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MASTER

MANAGEMENT

MASTER´S FINAL WORK

DISSERTATION

THE IMPACT OF ESG SCORES ON EUROPEAN PUBLICLY LISTED COMPANIES´ FINANCIAL PERFORMANCE

MANUEL GUEDES BACALHAU

SUPERVISION:

PROF. JOSÉ MANUEL GONÇALVES PINTO

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Glossary

CSRD – Corporate Sustainability Reporting Directive

CSR – Corporate Social Responsibility

ECB – European Central Bank

ESG – Environmental, Social, and Governance

EU – European Union

FE – Fixed Effects

GRI – Global Reporting Initiative

NFRD – Non-Financial Reporting Directive

OLS – Ordinary Least Squares

RE – Random Effects

ROA – Return on Assets

ROE – Return on Equity

SFDR – Sustainable Finance Disclosure Regulation

Abstract

This study aims to examine the relationship between ESG (Environmental, Social, and Governance) scores and firm´s financial performance. The growing importance given to this topic, emerges from the need for companies and stakeholders to understand how ESG activities affect financial results because of the increased focus on sustainability and the stricter regulatory frameworks. In order to test this relationship, it was used a dataset with sustainability and financial information, retrieved from Thomson Reuters database, of European publicly listed companies, between 2017 and 2023, corresponding to 9426 observations, which cover 2014 companies across 25 European countries. Thus, this study employed Ordinary Least Squares (OLS) regression, fixed effects panel data regression, and dynamic panel data models to test how ESG practices impact firm´s financial performance, measured by Return on Assets (ROA).

According to the results from the OLS model, there is a positive and statistically significant relationship between overall ESG and individual pillars score with ROA, suggesting that companies with higher ESG scores tend to have better financial outcomes. However, when controlling for firm-specific unobserved factors through the fixed effects model, their statistical significance disappears, except for the governance pillar, which showed a negative impact on ROA. To address potential endogeneity and reverse causality, it was introduced a dynamic panel data model with lagged variables, showing that higher ESG scores in previous periods could lead to short-term decreases in ROA.

The findings suggest that ESG investments may lead to lower short-term financial performance, due to the initial costs associated with ESG initiatives. The study's limitations include its relatively short time frame, geographical focus on Europe, and potential differences in ESG rating methodologies. Future research should focus on expanding the time frame to better assess the long-term impacts of ESG score on financial outcomes.

Keywords: ESG Scores; Financial Performance; Sustainability; Regulatory Framework; European Companies; Linear Regression; Dynamic Panel data; Fixed Effects; Return on Assets.

JEL Codes: C01; C12; C23; G3; M14

Resumo

Este estudo tem como objetivo examinar a relação entre as pontuações ESG (Ambiental, Social e Governança) e o desempenho financeiro das empresas. A maior relevância deste tema resulta da necessidade das empresas e *stakeholders* compreenderem como as atividades ESG afetam os resultados financeiros, devido ao maior foco na sustentabilidade e ao aumento das exigências regulatórias. Para testar esta relação, foram utilizados dados financeiros e de sustentabilidade de empresas europeias cotadas em bolsa, extraídos Thomson Reuters, de 2017 a 2023, correspondendo a 9426 observações de 2014 empresas de 25 países. O estudo utilizou o modelo de regressão de Mínimos Quadrados Ordinários (OLS), dados de painel de efeitos fixos e de painel dinâmico para testar o impacto das práticas ESG no desempenho financeiro da empresa, medido pelo Retorno sobre Ativos (ROA).

De acordo com os resultados do modelo OLS, existe uma relação positiva e estatisticamente significativa entre as pontuações ESG, tanto globais como dos pilares individuais, com o ROA, sugerindo que empresas com maiores pontuações ESG têm melhores resultados financeiros. Contudo, ao controlar fatores não observados específicos da empresa no modelo de efeitos fixos, essa significância estatística desaparece, exceto para o pilar governança, que mostrou um impacto negativo no ROA. Para abordar a potencial endogeneidade e causalidade reversa, foi introduzido um modelo de dados em painel dinâmico com variáveis desfasadas, revelando que maiores pontuações ESG em períodos anteriores podem reduzir o ROA a curto prazo.

Os resultados sugerem que investimentos em ESG podem reduzir o desempenho financeiro de curto prazo, devido aos custos iniciais associados. As limitações do estudo incluem o curto período de análise, foco geográfico na Europa e potenciais diferenças metodológicas nas classificações ESG. Pesquisas futuras devem concentrar-se na expansão do período de análise para avaliar melhor os impactos de longo prazo das pontuações ESG nos resultados financeiros.

Palavras-chave: Pontuações ESG; Desempenho Financeiro; Sustentabilidade; Enquadramento Regulamentar; Empresas Europeias; Regressão Linear; Dados em Painel Dinâmico; Efeitos Fixos; Rentabilidade do Ativo.

Códigos JEL: C01; C12; C23; G3; M14

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1. Introduction

Over the past decade, the incorporation of Environmental, Social, and Governance (ESG) criteria into corporate strategy, has become crucial to business operations and investment decisions. As the global economy faces challenges such as climate change, social inequalities, and corporate governance issues, ESG provides a comprehensive framework that assesses a company's commitment to sustainability, social responsibility, and ethical governance (OECD, 2020). ESG criteria offers insights on how well companies are managing their environmental impact, treat their employees, and maintain transparent governance practices, which are viewed as crucial for long-term business success (Henisz, Koller, & Nuttall, 2019).

This way, ESG factors are not only essential for assessing a company´s sustainability practices, but also for evaluating its long-term financial performance. Companies that thrive in ESG metrics, often have better financial outcomes, since they are more likely to be recognized as better suited to manage risks, improve operational effectiveness, and cultivate relationships with stakeholders (Clark, Feiner, & Viehs, 2015). For instance, the environmental pillar, which includes criteria such as waste management, energy efficiency, and carbon emissions, which are increasingly seen as critical for firm´s long-term life, since companies are facing more rigorous regulations and a higher accountability from customers (Giese et al., 2019). Similarly, the social aspect of ESG, encompassing factors like employee relations, diversity, and community impact, are becoming increasingly important as businesses face heightened scrutiny from consumers and employees who prioritize ethical and socially responsible practices (Friede, Busch, & Bassen, 2015). Furthermore, the governance dimension, which addresses corporate governance practices, internal controls, and transparency, is recognized as crucial for maintaining investor confidence and ensuring regulatory compliance (Eccles et al., 2014).

The European Union (EU) has been leading the way in integrating ESG into corporate governance through rigorous regulatory frameworks, such as the Non-Financial Reporting Directive (NFRD) and the more recent Corporate Sustainability Reporting Directive (CSRD). These regulations have significantly influenced corporate behaviour, pushing companies to adopt more sustainable practices and enhance the transparency of their ESG disclosures (Doni et al., 2020). As a result, investors are increasingly incorporating ESG criteria into their decision-making processes, driven by the belief that companies with better ESG practices are more likely to achieve long-term financial success and sustainability (Friede et al., 2015).

As a consequence of these global events, that led to increased importance placed on ESG criteria, and as environmental regulations became stricter, the value of companies started to be threatened to the risk of not meeting environmental directives (Christensen et al., 2019). A study by Chen et al. (2023) found that strong ESG performance may lead to a lower cost of capital for a firm, indicating that sustainability practices have become crucial to risk management and investor decision-making. Hence, companies are evaluated not just by their financial results, but also by how they compare their competitors, in terms of sustainability, making ESG data vital for their market value and strategic positioning (Chen et al., 2023).

This shift reflects a growing recognition that companies that perform well on ESG metrics may also be better positioned to deliver sustainable financial returns (Khan, Serafeim, & Yoon, 2016). As a result, ESG is now considered a vital component of risk management and value creation in capital markets, rather than just a minor topic of morally conscious investors (Edmans & Kacperczyk, 2022). This way, with the disclosure of the non-financial reports, including ESG ratings and sustainability data, business, and investors, are able to analyse data related to environmental, social and governance factors from the same perspective as financial data is analysed (Leins, 2020).

In this context, the question comes up about the added value that sustainability brings to a company, thus understanding the relationship between ESG and financial performance is more relevant than ever, as stakeholders seek to align financial objectives with sustainability goals (Fatemi, Fooladi, & Tehranian, 2015). From a long-term investment standpoint, firms that achieve higher ESG scores and integrate sustainable practices into their operations, tend to show positive growth trends, which can enhance their attractiveness to investors (Starks, 2017).

Although, several studies have documented a positive relationship between ESG scores and financial performance (Clark et al., 2015; Fried et al., 2015;), other papers argue a negative relationship (Ruan & Liu**,** 2021; Fatemi et al., 2018) while some even found that there is no relationship at all (Huang, 2021).

The mixed evidence found can be attributed to several factors. First, as studies use different financial metrics, such as accounting-based measures (ROA, ROE) and market-based ones (stock returns), they end up with varying results (Ma et al., 2018). Second, focusing on only one dimension of ESG, whether those are environmental, social or governance, instead of analysing all of ESG pillars, could lead to

insufficient findings (Han et al., 2016). Additionally, regional differences are also one reason for mixed findings, since Western countries often show positive relationships (Alareeni & Hamdan, 2020), while Eastern countries may present mixed or negative outcomes (Ruan & Liu, 2021) due to distinct economic and political contexts, such as regulatory environments. Finally, ESG impacts may differ over short-term versus long-term horizons, while long-term investors might value sustainability more, leading to positive results, whereas short-term studies might not capture these effects, leading to negative outcomes.

Given the mixed evidence and growing importance of ESG, this thesis seeks to study whether companies with higher ESG ratings consistently outperform those with lower ratings in terms of financial metrics, such as Return on Assets (ROA). This study aims to contribute to the ongoing debate on the financial implications of ESG practices, by examining this relationship using a dataset composed by European publicly listed companies, providing insights that are relevant for both academics and practitioners. Unlike prior studies, which were often limited to individual countries, this paper aims to broaden the scope, including many countries, and by exploring all three dimensions of ESG, also contributing to the expanding literature in this field. Finally, this paper makes a significant contribution by utilizing more recent ESG data from companies across Europe, offering insights on the latest developments in European corporate governance and regulatory environment.

This paper is structured as follows. The first chapter introduces the research, followed by chapter 2, which reviews existing literature. Chapter 3 outlines the sample and methodology used, while chapter 4 discusses the findings and presents evidence for analysis. Lastly, chapter 5 concludes the study, highlighting its limitations and offering suggestions for future research.

2. Literature Review

2.1. ESG Definition and its Importance

Environmental, Social, and Governance (ESG) standards provide a framework to assess how companies incorporate these practices into their business and evaluate the sustainability and ethical impact of their activities. When evaluating a company´s sustainability and its impact on society, investors and other stakeholders focus on key areas of ESG (OECD, 2020).

The first letter of ESG stands for Environmental criteria, which addresses a company's impact on the natural environment, including factors such as carbon emissions, energy efficiency, waste management, resource conservation, and biodiversity protection. Companies with strong environmental performance are those that actively seek to minimize their ecological impact and contribute to environmental preservation and restoration (Clark et al., 2015).

The social pillar focuses on how a business manages its relationships with employees, suppliers, and the public image it has among its customers. These metrics include factors such as employee diversity in terms of their race, ethnicity, gender, and health, as well as the company´s management practices and organizational culture (OECD, 2020). Companies that score well on the social dimension of ESG are those that prioritize ethical business practices, social equality, and the well-being of all stakeholders (Friede et al., 2015).

The governance component emphasizes the internal procedures, controls, and decision-making processes that a company implements to operate efficiently, comply to legal requirements, and fulfil the expectations of its stakeholders (OECD, 2020). Strong governance practices are critical for ensuring transparency, accountability, and ethical decision-making within an organization (Giese et al., 2019) and an effective governance is crucial for maintaining trust with stakeholders and ensuring long-term business sustainability (Gillan et al., 2021).

With the rise of global challenges such as climate change, social inequalities, and corporate governance scandals, stakeholders, including investors, customers, and regulators, are demanding greater accountability and transparency from companies. As a result, ESG factors have become crucial to risk management and value creation (Eccles, Ioannou, & Serafeim, 2014).

Over the past decade, the importance of Environmental, Social, and Governance (ESG) criteria has risen, becoming a central aspect of business practices and investors strategy. This growth can be

explained by many factors, some of them being the increased awareness of global environment challenges, heightened social consciousness, and the recognition that good governance practices are essential for long-term corporate success (Eccles & Serafeim, 2013).

The rapid growth on sustainability issues has pushed companies to adopt more sustainable practices and significantly increase their standards within a short period of time (Fatemi, Glaum, & Kaiser, 2018).

The understanding that business can no longer disregard ESG implications of their operations, alongside societal and governmental pressure, is responsible for the growing relevance of ESG in the corporate sector (Sullivan & Gouldson, 2017).

Consumers are becoming more conscious of the ethical and environmental implications of their decisions, being more likely to support companies that demonstrate a commitment to sustainability and responsible business practices. This way, companies that integrate ESG into their core strategies, will be able to attract and retain more customers (Peloza & Shang, 2011). Employees are also increasingly concerned with ESG practices of their employers and drawn to organizations that contribute positively to society. Companies with strong ESG performance tend to have higher levels of employee engagement (Aguilera, Rupp, Williams, & Ganapathi, 2007).

A strong ESG proposition, can enhance a company´s reputation and brand value, leading to increased customer loyalty, higher employee engagement, and greater investment trust. Companies that are perceived as leaders in sustainability are more likely to attract and retain stakeholders who prioritize ethical and responsible business practices (Eccles et al., 2014).

On top of that, regulators are increasingly incorporating ESG metrics into their supervision activities, recognizing that these factors are critical to the stability and resilience of the financial system. Companies that fail to address ESG issues may face regulatory penalties and reputational damage, which can negatively impact their financial performance (Schoenmaker & Schramade, 2018).

As sustainability becomes a key competitive differentiator, companies with a strong ESG proposition are able to differentiate themselves and are more likely to outperform their peers (Eccles & Klimenko, 2019). Hence ESG factors are closely linked to a company´s risk profile, companies that neglect environmental and social risks, may face significant and reputational damage. On the other hand, companies that integrate ESG considerations into their risk management strategies reduce their

exposure to potential liabilities (Amel-Zadeh & Serafeim, 2018). As investors are seeking to align their portfolios with sustainable and responsible investments into companies with a good ESG practices, recognizing that these are likely to offer more stable returns and reduced risks. This can result in lower financing costs and greater financial flexibility, enabling companies to invest in growth opportunities and to achieve long-term success (Giese et al, 2019; Kotsantonis, Pinney, & Serafeim, 2016).

The transition towards more sustainable business practices is not just a trend but a fundamental shift in how companies operate. Firms that ignore ESG factors risk losing their competitive advantage, as consumers, investors, and regulators increasingly demand responsible and sustainable business behaviour (Clark, Feiner, & Viehs, 2015). Investors increasingly recognize that the materiality of ESG factors can significantly influence a company's future financial performance. Transparent ESG disclosure helps investors assess the extent to which a company is managing these material risks and opportunities, thereby allowing for more informed investment decisions (Khan, Serafeim, & Yoon, 2016).

The importance of ESG disclosure lies in its ability to enhance the transparency and accountability of a company's operations. For investors, this information is crucial in evaluating a company's commitment to sustainable practices and its potential for long-term growth (Giese et al., 2019). Therefore, ESG ratings offer a standardized method for evaluating a company´s performance on environmental, social, and governance factors, helping investors and other stakeholders make more informed decisions (Park & Jang, 2021).

Sustainability practices, along with the inclusion of ESG data, are beginning to be recognized as factors influencing the rise in a company´s stock value. However, the incorporation of ESG criteria into investment decisions is driven more by financial results than by ethical or sustainability considerations (Amel-Zadeh & Serafeim, 2018).

2.2. Regulatory Framework and Policies in the European Union

In order to tackle the inconsistencies in ESG reporting and the rising demand for ESG, independent organizations started developing and promoting ESG reporting guidelines aimed at enhancing and standardizing reporting practices across various industries and countries (Rouen et al., 2022).

Sustainability further entered the corporate agenda trough initiatives like the Global Reporting Initiative (GRI), which provided a framework for companies to voluntarily disclosure their environmental, social, and governance performance. Stakeholders are now able to hold business responsible for their social and environmental impacts, as the GRI standards established a basis for transparency and helped standardize sustainability reporting. This way, GRI guidelines have played a crucial role in shaping the way corporations report their sustainability efforts, helping to standardize the content and structure of sustainability disclosures (Hess, D., 2008), and ensuring that the information is relevant, consistent, and comparable across industries and regions (Eccles, Krzus, & Ribot, 2019).

In 2014, the European Parliament approved the Directive 2014/95, known as the Non-Financial Reporting Directive (NFRD), that states mandatory requirements for large companies to disclosure non-financial information, including ESG metrics. The introduction of the EU Non-Financial Reporting Directive marked a shift from voluntary to mandatory reporting, particularly for large corporations, which are now required to disclosure information on ESG aspects (Doni et al., 2020).

The 2015 Paris Agreement has risen the importance of sustainability in corporate strategies, as it set global targets for reducing greenhouse gas emissions and limiting global warming. Although this agreement was not legally bounded, in terms of enforcing emissions reductions, it created a global need to address global climate goals. The Paris Agreement is widely seen as a landmark achievement in global climate governance, as it marks the first time that the majority of countries committed to limit global warning and reduce emissions (Falkner, 2016).

The development of EU ESG regulation has been marked by several key milestones, beginning with the introduction of the Sustainable Finance Disclosure Regulation (SFDR) in 2019. This regulation is part of a broader strategy to direct capital flows towards more sustainable investments and to manage financial risks stemming from climate change, resource depletion, and social inequalities. The SFDR requires financial market participants to disclose how they integrate ESG factors into their investment processes, thereby increasing transparency and reducing the risk of greenwashing (European Commission, n.d.).

Another key element of EU ESG regulatory framework is the EU Taxonomy Regulation, which establishes a classification system for environmentally sustainable economic activities. This regulation aims to provide clarity and consistency in identifying which activities can be considered sustainable,

thereby facilitating informed investment decisions, and promoting a common classification process for sustainability across Europe (Tolliver et al., 2020).

In addition to the NFRD, another significant development, is that the European Union introduced the Corporate Sustainability Reporting Directive (CRSD) in 2021, which expanded the scope and depth of non-financial reporting. This directive reflects the growing recognition that accurate and reliable ESG information is essential for investors, regulators, and other stakeholders to assess companies' sustainability performance. The CSRD mandates that large companies report on a wider range of ESG issues and in greater detail, thus improving the quality and comparability of ESG data across the EU (European Commission, 2021). The CRSD aims to standardize ESG reporting across the European Union by introducing more detailed reporting requirements, which are aligned with the EU´s sustainability goals and the Green Deal (Gjølberg & Steen, 2023).

The European Union (EU) has been a leader in the global movement towards corporate sustainability, through regulatory measures, recognizing the critical role that financial markets play in achieving broader environmental and social goals. The European Commission is responsible for proposing legislation, setting policy agendas, and ensuring that member states comply with EU laws. This way, the European Commission´s actions are guided by the European Green Deal, a policy framework aimed at transforming the EU into a sustainable economy with net-zero greenhouse gas emissions by 2050 (European Commission, 2019).

Alongside the European Commission, there are other EU institutions such as the European Parliament and the European Council that are instrumental in the development and approval of ESG regulations. The European Parliament, acting on behalf of EU citizens, has been a significant supporter of strict ESG standards and has been instrumental in the legislative process by revising and approving proposals put forward by the Commission (Van Den Hurk & Van Der Klooster, 2024).

Furthermore, the European Central Bank (ECB) and national financial regulators are increasingly integrating ESG criteria into their supervisory frameworks. The ECB has incorporated climate-related risks into its monetary policy and supervisory activities, emphasizing the importance of managing ESG risks in the banking sector (European Central Bank, 2021). National regulators, meanwhile, are responsible for enforcing compliance with EU regulations at the domestic level, ensuring that companies and financial institutions meet their ESG obligations.

The introduction of ESG regulations in the EU has significantly influenced corporate behaviour, pushing companies to integrate sustainability into their core business strategies. The demand for improved ESG disclosures has increased transparency and accountability, requiring companies to offer more detailed information about their environmental effects, social practices, and governance frameworks (Tolliver et al., 2020).

Moreover, the EU's ESG regulations have contributed to a shift in investors behaviour, with more capital being directed towards companies that demonstrate strong ESG performance. This has created additional incentives for companies to improve their ESG practices, as those who fail to do so may find it more difficult to attract investment and may face higher costs of capital (Giese et al., 2019).

In the context of EU firms´, larger companies´ business models are changing because of the implementation of environmentally friendly sectors and renewable energy branches. This allows the companies to be in the so-called green funds, helping to retain their value at the market level (Gonçalves et al., 2021). However, the impact of ESG regulations is not the same across all companies. While large corporations, with substantial resources are generally better suited to meet the new requirements, small and medium-sized enterprises (SMEs) may face challenges in terms of compliance and reporting. This has led to a need for more support and guidance for SMEs to ensure that they are not unfairly impacted by the regulatory framework (Greenomy, 2023).

Overall, the EU's regulatory framework has been pivotal in promoting sustainable corporate behaviour and aligning business practices with global sustainability goals. As these regulations continue to evolve, they are likely to play an increasingly important role in shaping the future of corporate governance and sustainability in the EU and beyond.

2.3. Relationship between ESG and Financial Performance

The relationship between ESG and financial performance has been a focal point of academic research and industry analysis. However, the key question that business and shareholders face is whether these ESG practices can translate into a better financial performance (Carp et al., 2019).

In theory, companies that score highly on ESG metrics are expected to have better financial performance due to enhanced risk management, improved operational efficiencies, and stronger stakeholder relationships (Clark et al., 2015).

There are several theoretical frameworks that support the incorporation of ESG considerations into firm´s strategy. The legitimacy theory proposes that companies with strong ESG initiatives gain societal approval, which can lead to financial gains through a stronger reputation and increased customer loyalty (Suchman, 1995). A concern of Legitimacy Theory is to ensure that a company's actions are seen as appropriate and acceptable by society as a whole. According to this theory, business has a reactive nature, meaning that companies may engage in CSR or ESG activities primarily in response to societal pressures or crises to restore or maintain their legitimacy (Suchman, 1995).

The agency theory addresses the conflicts between shareholders and managers (agents). In the context of ESG initiatives, these conflicts can arise due to the difference in priorities. Prioritising ESG investments can be a strategy used by managers to boost their reputation and meet external demands, while the main the main objective of shareholders, which is to maximise financial profits, may not always align. Certain ESG activities may be seen by shareholders as negative to short-term profitability, particularly if they feel that these expenditures have no direct impact on financial performance (Jensen & Meckling, 1976).

On the other hand, according to the stakeholder theory, business that take into account the interests of all stakeholders, whether its customers, employees, investors, or suppliers, are more likely to achieve better financial results over time, by building trust and minimize risks (Freeman, 1984). This theory argues that companies should balance the interests of all stakeholders, rather than prioritizing shareholders' financial returns. This approach often leads companies to adopt sustainable practices, improve working conditions, and engage in ethical business conduct to maintain positive stakeholder relationships (Donaldson & Preston, 1995).

According to previous papers, the evidence found regarding the relationship between ESG performance and financial results was inconclusive. For instance, studies have demonstrated that firms with higher ESG ratings tend to experience better financial outcomes and reduced financing costs, thereby improving their overall performance (Giese et al., 2019; Cheng et al., 2014; Eccles et al., 2014). Halbritter and Dorfleitner (2015) suggest that firms with strong ESG ratings are more likely to grow over time, whereas those with weaker ESG ratings may face a decline in value in the long term.

Investors are increasingly integrating ESG factors into their investment decisions, driven by the belief that companies with strong ESG performance are better positioned to manage risks and capitalize on opportunities. Studies have shown that companies with high ESG scores tend to experience lower

volatility, reduced cost of capital, and better long-term financial performance (Friede et al., 2015; Giese et al., 2019).

Numerous studies have demonstrated that strong ESG drivers can positively impact financial performance. For instance, a study by Fried, Busch, and Bassen (2015) reviewed over 2000 studies, and found that the majority reported a positive correlation between ESG and corporate financial performance. Similarly, research by Giese et al. (2019) found that companies with higher ESG scores tended to exhibit lower volatility in stock returns and a lower cost of capital. Another paper by Eccles, Ioannou, and Serafeim (2014) supports this finding by showing that companies with strong sustainability practices tend to outperform their peers over the long term. They highlight that ESG efforts can enhance reputation, reduce risks, and improve operational efficiency, leading to better financial outcomes.

Investors are increasingly incorporating ESG factors into their investment decisions, driven by the belief that companies with strong ESG performance are more likely to generate sustainable returns, and that ESG is viewed not only as a measure of ethical behaviour but also as a key driver of financial performance.

On the other hand, some studies have found conflicting evidence, suggesting that ESG factors may not always directly contribute to firm performance, and in some cases, they might even negatively impact financial outcomes (Chen et al., 2021).

A study by Ruan and Liu (2021) found that in certain markets, such as China, heavy investment in ESG initiatives might lead to increased costs without immediate financial benefits, on the short term. Their research points out the complexity of ESG integration, especially in regions where regulatory frameworks and market conditions differ.

The paper of Humphrey, Lee, & Shen (2012) investigates the cost of sustainability efforts and finds that firms with high ESG ratings sometimes experience lower financial performance. The study suggests that these firms may incur higher costs and may be at a disadvantage compared to those that do not prioritize ESG as strongly.

The studies show inconclusive evidence regarding the relation of ESG and financial performance, given the mixed results obtained. that can be attributed to various factors. However, the strength and direction of the ESG-financial performance relationship can vary based on factors such as

industry, region, and specific ESG dimensions. One of these factors being the difference in measurement methods. For instance, some studies use accounting-based measures such as Return on Assets (ROA) and Return on Equity (ROE), while others rely on market-based measures like stock returns or Tobin's Q (Ma et al., 2018). This variability can lead to different conclusions regarding ESG´s financial impact.

Another factor contributing to mixed results is the focus of different dimensions of ESG. While some studies consider all three pillars (environmental, social, and governance) collectively, others might focus on one pillar, leading to varying outcomes (Han et al., 2016). For instance, focusing solely on environmental pillar might obtain different results compared to a study that includes social and governance factors as well. Other example is that environmental factors may be more significant in resource-intensive industries, while governance may be more critical in sectors with high regulatory scrutiny (Gillan et al., 2021).

Furthermore, regional differences play a significant role in the observed variations. Studies conducted in Western countries, such as the United States and European nations, often show a positive relationship between ESG and financial performance (Alareeni & Hamdan, 2020). In contrast, research from Eastern countries, such as China and South Korea, reveals more mixed or even negative outcomes (Ruan & Liu, 2021; Hwang et al., 2021), reflecting different market dynamics and regulatory environments.

Additionally, some studies suggest that the financial benefits of ESG may be more pronounced in the long term, as companies that invest in sustainable practices often see their efforts pay off over time (Eccles et al., 2014).

Despite the generally positive findings, there is still a debate about the causal direction of the relationship between ESG and financial performance. Some argue that financially successful companies are more likely to invest in ESG initiatives, while others argue that strong ESG practices drive financial success. This ongoing debate highlights the need for further research, particularly in the context of different regulatory environments and industry sectors.

2.4. Research Hypothesis

While the integration of ESG factors into investment strategies is often justified by the assumption that socially responsible practices lead to better financial outcomes, the empirical evidence on this relationship is not certain, given the mixed results obtained from different papers.

Studies like those by Humphrey et al. (2012) and Renneboog et al. (2008) have shown that ESG ratings do not always correlate positively with financial performance, and in some cases, can even have neutral or negative impacts. This variability suggests that the relationship between ESG ratings and financial performance may depend on several factors, including industry, region, and the specific ESG criteria being considered. For instance, some firms may experience short-term financial costs due to ESG investments, while others might see long-term gains (Singhal et al., 2024).

Regarding the mixed findings, the research question of this paper aims to explore whether companies with higher ESG ratings consistently outperform those with lower ratings in terms of financial metrics, such as Return on Assets (ROA).

The hypotheses for this study are the following:

- **Hypothesis 1:** There is a positive relationship between ESG score and the financial performance.
- **Hypothesis 1.1:** There is a positive relationship between the environmental score and the financial performance.
- **Hypothesis 1.2:** There is a positive relationship between the social score and the financial performance.
- **Hypothesis 1.3:** There is a positive relationship between the governance score and the financial performance.

3. Methodology and Data

3.1. Sample and Data

The focus of this thesis is to test whether companies that prioritize sustainability achieve better financial results, by examining the relationship between ESG scores and financial performance. Moreover, the objective is assessing how the components of the ESG score influence a firm´s financial outcomes, to determine if higher ESG scores lead to better financial performance.

The sample used for this study is composed by publicly listed European companies, from 2017 to 2023. For this study, there were chosen companies from the European Union, due to the increase of

laws and regulations regarding sustainable finance and reporting, in recent years, thus, the timeframe was selected to allow the analysis to consider the impact of recent European regulatory frameworks and global events, such as the COVID-19, on corporate ESG performance.

The financial and sustainability data was extracted from the Thomson Reuters Eikon Refinitiv database, which is one of the most complete ESG databases, containing detailed sustainability information, including individual scores for each of the three ESG pillars, and the combined score for ESG. This database evaluates companies´ sustainability performance across over 450 company-level metrics for more than 10 000 publicly listed companies around the world. Refinitiv´s ESG scores aim to provide a comprehensive and comparable assessment of a company´s sustainability performance across 186 metrics that are most relevant to each industry. These metrics are grouped in ten key categories: resource use, emissions, and innovations regarding the environmental pillar; workforce, human rights, community, and product responsibility, regarding the social pillar; management, shareholders, and corporate social responsibility (CSR) strategy regarding the governance pillar. Additionally, each of the ten categories is assigned a score on a scale from 0 to 100 (Refinitiv, 2020). Thus, the scoring system is obtained by summing the category weights, which differ across industries for environmental and social factors, whereas the governance score is weighted the same for all industries.

First, in the data collection process, it was retrieved information for every European publicly listed company for the seven years of the analysis. To ensure the reliability of the data, companies with missing ESG scores or incomplete data for any of the three pillars, or firms that didn´t have data for the necessary control variables and economic performance metrics were excluded from the analysis. Additionally, were also excluded from the study observations, with strange values such as negative total debt and revenue. Furthermore, for a country to be studied, it had to have a minimum of 10 observations, meaning that countries with few observations were not included in the study. Finally, in the data cleaning process, the top and bottom 5% outliers from the variables Profit Margin and Liquidity were taken out, eliminating extreme values from the analysis that could otherwise lead to biased results, as done by Ammann et al. (2011). These outliers can be identified in the boxplot *Figure 1* and *Figure 2* on the Appendix section.

Hence, after filtering out incomplete observations, the final dataset consisted of 2014 companies covering 25 countries in the European Union, representing 9426-year observations.

As evidence shows on table I, almost half of the observations of this study come from three countries, the first being United Kingdom with 24,06%, followed by Germany with 12,34% and Sweden with 11,08%. France, Switzerland, and Italy follow the top three countries with 9,06%, 7,71% and 5,38% of the observations, respectively, while the rest of the countries don´t reach 4%. Twelve countries are between the 1% and 4% mark, while Portugal, Cyprus Hungary, Malta, Iceland, Romania, and Ukraine don´t even reach 1%.

Regarding the number of firms, they follow the same pattern of the number of observations, being that the United Kingdom has the highest number of firms with almost 497, followed by Germany with 254 and Sweden with 242. It is worth mentioning that Hungary, Malta, Iceland, Romania, and Ukraine do not have ten firms in the observations.

Table I: Summary Table by Country of Headquarters

Country of Headquarters	N	N Percentage	Number of Firms
United Kingdom	2,268	24.06	497
Germany	1,163	12.34	254
Sweden	1,044	11.08	242
France	854	9.06	168
Switzerland	727	7.71	153
Italy	507	5.38	108
Finland	325	3.45	70
Spain	319	3.38	63
Netherlands	307	3.26	55
Norway	284	3.01	67
Denmark	247	2.62	49
Ireland	223	2.37	42
Belgium	202	2.14	39
Austria	168	1.78	30
Russia	168	1.78	37
Luxembourg	155	1.64	36
Poland	143	1.52	29
Greece	105	1.11	23
Portugal	65	0.69	13
Cyprus	34	0.36	10
Hungary	34	0.36	6
Malta	33	0.35	7
Iceland	22	0.23	7
Romania	19	0.20	7
Ukraine	10	0.11	2
Total	9,426	100	2,014

3.2. Variable Definition

The dependent variable used for this study is the Return on Assets (ROA), which is a financial ratio that measures a company´s profitability relative to its total assets, reflecting a company´s ability to generate profit from its assets. ROA was chosen as the dependent variable, since as a measure of operational efficiency, it provides information on how effectively a company is utilizing its resources to produce earnings. Thus, the better the firm manage its assets, the higher this indicator will be, and firms with high levels of profitability tend to have a higher concern with sustainability. As previous studies before, such as (Pulino et al, 2022; Chouaibi et al., 2021) also used this account-based metric to assess the relationship between ESG scores and financial performance.

As for the independent variables selected for this research, they serve as the non-financial metrics, measuring a firm´s sustainability performance, such as the overall ESG score, as well as the individual ESG scores for the three pillars (environmental, social, governance). These were extracted from the Thomson Reuters Refinitiv database, and their score varies from 0 to 100, the latter being the better score.

The ESG score represents an overall score that reflects a company´s performance across environmental, social, and governance dimensions, and it's an aggregated score that combines various indicators within these three pillars.

As for the individual metrics, the environmental pillar score assesses a firm´s impact on natural systems, including air, water, land, and ecosystems. It evaluates how well a company manages environmental risks and opportunities, with a focus on responsible resource use, carbon emissions, and innovative practices. This metric highlights the firm´s ability to generate long-term shareholder value while minimizing environmental impact through best management practices.

Additionally, the social pillar score evaluates how well a company uses effective management practices to foster good relationships with their employees, clients, suppliers, and society as a whole. This variable includes the company´s focus on product responsibility, community involvement, and human rights. This score reflects the firm´s reputation and its ability to maintain strong operational practices, which are key factors in creating long-term shareholder value.

Finally, the governance pillar score evaluates a company´s management effectiveness, focusing on leadership, shareholder influence, and corporate social responsibility strategy. This variable

measures how well a company aligns its practices with long-term shareholders' interests, ensuring that executives and board members behave and act responsibly. The evaluation of management practices, the capacity to guarantee a balance between rights and obligations, and the creation of incentives have impact on the score of this metric.

Eliminating internal and external factors that could influence the independent variables is crucial for ensuring a solid model. Thus, to take into consideration the effects of corporate-related factors, the following control variables were included.

The first control variable selected for this study is Financial leverage, which is defined by the extent to which a company is using debt to finance its operations, moreover, the level of usage of borrowed capital to cover its assets. Financial leverage is a crucial control variable, as it influences both risk and return. Thus, high leverage can amplify returns in favourable conditions, but also increases the risk of financial distress, which could impact ROA. In order to isolate the impacts of other factors on a firm´s financial performance and risk, this variable is commonly controlled in studies like those by Zhou et al., (2022), and Pulino et al., (2022) this way increasing the accuracy and reliability of the model.

Secondly, the variable Firm size is an important factor, since it can influence the value and the financial performance of a company and corporate sustainability (Waddock & Graves 1997). Hence, bigger companies might be more motivated to engage in CSR initiatives and practices, since they are more susceptible to external pressures (Cho et al., 2019), they also often have more resources and greater market power, which can affect their financial performance and ability to implement ESG practices. Controlling for firm size ensures that the results are not skewed by difference in scale. This variable is measured by the natural logarithm of total assets.

In addition, Profit margin is a profitability ratio calculated as net income divided by revenue, reflecting the percentage of revenue that remains as profit after all expenses are accounted for. The company´s drive to pursue a more sustainable business strategy may be connected with its capacity to create profit (Chouaibi et al., 2021). Profit margin is considered to account for the intrinsic profitability of a company´s operations. Companies with higher profit margins may have more flexibility to invest in ESG initiatives, which could affect their financial performance.

Liquidity was included in the model as a control variable, measuring a company´s ability to meet its short-term obligations, dividing total current assets by the total current liabilities. A company´s liquidity position is essential for its financial health since firms with higher liquidity are better

positioned to weather financial and may have more resources available to invest in ESG initiatives Ammann et al (2011).

Lastly, inflation is the rate at which the general level of prices for goods and services rises, leading to lower purchasing power, influencing companies´ profitability. Including inflation as a control variable allows the study to account for macroeconomic factors that might otherwise skew the results. As this study is based on European countries, this control variable must be country specific, thus, it was chosen their respective inflation rate accordingly to the year, to measure inflation. This data was collected from the World bank database. Table II provides an overview of the definition and classification of the variables used in the study.

Table II: Definition and Classification of Variables

Classification	Variable Name	Abbreviation	Definition
Dependent Variable	Return on Assets	ROA	Net Income/Total Assets
Independent Variables	ESG Score	ESG	Overall ESG Score
	Environmental Score	ENV	Environmental Pillar Score
	Social Pillar Score	SOC	Social Pillar Score
	Governance Pillar Score	GOV	Governance Pillar Score
Control Variables	Financial Leverage	FLEV	Total Debt/Total Assets
	Firm Size	FSIZE	Natural Logarithm of Total Assets
	Profit Margin	PM	Net Income/Total Revenue
	Liquidity	LIQ	Total Current Assets/Total Current Liabilities
	Inflation	INF	Generalized increase in the price of goods and services over a period of time

3.3. Methodology

Regarding the methodology used, this study employs the Ordinary Least Squares (OLS) method to analyse the relationship between ESG scores and financial performance, as used in previous research, such as Velte (2017) and Shaikh (2021). This statistic methodology estimates the coefficients of linear regression models and is well suited for examining the impact of multiple independent variables on a single dependent variable.

The model created, is composed by four regressions, each utilizing the same base model with the dependent and control variables, but differing in the dependent variable used, according to the hypothesis being tested. The initial regression has the combined ESG score as the independent variable,

and for the remaining regressions, that variable is changed by the three individual ESG pillars. More specifically, the objective is to understand how the different ESG components (overall ESG score, and the individual environmental, social, and governance pillar scores) influence Return on Assets (ROA), while controlling for other relevant financial factors such as Financial leverage, Firm size, Profit margin, Liquidity, and inflation. For the estimation on the four hypotheses for this analysis, the equations used are the following:

(1) $ROA = \beta_0 + \beta_1 ESG\_Score + \beta_2 Financial\_Leverage + \beta_3 Firm\_Size + \beta_4 Profit\_Margin + \beta_5 Liquidity + \beta_6 Inflation + \mu$

(2) $ROA = \beta_0 + \beta_1 Environmental\_Pillar\_Score + \beta_2 Financial\_Leverage + \beta_3 Firm\_Size + \beta_4 Profit\_Margin + \beta_5 Liquidity + \beta_6 Inflation + \mu$

(3) $ROA = \beta_0 + \beta_1 Social\_Pillar\_Score + \beta_2 Financial\_Leverage + \beta_3 Firm\_Size + \beta_4 Profit\_Margin + \beta_5 Liquidity + \beta_6 Inflation + \mu$

(4) $ROA = \beta_0 + \beta_1 Governance\_Pillar\_Score + \beta_2 Financial\_Leverage + \beta_3 Firm\_Size + \beta_4 Profit\_Margin + \beta_5 Liquidity + \beta_6 Inflation + \mu$

Additionally, it was implemented a Panel Data regression with Fixed effects, which is a statistical model that allows to control for unobserved heterogeneity, useful when analysing firm data over time. The fixed effects model assumes that the unobserved firm-specific effects (λi) are correlated with the independent variables, and this correlation is accounted for by subtracting the firm's average value of each variable from the individual observations. Thus, this model was selected to control for time-invariant, firm-specific characteristics that might bias the estimates if omitted, and for the estimation of the four hypotheses to study, are the following:

(1) $ROA_{it} = \beta_0 + \beta_1 ESG\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(2) $ROA_{it} = \beta_0 + \beta_1 Environmental\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(3) $ROA_{it} = \beta_0 + \beta_1 Social\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(4) $ROA_{it} = \beta_0 + \beta_1 Governance\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

To conclude the analysis, it was incorporated a Dynamic panel data regression model with lagged fixed effects, in order to account for the dynamics in the relationship between ESG and ROA, while also accounting for firm-specific heterogeneity. To examine this dynamic, the study added lagged values of the independent variables to capture potential delayed effects of ESG initiatives on financial performance. The dynamic panel data model with lagged fixed effects can be expressed as:

(1) $L.ROA_{it} = \beta_0 + \beta_1 L.ESG_{Score_{it}} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(2) $L.ROA_{it} = \beta_0 + \beta_1 L.Environmental\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(3) $L.ROA_{it} = \beta_0 + \beta_1 L.Social\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

(4) $L.ROA_{it} = \beta_0 + \beta_1 L.Governance\_Pillar\_Score_{it} + \beta_2 Financial\_Leverage_{it} + \beta_3 Firm\_Size_{it} + \beta_4 Profit\_Margin_{it} + \beta_5 Liquidity_{it} + \beta_6 Inflation_t + \mu_i + \varepsilon_{it}$

4. Results and Analysis

4.1. Descriptive Statistics Analysis

As shown on Table III, it´s presented the descriptive statistical results for the variables that compose the dataset used for this study.

Table III: Summary Statistics for Numerical Variables

Statistic	N	Mean	St. Dev.	Min	Max
ROA	9,426	0.046	0.075	−0.639	0.684
ESG Score	9,426	52.806	20.332	0.742	95.458
Environmental Pillar Score	9,426	47.907	25.765	0.000	99.294
Social Pillar Score	9,426	56.617	23.241	0.281	98.136
Governance Pillar Score	9,426	51.328	23.043	0.487	98.751
Financial Leverage	9,426	0.259	0.167	0.000	2.205
Firm Size	9,426	21.387	1.854	11.674	27.580
Profit Margin	9,426	0.076	0.147	−0.500	0.922
Liquidity	9,426	1.634	0.867	0.492	5.490
Inflation	9,426	3.108	2.820	−1.248	20.184

The dependent variable, Return on Assets is a financial ratio that reflects a company´s ability to generate profit from its assets. From the analysis on Table III, it´s possible to verify that ROA ranges from -0,639 and 0,684, with a mean of 0,046 and standard deviation of 0,075. Thus, on average, a company earns 4,6% profit for every unit of assets it owns, in other words, for every euro of assets that the firm has, it generates 0,046 euros.

Regarding the independent variables, the overall ESG score mean is 52,81, with a standard deviation of 20.33, ranging from 0,742 to 95,458, indicating a significant spread in the level of ESG engagement across firms. As this variable incorporates all three pillars, firms could have high scores in one or more pillars while underperforming in others, which impacts the overall ESG score.

The environmental pillar score has the lowest mean out of the three, that being 47,91, with a standard deviation of 25,77, showing a wide disparity in environmental performance across firms. Evidence suggest that this pillar needs the most improvement, as some companies scored zero in this variable, and that many firms in Europe might still be struggling with environmental issues or prioritizing other aspects of ESG. Nevertheless, the maximum score is 99, 29, the highest of the independent variables, showing that there are companies that actively engage in environmental issues.

On the opposite, the social pillar has the highest mean out of the independent variables, with an average of 56,62. The relatively high mean score, might indicate that firms tend to prioritize social issues, such as labour practices, human rights, and diversity, possibly due to regulatory requirements or societal pressures.

The average governance score is 51,33, being a relatively low score, suggesting that governance is an area where many firms struggle. A low governance score is often linked to poor management, lack of transparency, and susceptibility to unethical practices.

Looking at the control variables, Financial Leverage has a mean 0,259, meaning that, on average, 25,9% of the company´s assets are financed through debt, suggesting that firms are moderately leveraged, and don't have a high risk associated with high interest payments on their financial obligations. However, a standard deviation of 0,167 implies that leverage differs across companies, being that the maximum value is 2,205. Firm Size variable ranges from 11,674 to 27,580, showing that the dataset includes both small and large companies. Additionally, it has a relatively low standard deviation (1,854), suggesting that firm size does not vary significantly as other variables.

As for the other control variables, the average company is generating a profit margin of 7,6%, ranging from -0,500 to 0,922, and has 1,63 times more current assets than liabilities, indicating good short-term solvency, with liquidity varying from 0,492 to 5,490. The information on the table, shows that some firms have significant losses and may face liquidity challenges, while others have high margins and are highly liquid. Both profit margin and liquidity show some moderate volatility across firms, as their standard deviation is 0,147 and 0,867, respectively.

Finally, inflation represents country-specific inflation rates over the study time period. The mean is 3,108, ranging from -1,248 to 20,184, with the standard deviation of 2,820, showing significant differences in inflation rates across countries and years. These differences were expected given the long-time frame of this study, and that it included years of global pandemic and war.

4.2. Correlation Analysis

Table IV provides a valuable overview, measuring the strength and direction of the linear relationship between the variables of this study. Thus, it quantifies how changes in one variable are associated with changes in another, ranging from -1 (perfect linear correlation) to 1 (perfect linear negative correlation), where 0 suggests that there is no relationship at all between two variables.

Table IV: Pearson Correlation Matrix

	ESG Score	Environmental Pillar Score	Social Pillar Score	Governance Pillar Score	ROA	Financial Leverage	Firm Size	Profit Margin	Liquidity	Inflation
ESG Score	1									
Environmental Pillar Score	0.863	1								
Social Pillar Score	0.907	0.750	1							
Governance Pillar Score	0.738	0.454	0.485	1						
ROA	0.027	0.025	0.026	0.015	1					
Financial Leverage	0.103	0.100	0.097	0.068	-0.241	1				
Firm Size	0.674	0.641	0.633	0.423	-0.032	0.184	1			
Profit Margin	0.005	0.010	0.007	-0.016	0.626	-0.109	0.091	1		
Liquidity	-0.169	-0.174	-0.152	-0.098	0.202	-0.299	-0.255	0.152	1	
Inflation	-0.001	0.010	-0.029	0.022	0.012	-0.004	-0.061	-0.006	-0.021	1

The correlation between the ROA and overall ESG score, as well as the three individual pillars (Environmental, Social, and Governance) is positive but very weak, meaning that while there is some association between sustainability efforts and a better Return on Assets, it is not very strong.

It´s possible to verify the strong positive relation between overall ESG score and the three individual pillars, with the social pillar variable being the most correlated, and governance the lowest. As ESG score is an aggregate measure of how well a company performs across all three pillars, the high correlations suggest companies performing well in one pillar, are likely to perform well in the others.

As expected, Financial Leverage shows a moderate negative relationship with ROA, implying that companies with higher debt tend to perform worse in terms of asset returns. Furthermore, the strong positive correlation of ROA and Profit Margin, indicates that profitability is highly linked to how efficiently assets are used.

Table IV shows that larger firms tend to score better on ESG metrics, which may indicate that larger corporations are more able to invest in sustainability initiatives.

Nevertheless, correlation does imply causality, even if two variables are correlated, it doesn´t mean one causes the other to change. As Pearson´s correlation measures linear relationships, there may be non-linear relationships between the variables.

4.3. Regression Analysis

The results of the regression analysis are presented in Table V, employing the Ordinary Least Squares (OLS) model. The table includes four distinct models that evaluate different hypotheses. The first model tests the effect of the overall ESG score on firm performance, measured by Return on Assets (ROA). In contrast, model 2 focuses the Environmental pillar, model 3 on the social pillar and model 4 on the governance pilar, examining their individual impacts on the same performance metric.

Table V: Linear Regression

	Dependent variable:			
	ROA			
	(1)	(2)	(3)	(4)
ESG_Score	0.0005***			
	(0.00004)			
Environmental_Pillar_Score		0.0004***		
		(0.00003)		
Social_Pillar_Score			0.0004***	
			(0.00003)	
Governance_Pillar_Score				0.0002***
				(0.00003)
Financial_Leverage	−0.0654***	−0.0657***	−0.0659***	−0.0668***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)
Firm_Size	−0.0059***	−0.0051***	−0.0050***	−0.0031***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Profit_Margin	0.3132***	0.3118***	0.3122***	0.3108***
	(0.0040)	(0.0040)	(0.0040)	(0.0041)
Liquidity	0.0045***	0.0047***	0.0044***	0.0045***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Inflation	0.0002	0.0002	0.0003	0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Constant	0.1288***	0.1227***	0.1166***	0.0862***
	(0.0085)	(0.0086)	(0.0083)	(0.0077)
Observations	9,426	9,426	9,426	9,426
R^2	0.4396	0.4370	0.4370	0.4323
Adjusted R^2	0.4392	0.4367	0.4367	0.4320
F Statistic (df = 6; 9419)	1,231.353***	1,218.658***	1,218.691***	1,195.599***
Note:				*p<0.1; **p<0.05; ***p<0.01

Analysing the results of the regressions, it is possible to identify that the relationship between ROA and ESG score, as well as with the individual pillars (environmental, social, and governance), tested in the other models, is positive. Thus, this indicates a small but statistically positive impact, at the 1% significance level of the variables on ROA, suggesting that firms with stronger ESG scores, as well as individual pillar scores, tend to have better financial performance, in terms of ROA.

Across all four models, it was found a negative and statistical significance (at the 1% significance level), suggesting, that higher leverage reduces ROA. Additionally, the variable Firm Size also points out a negative and statistical significance (at the 1% significance level) in all models, indicating that larger firms tend to have slightly lower ROA. The negative association might be due to the fact that larger firms could have diminishing return on assets, possibly due to inefficiencies at scale, as they grow.

The coefficient for Profit Margin (approximately of 0,313) has a very strong positive effect on ROA, being statistically significant, at the 1% significance level, across all models. Liquidity also shows a positive impact on ROA and is statistical significance (at the 1% significance level), indicating that firms with greater liquidity are better positioned to manage their resources effectively. However, inflation is the only variable that is not statistically significant variable across all four models, meaning that inflation might not directly affect firm´s ROA in this context.

Furthermore, the R-squared range from 0,432 to 0,440, indicating that about 43%-44% of the variability in ROA is explained by the models. This is reasonable level of explanatory power, suggesting that while these factors are important, other variables not included in the models also influence ROA. Additionally, the F-statistics are all highly significant, confirming that the models are statistically significant (at the 1% significance level), and that the independent variables (ESG score, Environmental, Social, and Governance Pillar score) collectively influence ROA.

Given the fact that this study examines sustainability metrics and financial information of European countries from 2017 to 2023, Panel Data Regression is the most appropriate model for this analysis, as it effectively addresses the complexity of datasets that include both time-series and cross-sectional dimensions.

Panel Data Regression allows the control of both time and cross-sectional differences by analysing firm´s variables over the years. It´s important to control for firm heterogeneity, by accounting for unique characteristics of firms (such as firm culture, management quality, and industry specific

factors) that do not change over time but may affect their performance. Thus, this ensures that the results are more robust to variations across firms and time, which is critical in ESG studies where both temporal and cross-sectional variations are significant.

In order to choose whether a fixed effects (FE) model or a random effects (RE) model is more appropriate for the panel data regression analysis, it was performed a Hausman Test. The Hausman Test examines whether the unique errors (random effects) are correlated with the regressors (independent variables). The objective consists in identifying which model provides consistent and unbiased estimates. The results of the test are displayed in Table VI.

Table VI: Hausman Test

	Chi-squared	P-value
Model 1	391.658	0.000
Model 2	375.196	0.000
Model 3	357.957	0.000
Model 4	378.903	0.000

This analysis evaluates the null hypothesis that the most suited model is the random effects (RE), which assumes that the differences across firms are random and uncorrelated with the independent variables. The results indicate that we should reject the null hypothesis, at the 1% significance level (p-value is 0.000), meaning that the fixed effects (FE) model is the most suited for this study. The reason of this being that the fixed effects model controls for the correlation between unobserved time-invariant characteristics specific to each firm that don´t change over time but can influence ROA and the regressors (independent and control variables).

Given the results of the Hausman Test, it was performed a panel data regression analysis using fixed effects, and the results are shown in Table VII.

Table VII: Panel Data Regression - Fixed Effects

	Dependent variable:			
	ROA			
	(1)	(2)	(3)	(4)
ESG_Score	−0.0001			
	(0.0001)			
Environmental_Pillar_Score		−0.00002		
		(0.00004)		
Social_Pillar_Score			0.00003	
			(0.00005)	
Governance_Pillar_Score				−0.0001**
				(0.00004)
Financial_Leverage	−0.1193***	−0.1194***	−0.1195***	−0.1188***
	(0.0058)	(0.0058)	(0.0058)	(0.0058)
Firm_Size	−0.0023	−0.0025	−0.0028*	−0.0021
	(0.0016)	(0.0016)	(0.0016)	(0.0015)
Profit_Margin	0.3729***	0.3730***	0.3732***	0.3728***
	(0.0044)	(0.0044)	(0.0044)	(0.0044)
Liquidity	0.0026***	0.0025***	0.0025***	0.0026***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Inflation	0.0007***	0.0007***	0.0006***	0.0007***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	9,426	9,426	9,426	9,426
R^2	0.5445	0.5445	0.5445	0.5447
Adjusted R^2	0.4203	0.4203	0.4203	0.4206
F Statistic (df = 6; 7406)	1,475.6080***	1,475.3740***	1,475.4510***	1,476.9100***
Note:				*p<0.1; **p<0.05; ***p<0.01

In the Fixed effects model is possible to identify that ESG score, Environmental Pillar Score, and Social Pillar Score the effects on ROA are much smaller or even negative and are no longer statistically significant (in contrast to OLS model), suggesting that they may not directly impact a firm´s Return on Assets (ROA). In terms of sustainability metrics, the Governance Pillar Score is the only one that is statistically significant (at the 5% significance level). The negative impact of financial leverage and the positive impact of Profit Margin on ROA are stronger in the fixed effects model compared to OLS, while remaining statistically significant (at the 1% significance level) across all models.

In terms of R-squared values in the fixed effects model, they are higher than the OLS model, ranging from 0.5445 to 0.5447, indicating that the models explain about 54.5% of the variation in ROA, after accounting for entity-specific effects. Regarding the F-statistic, they are highly significant across all models, indicating that the models are statistically significant (at the 1% significance level) and the variables collectively explain variations in ROA.

In the fixed effects model, which controls for unobserved firm-specific factors that do not change over time (such as firm culture, company size, management quality, and industry positioning), the results show a much weaker or non-statically significant relationship between the ESG score and the individual pillars score (except for Governance Pillar score) with ROA. This suggest that the positive impact of ESG performance on ROA observed in the OLS model is largely driven by these unobserved firm-specific factors. For instance, firms with higher ESG scores might also have other unobserved factors that drive their ROA, which OLS attributes to the ESG score. Fixed effects strip away this bias, often leading to a change in the significance and size of coefficients.

The OLS estimation assumes no correlation between firm-specific characteristics and the explanatory variables. When this assumption is violated, OLS estimates become biased and inconsistent, potentially overstating the impact of ESG scores on financial performance. In contrast, the fixed effects model accounts for these unobserved, time-invariant factors, providing a more reliable estimate of the effect of ESG performance on ROA. This difference in results demonstrates the importance of controlling for unobserved, time-invariant factors when assessing the impact of ESG and financial metrics on firm performance.

Furthermore, the previous limitations found, such as the fixed effects model provided more robust results than OLS but still left some concerns about reverse causality or simultaneous relationships between ESG scores and financial performance and cannot completely eliminate endogeneity or address the temporal sequence of changes in ESG performance and financial results. Additionally, fixed effects assumes that the effects of past performance are captured entirely by firm-specifics characteristics, potentially omitting the influence of past values of the dependent variable (ROA), given that financial performance is inherently dynamic, as past performance can significantly influence present and future performance.

In order to tackle these limitations, it was implemented a dynamic panel data regression analysis with fixed effects, by including one year lagged dependent (ROA) and independent variables (ESG

score, Environmental, Social, and Governance Individual Pillar Score) in a dynamic panel data model, allowing to capture the persistence of financial performance over time. This way, by lagging the dependent and independent variables, the model can better handle endogeneity, ensuring that the study examines the past effect of ESG performance on current financial performance results. The OLS and fixed effects models provided mixed or weak evidence regarding the relationship between ESG scores and ROA, this could be due to the fact that the impact of ESG investments might not happen immediately and could take time to influence financial outcomes.

Moreover, the lagged fixed effects model offers a more robust approach, accounting for potential heteroskedasticity or serial correlation in the residuals, ensuring reliable standard errors. With the introduction of the lagged variables, it was possible to reduce the risk of reverse causality and the endogeneity concerns and test the delayed impact of ESG initiatives while also controlling for firm-specific unobserved heterogeneity. Furthermore, this model is ideal for capturing the long-term impact of ESG on financial performance, acknowledging that sustainability initiatives may not show immediate results but instead influent firm performance in future periods.

Table VIII: Dynamic Panel Data Regression with Fixed Effects Model

	Dependent variable:			
	L.ROA			
	(1)	(2)	(3)	(4)
L.ESG_Score	−0.0006***			
	(0.0001)			
L.Environmental_Pillar_Score		−0.0003***		
		(0.0001)		
L.Social_Pillar_Score			−0.0002**	
			(0.0001)	
L.Governance_Pillar_Score				−0.0004***
				(0.0001)
Financial_Leverage	−0.1046***	−0.1039***	−0.1052***	−0.1031***
	(0.0103)	(0.0103)	(0.0104)	(0.0103)
Firm_Size	0.0046	0.0032	0.0022	0.0035
	(0.0030)	(0.0030)	(0.0029)	(0.0029)
Profit_Margin	−0.0318***	−0.0311***	−0.0303***	−0.0308***
	(0.0080)	(0.0080)	(0.0080)	(0.0080)
Liquidity	0.0061***	0.0061***	0.0061***	0.0061***
	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Inflation	0.0011***	0.0010***	0.0008***	0.0009***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Observations	7,246	7,246	7,246	7,246
R^2	0.0313	0.0284	0.0264	0.0319
Adjusted R^2	−0.3038	−0.3076	−0.3104	−0.3030
F Statistic (df = 6; 5383)	28.9796***	26.2479***	24.3352***	29.5414***
Note:				*p<0.1; **p<0.05; ***p<0.01

As its possible to identify in table VIII, with the introduction of the dynamic panel data regression with fixed effects, the independent variables (ESG score, Environmental, Social, and Governance Pillar Score) became statistically significant at the 1% significance level (except for Social Pillar Scores at the 5% significance level) once more. The coefficients of the variables suggest that higher ESG scores in the previous periods may lead to a decrease in a firm´s ROA, indicating that the financial benefits of high ESG ratings are not immediate and can lead to short-term costs that affect profitability. In the case of the individual pillars score, they follow this trend, meaning that they have a negative relationship with ROA, which could be due to high costs associated with environmental

investments, costs with employees, and that stronger governance measures are associated with higher costs at a short-term profitability.

In terms of the control variables, they follow the same trends as the previous models, as Financial Leverage and Profit Margin consistently show a strong negative and positive relationship with ROA, respectively, being statistically significant (at the 1% significance level across all models). Both Inflation and liquidity show a positive and statistically significant (at the 1% and 5% significance level, respectively) effect across all models. Additionally, Firm Size has no statistical significance.

The R-squared results suggest that between 26,9% and 32,2% of the variance in the dependent variable (ROA) is explained by the independent and control variables of the model. The models are statistically significant (at the 1% significance level), according to the F-statistic, which is highly significant across all models, meaning that the variables collectively explain variations in ROA.

Moreover, the findings imply that while ESG initiatives may seem beneficial from an immediate financial standpoint, as demonstrated in the OLS model, but when there were applied more complex econometric techniques (such as controlling for firm-specific effects and lagging variables), it became evident that the ESG led to an increase in costs on the short-term. The results indicate that firms investing in ESG should expect lower profitability in the short-term due to the upfront costs of implementing ESG initiatives.

5. Conclusion and Limitations

In the last decade, sustainability has become a central topic for stakeholders, and more rigid regulatory frameworks have been created, thus companies have made more sustainable efforts to comply with this external pressure. This topic became even more evident with the COVID-19 pandemic, that further increased global awareness of sustainability-related issues (Li et al., 2021). As a result, the number of research studying the link between ESG practices and firm´s financial performance has grown significantly, since there is an increasing agreement that the financial system should not only prioritize strength and stability but also incorporate sustainable principles (Miralles-Quirós et al., 2019).

The present study aimed to study the relationship between ESG scores and financial performance, in order to test if these ESG practices do in fact lead to better financial outcomes. As this topic is considered somewhat recent, and there are mixed findings regarding the relationship under discussion, this study further contributes to the ongoing literature and research, by broadening the scope with a multi-country analysis, during a time period impacted by new regulatory frameworks. Furthermore, it was also possible to contribute to the expanding literature in this field by studying the effects of the individual dimensions of ESG criteria (Environmental, Social, Governance), whereas some previous studies disregarded these individual pillars.

Therefore, this paper focuses on European publicly listed companies, from the year of 2017 to 2023, and their sustainability and financial data was collected from Thomson Reuters Refinitiv. Hence, the study examined 2014 companies covering 25 countries in the European Union, representing 9426-year observations.

Under the OLS method, it was demonstrated a significant positive relationship between ESG scores and firm´s financial performance (measured as ROA). Specifically, the coefficient of the ESG score and the individual pillars score (Environmental, Social, and Governance) showed a positive and statistically significant (at the 1% significance level) impact on Return on Assets (ROA), suggesting that firms with higher ESG performance tend to have better financial outcomes.

Regarding the panel data regression with fixed effects model, which was implemented due to the rejection of the null hypothesis of the Hausman Test, meaning that fixed effects is the most suitable model to use in the study. The fixed effects estimation showed a non-statistical significance relationship between ESG score, Environmental and Social pillar score with ROA. However, the governance pillar score showed a negatively and statistically significant relationship (at the 5% significance level) with

ROA. As the fixed effects model controls for unobserved effects that are constant over time for each entity (company size, organizational culture, industry, etc.) and focuses only on variations within the entities over time, this suggests that positive impact of ESG performance on ROA observed in the OLS model is largely driven by these differences between companies (unobserved firm-specific factors).

Finally, it was implemented a dynamic panel data with lagged fixed effects in order to solve the previous problems, by introducing lagged dependent (ROA) and independent (ESG score, Environmental, Social, and Governance Pillar Score) providing more robust results. As a result, it was possible to provide more robust results, while tackling concerns about reverse causality or simultaneous relationships between ESG scores and financial performance, eliminating endogeneity, and addressing the temporal dynamics, providing a more realistic analysis of how past ESG practices impact current financial results. The results showed that the one year lagged independent variables (ESG score, Environmental, Social, and Governance Pillar Score) became statistically significant at the 1% significance level (except for Social Pillar Scores at the 5% significance level). The coefficients of the variables suggest that higher ESG scores in the previous periods may lead to a decrease in a firm´s ROA, indicating that the financial benefits of high ESG ratings are not immediate and can lead to short-term costs that affect profitability. Regarding the control variables, they consistently indicated that financial leverage negatively impacts profitability, while profit margin and liquidity positively influence ROA, meaning that financial metrics remain strong predictors of company´s performance.

In conclusion, this paper found that in the short-term, higher ESG scores lead to lower firm financial performance, possibly due to the fact that ESG investments and initiatives require large resources, which translate into costs that do not immediately translate into financial gains. As the paper by Velte (2017) found that strong ESG scores and performance leads to higher long-term value of firms and greater stakeholder trust, while it may negatively impact the short-term financial performance of a company due to the costs of implementing ESG practices.

Regarding the limitations of this study, the first lies in the fact that the study only analysed a relatively short period of time (2017-2023), since a longer timeframe would benefit in a more comprehensive understanding of the relationship between ESG scores and financial performance. Secondly, the geography of the companies used in the study is a limitation, since there was only selected European countries, and that most of the observations came from the same countries. Thirdly, there is the limitation of the ESG rating methodologies used to classify the sustainable metrics by the different third-party private institutions, since even when they use similar scales, there could be differences in

their framework that could lead to different scores or grades. Additionally, while the dynamic panel data model with lagged fixed effects addressed some endogeneity, there may still be some concerns, because while high ESG scores might influence financial performance, firms with better financial outcomes might also invest more in ESG initiatives, creating a reverse causality situation. Finally, the availability, the quality, and the consistency of ESG data, which may differ according to different industries and regions presents another limitation, since it can impact the reliability of the results.

Furthermore, since this study only answered about the negative relationship between ESG scores and firm financial performance, I would suggest for future research to expand the time frame of the analysis, providing insights on the long-term relationship and impact of ESG practices on financial performance.

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Appendix

```
##       Min.    1st Qu.     Median       Mean    3rd Qu.       Max.
## -17099.996      0.015      0.061     -2.666      0.131    839.812
```

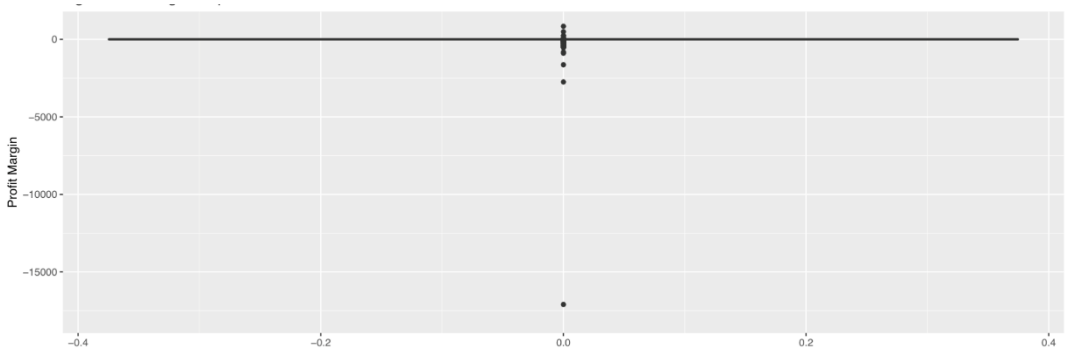

Figure 1: Profit Margin Boxplot

```
##      Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
##     0.000    1.005    1.400    2.689    2.093 1226.929
```

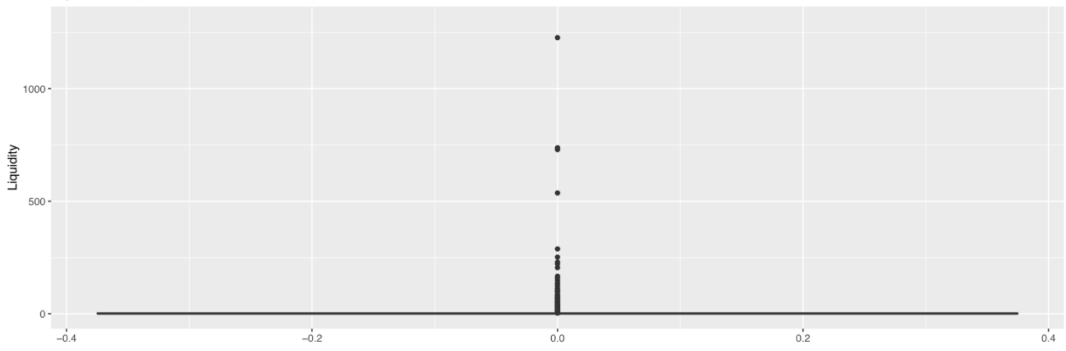

Figure 2: Liquidity Boxplot