0.0003, but it is not statistically significant while coefficient for Governance pillar is -0.0002 and it is statistically significant. It implicates that one unit increase in Governance would have negative impact on ROA as one unit increase in Governance would decrease dependent variable for 0.0002 units. When it comes interactions, coefficient for the interaction term EQ is approximately 0.0003. This represents the change in the effect of the Environmental variable on the dependent variable for a one-unit change in the Quartile variable which is statistically significant. Coefficients for the other two interaction terms, SQ and GQ, are -0.0002 and -0.0001, but they are not statistically significant, and therefore do not have impact on ROA. Coefficient of control variable SIZE totals 0.0194, and is statistically significant. It suggests that one-unit increase in market capitalization would positively influence Return on Assets by 0.0194 units.

Table 11: Return on Assets fixed effects regression model (9)

	ROA
E	-0.0016***
	(0.0004)
S	0.0003
	(0.0004)
G	-0.0002***
	(0.0003)
SIZE	0.0194***
	(0.0062)
EQ	0.0003**
	(0.0002)
SQ	-0.0002
	(0.0001)
GQ	-0.0001
	(0.0001)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=845; R^2=0.0459*

Source: own work.

For model (10) which has individual pillars as independent variables, too, but without natural logarithm of market capitalization results are presented in Table 12. The coefficient for Environmental pillar is approximately -0.0014. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately 0.0014 units in the dependent variable ROA, all else being equal. This effect is statistically significant. The coefficients for Social, and Governance pillars are 0.004 and -0.003 implicating that one unit increase in Social would have positive impact on ROA while Governance would have negative as one unit increase in Governance would decrease dependent variable for 0.003 units. When it comes interactions, coefficient for the interaction term EQ is approximately 0.0002. This represents the change in the effect of the Environmental variable on the dependent variable for a one-unit change in the Quartile variable which is statistically significant. Coefficients for the other two interaction terms, SQ and GQ, are -0.0002 and 0.0001, but they are not statistically significant, and therefore do not have impact on ROA in this regression model.

Table 12: Return on Assets fixed effects regression model (10)

	ROA
E	-0.0014***
	(0.0004)
S	0.0004
	(0.0004)
G	-0.0003
	(0.0003)
EQ	0.0002*
	(0.0001)
SQ	-0.0002
	(0.0001)
GQ	0.0001
	(0.0001)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=852; R^2=0.0345*

Source: own work.

Overall, the results presented for models (8), (9), and (10) in tables 10, 11, and 12 are mixed. We find that overall ESG score has a negative and highly significant relationship with Return on Assets together with natural logarithm of market capitalization. Then, in regression analysis conducted to assess the impact of ESG pillars individually together with SIZE as control variable, we find that Environmental and Governance pillar have negative and significant relationship with ROA while Social pillar has positive, but insignificant impact. SIZE as control variable has significant, positive relationship. In the third model with ROA as dependent variable in which independent variables are the same as in the second one, but without SIZE as control variable only Environmental pillar has significant relationship with ROA which equals to -0.0014.

Looking at the interactions which were tested only EQ was statistically significant in both model (9), and (10). For model (9) impact equals to 0.0003 while in model (10) it is a little bit lower as it totals 0.0002. These results suggest that for each one-unit increase in the Environment score, ROA is expected to increase by 0.0003 units and 0.0002 units, but these effects are contingent on the Quartile value. In practical terms, this implies that higher Environment scores are associated with improved ROA, but the extent of this improvement depends on the Quartile category. This interaction effect has a meaningful impact on ROA and is unlikely to be a result of random chance, as indicated by its statistical significance.

4.4.2 Regression Analysis: Market to Book ratio

For Market to Book ratio, fixed effect panel data regression analysis is conducted on models (11), (12), and (13) which are presented in chapter 2.3.5.

The overview of those results is in Tables 13, 14, and 15. Table 13 shows in the results of the fixed effects regression analysis between the overall ESG score as independent variable, natural logarithm of market capitalization, SIZE, as control variable and MTB as dependent variable. Robust standard errors are specified under variable coefficients.

Table 13: Market to Book ratio fixed effects regression model (11)

	MTB
ESG	-0.1973***
	(0.0435)
SIZE	1.1746
	(0.9265)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=828;* R^2*=0.0276*

Source: own work.

The coefficient estimate for ESG is -0.1973, and it is highly statistically significant with a very small p-value – less than 0.01. This suggests that the overall ESG has a negative effect on the dependent variable MTB. Precisely, for every one unit increase in the overall ESG score of LTSE 100 Index constitutes, MTB decreases by approximately 0.1973 units.

Control variable, SIZE, is statistically insignificant and the coefficient estimate is 1.1746. It can be interpreted that for every one unit increase in SIZE, Market to Book ratio increases for 1.746 units, but due to its high p-value it cannot by concluded that it is meaningful in explaining the variability in MTB.

The results of model (12) in which instead of the overall ESG score, individual pillars are used as independent variables together with interactions with quartiles which are assigned to each firm based on results in every year. Hence, the independent variables in Table 14 EQ, SQ, and GQ. The coefficient for Environmental pillar is approximately -0.1583. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately 0.1583 units in the dependent variable MTB, all else being equal. This effect is statistically significant. The coefficients for Social pillar is 0.1128, but it is not statistically significant while coefficient for Governance pillar is -0.1881 and it is statistically significant. It implicates that

one unit increase in Governance would have negative impact on MTB as one unit increase in Governance would decrease dependent variable for 0.1881 units.

When it comes interactions, coefficient for the interaction term EQ is approximately 0.0192. This represents the change in the effect of the Environmental variable on the dependent variable for a one-unit change in the Quartile variable. Coefficients for interaction term, SQ, is -0.0421, but it is not statistically significant, and therefore does not have impact on MTB. Interaction term GQ equals to 0.0386, and it is statistically significant. This represents the change in the effect of the Governance variable on the dependent variable for a one-unit change in the Quartile variable is meaningful and Governance effect on MTB is contingent on Quartile value. Coefficient of Control variable SIZE totals 0.3655, and is statistically insignificant. It suggests that one-unit increase in market capitalization would positively influence Market to Book ratio by 0.3655 units.

Table 14: Market to Book ratio fixed effects regression model (12)

	MTB
E	-0.1583**
	(0.0755)
S	0.1128
	(0.0845)
G	-0.1881**
	(0.0616)
SIZE	0.3655
	(1.1142)
EQ	0.0192
	(0.0271)
SQ	-0.0421
	(0.0310)
GQ	0.0386*
	(0.0233)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=829; R^2=0.0368*

Source: own work.

For model (13) which also has individual pillars as independent variables, but without natural logarithm of market capitalization results are presented in Table 15. The coefficient for Environmental pillar is approximately -0.1558. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately -0.1558 units in the dependent variable MTB, all else being equal. This effect is statistically significant. The coefficients for Social pillar is 0.1140, but it is not statistically significant while coefficient for

Governance pillar is -0.1897 and it is highly statistically significant. It implicates that one unit increase in Governance would have negative impact on MTB as one unit increase in Governance would decrease dependent variable for 0.1897 units.

When it comes interactions, coefficient for the interaction term EQ is approximately 0.0193. This represents the change in the effect of the Environmental variable on the dependent variable MTB for a one-unit change in the Quartile variable which is statistically insignificant. Coefficients for interaction term, SQ, is -0.0410, but it is not statistically significant, and therefore does not have impact on MTB. Interaction term GQ equals to 0.0397, and it is statistically significant. This represents the change in the effect of the Governance variable on the dependent variable for a one-unit change in the Quartile variable has a positive impact on Market to Book ratio and at the same time it is meaningful.

Table 15: Market to Book ratio fixed effects regression model (13)

	MTB
E	-0.1558**
	(0.0745)
S	0.1140
	(0.0843)
G	-0.1897***
	(0.0613)
EQ	0.0193
	(0.0271)
SQ	-0.0410
	(0.0306)
GQ	0.0397*
	(0.0231)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=832; R^2=0.0354*

Source: own work.

Overall, the results presented for models (11), (12), and (13) are mixed as in the previous regression models with ROA as the dependent variable. We find that overall ESG score has a negative and highly significant relationship with Market to Book ratio which is the same case as in the model (8). However, the difference here is that coefficient of natural logarithm of market capitalization, SIZE, while being high 1.175, is statistically insignificant.

Then, in regression analysis conducted to assess the impact of ESG pillars individually together with SIZE as control variable, we find that Environmental and Governance pillar have negative and significant relationship with MTB while Social pillar has a positive, but insignificant

impact. SIZE as control variable has insignificant, positive relationship. All interaction variables are insignificant although it is interesting to observe that EQ, and GQ are positive while SQ is negative when we take into consideration coefficients of individual pillars.

In the third model with MTB as dependent variable in which independent variables are the same as in the second one, but without SIZE as control variable Environmental and Governance pillars have significant relationship with MTB which equals to -0.1558, and -0.1897 respectively. In this model Social pillar is negative and insignificant.

Looking at the interactions which were tested only GQ coefficients are statistically significant in both model (12), and (13). For model (12) impact equals to 0.0386 while in model (13) it is a little bit higher as it totals 0.0397.

4.4.3 Regression Analysis: Forward Price to Earnings ratio

For Forward Price to Earnings ratio, fixed effect panel data regression analysis is conducted on models (14), (15), and (16) which are presented in chapter 2.3.5.

The overview of those results is in Tables 16, 17, and 18. Table 16 shows the results of the fixed effects regression analysis between the overall ESG score as independent variable, natural logarithm of market capitalization, SIZE, as control variable and Forward Price to Earnings ratio as the dependent variable. Robust standard errors are specified under variable coefficients.

The coefficient estimate for ESG is 0.0109, and it is statistically insignificant. If it would be statistically significant, this would suggest that the overall ESG has a positive effect on the dependent variable FPE. Precisely, for every one unit increase in the overall ESG score of LTSE 100 Index constitutes, FPE increases by approximately 0.0109 units.

Control variable, SIZE, is highly statistically significant and the coefficient estimate is 4.9145. It can be interpreted that for every one unit increase in SIZE, Market to Book ratio increases for 4.9145 units.

Table 16: Forward Price to Earnings ratio fixed effects regression model (14)

	FPE
ESG	0.0109
	(0.0464)
SIZE	4.9145***
	(1.0052)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=824; R^2=0.0382*

Source: own work.

The results of model (15) in which instead of the overall ESG score are presented in Table 17. Individual pillars are used as independent variables together with interactions with quartiles which are assigned to each firm based on market capitalization in every year. Hence, the independent variables in Table 17 EQ, SQ, and GQ. The coefficient for Environmental pillar is approximately -0.0717. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately 0.0717 units in the dependent variable FPE, all else being equal. This effect is statistically insignificant. The coefficients for Social pillar is 0.0222, but it is not statistically significant while coefficient for Governance pillar is 0.0156. It implicates that one unit increase in Governance would have positive impact on FPE as one unit increase in Governance would increase dependent variable for 0.0156 units. However, it is statistically insignificant, too.

When it comes interactions, coefficient for the interaction term EQ is 0.00006. This represents the change in the effect of the Environmental variable on the dependent variable for a one-unit change in the Quartile variable. However, it is statistically insignificant. Coefficients for the other two interaction terms, SQ and GQ, are 0.0077 and 0.0110, but they are not statistically significant, and therefore do not have impact on Forward Price to Earning ratio. Coefficient of Control variable SIZE totals 4.3406, and is statistically significant. It suggests that one-unit increase in market capitalization would positively influence Forward Price to Earnings ratio by 4.3406 units.

Table 17: Forward Price to Earnings ratio fixed effects regression model (15)

	FPE
E	-0.0717
	(0.1076)
S	0.0222
	(0.1019)
G	0.0156
	(0.0935)
SIZE	4.3406*
	(2.2093)
EQ	0.00006
	(0.0410)
SQ	0.0077
	(0.0302)
GQ	0.0110
	(0.0312)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=825; R^2=0.0439*

Source: own work.

For model (16) which has individual pillars as independent variables, too, but without natural logarithm of market capitalization results are presented in Table 17. All coefficients that are obtained in this model are statistically insignificant. In other words, those independent variables do not have any impact on Forward Price to Earnings ratio. The coefficient for Environmental pillar is -0.0310. This means that a one-unit increase in the Environmental variable is associated with a decrease of approximately -0.0310 units in the dependent variable FPE. As already mentioned, this effect is statistically insignificant. The coefficients for Social, and Governance pillars are 0.0059 and 0.0216 implicating that one unit increase in Social and Governance would have positive impact on FPE.

When it comes to the interactions, coefficient for the interaction term EQ is approximately 0.0014. This represents the change in the effect of the Environmental variable on the dependent variable for a one-unit change in the Quartile variable which is statistically insignificant. Coefficients for the other two interaction terms, SQ and GQ, are 0.0318 and 0.0126, but they are not statistically significant, and therefore do not have impact on FPE in this regression model.

Table 18: Forward Price to Earnings ratio fixed effects regression model (16)

	FPE
E	-0.0310
	(0.1225)
S	0.0059
	(0.1164)
G	0.0216
	(0.0984)
EQ	0.0014
	(0.0425)
SQ	0.0318
	(0.0353)
GQ	0.0126
	(0.0340)

*Note: *p < 0.1; **p < 0.05; ***p < 0.01; n=831; R^2=0.0103*

Source: own work.

Overall, the results presented for models (14), (15), and (16) are almost unanimous. We find that overall ESG score, its individual pillars, and the interaction terms all have statistically insignificant relationship with Forward Price to Earnings ratio. The overall ESG score would have positive relationship with FPE which is different than in comparison with the other two dependent variables, ROA and MTB, where it has a negative impact. All individual pillars together with interaction terms, beside Environmental, which has in the both analysis negative coefficients, would have positive impact on Forward Price to Earnings, too. SIZE as control variable has significant, positive relationship with FPE making it the only variable that has coefficients which are statistically significant.

5 CONCLUSION

5.1 Overall Findings and Contributions

In this research paper, I have tested the relationships between key financial performance indicators and ESG factors. By considering Return on Assets, Market to Book ratio, and Forward Price to Earnings ratio as the dependent variables, and ESG, Environmental, Social, and Governance pillars as independent variables, I sought to uncover the connections between sustainability practices and financial metrics. Additionally, we introduced the natural logarithm

of market capitalization (SIZE) as a control variable to account for potential confounding factors.

The results of the analysis revealed a several interpretations of relationships between ESG factors and financial performance metrics. These findings are interesting as there is ongoing discourse regarding the impact of sustainability practices on corporate profitability, market valuation, and investor sentiment.

In my examination of ROA, I have observed several compelling trends. Firstly, the overall ESG score exhibited a strong and negative relationship with ROA. This suggests that companies with higher ESG scores tend to experience lower returns on their assets. Interestingly, this relationship remained highly significant even after controlling for firm size, highlighting the role that ESG considerations can play in shaping financial performance. Further dissection of the ESG pillars revealed that both the Environmental and Governance pillars were negatively associated with ROA, indicating that robust environmental and governance practices may curtail profitability. In contrast, the Social pillar demonstrated a positive but statistically insignificant impact, suggesting that social initiatives may not directly impact ROA.

The exploration into interaction effects introduced an additional dimension to the analysis. I have found that the interaction terms between Environmental pillar and quartiles based on market capitalization (EQ) were statistically significant in models (9) and (10). These interactions hinted at the nuanced connection between ESG factors and firm size, offering interesting insights for future research.

Turning our attention to MTB, there were mixed result, too. While the overall ESG score similarly to the aforementioned ROA, displayed a negative relationship with MTB, this effect was weaken when SIZE was introduced as a control variable, with SIZE emerging as statistically significant coefficient. Within the individual ESG pillars, both the Environmental and Governance pillars exhibited negative and significant associations with MTB, indicating that investors may discount firms with strong environmental and governance practices. Conversely, the Social pillar displayed a positive but statistically insignificant impact, suggesting that social initiatives may not be primary drivers of MTB ratios.

Table 19: Conclusions based on research questions

Research question	Conclusion drawn
RQ1: What is the relationship between a company's ESG score and its Return on Assets?	ESG score has negative, significant impact on ROA
RQ2: What is the relationship between a company's ESG score and its Market to Book ratio?	ESG has negative, significant impact on MTB
RQ3: What is the relationship between a company's ESG score and its Forward Price to Earnings ratio?	ESG has insignificant impact on FPE
RQ4: What is the relationship between a company's individual pillar score and its Return on Assets?	Environmental, and Governance pillars have negative, significant impact on ROA while interaction term EQ has positive, significant impact
RQ5: What is the relationship between a company's individual pillar score and its Market to Book ratio?	Environmental, and Governance have negative, significant impact on MTB while interaction term GQ has positive, significant impact
RQ6: What is the relationship between a company's individual pillar score and its Forward Price to Earnings ratio?	All independent variables have insignificant impact on FPE

Source: own work.

Lastly, in the analysis of FPE, the findings portrayed a consistent theme of statistical insignificance. The overall ESG score, its individual pillars, and the interaction terms all failed to demonstrate a significant relationship with FPE. This implies that, in the study, ESG factors did not exert a substantial influence on investors' perceptions of future earnings potential, as captured by the FPE ratio. Notably, SIZE retained its significance across all models, exhibiting a positive relationship with FPE.

In summary, the research underscores the intricate dynamics between ESG factors and financial performance metrics. While ESG considerations appear to significantly influence ROA and MTB, their impact on FPE remains elusive. Firm size, as represented by SIZE, emerges as a pivotal factor across various models. These findings contribute to a richer understanding of the multifaceted relationship between sustainability practices and financial outcomes. Future research endeavors should dig deeper into the underlying mechanisms at play and explore contextual factors to enhance our comprehension of this complex interplay. In Table 19 are presented conclusion on research questions which are drawn after the results have been obtained. In conclusion, the research paper achieved its objectives by systematically

investigating the intricate relationships between ESG factors and financial performance metrics. Detailed methodology, including fixed effects regression models, control variables, and moderating factors, allowed me to provide detailed insights into the impact of ESG considerations on ROA, MTB, and FPE.

5.2 Practical and Theoretical Implications

The negative relationship between the overall ESG score and Return on Assets suggests that companies need to carefully consider their sustainability practices. Firms with higher ESG scores may need to assess the potential trade-offs between sustainable practices and short-term profitability. This finding highlights the importance of finding a balance between ESG considerations and financial performance. The results suggest that investors may view companies with robust environmental and governance practices less favorably, as indicated by the negative association between these pillars and MTB ratios. This has practical implications for firms looking to attract investment. Companies must communicate their ESG initiatives effectively to investors to ensure that the market accurately perceives the long-term value they create.

Given the importance of ESG factors, companies may benefit from transparent and comprehensive sustainability reporting. Clear communication of sustainability initiatives can enhance a company's reputation and potentially improve investor sentiment. As ESG factors gain prominence, regulatory bodies may introduce more stringent reporting requirements. Firms should stay informed about evolving regulations to ensure compliance and avoid potential legal and reputational risks. The mixed results regarding investor sentiment and perception of ESG practices call for deeper theoretical exploration of investor behavior. Researchers should investigate the factors that influence how investors assess the financial implications of sustainability initiatives.

In conclusion, the research bridges the gap between ESG factors and financial performance metrics, offering insights that have practical implications for firms, investors, and policymakers. Theoretical implications highlight the need for more nuanced models that account for the multifaceted nature of ESG-firm performance relationships. As sustainability becomes increasingly central to business strategies and investment decisions, understanding these implications is essential for navigating the complex landscape of sustainability and finance. Ultimately, this research advances our knowledge of the critical role that ESG considerations play in shaping corporate financial performance and market dynamics. Future research should continue to explore these relationships in greater depth to inform more informed decision-making in the corporate and financial sectors.

REFERENCE LIST

1. Abdi, Y., Li, X., & Càmara-Turull, X. (2021). Exploring the impact of Sustainability (ESG) disclosure on firm value and Financial Performance (FP) in airline industry: The moderating role of size and age. *Environment, Development and Sustainability, 24(4)*, *5052–5079*. https://doi.org/10.1007/s10668-021-01649-w
2. Arkes, J. (2023). *Regression analysis a practical introduction*. Routledge, Taylor; Francis Group.
3. Aydoğmuş, M., Gülay, G., & Ergun, K. (2022). Impact of ESG performance on firm value and profitability. *Borsa Istanbul Review, 22*. https://doi.org/10.1016/j.bir.2022.11.006
4. Bae, K.-H., El Ghoul, S., Gong, Z. (Jason), Guedhami, O. (2021). Does CSR matter in times of crisis? Evidence from the COVID-19 pandemic. *Journal of Corporate Finance, 67, 101876*. https://doi.org/10.1016/j.jcorpfin.2020.101876
5. Behl, A., Kumari, P. S., Makhija, H., & Sharma, D. (2021). Exploring the relationship of ESG score and firm value using cross-lagged panel analyses: Case of the Indian Energy Sector. *Annals of Operations Research, 313(1), 231–256*. https://doi.org/10.1007/s10479-021-04189-8
6. Berg, F., Heeb, F., & Kölbel, J. (2022). The economic impact of ESG Ratings. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4088545
7. Berg, F., Koelbel, J., Pavlova, A., & Rigobon, R. (2022). *ESG Confusion and Stock Returns: Tackling the Problem of Noise*. https://doi.org/10.3386/w30562
8. Bernard, V. L., & Thomas, J. K. (1989). Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research, 27, 1–36*. https://doi.org/10.2307/2491062
9. Bradley, B. (2021). *ESG investing for dummies*. For Dummies, a Wiley brand.
10. Brammer, S., Brooks, C., & Pavelin, S. (2006). Corporate Social Performance and Stock Returns: UK evidence from Disaggregate Measures. *Financial Management, 35(3), 97–116*. https://doi.org/10.1111/j.1755-053x.2006.tb00149.x
11. Chase, C. W. (2013). *Demand-Driven Forecasting* (2nd ed.). John Wiley & Sons.
12. Cornell, B. (2020). ESG preferences, risk and return. *European Financial Management, 27(1), 12–19.* https://doi.org/10.1111/eufm.12295
13. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74(366), 427*. https://doi.org/10.2307/2286348
14. Duah-Boateng, C., & Twumasi-Ankrah, S. (2019). Assessing the effect of utilization and availability on production in open-pit mining: Statistical perspective. *Internatioanl Journal of Science, Environment and Technology, 8(3), 507-517*.
15. Duque-Grisales, E., & Aguilera-Caracuel, J. (2019). Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international diversification and Financial Slack. *Journal of Business Ethics, 168(2), 315–334.* https://doi.org/10.1007/s10551-019-04177-w
16. Eccles, R. G., & Youmans, T. (2015). *Implied Materiality and Material Disclosures of Credit Ratings.* Harvard Business School General Management Unit Working Paper, (15-079).

17. Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics, 101(3), 621–640.* https://doi.org/10.1016/j.jfineco.2011.03.021
18. Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of Disclosure. *Global Finance Journal, 38, 45–64*. https://doi.org/10.1016/j.gfj.2017.03.001
19. Fatima, T., & Elbanna, S. (2022). Corporate Social Responsibility (CSR) implementation: A Review and a research agenda towards an integrative framework. *Journal of Business Ethics, 183(1), 105–121.* https://doi.org/10.1007/s10551-022-05047-8
20. Feng, L., Pan, Z., & Sohail, H. M. (2022). ESG performance and stock prices: Evidence from the COVID-19 outbreak in China. *Humanities and Social Sciences Communications, 9(1)*. https://doi.org/10.1057/s41599-022-01259-5
21. Fitzpatrick, G., Neilan, J., & Reilly, P. (2020). *Time to rethink the s in ESG*. The Harvard Law School Forum on Corporate Governance. https://corpgov.law.harvard.edu/2020/06/28/time-to-rethink-the-s-in-esg/
22. Folger-Laronde, Z., Pashang, S., Feor, L., & ElAlfy, A. (2020). ESG ratings and financial performance of exchange-traded funds during the COVID-19 pandemic. *Journal of Sustainable Finance Investment, 12(2), 490–496*. https://doi.org/10.1080/20430795.2020.1782814
23. Freeman, R. E. (2010). *Strategic management: A stakeholder approach.* Cambridge University Press.
24. Garcia, A. S., & Orsato, R. J. (2020). Testing the institutional difference hypothesis: A study about environmental, social, governance, and financial performance. *Business Strategy and the Environment, 29(8), 3261–3272.* https://doi.org/10.1002/bse.2570
25. Giannopoulos, G., Kihle Fagernes, R. V., Elmarzouky, M., & Afzal Hossain, K. A. (2022). The ESG disclosure and the financial performance of Norwegian listed firms. *Journal of Risk and Financial Management, 15(6), 237.* https://doi.org/10.3390/jrfm15060237
26. Google Trends (2023). *ESG*. https://trends.google.com/trends/explore?date=2013-01-01%202023-09-19&q=ESG&hl=hr
27. Grossman, S. J., & Stiglitz, J. E. (1980). On the Impossibility of Informationally Efficient Markets. *The American Economic Review, 70(3), 393–408.* http://www.jstor.org/stable/1805228
28. Gusheva, E., & de Gooyert, V. (2021). Can we have our cake and eat it? A review of the debate on green recovery from the COVID-19 crisis. *Sustainability, 13(2), 874*. https://doi.org/10.3390/su13020874
29. Han, J.-J., Kim, H. J., & Yu, J. (2016). Empirical study on relationship between Corporate Social Responsibility and financial performance in Korea. *Asian Journal of Sustainability and Social Responsibility, 1(1), 61–76.* https://doi.org/10.1186/s41180-016-0002-3
30. Heinkel, R., Kraus, A., & Zechner, J. (2001). The effect of green investment on corporate behavior. *The Journal of Financial and Quantitative Analysis, 36(4), 431.* https://doi.org/10.2307/2676219
31. Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics, 93(1), 15–36.* https://doi.org/10.1016/j.jfineco.2008.09.001

32. Hossain, A., Hossain, T., Jha, A., & Mougoué, M. (2023). Credit ratings and social capital. *Journal of Corporate Finance, 78, 102338*. https://doi.org/10.1016/j.jcorpfin.2022.102338
33. Hvidkjær, S. (2017). *ESG investing: a literature review*. Report prepared for Dansif.
34. Hsiao, C. (2003). *Analysis of Panel Data, 34(2)*. https://doi.org/10.1017/cbo9780511754203
35. Ignatov, K. (2023). When ESG talks: ESG tone of 10-K reports and its significance to stock markets. *International Review of Financial Analysis, 89, 102745*. https://doi.org/10.1016/j.irfa.2023.102745
36. Ioannou, I., & Serafeim, G. (2019). *Corporate sustainability: A strategy?*. Harvard Business School Accounting & Management Unit Working Paper, (19-065).
37. Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for Stock Market Efficiency. *The Journal of Finance, 48(1), 65–91*. https://doi.org/10.1111/j.1540-6261.1993.tb04702.x
38. Kaiser, L. (2020). ESG integration: Value, growth and momentum. *Journal of Asset Management, 21(1), 32–51.* https://doi.org/10.1057/s41260-019-00148-y
39. Kacapyr, E. (2022). *Essential Econometric Techniques: A Guide to concepts and applications*. Routledge.
40. Landi, G., & Sciarelli, M. (2019). Towards a more ethical market: The impact of ESG rating on Corporate Financial Performance. *Social Responsibility Journal, 15(1), 11–27*. https://doi.org/10.1108/srj-11-2017-0254
41. Lee, C. F., & Yu, M. (2019). *Advances in Pacific basin business, Economics and Finance*. Emerald Publishing Limited.
42. Liu, L., Nemoto, N., & Lu, C. (2023). The effect of ESG performance on the stock market during the COVID-19 pandemic — evidence from Japan. *Economic Analysis and Policy, 79, 702–712*. https://doi.org/10.1016/j.eap.2023.06.038
43. Markowitz, H. M. (1959). *Portfolio selection: Efficient Diversification of Investments*. J. Wiley.
44. Martin, B., Brindisi, C., & Kay, I. (2020, September 14). *The stakeholder model and ESG.* The Harvard Law School Forum on Corporate Governance. https://corpgov.law.harvard.edu/2020/09/14/the-stakeholder-model-and-esg/
45. Mercereau, B., Melin, L., & Lugo, M. M. (2022). Creating shareholder value through ESG engagement. *Journal of Asset Management, 23(7), 550–566*. https://doi.org/10.1057/s41260-022-00270-4
46. Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. *The Journal of Finance, 42(3), 483–510*. https://doi.org/10.1111/j.1540-6261.1987.tb04565.x
47. Ni, Y., & Sun, Y. (2023). Environmental, social, and governance premium in Chinese stock markets. *Global Finance Journal, 55, 100811*. https://doi.org/10.1016/j.gfj.2023.100811
48. Nirmal, R. K. K. (2020). *Econometrics*. CRC Press.
49. Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate Social Responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling, 52, 400–407.* https://doi.org/10.1016/j.econmod.2015.09.019

50. Olsen, B. C., Awuah-Offei, K., & Bumblauskas, D. (2021). Setting materiality thresholds for ESG disclosures: A case study of u. s. mine safety disclosures. *Resources Policy, 70, 101914*. https://doi.org/10.1016/j.resourpol.2020.101914
51. Ouchen, A. (2021). Is the ESG portfolio less turbulent than a market benchmark portfolio? *Risk Management, 24(1), 1–33*. https://doi.org/10.1057/s41283-021-00077-4
52. Rahman, H. U., Zahid, M., & Al-Faryan, M. A. (2023). ESG and firm performance: The rarely explored moderation of sustainability strategy and Top Management Commitment. *Journal of Cleaner Production, 404, 136859*. https://doi.org/10.1016/j.jclepro.2023.136859
53. Rao, A., Dagar, V., Sohag, K., Dagher, L., & Tanin, T. I. (2023). Good for the planet, good for the wallet: The ESG impact on Financial Performance in India. *Finance Research Letters, 56, 104093*. https://doi.org/10.1016/j.frl.2023.104093
54. Refinitiv. (2023). *ESG Scores*. https://www.refinitiv.com/en/sustainable-finance/esg-scores#methodology
55. Saygili, E., Arslan, S., & Birkan, A. O. (2022). ESG practices and Corporate Financial Performance: Evidence from Borsa Istanbul. *Borsa Istanbul Review, 22(3), 525–533*. https://doi.org/10.1016/j.bir.2021.07.001
56. S&P Global. *Understanding the "E" in ESG.* (n.d.). https://www.spglobal.com/en/research-insights/articles/understanding-the-e-in-esg
57. S&P Global. *What is the "G" in ESG?.* (n.d.-b). https://www.spglobal.com/en/research-insights/articles/what-is-the-g-in-esgo
58. S&P Global. *What is the "S" in ESG*. (n.d.-b). https://www.spglobal.com/en/research-insights/articles/what-is-the-s-in-esg
59. Sayrs, L. W. (1989). *Pooled time series analysis*. Sage Publications.
60. Statista. (2023). *Global ESG ETF assets from 2006 to 2022*. https://www-statista-com.nukweb.nuk.uni-lj.si/statistics/1297487/assets-of-esg-etfs-worldwide/
61. Sustainable Stock Exchanges. (2022). *ESG disclosure*. https://sseinitiative.org/esg-disclosure/
62. Global Compact (2004). *Who Cares Wins: Connecting Financial Markets to a Changing World*. UN Environment Programme – Finance Initiative. https://www.unepfi.org/fileadmin/events/2004/stocks/who_cares_wins_global_compact_2004.pdf
63. Valentine, S., & Fleischman, G. (2007). Ethics programs, perceived corporate social responsibility and job satisfaction. *Journal of Business Ethics, 77(2), 159–172*. https://doi.org/10.1007/s10551-006-9306-z
64. Velte, P. (2017). Does ESG performance have an impact on financial performance? evidence from Germany. *Journal of Global Responsibility, 8(2), 169–178*. https://doi.org/10.1108/jgr-11-2016-0029
65. Vu, T. (2017). *Econometrics for daily lives, volume I*. Business Expert Press.
66. Welc, J., & Rodriguez, E. P. J. (2018). *Applied Regression Analysis for business: Tools, traps and applications*. Springer International Publishing.
67. Wen, H., Ho, K. C., Gao, J., & Yu, L. (2022). The fundamental effects of ESG disclosure quality in boosting the growth of ESG investing. *Journal of International Financial Markets, Institutions and Money, 81, 101655*. https://doi.org/10.1016/j.intfin.2022.101655

68. Wu, W.-T. (2007). The forward P/E ratio and earnings growth. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1014177
69. Yoon, B., Lee, J., & Byun, R. (2018). Does ESG performance enhance firm value? evidence from Korea. *Sustainability, 10(10), 3635*. https://doi.org/10.3390/su10103635

APPENDICES

Appendix 1: Summary in Slovene language

Rastoči interes investitorjev in globalna ozaveščenost o tveganjih, zlasti tistih, povezanih z okoljem, ter drugimi nefinančnimi dejavniki, kot so družbena odgovornost in zdravo upravljanje, podjetja silijo, da okrepijo svoja prizadevanja in se osredotočijo na te nefinančne vidike svojih dejavnosti. Investitorji, zaposleni, dobavitelji, stranke in državne institucije vedno bolj pričakujejo, da bodo podjetja proaktivno reševala te zadeve, izvajala potrebne ukrepe za obvladovanje tveganj in zagotavljala učinkovito poročanje.

Podjetja običajno komunicirajo o svojem ravnanju pri obvladovanju teh tveganj v treh širših kategorijah: Okolje, Družbena odgovornost in Upravljanje, ali pa preprosto po akronimu ESG. Ti dejavniki so postali del vsake seje upravnega odbora, saj delničarji in morebitni novi investitorji upoštevajo, kako podjetje uresničuje ESG v svojih dejavnostih.

Ker obstaja vse več dokazov, da podjetja, ki dajejo prednost vprašanjem ESG, dosegajo boljše dolgoročne rezultate v različnih vidikih, kot so povečana rast prodaje, višji donos na kapital in celo preseganje trga, izhajajoč iz meritve alfe, sem se odločil preučiti, kako dejavniki ESG vplivajo na vrednotenje podjetja.

Glavni cilj študije je preučiti razmerje med skupnimi ocenami ESG in tremi finančnimi kazalniki uspešnosti, in sicer donosom na sredstva (ROA), razmerjem med tržno in knjigovodsko vrednostjo (MTB) ter razmerjem med napovedano ceno in dobičkom na delnico (FPE) podjetij, ki so del indeksa Financial Times Stock Exchange 100.

V smeri tega cilja sem izvedel obsežno empirično analizo z uporabo modelov regresije s fiksnimi učinki. Zlasti smo ugotovili, da ESG uspešnost kaže negativno in zelo pomembno razmerje s tržno vrednostjo podjetja (MTB) in dobičkonosnostjo (ROA), kot kažejo koeficienti -0,1973 in -0,0010. Za drugi kazalnik vrednosti, FPE, je koeficient pozitiven, 0,0109, vendar ni statistično pomemben, zato ga ne moremo uporabiti pri oblikovanju zaključkov, kot pri koeficientih MTB in ROA.

Po pridobitvi rezultatov se ti interpretirajo, nato se oblikujejo zaključki, preden se poudarijo morebitni predlogi, ki bi jih bilo mogoče dodatno izvesti, da bi dosegli boljši končni izid.

Struktura članka je naslednja: V poglavju 1 se razpravlja o teoretičnih osnovah in pregledu prejšnjih raziskav. Poglavje 2 opisuje podatke, spremenljivke in metodologijo. Poglavje 3 predstavlja rezultate regresijske analize. Poglavje 4 pa ponuja zaključne ugotovitve in predloge za nadaljnje raziskave.

Appendix 2: Constitutes of FTSE 100 Index

Company name	Company name
ASTRAZENECA PLC	WPP PLC
SHELL PLC	HALMA PLC
HSBC PLC	INTERCONTINENTAL HOTELS GROUP PLC
UNILEVER PLC	SAGE GROUP PLC
RIO TINTO PLC	COCA COLA HBC AG
BP PLC	CRODA INTERNATIONAL PLC
DIAGEO PLC	BURBERRY GROUP PLC
BAT PLC	NEXT PLC
GSK PLC	SPIRAX-SARCO ENGINEERING PLC
GLENCORE PLC	JD SPORTS FASHION PLC
RELX PLC	INTERNATIONAL CONSOLIDATED AIRLINES GROUP SA
LSE GROUP PLC	SMURFIT KAPPA GROUP PLC
RECKITT PLC	ENTAIN PLC
NATIONAL GRID PLC	SCHRODERS PL
COMPASS GROUP PLC	UNITED UTILITIES GROUP PLC
ANGLO AMERICAN PLC	INTERTEK GROUP PLC
PRUDENTIAL PLC	ADMIRAL GROUP PLC
LLOYDS BANKING GROUP PLC	MELROSE INDUSTRIES PLC
CRH PLC	SEVERN TRENT PLC
BAE SYSTEMS PLC	CENTRICA PLC
FLUTTER ENTERTAINMENT PLC	WHITBREAD PLC
EXPERIAN PLC	J SAINSBURY PLC
BARCLAYS PLC	ST JAMES'S PLACE PLC
NATWEST GROUP PLC	MONDI PLC
ASHTEAD GROUP PLC	PERSHING SQUARE HOLDINGS LTD
VODAFONE GROUP PLC	PEARSON PLC
SSE PLC	SMITHS GROUP PLC
3I GROUP PLC	AUTO TRADER GROUP PLC
TESCO PLC	PHOENIX GROUP HOLDINGS PLC
STANDARD CHARTERED PLC	B&M EUROPEAN VALUE RETAIL SA
RENTOKIL INITIAL PLC	ENDEAVOUR MINING PLC
IMPERIAL BRANDS PLC	FRESNILLO PLC
BT GROUP PLC	M&G PLC
ASSOCIATED BRITISH FOODS PLC	AIRTEL AFRICA PLC
ANTOFAGASTA PLC	F&C INVESTMENT TRUST PLC
LEGAL & GENERAL GROUP PLC	WEIR GROUP PLC
ROLLS-ROYCE HOLDINGS PLC	DCC PLC
AVIVA PLC	LAND SECURITIES GROUP PLC
SMITH & NEPHEW PLC	BARRATT DEVELOPMENTS PLC
BUNZL PLC	KINGFISHER PLC

INFORMA PLC	DS SMITH PLC
SEGRO PLC	RIGHTMOVE PLC
SCOTTISH MORTGAGE INVESTMENT TRUST PLC	HISCOX LTD
CONVATEC GROUP PLC	HARGREAVES LANSDOWN PLC
TAYLOR WIMPEY PLC	PERSIMMON PLC
BEAZLEY PLC	RS GROUP PLC
FRASERS GROUP PLC	UNITE GROUP PLC
OCADO GROUP PLC	JOHNSON MATTHEY PLC
ABRDN PLC	BRITISH LAND COMPANY PLC
BERKELEY GROUP HOLDINGS PLC	HALEON PLC