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**The impact of ESG and Environmental scores on the companies’
performance: Evidence from European listed companies in
industries with high materiality issues.**

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Abstract

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Title of the dissertation: The impact of ESG and Environmental scores on the companies' performance: Evidence from European listed companies in industries with high materiality issues.

This research examines the relationship between Environmental, Social, and Governance (ESG) policies and practices and a company's financial performance.

To perform this analysis a sample of 113 European listed companies from 2013 to 2023, extracted from the Bloomberg database, was used to examine the impact of ESG and environmental scores on key financial indicators, such as Return on Equity (ROE), Tobin's Q and Return on Assets (ROA). My findings indicate a positive relation between ESG scores and all the three financial metrics, with more statistical significance in the relation with Tobin's Q and ROA, within ROE this relation is still positive, albeit its marginal significance. In the ROE, the results suggest that companies that discuss climate change risks and have initiatives to reduce carbon emissions may have a lower financial performance within the short term, so the initial expenses associated with adopting sustainable practices could momentarily restrict profitability. Finally, my research finds no significant evidence between the Environmental Disclosure Score and any of the three indicators.

These findings are in line with other previous studies, which contribute to the continuing discussion about the financial benefits of sustainability practices and emphasize the significance of a well-rounded approach to ESG integration.

Key words: ESG (Environmental, Social, and Governance), Financial performance, Sustainability, Corporate Social Responsibility (CSR), Transaction

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Table of Contents

1. Introduction.....	3
1.1. Problem Description.....	3
1.2. Research Hypothesis.....	8
2. Literature Review	9
2.1. Main issues regarding ESG	9
2.2. The Limitations of the ESG scores.....	11
2.3. The role of firms to mitigate climate change and its impact in the financial performance	13
2.4. The relation between ESG scores and companies' financial indicators	15
2.5. How banks can contribute to mitigate climate changes	17
2.6. The Growth of ESG Investments.....	19
2.7. Industries with material issues.....	21
2.7.1. Energy and Utilities	23
2.7.2. Mining and Extraction	24
2.7.3. Chemicals.....	25
2.7.4. Agriculture and Food	26
2.7.5. Transportation	27
2.7.6. Technology	28
3. Data collection	30
4. Variables	31
5. Data and Methodology	36
6. Regression Analysis and Findings	40
6.1. The relationship between ESG and Return on Equity (ROE)	40
6.2. The relationship between ESG and Tobin's Q.....	45
6.3. The relationship between ESG and ROA.....	50

7. Conclusion	56
7.1. <i>Summary of the main findings</i>	56
7.2. <i>Suggestions to future studies</i>	58
8. References	60

1. Introduction

1.1. Problem Description

The surface temperature in 2022 was 1.1 °C warmer than the pre-industrial era (1850–1900), according to IPCC, and 0.86 °C warmer than the average for the 20th century, this has resulted in more frequent and extreme weather events, for example, October 2023 was the hottest October of all the register records, every day we saw new extreme episodes that affect our life, such as the fires in Portugal, the snow storms in Germany, floods in Australia, etc.

With the Paris Agreement and other regulations created during the last periods, we are already adjusting our living standards to counteract these changes as we enter a phase that could be extremely significant for our society's future, and businesses are following suit. The shift to a more environmentally sustainable future will require the transition to a greener economy, with a greater emphasis on greener finance.

Since 2015, the signature of the Paris Agreement by more than 190 countries at COP21, started the track to “limit global warming to 1.5°C, greenhouse gas emissions must peak before 2025 at the latest and decline 43% by 2030”, with its implementation and the introduction of the nationally determined contributions (NDCs) in 2020, countries have now to present their plans and actions for the reduction of their greenhouse gas emissions to fulfil the Paris Agreement's objectives, they also have to communicate the steps they'll take to strengthen their resistance to the effects of climate change.

In the European Union, the creation of the European Green Deal, was based on 4 pillars: a predictable and simplified regulatory environment, speeding up access to finance, enhancing skills, and open trade for resilient supply chains. This European Green Deal will make the EU a contemporary, resource-efficient, and competitive economy to meet these problems, ensuring: no net greenhouse gas emissions, making Europe the first climate-neutral continent by 2050, resource-use-independent economic growth, and that no person and place is left behind. A package of suggestions to adapt EU climate, energy, transport, and tax policies such that net greenhouse gas emissions be reduced by at least 55% by 2030 relative to 1990 levels has been approved by the European Commission. Some action that has been adopted by EU's countries are increasing the renewable energy use, with new funds and incentives to the installation of new sources of

renewable energy, the promotion of the energy efficiency, a reduction in the methane emissions, improve air quality and the creation of new networks for energy between EU's countries.

Also, China the biggest greenhouse gas emitter in the world, created in 2021, the 14th Five-Year Plan, which will conduct the track to reach its peak of carbon emissions by 2030 and achieve carbon neutrality by 2060, the Plan includes measures that “promotes low-carbon development and the circular economy with new approaches to transport, energy production, and waste management policies”. In the US, and despite being withdrawn from the Paris Agreement during the Donald Trump's administration, the new Biden's administration has adopted some practices to address climate change, one of the most important was rejoining the Paris Agreement in 2021, they also created new directives to give climate factors top priority while making decisions, establish challenging goals for reducing emissions and encourage the growth of sustainable energy. New measures to promote investments for initiatives involving renewable energy, the infrastructure for electric vehicles, public transportation, and grid enhancements, the stipulation of ambitious targets to reduce fossil fuels dependence, with strategies to boost solar energy deployment, expand offshore wind capacity, and encourage the use of electric vehicles and try to increase the International Cooperation, with the hosting of climate summits, and the celebration of both bilateral and multinational climate negotiations, to support developing nations in their attempts to mitigate and adapt to climate change.

Recognizing all the risks that climate change are creating and addressing these challenges within the financial system, the G20 Financial Stability Board (FSB) and the Task Force on Climate-related Financial Disclosures (TCFD) have become important players, being important in encouraging consciousness, resiliency, and openness in the financial industry.

The G20 FSB, which was created in 2009, acts as a global organization that synchronizes financial supervision and regulation amongst G20 nations. It has developed important initiatives and plans, that involve the development of assess and managing climate-related risks, including a guide to performing stress tests, scenario analysis, and incorporating climate risks into risk management procedures, the institution also provides recommendations in order to enhance openness and facilitate the evaluation of climate-related risks and opportunities by stakeholders in relation to financing and investment activities.

Another important key actor in the promotion of climate sustainability is the Task Force on Climate-related Financial Disclosures, the TCFD, created in 2015 by the Financial Stability Board, with the objective of developing a voluntary framework for revealing financial opportunities and dangers associated with climate change. Important components of the TCFD structure are the recommendations of the promotion of strong governance procedures that can improve long-term resilience and more effectively incorporate climate factors into strategic decision-making; specify which are their climate-related risks and opportunities, making it easier to identify new opportunities for growth decreasing and mitigating these risks. Another recommendation is the adoption of targets and metrics, that allow companies to show to its stakeholder that they are committed to sustainable practices and which actions are taken to reach the company's objectives. Together with FSB, TCFD argues that constant collaboration and commitment from stakeholders is key to having an effective battle against climate change.

The risks and costs of climate change are already here, with expectations of a 1°C increase in temperature is associated with a \$1.6 million decrease in earnings for a median-sized firm (Hugon, 2019), the same author said that unfortunately even companies that may be vulnerable to a climate change environment frequently underestimate the detrimental effects on profits. In 2021 costs associated with severe weather-related disasters in the US were more than \$145 billion (Echo & Cartwright, 2022). The Swiss Re Institute estimates that economic losses from natural catastrophes were \$280 billion in 2023, and “expect that insured losses from natural catastrophes, which were USD 108 billion in 2023, will continue to grow by 5–7% annually”, since 2017, only in 2019 this value was below \$100 billion, and the average value between 2018 and 2022 was \$105 billion, however with this expected growth in 10 years we may see a value that is the double of the actual.

The costs of climate change are not only related to the production of raw materials, or the destruction of infrastructures, related to the increased number of extreme events such as hurricanes or tornados, but are also linked with the changes in consumer preferences influenced by climate change concerns (Klioutchnikov & Kliuchnikov, 2021). Can also have an enormous impact in terms of market value, with climate risks increasing the cost of capital (Berkman, 2019) and the cost of debt that may restrict access to finance (Kling, 2021). Other aspect that will impact firms will be the increase in the number of deaths, in 2023 it is estimated that more than 76 thousand people have died victims of natural catastrophes, this will reduce the number of active people, it

is estimated only in Asia 0.8 million premature deaths by 2050, related with pollution and climate changes (Xie & Dai, 2018).

It is impossible to overlook how climate change is affecting companies and the financial sector. The occurrence and severity of extreme weather events, in addition to other climate-related issues, present serious threats to the companies' financial performance. It is very important to start now mitigating its effects, incorporating sustainable practices, and adapting to the changing environment by using green financing as a means of facilitating the shift to a greener economy, this shift can also open important opportunities for sustainable growth.

During this dissertation I want to study the relationship between ESG policies and the financial performance of companies, trying to relate if this new trend regarding environmental protection, is getting positive results for the companies.

The main research question will be "How ESG impact the companies' results?". Trying to prove if companies with new ESG practices and are implementing new processes, following new strategies that not only promote an environmentally good practice, but also that link you with higher gender diversion/equality promotion, or with good governance actions.

When we look at the recent literature regarding this topic we achieve different results, numerous studies have discovered a positive correlation between financial performance and ESG performance. Both (Koundouri, 2021) discovered that company governance, one important component of ESG, had a positive impact on the financial conditions of companies in a study done with European companies, also (Kim, 2021) concluded that there exists a positive relation between ESG variables and credit rating, also (Paulino, 2022) found a positive relation in some Italian companies between ESG disclosure and firm performance. Other studies show another result, for example, (Kalia & Aggarwal, 2022) conclude that the relationship between ESG activities and firm performance should not be generalized, or (Zhan, 2023), defends some cautions, stressing the potential for management opportunism to have a detrimental impact on innovation and the ambiguous impact of ESG on corporate performance. Some other studies reach negatives relations between ESG scores and financial performance, in Latin American multinationals with higher ESG scores have lower financial performance (Duque-Grisales & Aguilera-Caracuel, 2019), they analyse "104 multinationals from Brazil, Chile, Colombia, Mexico and Peru between 2011 and 2015", making a specific analysis of the Environmental parameter and "show that the relationship

between the E (environmental) scores and FP (financial performance) of the multinationals in our sample is negative and statistically significant”, concluding that in companies with higher E scores, their financial results are lower, finally, making a research in “A-share listed companies in Shanghai and Shenzhen from 2012 to 2021” with emphasis in companies that care about the environment under the mesomeric influence of green technology innovation, (Liang, et. Al., 2023) found " significant negative correlation between ESG performance and financial performance of environmentally sensitive enterprises, meaning that companies with better ESG performance tend to have lower financial performance”.

During this study, I will look for what the investigators say and do my own research to conclude the impact that ESG policies have on firms’ financial results.

The motivation that leads me to my investigation and to this topic are firstly reasons that are related to understanding how companies are evolving for a sustainable economy, which practices, and which results are companies having during these changing moments; secondly, being ESG an actual theme with a lot of discussion during the last years, try to increase my knowledge with ESG and with its practices, finally, is having a dissertation that companies could in the future use to check which strategies could be done to reach certain goals regarding ESG.

1.2. Research Hypothesis

To perform an analysis of how the ESG and firm performance are related, it is important to estimate the research hypothesis that I will follow and try to answer during my dissertation.

The first topic that I will approach is how ESG and impact the financial performance of companies and see if companies with better sustainability practices will have better performance.

H1: *There is a positive and significative relation between ESG and financial performance of companies.*

The second one take into account how ESG can influence the companies' market valuation compared to the replacement cost of its assets (Tobin's Q)

H2: *There is a positive and significative influence of ESG on the market valuation in relation to the replacement cost of its assets of a company.*

Finally, in the third part of the empirical research, I want to know what the relation between ESG and profitability can be.

H3: *There is a positive and significative relation between ESG and the profitability of a company.*

2. Literature Review

2.1. Main issues regarding ESG

Nowadays, sustainability reporting is an obligation for biggest and/or publicly traded companies all over the world. Thus, access to financial markets, government funds and bank loans, as well as top-tier clients will be increasingly impossible without actively managing sustainability issues and reporting them according to international standards. Beside that, also consumers have increased their sensibility to environmental issues, increasing their awareness when choosing products that are according to best sustainable practices.

Environmental, social, and governance, or ESG, scores have become popular as stand-ins for assessing an organization's sustainability. These scores have positive impact on credit rating (Kim & Li, 2021), increases investment efficiency and can improve the company's market value (Zhou, Liu & Luo, 2022).

However, there are some concerns regarding the ability of these scores to measure sustainability adequately. The three main issues are related with the lack of sustainability measure, the way of quantifying ESG and the absence of Transparency.

In terms of the Lack of sustainability measures, ESG scores are becoming mainstream approximation for evaluating sustainability in organizations (Clément, Alexandre et al., 2022), ESG score have been used to express, by companies, the sustainability development of an organization, however, we can see that in many cases these scores fail to have a reliable measurement, mainly because important sustainability principles like temporality, effect, resource management, and interconnection are not fully portrayed by them. Besides that, and despite having a materiality concept, this measure is hard to quantify.

The way the ESG score measures corporate sustainability gives an advantage to larger firms with more resources (Drempetic & Klein, 2019), the firm size gives more resources to the company to the company provide ESG data, and the availability of a company's ESG data on the company's sustainability performance, this organization legitimacy creates a correlation between the variables. This degree of a bad measure of sustainability can create risks to the disclosure of sustainability, however, a study about the Effects of ESG Factor Mismanagement and

Sustainability Reporting on Company Results, that analyses companies in Romania, discovered no connection between ESG risk and market performance, or sustainability disclosure and growth (Oprean-Stan, Oncioiu & Iuga, 2020), during the same resource, was found evidence that a company's commitment to sustainability cannot be adequately described by its ESG disclosure, which emphasizes the adoption of particular standards of conduct and adherence to ethical values.

Another issue that occurs with the ESG measure is the way of measure and how ESG is quantified. Although materiality concepts are applied in ESG scores, their measurements are not necessarily measurable. This makes it difficult to measure and compare sustainability levels amongst companies with accuracy. The agreement between the ESG scores is low (Widyawati, 2020), after a thorough examination of four ESG ratings' dimensionality, validity, and reliability suggests their measurement concerns and constructions are very different. In cause of that here are no convergence regarding these measures and turn harder to have a comparison between companies.

Many and many studies have looked to the difficulty of quantifying ESG, (Hajdu, 2023) draws attention to how challenging it is to compare and evaluate ESG reports, which are frequently qualitative in nature. The abundance of tools and frameworks exacerbates this further. Other studies emphasis the lack of some dimension in quantify ESG, mainly in its social part, in terms of social risk and inequality (Semet, 2020), other researchers conclude that sustainability elements like temporality, impact, resource management, and interconnection are not intended to be measured by ESG scores.

Finally, the absence of Transparency when measure ESG is also a huge issue, affects the efficacy and consistency of ESG rankings, which has an impact on investor decision-making and firm value (Dranev, et al., 2024), that conclusion was also reached in a study performed by Ellen Pei-yi Yu and Qian Guo and Bac Van Luu in 2018, they found significant evidence supporting increased ESG issue disclosure that raises business valuation metrics, they also conclude that firms that have larger assets, stronger liquidity, and a track record of solid financial results will be more transparent about ESG.

Despite all the aspect that have been improved during the last years in terms of ESG disclosure and explanation to investors, mainly in the bigger and public companies, with a clear positive relation with their financial performance, “there is still room for improvement, especially regarding transparency” (Jambor, 2023), it is also important for investor to know how to interpret

the data and the reports, because ESG reports are not standardized, they might not accurately represent a company's sustainability performance.

2.2. The Limitations of the ESG scores

ESG scores assess a company's sustainability and ethical performance, considering all the three aspects of ESG, Environmental, Social and Governance. The majority of these scores classify in a range from 0 to 100 an organization's effectiveness using sustainability metrics. Some scores are very known such as the Refinitiv (from Reuters) and the Bloomberg scores, others such as the MSCI ESG Rating or the S&P Global Sustainability Yearbook are not so well known, during this Dissertation I will only write about the first two.

It is essential to consider the variations in applicability and accuracy between major and small organizations when assessing ESG scores (Cakir, et al., 2023). To evaluate ESG, most of the times tends to obtain information on corporate sustainability reports that have been released or on survey-based self-reporting from businesses, following some frameworks established by international institutions such as the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), and the Carbon Disclosure Project (CDP), there are also other frameworks provided by OECD, PRI or UN Principles Guidelines on Business and Human Rights (UNGP).

Inside the European Union there are some directives that impact the ESG reporting's standards, the EU's disclosure regulations are intersectoral in nature and requires a double materiality assessment that also includes the impact that the firm can have not only in the environment but also in its stakeholders.

However, there are 4 main issues that impact the ESG scores and create limitations when assessing the ESG level of a company: the inconsistency of the data, the selection of the benchmark, the ESG data imputation and the lack of disclosure (Kotsantonis & Serafeim, 2019).

The first issue, occur mainly because different firms have different KPI and metrics to measure their ESG data, "This inconsistency poses a significant challenge when making comparisons among companies. Since these metrics are not necessarily measuring the same thing". The second

one causes problems when we compare different realities, mainly because when we are evaluating ESG scores, we compare companies with different realities and choose the best and the worst company based in a score that as we have said before is not standardized and the benchmark for the sample's scores will be established by defining the range of the greatest and worst performance. The literature presents two manners of surpass this problem, either by comparing performance to a peer group or by evaluating performance in absolute terms using a predetermined "optimal" degree of ESG metrics performance. The absence of regulations and standards for ESG disclosure suggests that not all businesses will disclose ESG information, and those that do won't do so consistently, this gaps in data will turn harder the analysis in data that include a variety of firms, periods, and sustainability indicators. Lastly, the lack of disclosure turns difficult the definition of a good or a bad ESG performance. Strong evidence was discovered in another study indicating that organizations with higher ESG disclosure likely to have higher levels of disagreement, or variety, in their ESG ratings (Christensen, et. al., 2022), showing that is needed an enhanced transparency as well as a better comprehension of the many ESG indicators and how best to incorporate them into company performance evaluation systems. A manner of solving this issue, is by establishing a fair foundation for ESG measurements and practicing self-regulation in a manner that promotes comparability, this will benefit not only companies, but also will benefit investors, who are the most affected with the incompatibility of metrics over time and between companies (Amel-Zadeh & Serafeim, 2018).

It is also important to highlight that despite all the limitations that we show above, ESG scores can assess companies' behaviour in terms of ESG. These means that, *ceteris paribus*, an organization is likely to perform well in comparison to its peers if it consistently receives high ESG scores from different rating agencies.

2.3. The role of firms to mitigate climate change and its impact in the financial performance

New trends regarding environmental protection and climate changes, are leading companies to change their business model, with the introduction of ESG best practices. New regulations, such as NFRD in European Union are allowing companies to improve their practices.

The introduction of CSR (Corporate Social Responsibility) is making companies to commit those practices in a way that are more economically, socially, and environmentally sustainable while balancing the interests of many stakeholders, including as shareholders, employees, customers, suppliers, communities, and the environment.

NFRD is a law from EU, that obligates companies, depending on their size (usually, with more than 500 employees), to provide data about ESG in their annual reports. This keep informed both stakeholders and shareholders about not only their impact on society and the environment, but also the financial results of these sustainable practices, promoting transparency and accountability. These instruments also obligate to report on issues pertaining to the environment, social and employee elements, human rights and anti-corruption. The company's policies, results, and risks pertaining to these areas should all be described in these reports, along with any pertinent non-financial KPIs, allowing to an evaluation for stakeholders, investors, etc., of its sustainable practices and performance.

However, NFRD does not have any kind of format or procedures to the reporting process, company are allowed to choose in which way do they disclose non-financial information. Nevertheless, many of them try to give stakeholders access to information that is pertinent, clear, and easy to understand so they can evaluate the company's performance and effect in these areas, enabling them to make knowledgeable decisions and pushing companies to include environmental, social, and governance (ESG) factors into their operations and business plans. It involves incorporating social and environmental issues into relationships with stakeholders and commercial operations, taking steps to lessen the impact on the environment, encourage moral labour practices across the suppliers (rejecting slavery and child labour practices), encourage the growth and well-being of employees, and engage in ethical and transparent business operations. Many see these programs as a way for companies to show that they care about more than just making profits – that is,

sustainability, ethics and social responsibility. They can help with risk mitigation related to ESG issues, enhancing brand reputation, and establishing credibility and trust with stakeholders and consumers.

All the lack of standards and procedures makes NFRD being replaced by CSRD and SFDR directives. Corporate Sustainability Reporting Directive (CSRD) is a new regulation that expand the scope of ESG reporting, it makes large and listed companies inside the European Union to create more detail and standardized reporting on ESG factors. The CSRD seeks to improve the comparability and transparency of sustainability information, turning easier to take informed decisions. The Sustainable Finance Disclosure Regulation (SFDR) was active in March 2021 and aims to make the market for sustainable investment products more transparent, it mainly action is imposing more requirements regarding financial advisors and market participants at the entity and product levels.

Finally, since last December, the European Union has established new standards for ESG reporting, the European Sustainability Reporting Standards (ESRS), these detailed standards guarantees that firms comply with the CSRD, give thorough and comparable sustainability information, and work to expedite the EU's reporting requirements.

It is also important to note that during the reporting of ESG issues, is important to determining the opportunities and threats associated with ESG factors considering the Double Materiality concept, identify which of the issues are related to Environmental and Social Materiality measuring the impact of the company's activities on the environment and society; and Financial Materiality calculating the impact of sustainability issues on the company's financial performance.

Adopting these regulations and directives into its practices and actions allow companies to mitigate ESG-related issues, bolster stakeholder credibility and trust while improving company reputation, these can benefit both their financial performance and social impact.

2.4. The relation between ESG scores and companies' financial indicators

Some authors study the impact and how ESG scores can change companies' financial performance. Michal Baran studies the Polish Energy sector finding high correlation between ESG scores and corporate finance performance, however, display varying outcomes because of variations in administrative rules and state ownership, similar evidences was reached by Yi Sun, concluding that, ESG scores are positively correlated with company stock prices, having a higher correlation in upscale sectors or areas with healthier economies, on the other side, Eduardo Duque-Grisales after studying companies in Latin America, conclude that ESG scores and financial performance have a negative and statistical significative relation, moderated by geographic international diversity and financial slack. Also, in research, with evidence from the European tourism industry, ESG scores had a negative relation with firm performance (Demiraj et al., 2023).

Looking now for specific indicators that can be used to assess the company's financial performance, analyzing a sample of companies from G7, between 2014 and 2018, "a statistically significant positive relationship between the ESG disclosure with firm's ROA and ROC" was found (Almeyda & Darmansya, 2019), in terms of the ROA, (Garcia Sousa, 2023) found a positively and significant relation between it and ESG scores in 1000 Bloomberg US companies, same conclusions have been reached in an empirical study within companies in the airline industry, "in the model established with the ESG Overall Score, it was concluded that there was only a statistically significant effect on Return on Assets (ROA)" (Sisman et al., 2020). Contrary to this, others researchers, found conclusion that appoint for a negative relation between ESG and ROA (Shobhwani et al., 2023 & Demiraj et al., 2023), or even, a convex relation that was founded in a sample of 108 East Asian listed firms from 2011 to 2017 between ROA and the Environmental Score (Naimy et al., 2021).

Also, the relation between ESG and Tobin's Q shows different conclusions in previous studies, some of them achieve positive and significative relations, such as a study with Chinese listed companies (Yu, X., 2022) or (Dkhili, 2023) that found that ESG has a positive effect on Tobin's Q, through the moderating effect of competitive advantage, high corporate ESG performance boosts market performance, with a sample of 720 firms from 8 European countries' listed companies during more than 10 years, some others authors indicate a weaker, but still positive,

relation (Falzon, 2022). We have also other papers with contrary findings, for example, a selection of 164 banks (Alamsyah, 2023), achieved a significative negative relation between ESG score and Tobin's Q, similar to that obtained by (Aybars et al., 2019), with a relation between lower ESG scores and higher Tobin's Q.

Finally, the return on equity (ROE) have also been intensive studied in its relationship with ESG, showing also interesting findings in the literature, in the same study that found negative relations between ESG Scores and ROA, Kapil Shobhwani, found negative relation between ESG risk score and ROE, however that statistic was not significative, in a close way, Syaputra et al. (2022), after looking for a sample within ESG Sector Leaders IDX Kehati, captured a negative non-significative effect between both variables. Other authors have founded contrary conclusion, in a study within the food industry, the relationship between ESG and ROE became positive and significative (Buallay, 2021), also, in a research with Malaysian companies a positive influence of ESG scores in financial performance, mainly the ROE was founded (Atan et al., 2018) and after studying companies from US S&P-500, Alareeni et al. (2020), it concluded that high levels of ESG disclosure are linked with high ROE, with the same study another interesting finding was reached, "measuring ESG sub-components separately showed that environmental (ENV) and corporate social responsibility (CSR) disclosure is negatively associated with ROA and ROE".

2.5. How banks can contribute to mitigate climate changes

Banks are among the many stakeholders who must actively participate in addressing the urgent global issue of climate change, contributing to a more sustainable finance and to a transition for a carbon neutral economy.

The primary responsibility of banks is to integrate climate considerations into their policies and procedures to manage the financial risks associated with climate change (Santos & Rodrigues, 2021), they have also the function of analyse the projects/companies that are supported by them regarding their environmental risks, for example by reducing funding for fossil fuel projects, enacting financial disclosures relating to climate change (Elliott & Löfgren, 2022). Another way to actively support a low-carbon global economy is providing "climate-friendly" financial products and services, such as finance for renewable energy projects or assistance with energy efficiency improvement initiatives. If we look for some important banks, for example BNP Paribas, at the moment, the institution does not support projects/companies that are inserted in some areas, considered by them as areas with high risk of environmental damage, such as the coal mining sector or the Coal-Fired Power Generation industry, having a robust team of ESG Analyst that provide also assessment to decrease some clients' ESG risk. They have also interesting ambitions in their Sustainable Targets, wanting to accelerate the mobilization of the Group's business on sustainable finance issues. In terms of targets to 2025, the financial institution wants to increase their amount of Sustainable loans to Corporates, Institutional & Individuals dedicated to Sustainable projects to €150bn and reach an amount of €300bn of sustainable investments assets under Management following ESG principles.

Other aspect where banks can be very important is in a transition for a carbon neutral economy, pushing thoughtfully crafted policy levers and driving significant investments in low-carbon assets and climate-resilient facilities (Gunningham, 2020), examples of projects that can be helped with loans with better conditions are projects related with renewable energy (solar, eolic, etc.), but also project that contribute for lower carbon emissions (the construction of an electrical railway, constructions of a bicycle path, etc.). Furthermore, banks must put in place more comprehensive governance structures that deliberately and methodically address climate change, considering both

the direct and indirect environmental effects of their operations as well as the integration of climate-related risks within risk management procedures.

In terms of regulations, we can see that the European Union has created the Directive 2014/95/EU, this required several significant projects/companies to provide non-financial information, such as ESG issues linked to climate change, improving the comparability and consistency of non-financial information revealed by EU companies (Santos & Rodrigues, 2021).

Banks have a crucial role to fight against climate change and help the world to reach a more sustainable economy, with low carbon emissions. The main way to do it is helping important projects that promote sustainable investments, as well as, controlling risks, both financial and environmental, associated with climate change. These institutions are required by law to disclose information relating to climate change, and the need for more comprehensive governance frameworks that incorporate climate issues into day-to-day operations is now a reality that is noted by all.

2.6. The Growth of ESG Investments

Over the past ten years, there has been a noticeable increase in the incorporation of ESG factors into investment strategies, this reflects a growing recognition that ESG factors can influence a company's financial performance, risk profile, and valuation.

Growing awareness of issues related to corporate governance, social responsibility, and climate change has given rise to ESG investing, which is benefiting investors as well as society at large (Zhong, 2023). After the coronavirus pandemic, ESG investing grew steadily, with the integration of economic, social, and governance principles by the millennial generation driving its growth (Pancholi, et al., 2022).

One of the main themes in the literature is how financial performance and environmental standards relate to each other. According to studies, businesses with robust ESG profiles typically have greater profitability, less volatility, and greater resilience to downturns in the economy (Kim, 2021). Also, Hamdi Khalfaoui found, in some US firms, a favourable correlation between ESG and financial performance, with certain variables like cash holding and minority interest having a big influence on this correlation.

But over longer time horizons, outperformance is correlated with a strong ESG profile, particularly in markets or times when investors start to prioritize ESG factors more (Ga-Young Jang et al., 2020), we can conclude that ESG investments can be better in a long-term strategy instead of short-term, in line with the idea that long-term corporate success is facilitated by sustainable business practices.

In the UN Climate Change Summit, the United Nations created in September 2019 the Net-Zero Asset Owner Alliance (NZAOA), an agency that is composed of the biggest insurers and pension funds in the world, in charge of managing investments totalling more than 2.4 trillion US dollars. The WWF, the PRI, the Finance Initiative of the United Nations Environment (UNEP FI), and the Mission 2020 campaign have also joined them. The main goal of this organization is the transaction of their investment portfolios to net zero GHG emissions by 2050, reaching the Paris Agreement objective of a maximum rise of the temperature of 1.5°C. For the short-run, the organization is establishing ranges for the reduction on CO₂ emissions (22 – 32% for 2025 and 40-60% for 2030).

In terms of the ESG factors' role in risk management, according to studies, investors may be able to detect possible hazards that are hidden from view by conventional financial analysis by taking ESG factors into account (Hübel et al., 2019). Companies that have higher ESG scores, mainly in the Environmental and Governance disclosure, are normally associated to be far from scandals and controversies, these help them to keep their market value and the confidence of investors. The use of ESG analysis can be a tool for investors to evaluate the viability of a company's operations and their effects on long-term risk and performance (Zakhmatov, 2023). To improve its portfolio Sharpe ratio, investors should increase its positions in high-ESG securities, leading also to higher risk-adjustment returns (Pedersen, et al., 2019). This study also emphasizes the importance of include ESG factors in portfolio decisions to manage the trade-off between ESG issues and the Sharpe ratio.

In terms of the influence of ESG in corporate behaviour and market expectations, some studies conclude that companies with better ESG scores are the most scrutinized by investors and stakeholders (Zhan et al., 2023), this makes them move to more sustainable practices. This interaction shows that ESG investing can encourage businesses to make improvements in areas such as social responsibility, environmental impact, and governance standards. Moreover, investor behaviour may be influenced by the expectation of ESG-driven transformation, which could result in a continuous reassessment of the companies that are deemed desirable investments (Kong et al., 2023). However, some other studies have found contrary conclusions, for example, ESG ratings do not positively and statistically significantly impact market premiums for Italian-listed companies, despite increased interest in CSR (Landi et al., 2019).

2.7. Industries with material issues

Many and many industries are characterized with higher material issues, these are topics or issues that could have a big influence on how well a company can produce value in the short, medium, and long terms. These issues can be relevant to the organization's stakeholders, comprising financiers, clients, staff, vendors, local communities, and regulatory bodies.

According to ESRS, materiality refers to the point at when ESG concerns gain enough importance to affect an organization's performance, decisions, and actions, try to identify which sustainability elements are essential to the value creation of the firm and the interests of its stakeholders.

ESG factors can change within different industries, however, with different natures of their operation, the impact of material issues can be different from industry to industry, and how they affect society, the environment, and government systems.

There are important elements to identify materiality in ESRS, mainly the Double Materiality Perspective, considering the financial materiality and impact materiality, the first one is impacting a company's operational or financial performance, the second one affects economy, environmental and people.

Regarding the tools that allow to identify materiality, it is important to highlight the SASB Materiality Finder, that helps firms to determine the sustainability concerns that are relevant to each industry, and the EU Taxonomy Navigator provides a classification scheme for economic activities that are environmentally sustainable, helping firms discover actions that are in line with the EU's sustainability objectives to detect significant environmental issues

Material issues in industries have a complicated and multidimensional interaction with ESG ratings. Some researchers have studied the importance and the impact of material issues in ESG ratings and the relationship between ESG and financial results.

Zach Williams and Nicolas Madison find an important relationship of considering material in ESG ratings, however when comparing the relation between ESG scores and financial performance. However, neither of them did not agree, finding no direct relationship between ESG scores and financial performance (Williams, 2022). If we look into their hypothesis they study three relations,

firstly they found no correlation between abnormal returns and current ESG scores, with the abnormal returns being calculated using the CAPM model to compute the excess return over the projected return using risk-free rates and market performance and the ESG scores includes the scores “issued by Bloomberg as of May 2022 and one calculated summation score of all three scores added together”, in a second hypothesis, they found the same result with now studying the Changes in ESG scores, both of them calculated in the same way of the 1st hypothesis. In the 3rd hypothesis, they calculate if “Abnormal Returns of Firms with ESG Ratings are Equal to the Abnormal Returns of Firms Without Complete ESG Ratings”, in this case they use 3 different Bloomberg ESG ratings: environmental, social, and governance, firms are considering with completing ESG ratings, if they have all the three ratings. However, the main conclusion of this study was that “after controlling for industry classification, there is not a statistically significant relationship between abnormal returns and ESG ratings”, so the study does not find a relation that supports “that ESG scores are related to increased financial performance”.

On the other side, we have some other conclusion such as demonstrating the substantial impact of financial materiality on ESG performance rankings and scores (Madison, 2021), or (Consolandi, 2020) implies that businesses in sectors with a high concentration of ESG materiality are rewarded by the market. Nicolas Madison and Eduardo Schiehl in its study “The Effect of Financial Materiality on ESG Performance Assessment”, conclude that the informative value of ESG scores and rankings is influenced by financial materiality, which makes it possible to identify investment opportunities in companies that score highly on business critical ESG concerns. Stakeholders are now demanding information regarding ESG. They want to know more and more about the ESG risks and practices to mitigate these risks, regarding the projects and business that they are inserted into. The same is true about new investors, they “want to know about the financial materiality of ESG issues before they make their investment decision”. The same study concludes that “innovations in accounting standardization practices, such as the SASB standards, offer useful guides to help researchers and practitioners prepare more relevant ESG disclosures”. Another important method used by this study is “consider the industry specificity of ESG issues in performance assessment”, however this fact inserted a huge limitation to the conclusions, they only were available to compare 3 of the 11 industries. Regarding that, they also reach the

conclusion that financial materiality issues should be integrated into ESG performance's qualification and in investment practices.

The importance of have robust and reliable ESG information increases with industries that are prone to have higher material issues (Sepúlveda-Alzate et al., 2021), this research studies the material issues from companies in Latin American, mainly in Colombia, Mexico, Brazil, Chile and Argentina. It was clear that some material issues such as lack of water, climate change and environmental damage are becoming more and more interesting for companies. In their sustainability reports, Latin American corporations give priority to environmental, social, and governance issues. The energy, mining, and utilities industries exhibit the highest materiality scores. Concerns regarding social and environmental issues are spread unevenly among consumer staples businesses operating in the Hong Kong Stock Market, with social issues receiving priority and environmental issues being seen less important (Xinxin, 2023).

In terms of industries with high material issues, to do this research I decided to search in previous studies and papers, which conclusions they reach regarding this topic. In the same research that I gave emphasis in the previous paragraph, they conclude that in the sustainability reports of Latin American listed firms, the energy, mining, and utilities sectors have received the highest rankings for material elements, other researchers add other industries such as the chemical and petrochemical industries (Schütze, 2005), the nuclear industry (Raj et al., 2000) and the fuel industry (Callander, 2007).

After all the information that I searched, I reached a decision regarding industries that have high material issues, and that would be used during my empirical research. The 6 industries that I decide to use are: Energy and Utilities; Mining and Extraction; Chemicals; Agriculture and Food; Transportation; Technology.

2.7.1. Energy and Utilities

A sector that is often associated with both carbon emissions and with the transaction for a sustainable economy. Since the energy industry contributes significantly to global carbon emissions, the environmental component of ESG is quite important. Firms in this industry are held to a high standard when it comes to energy sources and carbon emissions. It also expected the adoption of practices that allow the transitioning to cleaner energy sources, cutting emissions, and

waste management. Social elements include things like labor rights and safety, while governance addresses issues like regulatory compliance and transparency.

Looking now for previous studies evolving this industry and their ESG issues and ratings, I found that some authors conclude that ESG scores are positively connected with industry long-term value, especially in terms of environmental and social areas (Ko, Lee et al., 2022). Other issues faced by the companies within the energy sector is the need to mitigate CO₂ emissions and address climate change concerns (Agbaji et al., 2023), more and more governments, stakeholders and investors are increasing its pressure to the sector in a way to address climate change and reach net-zero emissions by 2050. The energy industry must embrace sustainable business practices and be in line with the SDGs (Sustainable Development Goals). In particular, the utility industry should prioritize the production of power with zero carbon emissions, environmentally friendly manufacturing methods, conscientious supply and value chains, and responsible corporate citizenship.

It is important to highlight inside of this industry, the oil and gas industry, that plays a part in the energy transition, carbon capture and storage, safety performance, and social responsibility, all of which have a positive ESG impact (Whitaker, 2022), the reasons for this effective impact can be explained by the significant contribution of LNG and gas to the energy transition, as well as the potential significance of carbon capture and storage in lowering emissions. However, some other authors highlighted the harder challenges faced by this sector in implementing ESG strategies, among them the absence of standards and the requirement to strike a balance between profitability and sustainability (Arboleda, 2023).

To sum up, the main challenges faced by the industry regarding ESG includes financial performance, resilience, continuous operating and the shift to a more sustainable and renewable energy while keeping support new ESGs activities.

2.7.2. Mining and Extraction

This industry faces more and more challenges with the increased use of land, that in many places involves the destruction of protected places and in some cases even the destruction of villages and other residential places. Adding to this are the issues related to environmental degradation and pollution, in many terms, such as the water, noise and visual pollution. In social terms, there are

also issues related to the use of slavery or the violation of human rights, especially in areas with weak regulations and oversight.

The main problem of this industry is that all the issues, that can also be found in other industries, such as the hydric and carbon footprint, the local and environmental damage or the waste disposal, being considered in an industrial scale, increase all the consequences that arise from them (Andrés López et al., 2022), this was the evidence from a study made in the Chilian mines, that due to its industrial scale and dependency of the mining sector in its GDP, creates many and many challenges to the creation and imposition of ESG measures that mitigate these risks in future mining projects.

In operative and social terms, the mining sector is facing huge difficulties regarding the lack of availability of capital, explorations in isolated locations, the impact on local communities, leading to socioeconomic issues including excessive poverty and insufficient medical care, and labor questions, mainly unfair wages, human rights violation and the lack of safety measures (Marimuthu, 2021).

In general, the mining and extraction sector must prioritize social and environmental obligations, encourage reporting openness, and implement sustainable practices at every level of mining operations to solve these ESG challenges.

2.7.3. Chemicals

Very similar to both industries that I mentioned previously, it is a sector that encounters environmental challenges mainly related with the pollution, in this case more air pollution and waste management, in social terms it is also known as a sector that faces problems such as labor practices and product safety. Concerns exist over supply chain management, worker safety, and the use of hazardous products.

The effects of pesticides, economic stability, tensions between environmental preservation and public health agendas, and unequal risk distribution are some of the ethical issues surrounding industrial chemicals (Smith et al., 2019), and is challenged by the requirement to reduce pollution in the air, water, land, and other sectors; major polluters in these sectors include the mining, ethylene manufacturing, gas, and oil industries (Artie, 2018).

The chemical sector must adopt a more ecological risk assessment methodology, among other ESG concerns (Maltby, 2018), the relevance of environmentally friendly and sustainable engineering and chemistry.

This industry is also being impacted by new laws and regulations, for example in Europe, with the European Green Deal, that wants to reduce emission of greenhouse gases and promote the sustainability of new chemicals products, the petrochemical industry's effects on the environment and society, that causes dangers to human health and ecosystems.

2.7.4. Agriculture and Food

The food and agriculture industry is one of the sectors that have more concerns raised with ESG, it is also a sector that could be very important to a transition to a more sustainable economy. These issues are mainly environmental challenges, such as sustainable ingredient sources, care for animals, ethical work practices, diet and well-being, and the effects of agricultural activities on nearby communities and the environment.

Reducing emissions, waste, and water use are the main environmental goals. Food safety, marketing strategies, and regulatory compliance are the three main focuses of governance issues.

Some authors refer that currently the main problems faced by the industry are the absence of innovative systems, food security, natural disasters and climate change, and the availability and accessibility of food (Mishra et al., 2023), the fact that more and more population is living in the cities, are pressuring this industry with higher and higher demand for both quantity and quality of food. Another issue is ensuring food quality and security, mainly in developing countries, that have “a high share of agriculture in their GDP, adverse conditions hindering agricultural production and deficient infrastructure” (Pawlak & Kołodziejczak, 2020), to solve these issues a new growth plan to deal with limited natural resources and rash decisions will be required.

Looking for the European Union, a new Green Deal, was created in 2019 by the European Commission, the main goal of this new document is to “transform the Union into a modern, resource-efficient and competitive economy, where there are no net emissions of greenhouse gases by 2050, economic growth is decoupled from resource use”. Another objective is to adopt a biological agriculture approach and achieve a huge reduction in terms of pesticides and fertilizers (Malorgio & Maragon, 2021), this will allow to higher protection in terms of agricultural land and

the biodiversity, mitigating another ESG issue related with this industry, the soil contamination and the loss of agriculture biodiversity, that is linked with the industrial scale of the food production.

Another issue linked with agriculture and the food production industry is water consumption, mainly used in irrigation, animal husbandry and aquaculture. Looking now for a study that analyze the problems created using water in agriculture in the US and in China, by Gregory Veeck, Ann Veeck and Hongyan Yu, the first conclusion that they arrive is that in both countries water tables have dropped and crop productivity has been restricted because of excessive and unsustainable groundwater use. The reduction in rainfall and the irregular precipitation, linked with the climate changes, is created challenges for both nations, with huge impacts in the long-term sustainability of cultures with high water consumption, such as the cotton, rice or the catfish and tilapia aquaculture, and with the “current water consumption rates in the farming regions of both nations are simply not sustainable”, unless some legislation is created to regulate this problem, the future of agriculture and food industry in both countries can be in risk. Another country being seriously impacted by the lack of water and extreme drought is Spain, with areas in the Autonomous regions of Andalusia or Catalonia that are controlling the water use in agriculture and husbandry, in some cases limited water use for the population is also being imposed.

2.7.5. Transportation

Companies in the transport sector try to update their methods and actions to more sustainable practices. The need to address environmental issues is growing as transportation becomes more sustainable. It is one of the industries with the highest energy consumption. The main environmental considerations are related to carbon emissions, fuel efficiency and preservation of ecosystems. There are also other issues such as the safety standards, and labor practices.

There are many sectors within the transportation industry that are truly impacted by significant ESG issues, aviation, the road transportation sector or logistics transportation. All the three-face significant and similar challenges, such energy consumption and CO₂ emissions. Globally, the transports sector is responsible for 27% of global energy consumption and for 33.7% of pollutant emissions and greenhouse gas.

In terms of the road transport sector, the industry is still having a huge number of vehicles using ICEs (internal combustion engines) that use fossil fuels, the transition to alternative energy sources and the development of new vehicle technology is crucial (Mébarki, 2020). The change to a sustainable transportation method is also involving new challenges, electric vehicles have lower autonomy, have huge problems with the lower temperatures (in Oslo with temperatures of -15° C, 50% of the public buses' autonomy was lost) and requires significant time to recharge. However, in the future the development of new lithium ion or lithium polymer batteries could mitigate the issues with the lower autonomy. Another aspect where electric vehicles are positive is to lower noise pollution and improve energy efficiency. In order to improve firm value, the automotive industry is also expected to better address sustainability issues (Dinca, 2022), keeping their investment in the development of new greener and more efficient solutions.

Another concern is logistics transportation, which contributes significantly to environmental pollution. Sustainable logistics and alternate modes of transportation, such as railway transport, are being suggested as solution (Keleş, 2021), changing their practices can include problems in the short run, however, due to the long-run sustainability these new practices could result in better results in the future.

Finally, the aviation sector has also huge challenges regarding ESG, including noise pollution and greenhouse emissions. To mitigate them, the industry is focusing on implementing sustainable practices in four areas: operational innovations, sustainable energy carriers, organizational initiatives, and technical advancements (Andela, 2023), however, some specialists refer that the implementation of more sustainable solutions implies facing some barriers such as the switch to environmentally friendly airports, the use of sustainable aviation fuels, and restrictions on technology transfer (Markovskaya et al., 2023).

2.7.6. Technology

This industry faces challenges that can be considered unique, the main issue is related to cybersecurity and data protection. Frequently regarded as catalysts for innovation, progress and creativity, these companies face higher levels of scrutiny regarding all the issues mentioned previously, adding also ethical use of AI and antitrust regulations. Managing electronic waste and energy efficiency are two of the main environmental issues.

Tech companies are affected also by the low accuracy of their ESG measurement and financial constraints to make face with projects and ideas that could lead to sustainability (Li, 2023), the implementation of new technologies such as AI or blockchain, can help to increase the reliability and efficiency of ESG data.

3. Data collection

After choosing the industries that I want to study, I start to choose the companies that will fit in my empirical study.

Firstly, I have to say that only companies that are traded in European Stock Exchanges will be chosen during this research, for two main reasons, firstly to have a more reliable and valid data, secondly because are companies with higher data regarding ESG, that can be used as a comparison method.

I start to look in every industry that I choose before, which will be the main companies within the European main stock index, trying to look to a huge number of countries that will provide me with a homogeneous sample regarding European companies, another aspect that is important to highlight is the fact that the majority of my data starts in 2015, the year when the Paris Agreement was signed, that will also serve as another aspect of analysis, see if the Paris Agreement and the measures that countries and companies have start to implement are giving them financial results and performance.

After choosing all the companies that will be studied during this research, I search for their financial data and ESG information within the Bloomberg Data Base, with that I was allowed to obtain data from more than 110 European companies within the years that I want to study and that allowed me to construct my data base.

Below, I will present a table showing the number of companies is divided by each industry.

Industry	Number of Companies
Agriculture and Food	14
Chemicals	18
Energy and Utilities	33
Mining and Extraction	11
Technology	15
Transports	22
Total	113

Table 1: Distribution of companies per Industry

4. Variables

In this chapter I will explain which variables I have used during the empirical research, firstly, I will divide them into three main groups, the dependent variables, the ESG variables and the control variables.

In the first group, I choose the Return on Equity (ROE), the Return on Assets (ROA), and the Tobin's Q, the reasons that lead me to choose these three variables was after looking for some previous papers and studies and to obtain a more diverse reality of the firm's financial performance.

Return on Equity: during the study and after analysing some previous papers and other studies, I choose to obtain the ROE by a DuPont Analysis:

$$ROE = \frac{NI}{Revenue} * \frac{Revenue}{Total Assets} * \frac{Total Assets}{Total Equity}$$

Some previous papers after studying the relation between both variables reach various conclusions, In the Polish energy industry, ESG ratings are highly correlated with corporate financial performance (ROE) (Baran, 2022). In 2021, Naimy found significant relation between ESG scores and ROE, in companies from the East Asia. On the other hand, after studying a sample of Indian companies of the index NSE-100, there is no significant relationship between company performance and ESG risk scores or their components.

Return on Assets: the Return on Assets will also give us an idea regarding the relation between the Net Income, the Total Assets and ESG. It shows us how a company is profitable in relation to its Assets, however this ration can be highly impacted and different from industry to industry, because the value of Total Assets differs from company to company.

$$ROA = \frac{NI}{Total\ Assets}$$

Looking now for studies that analyse both variables, we see (Sisman & Cankaya, 2020) conclude that the relationship between the overall ESG score and ROA is statistically significant, after study a sample of companies within the airline industry. A unidirectional positive and substantial relationship between the ESG Combined Score and ROA that demonstrates the positive impact a rise in ESG scores have on operating success, was found during a study using the Thomson Reuters Environmental Social Governance (ESG) Combined Score and performance of S&P 500 firms with eleven years of data from between 2006 and 2016, performed by (Aybars et al., 2019), other studies such as the study performed by Viviane Y. Naimy in 2021, conclude that no relationship was detected between ESG and ROA.

Tobin's Q: Tobin's Q is a ratio that measures the relation between the market value of a company and its assets' replacement cost, in general manner, a company should always search to reach the equilibrium by equal its market value and its replacement cost.

To calculate this ratio, I decided to use the sum between the Market Capitalization, Total Liabilities, Preferred Equity and Minority/Non-Controlling Interest as the Market value of the company, so the formula that was used to calculate the Tobin's Q is:

$$Tobin's\ Q = \frac{Mkt\ cap. + Total\ Liabilities + Preferred\ Equity + Minority\ Interest}{Total\ Assets}$$

This indicator should always be proxy of 1, that indicates that the company is in equilibrium, and can also be used to show if a company stock is overvalued and undervalued. This indicator can also be impacted by the industry, some industries that have high values in both Total Assets and in their Market capitalization, also the size of the companies will impact these indicators, with higher companies having higher Tobin's Q.

Tobin's Q shows a significantly positive relationship between ESG composite performance and firm value (Yu & Xiao, 2022), that is also the conclusion of the studies performed by López-Toro, 2021, analyzing Listed Pharmaceutical Companies and by Nazarova, 2022. On the other side, (Aybars, 2019) found that “Tobin's Q seemed to affect ESG score rather than the ESG score inducing Tobin's Q. Higher Tobin's Q seems to lead to a lower ESG score. In other words, firms with higher growth potential as denoted by a higher Tobin's Q, are found to be less sensitive to ESG issues.”.

The second group is composed by variables that analyse ESG, inside this group are the ESG Scores, the Environmental Scores and variable that analyse how firms are reacting with climate change, I called it the Climate Change Score, that is a score (between 0 and 1) from 2 dummy variables (Risk Climate Change Discussed, Emission Reduction Initiatives).

The ESG score used was the Thomas Reuters Score, ranged between 0 and 100, a score that is elaborated as an average of each 3 disclosure scores (Environmental, Social and Governance), with each score being calculated considering indicators from different realities, as it is showed by the image below.

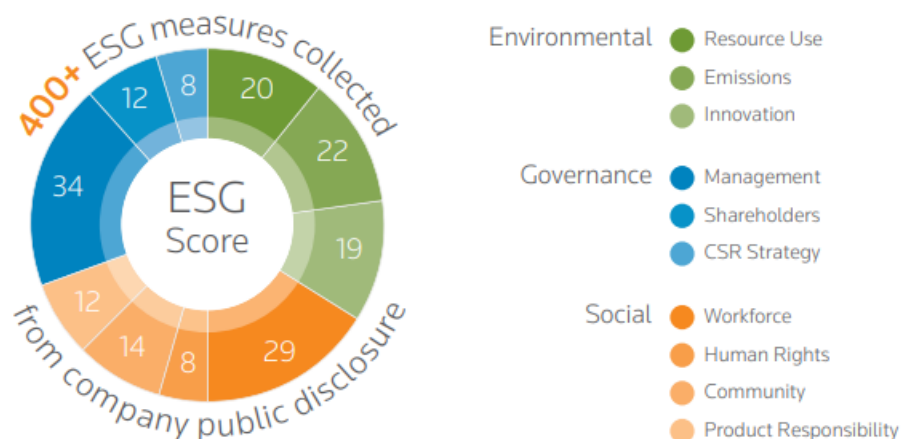


Figure 1: ESG metrics formation. Source: Thomson Reuters (2018)

The second variable that will be considered is the Environmental Disclosure Score, one of the three that is considered in the calculation of the Overall ESG Score, considering only the Environmental performance of a company. It is elaborated with indicators that assess the companies' practices in terms of resource use, emission, and innovation, with the weight of each category on the overall score being accordingly with the number of indicators that each category has.

The third and last variable of this group is the Climate Change Score, a variable that was created by me, using two dummy variables obtained from the Bloomberg Data Base, evaluating if companies have Emissions Reduction Initiatives and Risks of Climate Change Discussed, each of the variable has a value of 1 if the company had in that determined year that determined variable and 0 if not. After a careful analysis of each variable, I decide to do this score, not doing an average score of each variable, mainly because the variables had different statistical significance, the variable Risks of Climate Change Discussed, confer a high sensitive being important to have higher weight in this score, I gave it 70% of the total Score, secondly, the variable that show if a company had Emissions Reduction Initiatives, has a weight of 30% in the total score.

Climate Change Score = 0.7 * Risks of Climate Change Discussed + 0.3 * Emissions Reduction Initiatives

The table below show the descriptive statistics of the two dummy variables and the Climate Change Score.

Variables	N	Mean	Median	SD	Min	Max
Risk Climate Change Discussed	727	0.61	1.0	0.49	0	1
Emission Reduction Initiatives	727	0.96	1.0	0.19	0	1
Climate Change Score	727	0.70	1.0	0.35	0	1

Table 2: Descriptive Statistics of the variables that compose the Climate Change Score

Lastly, the third group are control variables, in this group are the Firm size, Leverage, Debt-to-Capital ratio and the Profitability. The majority of these set of variables have been used in previous studies, such as Auodadi & Marsat (2018), Velte (2017) and Drempetic et al, (2020).

The table below show us an explanation regarding the control variables and how was them calculated.

Control Variables	Explanation
Firm Size	Natural logarithm of firm's Total Asset [$\log(\text{Total Assets})$]
Leverage	Total Debt/EBITDA
Debt-to-capital ratio	Measures the proportion of a company's capital that is financed by debt
Profitability	Indicates how much profit a company generates for each dollar of revenue it earns, measure the company's efficiency in generating profits from its sales ($\text{NI}/\text{Revenue}$)
Financial Structure	Reflects how the company finances its operations and investments (unsystematic firm risk) (Total Debt/Total Assets)

Table 3: Explanation of the Control Variables

Firm Size: Some previous studies show the impact that the Firm Size can have, being described as the “ability to pay” new investment opportunities (Clacher & Hagendorff, 2012). The literature states that large companies can create economies of scale, increasing their Firm value (Jang et al, 2013). It is calculated as the natural logarithm of the company’s Total Assets, having been inserted in some previous researches in a similar way (Velte, 2017; Fischer & Sawcyn, 2013).

Leverage: It is calculated as a ratio between a company’s Total Debt and its EBITDA. Measure a company’s ability to make face with its incurred debts in terms of its EBITDA. A lower value in this ratio show that the company can pay off its debt more quickly.

Debt-to-capital ratio: Measure how a company is using Equity to finance its operations, instead of debt. Higher level in this ratio indicates that the company is using higher levels of debt to finance its operations and may be face higher interest expenses and increased risk of financial distress.

Profitability: The profitability measures the percentage of revenue that is converted into profit, assessing the efficiency of the operations and its ability to manage costs of a company, in this study I will use the Net Income Margin to evaluate the Profitability. It was used in a previous paper, to study the relation between ESG and Corporate Profitability after the pandemic (Duan et al., 2023).

Financial Structure: The company's financial structure is originated by the division between company's Total Debt and Total Assets, it evaluates the unsystematic firm risk, and reflects how the company is financing its operations. Also, in previous studies this variable has been used as control variable (Alereeni & Hamdan, 2020; Clacher & Hagendorff, 2012).

5. Data and Methodology

After present the data that will be used for this empirical research, I will now present all the methodology that I have used. During all this part, I have used the statistical software R, that allow me to estimate all the regressions, calculate the descriptive statistics, perform additional tests, etc.

All the models are constructed based on an unbalanced panel data, after the elimination of the 1% higher and lower values of all the dependent and ESG variables, this will eliminate the risk of having outliers/extreme values, an approach that is used also in some previous studies (Aouadi & Marsat 2018, Tamayo & Servaes, 2013), we also eliminate all the rows from N/A values within this variables. From the original data base with 1265 observation for each variable extracted from Bloomberg to this final panel data that has 727 observation that will be used to perform our study, I eliminate more than 500 observations per variable, most of them due to N/As values. Our data base will be an unbalanced panel (Stock & Watson, 2003, p. 54 & 363 and Wooldridge, 2012, p.491) with sample sizes ranging from N = 719 to N = 727. I will now present you the descriptive statistics of all these variables.

Variables	N	Mean	Median	SD	Min	Max	Skewness	Kurtosis
ESG_Score	727	57.98	59.61	11.43	22.03	78.56	-0.65	-0.28
Env.Score	727	51.46	55.21	18.51	0.33	81.06	-0.90	0.23
Climate_Ch_score	727	0.71	1.00	0.35	0.00	1.00	-0.49	-1.62
ROA	727	5.38	4.65	5.34	-9.40	26.70	0.48	1.16
ROE	727	15.17	13.92	13.01	-59.18	72.24	0.10	4.44
Tobin's Q	727	1.65	1.31	0.96	0.50	5.99	2.02	4.48
Control Variables								
Lev	719	3.14	1.92	16.46	-33.71	423.48	23.44	591.78
Firm_Size	727	10.01	10.00	1.45	6.55	13.24	-0.11	-0.61
Profitability	727	0.08	0.07	0.10	-0.62	0.65	-0.44	9.83
Fin_structure	719	0.25	0.23	0.13	0.00	0.71	0.44	0.12
Debt_capital	719	0.39	0.37	0.19	0.00	1.41	0.53	1.35

Table 4: Descriptive Statistics before manipulation of Control variables

Looking for our descriptive statistics' table, we do not observe any paradoxical behavior among the main variables, however it is important to highlight the fact that in the three variables from the ESG group, all of them have mean very similar to its median, this indicates that the variables follow a balanced and normal distribution, something that is also proved by the level of skewness close to 0.

In the group of our dependent variables, we also observe that the mean and median of the Tobin's Q are slightly close to 1. In all the three variables, observe mean and median with very similar values, this means that on average, the companies studied have above average Tobin's Q, ROA, and ROE performance. In the Return on Equity and in the Tobin's Q we also observed higher values in skewness and kurtosis (this only in the Tobin's Q), however, considering (George & Mallery, 2018), a variable can be considered normal distribution if the kurtosis is between -7 and +7 and the skewness is between -2 and +2, in this case I considered the value of the Tobin's Q skewness has a proxy of 2.

Looking now for our control variables, it is important to highlight that in this case, we found high levels in terms of kurtosis and skewness in both Leverage and Profitability ratios, values that show, specially in the Leverage, we don't have a normal distribution with extreme values, that could have impact in our analysis, to decrease this risk, and increase the robustness of our analysis, I adopt the solution of (Zhao et al., 2018), and decide to winsorize this two variables at the top and bottom 99th percentiles of their distributions, this decrease our number of observations to 688, and turning now the values of this two indicators acceptable in both variables, this process also decrease the Tobin's Q skewness to 2, a level that is within our acceptable value, as you can see in this table below.

Variables	N	Mean	Median	SD	Min	Max	Skewness	Kurtosis
ESG_Score	688	58.32	60.23	11.23	24.47	78.56	-0.67	-0.21
Env.Score	688	52.16	55.78	18.13	0.33	81.06	-0.95	0.42
Climate_Ch_score	688	0.72	1.00	0.35	0.00	1.00	-0.54	-1.57
ROA	688	5.60	4.70	4.97	-7.48	26.70	0.67	1.17
ROE	688	16.05	14.28	11.90	-59.18	72.24	0.76	4.61
Tobin's Q	688	1.67	1.32	0.97	0.52	5.99	2.00	4.34
Lev	688	2.41	1.93	1.88	0.00	13.09	1.81	4.70
Firm_Size	688	10.06	10.11	1.42	6.55	13.24	-0.14	-0.54
Profitability	688	0.08	0.07	0.08	-0.12	0.33	0.56	1.02
Fin_structure	688	0.24	0.23	0.12	0.00	0.71	0.39	0.00
Debt_capital	688	0.39	0.37	0.19	0.00	1.41	0.58	1.59

Table 5: Descriptive Statistics after manipulation of Control variables

Now I will present you the Correlation matrix between all the variables that will be used to perform this research.

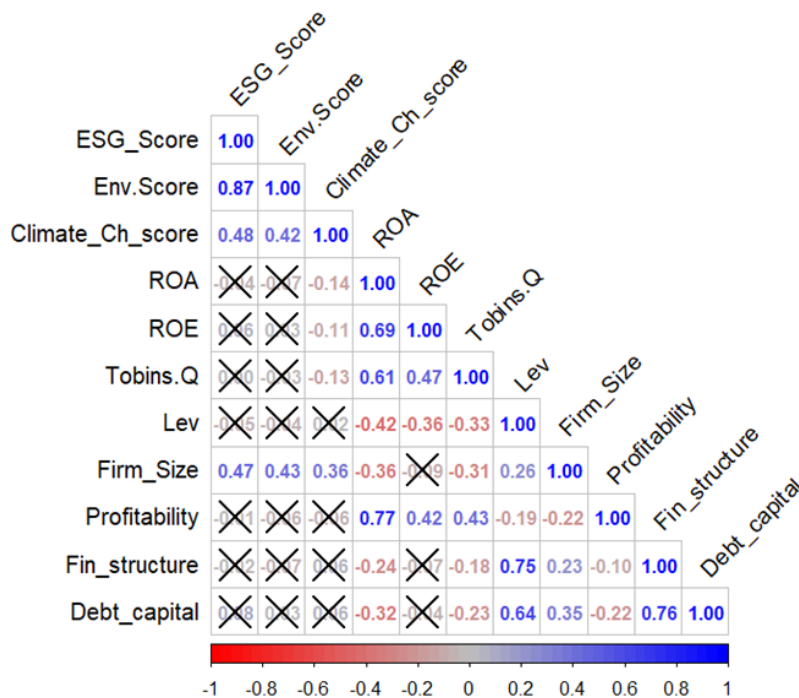


Figure 2: Correlation Matrix (Performed in R)

Looking now for the correlation matrix, it is important to focus the fact that variables that shows the score related with ESG (the ESG score and the Environmental Disclosure score) have not a significative correlation with all the dependent variables. The largest correlations are between the ESG Score and Environmental Score (0.87), ROA and the Profitability (0.77), Debt capital and financial structure (0.76), and between the financial structure and the Leverage ratio (0.75), considering these results, I decide to not use the Profitability as a control variable in the model that studies the ROA, also in all the models I decide to not use the Financial structure variable at the same time that both Leverage ratio and Debt capital. In terms of the correlation between the two score, something that is natural due to the fact that the Environmental disclosure score is one of the three parts that are used to construct the ESG score. We can therefore disregard this imperfect multicollinearity finding and conclude that there is no evidence of multicollinearity in any of the ESG variables because their correlations are two high to suspect multicollinearity. Other bivariate correlations stay on relatively moderate levels, ranging between [-0,42; 0,64], which alleviates others multicollinearity concerns, however, I will perform VIF (variance inflation factor) to which model to check how if my model is suffering from multicollinearity.

6. Regression Analysis and Findings

6.1. The relationship between ESG and Return on Equity (ROE)

To evaluate the relationship between the firm's ESG and financial performance, we will use the ESG scores and the Environmental score as independent variable, the Climate Change score will be used in the model with the Environmental score as independent variable, in all the models the ROE will be used as dependent variable, adding to this model also some control variables, the Firm size, and the financial structure.

Below you can see the results of the models that study the relation between ROE and the Environmental score and Climate change score.

	<i>Dependent variable:</i>		
	ROE		
	(1) <i>Pooled OLS</i>	(2) <i>Fixed Effects</i>	(3) <i>Random Effects</i>
Env.Score	0.075** (0.029)	0.092** (0.037)	0.079** (0.032)
Climate_Ch_score	-4.225*** (1.450)	-3.801** (1.669)	-4.087*** (1.487)
Firm_Size	-0.665* (0.373)	-0.443 (0.520)	-0.517 (0.426)
Fin_structure	-4.056 (3.823)	-9.261* (4.835)	-6.562 (4.126)
Constant	22.903*** (3.220)		21.752*** (3.746)
Observations	688	688	688
R ²	0.027	0.025	0.032
Adjusted R ²	0.021	-0.173	0.026
F Statistic	4.692*** (df = 4; 683)	3.725*** (df = 4; 571)	16.880***
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01		

Table 6: The impact of Environmental Score on the ROE

After the estimation of these 3 different models, I performed three test to check which type of model will be appropriate to take conclusions of these question.

Hausman Test	$X_2(4) = 2.2502$	p-value = 0.6898
Breusch-Pagan Lagrange Multiplier Test	$X_2(1) = 135.4417$	p-value = 0.0000
Breusch-Godfrey Test	LM test = 161.15	p-value = 0.0000

Variables	VIF	1/VIF
Env.Score	1.448576	0.6903333
Climate_Ch_score	1.284315	0.7786252
Firm_Size	1.379365	0.7249714
Fin_structure	1.086551	0.9203431
Mean	1.299702	0.7694073

Table 7: Preliminary Tests

After looking for these tests' statistics we can conclude that the model that is more appropriate to perform our analysis is the Random Effects models. With the p-value of the Breusch-Pagan test, we can also conclude that our sample face problems of heteroscedasticity, similar to that the Breusch-Godfrey test, is telling us that my sample is suffering from autocorrelation, so I estimate the robust standard errors (RSE), that will mitigate the potential effects of heteroscedasticity and autocorrelation within the sample. Finally, after performing a VIF test, we can see that all values are below 5, so our model does not suffer from multicollinearity (Stock & Watson, 2003).

Now I will present you the regressions between ROE and ESG Score.

	<i>Dependent variable:</i>		
	ROE		
	(1)	(2)	(3)
	Pooled OLS	Fixed Effects	Random Effects
ESG_Score	0.126*** (0.046)	0.170*** (0.056)	0.138*** (0.049)
Firm_Size	-1.098*** (0.372)	-0.917* (0.521)	-0.965** (0.427)
Fin_structure	-4.168 (3.800)	-10.596** (4.774)	-7.312* (4.094)
Constant	20.770*** (3.366)		19.562*** (3.830)
Observations	688	688	688
R2	0.021	0.027	0.029
Adjusted R2	0.017	-0.169	0.024
F Statistic	4.956*** (df = 3; 684)	5.269*** (df = 3; 572)	14.692***
<i>Note:</i>		* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$	

Table 8: The impact of ESG Score on the ROE

Hausman Test	X2 (3) = 3.2157	p-value = 0.3595
Breusch-Pagan Lagrange Multiplier Test	X2 (1) = 135.99	p-value = 0.0000
Breusch-Godfrey Test	LM test = 163.65	p-value = 0.0000

Variables	VIF	1/VIF
ESG_Score	1.311081	0.7627296
Firm_Size	1.384674	0.7221916
Fin_structure	1.067541	0.9367319
Mean	1.254432	0.7971736

Table 9: Preliminary Tests

As the case before, I should use the RE models to perform this study and estimate the robust standard errors, and again, the model, does not suffer from multicollinearity.

	<i>Dependent variable:</i>	
	ROE	
	(1)	(2)
Env.Score	0.079 (0.053)	
Climate_Ch_score	-4.087** (1.986)	
ESG_Score		0.138* (0.083)
Firm_Size	-0.517 (0.578)	-0.965 (0.596)
Fin_structure	-6.562 (10.050)	-7.312 (10.152)
Constant	21.752*** (5.392)	19.562*** (5.743)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 10: Estimation of RSE for the ROE's models

Looking now for the table above and also considering the estimation of the models, we observe statistical significance relation of both ESG score (at 10% level) and Climate Change Score (at 5% level) with ROE, contrary to the relation with the Environmental Score, that does not appear to have significance with the estimation of robust standard errors.

With these results we can conclude that an increase in the Climate Change score by 0.01 units will decrease the ROE in 0.0409p.p. *Ceteris paribus*, higher values in the Climate Change Score tend to decrease the ROE, taking into account, how the variable was constructed, this means that companies that have the Risk of Climate Change discussed and Initiatives to reduce carbon emissions, on average, have lower financial performance. In terms of ESG score, we see that an increase in 1 unit in the ESG score will, on average, leads to an increase in the ROE in 0.138 p.p, however it is important to highlight the fact that this statistically significant is marginal, if we look for previous authors, they attest that stronger evidence in favor statistically significant is commonly defined as a p-value of 0.05 or less (Stock & Watson, 2003), so, we must take cautions to consider this conclusion for this sample.

Another aspect that is important to tell, is the fact that in both models the R², be below 5%, so these models does not explain in huge part the variances on ROE, even after the inclusion of control variables to mitigate these effects. Although when we observe the F-statistic, in both models this value is higher than 10 and significant for a 1% level, so it allows us to explain the regressions (Siegel & Wagner, 2021).

These findings, mainly within the ESG score are accordingly with some other authors, that also found proves that companies with high ESG scores, on average, have higher ROE and better financial performance (for example, Atan et al., 2018 and Alareeni et al. 2020). Another aspect that can be deducted from our results is that companies with initiatives to reduce emissions and discussion of the risks with climate change have, on average, lower financial performance, explanations for that can vary, and even the past studies have not focused on that. A possible reason for that is the fact that companies need, in the short run, to make huge investments in innovations to adopt more sustainable practices, with high amount of investment in the short run, some of them will have lower returns and performance, having the majority of my sample within 2015 and 2022, it is possible that it is only capturing short term's effects of this score, however, some previous studies captured similar results, from 2001 to 2006, there was a negative correlation between corporate climate change initiatives and financial performance, particularly in Europe (Ziegler et al., 2009), another previous study, despite obtain a positive relation between climate change disclosure and corporate financial performance within Indonesian listed companies, however, the improvement occurs only in the long term, after some level is achieved (Iriyadi & Antonio, 2021).

6.2. The relationship between ESG and Tobin's Q

The Tobin's Q give us a perspective of the companies' market value related with its financial obligations. Like the analysis with ROE, I will estimate two regressions, one with the ESG score as independent variable and another with both Environment score and Climate Change score, adding in both regressions, the Firm Size, the financial structure and the Profitability as control variables.

	<i>Dependent variable:</i>		
	Tobin's Q		
	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
Env.Score	0.006*** (0.002)	0.008*** (0.002)	0.007*** (0.002)
Climate_Ch_score	-0.192* (0.103)	-0.100 (0.104)	-0.134 (0.097)
Firm_Size	-0.155*** (0.027)	-0.221*** (0.033)	-0.197*** (0.029)
Fin_structure	-0.598** (0.272)	-0.235 (0.304)	-0.334 (0.274)
Profitability	4.861*** (0.437)	3.225*** (0.427)	3.636*** (0.402)
Constant	2.809*** (0.245)		3.156*** (0.268)
Observations	688	688	688
R ²	0.253	0.199	0.211
Adjusted R ²	0.248	0.034	0.205
F Statistic	46.235*** (df = 5; 682)	28.267*** (df = 5; 570)	181.166***

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 11: The impact of Environmental Score on the Tobin's Q

Hausman Test	X ₂ (5) = 12.454	p-value = 0.0291
F-test for individual effects	F (112,570) = 5.715	p-value = 0.0000
Breusch-Pagan Lagrange Multiplier Test	X ₂ (1) = 359.76	p-value = 0.0000
Wooldridge's Test	F (1,573) = 31.658	p-value = 0.0000

Variables	VIF	1/VIF
Env.Score	1.414361	0.7070332
Climate_Ch_score	1.279019	0.7818493
Firm_Size	1.449986	0.6896617
Fin_structure	1.096892	0.9116669
Profitability	1.054401	0.9484060
Mean	1.258932	0.7943243

Table 12: Preliminary Tests

In this case based in the p-value of the Hausman test, we reject the null hypothesis, and the FE effects model will fit better in our analysis. In the Breusch-Pagan test, we still have a proxy of 0 as p-value, this means that we still have problems of heteroscedasticity and will have to estimate the robust standard errors to take more reliable conclusions. The VIF test, tell us that our model does not suffer of multicollinearity.

Now I will present you the regressions between Tobin's Q and ESG Score.

	<i>Dependent variable:</i>		
	Tobin's Q		
	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
ESG_Score	0.012*** (0.003)	0.016*** (0.004)	0.014*** (0.003)
Firm_Size	-0.184*** (0.027)	-0.250*** (0.033)	-0.225*** (0.029)
Fin_structure	-0.606** (0.269)	-0.302 (0.298)	-0.385 (0.270)
Profitability	4.733*** (0.437)	3.032*** (0.426)	3.463*** (0.402)
Constant	2.603*** (0.251)		2.917*** (0.268)
Observations	688	688	688
R ²	0.257	0.211	0.220
Adjusted R ²	0.252	0.051	0.215
F Statistic	59.003*** (df = 4; 683)	38.229*** (df = 4; 571)	190.837***
<i>Note:</i>		*p<0.1; **p<0.05; ***p<0.01	

Table 13: The impact of ESG Score on the Tobin's Q

Hausman Test	X ₂ (4) = 11.866	p-value = 0.0184
F-test for individual effects	F (112, 571) = 5.844	p-value = 0.0000
Breusch-Pagan Lagrange Multiplier Test	X ₂ (1) = 362.93	p-value = 0.0000
Wooldridge's Test	F (1, 573) = 33.726	p-value = 0.0000

Variables	VIF	1/VIF
ESG_Score	1.324251	0.7551440
Firm_Size	1.455325	0.6871318
Fin_structure	1.078567	0.9271560
Profitability	1.063193	0.9405634
Mean	1.230334	0.8127875

Table 14: Preliminary Tests

Again, we can see that the Fixed Effects models will fit better in our analysis, but we also will have to estimate the robust standard errors, to take better conclusions. The VIF test, tell us that our model does not suffer of multicollinearity.

	<i>Dependent variable:</i>	
	Tobin's Q	
	(1) Fixed Effects	(2) Fixed Effects
Env.Score	0.008 (0.005)	
Climate_Ch_score	-0.100 (0.176)	
ESG_Score		0.016** (0.008)
Firm_Size	-0.221*** (0.078)	-0.250*** (0.080)
Fin_structure	-0.235 (0.579)	-0.302 (0.565)
Profitability	3.225*** (0.704)	3.032*** (0.664)
<i>Note:</i>		

*p<0.1; **p<0.05; ***p<0.01

Table 15: Estimation of RSE for the Tobin's Q's models

Looking for this estimation, I do not have information to take any conclusions regarding the relation between Tobin's Q and the Environmental Disclosure Score, the same I can say about the Climate Change score, because both coefficients are not statistically significant, having p-values higher than 0.1.

In terms of the relation between the ESG Score and the Tobin's Q, I obtain data that allow me to conclude that companies with higher ESG Score have higher Tobin's Q, on average, an increase in 1 unit in the ESG score lead the company to increase its Tobin's Q by 0.016 percentual points, this conclusion has a level of significance for 5%.

In both models the R² are proxy of 20%, having also high and significant F-statistic, this is another reason that allow us to take these conclusions as valid and reliable.

These results are in line with other previous studies, high ESG scores has a positive relation on Tobin's Q (Yu, X., 2022; Cajias et al., 2014). Other study that concerns to the relation between ESG and Tobin's Q, conclude that ESG indicators and Tobin's Q have a positive correlation, suggesting that investing in ESG is an effective approach that raises the market value and earnings in multinational pharmaceutical companies (López-Toro et al., 2021).

6.3. The relationship between ESG and ROA

Finally, I will analyze how ESG and Environmental Scores impact the companies' profitability and efficiency. The methodology will be similar to the two relations studied before, however, in this case I will join Climate Change Score and ESG score in the same regression, being Environmental Score in a single regression, the reason for that was to try to see if within this sample, I will obtain similar results than other previous studies, a negative relation between the Environmental Score and ROA (Demiraj et al., 2023).

	<i>Dependent variable:</i>		
	ROA		
	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
Env.Score	0.011 (0.010)	0.011 (0.013)	0.010 (0.011)
Lev	-0.883*** (0.115)	-0.995*** (0.144)	-0.933*** (0.123)
Firm_Size	-0.979*** (0.140)	-0.861*** (0.201)	-0.905*** (0.161)
Debt_capital	-0.389 (1.165)	0.847 (1.593)	0.228 (1.312)
Constant	17.150*** (1.186)		16.376*** (1.383)
Observations	688	688	688
R2	0.242	0.176	0.202
Adjusted R2	0.238	0.008	0.197
F Statistic	54.605*** (df = 4; 683)	30.434*** (df = 4; 571)	173.141***
<i>Note:</i>			*p**p***p<0.01

Table 16: The impact of Environmental Score on the ROA

Hausman Test	$X_2(4) = 1.3129$	p-value = 0.8592
Breusch-Pagan Lagrange Multiplier Test	$X_2(1) = 116.98$	p-value = 0.0000
Breusch-Godfrey Test	LM test = 131.64	p-value = 0.0000

Variables	VIF	1/VIF
Env.Score	1.289296	0.7756172
Lev	1.752875	0.5704914
Firm_Size	1.453935	0.6877885
Debt_capital	1.837962	0.5440810
Mean	1.583517	0.6315057

Table 17: Preliminary Tests

In this case the Hausman Test tell us that we should use the RE model to formulate conclusions of the relationship between ROA and Tobin's Q. Again, we are suffering from heteroscedasticity in our sample, so again I will have to estimate the robust standard errors. The VIF test, tell us that our model does not suffer of multicollinearity.

Now I will present you the regressions between ROA and both ESG and Climate Change Scores.

	<i>Dependent variable:</i>		
	ROA		
	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
ESG_Score	0.053*** (0.018)	0.065*** (0.023)	0.056*** (0.020)
Climate_Ch_score	-1.171** (0.544)	-0.881 (0.627)	-0.998* (0.557)
Lev	-0.842*** (0.115)	-0.934*** (0.144)	-0.883*** (0.124)
Firm_Size	-1.012*** (0.144)	-0.996*** (0.203)	-0.990*** (0.164)
Debt_capital	-0.655 (1.159)	0.631 (1.588)	0.028 (1.306)
Constant	15.816*** (1.248)		15.127*** (1.423)
Observations	688	688	688
R2	0.252	0.186	0.211
Adjusted R2	0.246	0.019	0.205
F Statistic	45.913*** (df = 5; 682)	26.070*** (df = 5; 570)	182.832***

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 18: The impact of ESG Score on the ROA

Hausman Test	X ₂ (5) = 2.4282	p-value = 0.7873
Breusch-Pagan Lagrange Multiplier Test	X ₂ (1) = 114.55	p-value = 0.0000
Breusch-Godfrey Test	LM Test = 130.82	p-value = 0.0000

Variables	VIF	1/VIF
ESG_Score	1.579777	0.6330007
Climate_Ch_score	1.323009	0.7558527
Lev	1.787881	0.5593214
Firm_Size	1.524227	0.6560701
Debt_capital	1.840411	0.5433568
Mean	1.611061	0.6207089

Table 19: Preliminary Tests

In this case the statistic of the Hausman Test lead to the conclusion that the RE model will be the best option to proceed with these analyses, however, and like the other estimations, we have presence of heteroscedasticity in our model, so again to take any conclusions, I will firstly estimate the robust standard errors. Finally, and as like the previous cases, the VIF test, tell us that our model does not suffer of multicollinearity.

	<i>Dependent variable:</i>	
	ROA	
	(1) Random Effects	(2) Random Effects
Env.Score	0.010 (0.015)	
ESG_Score		0.056** (0.028)
Climate_Ch_score		-0.998 (0.736)
Lev	-0.933*** (0.143)	-0.883*** (0.146)
Firm_Size	-0.905*** (0.265)	-0.990*** (0.261)
Debt_capital	0.228 (1.763)	0.028 (1.685)
Constant	16.376*** (2.339)	15.127*** (2.109)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 20: Estimation of RSE for the ROA's models

As you can see, after the estimations of the robust standard errors for both regressions, we only keep data to make conclusion in the ESG Score, both Environmental and Climate Change Scores have not significance to allow us to conclude anything about their relationship with ROA, so within my sample, I am not able to tell you if the Environmental score as an inverse relation with ROA.

In terms of the ESG score, the results of my model show that the high ESG score allow firms to have high ROA and high profitability. On average, each unit increased in the ESG Score lead to an increase in 0.056 p.p. in the Return on Assets, this conclusion has a statistical significance for a 5% level.

As before, both models have high and significant F-statistics and relevant R2, higher than 20% that allow also to conclude that the model is capturing the reasons for the variation on the ROA, so this conclusion are statistically validated and reliable.

Looking for similar studies, my findings are very similar to other previous empirical studies, also in 2021, with a sample of 4708 firms in all industries from S&P Capital IQ—Compustat database, from 1991 to 2013, the same positive and significative relation was found between the companies ESG score and their profitability, measured by the ROA (Kim et al., 2021) or (Garcia Souza, 2023) that with a sample of more than 1000 companies achieve a positive a statistical significative relation between ESG Overall Score and ROA.

Contrary to other studies, in terms of the Environmental score, our findings do not allow us to take conclusions, even though that our results appoint to a positive relation between Environmental Score and ROA, the fact that this result has no statistical significance (with a p-value of 0.52), does not permit to know if this results are telling us the real effect of this variable in the ROA.

7. Conclusion

7.1. Summary of the main findings

During this dissertation I was able to establish a link between high ESG practices and better companies' performance, after performing an empirical analysis of a sample of 113 European listed companies within industries facing high materiality issues from 2013 to 2023.

After performing all the regressions, and the tests to increase the robustness and reliability of our analysis, the results show a positive and significative relationship between ESG Scores and the three financial indicators, ROE, ROA, and Tobin's Q, despite the fact that within the ROE our results found only a marginal statistical significance. I also obtain evidences that companies engaging in investment to adopt more sustainable practices, may in the short term face a decrease in its financial performance, likely due to the high investment that may incur to do it. In relation with the Environmental Disclosure Score, all the regressions that was estimated during this research does not find statistical significance to show us how is the relation between it and the financial indicators.

In relation with my research hypothesis, my results show that all the three indicators have a positive a significative (for a level of 5% in the case of ROA and Tobin's Q and 10% for the ROE) relation with ESG scores, showing that, on average, companies with high ESG Scores and turning its practices more sustainable will have better performance, even though that the investments to do it could decrease their results in the short term.

These findings are aligned with previous literature, that have also reached positive and significative relations between ESG score and firms performance, authors such as (Buallay, 2021 & Alareeni et al., 2020), in terms of ESG also came with the conclusion that companies with higher ESG scores also have higher Return on Equity and higher financial performance. In the Tobin's Q previous studies performed into a variety of samples have also arrive to the conclusions that higher Tobin's Q can be explained by higher ESG scores (Yu, X., 2022) in a sample of Chinese listed companies and (Dkhili, 2023), after studying European listed companies. Finally, in the ROA, companies with higher ESG scores have also higher profitability in some previous studies, such as (Garcia Sousa, 2023 & Sisman et al., 2020).

This Dissertation is another contribute to show that integrate ESG practices into the strategy could lead to financial benefits in the future, even that, in the short-term could lead to investments that could take some time to be noted. My results underscore the importance for firms to tackle ESG holistically, putting equal emphasis on truly integrating sustainability into their operations as well as compliance and reporting. Especially in sectors with significant materiality issues, this complete approach can improve financial sustainability and resilience.

This not only allow them to improve their sustainability, but also make them be in accordance with new customers trends, that are increasing its awareness with environment and all the topics surrounding sustainability. Finally, with all the new and recent regulations, integrate ESG practices could also avoid fines regarding environmental damage.

The positive correlation, proven by my empirical research, between ESG Scores and three important financial performance indicators should be another important fact, that lead companies to invest in more sustainable practices, increase its desire by know more about ESG and the impact that each business can have in the environment. Even though that it could not gave immediate financial results, the gain not only for the planet and society, but also in term of company's future financial results are a huge incentive to do it. All the agents, from employees, shareholders, investors, even policymakers, could also use these insights to assist and encourage environmentally friendly corporate operations, coordinating financial rewards with more general social objectives.

7.2. Suggestions to future studies

Future studies may increase the number of companies and try to also increase the number of years studied; this may allow to obtain statistical significant results to conclude something regarding the Environmental Disclosure Score. Also, will be important to look also for other external factors that should have impact in the ESG score, ROE, ROA, and Tobin's Q.

Another aspect that could be improved is the Climate Change Score, maybe adding more companies and other two dummy variables that are available in the Bloomberg data base (Climate Change Opportunities discussed and Climate Change Policies) and perform more test to improve this score. In an analysis, not restricted to European listed companies, adding companies from not only the United States but also from other countries, such as China, Brazil or Japan, this score could give us other perspective of how sustainable practices are impacting the firm's performance in the short term, and which results it could give to companies in the future.

In terms of dependent variables, will be good also to perform a similar study but having also the stock price as dependent variable (Sun et al., 2023 & Chen et al., 2023) and see what is the impact of ESG in the companies' stock valuation, or even check if companies that make higher investment to improve its practices to more sustainable in the short-term suffer also decreases in its stock price.

Another interesting and important way to this study might be perform a separately analysis of not only the Environmental disclosure score, but also to the Social and Governance scores, to see which one have more impact in firm's results.

Futures research should also take into account latest trends and regulations, maybe evolving landscape of ESG reporting standards, namely, CSRD or EU taxonomy, both of them require companies to report not only the impact of its sustainability issues in its activities, but also on environmental and society, a future study focusing on the implications of these regulations on financial performance may lead to interesting and valuable conclusions.

Another aspect of ESG that may be very important to analyze is the impact of consumers, activism and investor pressure on leading companies to better performance regarding ESG. New times are coming with clients, investors and stakeholders to demand transparent information of companies' practices, mainly when climate change is an upcoming trend that will be in focus for long times with the increase of extreme climate events all over the world. Understanding how this trends are

shaping corporate strategies and financial results can provide insight into how sustainability and financial performance interact dynamically in the contemporary corporate climate.

Finally, and keeping in this innovative trend, other interesting aspect to analyze will be how the recent developments in technology, that have been incorporated into reporting and investment analysis, are leading to increased correlation between ESG and firm's financial performance. ESG data can be more transparent and accurate, with the use of these technologies, which facilitates the evaluation of the real effects of sustainable practices on financial performance.

8. References

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Table of Tables

Table 1: Distribution of companies per Industry	31
Table 2: Descriptive Statistics of the variables that compose the Climate Change Score	34
Table 3: Explanation of the Control Variables.....	35
Table 4: Descriptive Statistics before manipulation of Control variables	37
Table 5: Descriptive Statistics after manipulation of Control variables.....	38
Table 6: The impact of Environmental Score on the ROE	40
Table 7: Preliminary Tests	41
Table 8: The impact of ESG Score on the ROE	42
Table 9: Preliminary Tests	43
Table 10: Estimation of RSE for the ROE's models	43
Table 11: The impact of Environmental Score on the Tobin's Q	45
Table 12: Preliminary Tests	46
Table 13: The impact of ESG Score on the Tobin's Q	47
Table 14: Preliminary Tests	Error! Bookmark not defined.
Table 15: Estimation of RSE for the Tobin's Q's models.....	48
Table 16: The impact of Environmental Score on the ROA	50
Table 17: Preliminary Tests	51
Table 18: The impact of ESG Score on the ROA	52
Table 19: Preliminary Tests	53
Table 20: Estimation of RSE for the ROA's models.....	54

Table of Figures

Figure 1: ESG metrics formation. Source: Thomson Reuters (2018).....	33
Figure 2: Correlation Matrix (Performed in R)	39

Appendix

1. Student's statement of the Master's dissertation authorship

Statement

I hereby declare that:

- the Master's dissertation has been written by me alone, unassisted, and has never served as the basis for any official procedure involving taking steps leading to obtaining a higher education diploma confirming the conferment of an academic degree;
- my Master's dissertation does not violate any copyright within the meaning of the act of 4 February 1994 on copyright and related rights (Journal of Laws of the Republic of Poland of 2022 item 2509) or moral rights protected under the law;
- the Master's dissertation was / was not* prepared by using an automatic text generator, in particular ChatGPT.

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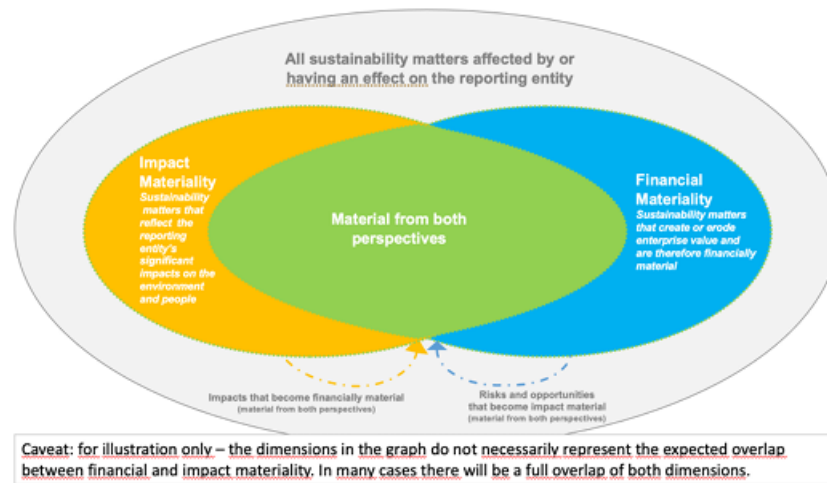
2. List of companies and industries

Companies	Industry
Air France-KLM	Transports
Airbus	Transports
Anglo American	Mining and Extraction
Antofagasta	Mining and Extraction
ASML	Technology
Astrazeneca	Chemicals
Atos	Technology
BASF	Chemicals
BE Semicondutores	Technology
BMW	Transports
Boledean	Mining and Extraction
BP	Energy and Utilities
Capgemini	Technology
Carrefour	Agriculture and Food
Continental	Chemicals
Danone	Agriculture and Food
DHL	Transports
DIA	Agriculture and Food
Diageo	Agriculture and Food
DSM	Agriculture and Food
DSV	Transports
EDF	Energy and Utilities
EDP	Energy and Utilities
Elia Group	Energy and Utilities
Endeavour Mining	Mining and Extraction
Endesa	Energy and Utilities
Enea	Energy and Utilities
Enel	Energy and Utilities
Engie	Energy and Utilities
EVN	Energy and Utilities
Fortum	Energy and Utilities
Galp	Energy and Utilities
Glencore	Mining and Extraction
Grupa Lotos	Energy and Utilities
Hexagon AB	Technology
Hikma Pharmaceuticals	Chemicals
Hapag-Lloyd AG	Transports
IAG	Transports
Iberdrola	Energy and Utilities
Infineon	Technology
Jeronimo Martins	Agriculture and Food
Johnson Matthey PLC	Chemicals
Kuehne + Nagel International AG	Transports
L'Oreal	Chemicals
Deutsche Lufthansa AG	Transports
Lubelski Wegiel Bogdanka SA	Mining and Extraction
LyondellBasell Industries NV	Chemicals
AP Moller - Maersk A/S	Transports
Mercedes-Benz Group AG	Transports
Metso Oyj	Technology
Michelin	Chemicals
MOL Hungarian Oil & Gas PLC	Energy and Utilities
Mueller Industries Inc	Agriculture and Food

Companies	Industry
Naturgy Energy	Energy and Utilities
Nestle SA	Agriculture and Food
National Grid PLC	Energy and Utilities
Nokia Oyj	Technology
Nokian Tyres	Chemicals
Norwegian Air Shuttle ASA	Transports
Novonesis (Novozymes)	Technology
OMV AG	Energy and Utilities
Orion Oyj	Chemicals
ORLEN SA	Energy and Utilities
Orsted AS	Energy and Utilities
PGE Polska Grupa Energetyczna SA	Energy and Utilities
Koninklijke Philips	Technology
Pirelli	Chemicals
Renault SA	Transports
Repsol SA	Energy and Utilities
Richter Gedeon Nyrt	Chemicals
Rio Tinto	Mining and Extraction
ROYMF	Transports
RWE AG	Energy and Utilities
Sage Group PLC	Technology
Sanofi SA	Chemicals
SAP	Technology
Schindler	Technology
Shell	Energy and Utilities
Siemens	Technology
Sika AG	Chemicals
Societatea Nationala Nuclearelectrica SA	Energy and Utilities
Solvay	Chemicals
Sonae	Agriculture and Food
Statoil	Energy and Utilities
Tesco	Agriculture and Food
TotalEnergies SE	Energy and Utilities
Umicore SA	Chemicals
Unilever PLC	Agriculture and Food
Uniper SE	Energy and Utilities
Verbund AG	Energy and Utilities
Vestas Wind Systems	Energy and Utilities
Vinci SA	Energy and Utilities
Volkswagen AG	Transports
Volvo Car AB	Transports
Anheuser-Busch InBev SA/NV	Agriculture and Food
Accenture PLC	Technology
CEZ Group	Energy and Utilities
Croda International PLC	Chemicals
EasyJet	Transports
Equinor ASA	Mining and Extraction
Glanbia PLC	Agriculture and Food
Jastrzebska Spolka Weglowa SA	Mining and Extraction
Kenmare Resources PLC	Mining and Extraction
Kerry Group PLC	Mining and Extraction
Linde PLC	Chemicals
Pegasus Hava Tasimaciligi AS	Transports
PGNIG	Energy and Utilities
TUI AG	Transports
Turkiye Petrol Rafinerileri AS	Energy and Utilities

Companies	Industry
Turkish Airlines	Transports
Coca-Cola HBC AG	Agriculture and Food
Wizz Air	Transports
Ryanair Holdings PLC	Transports

3. Impact and financial materiality



Source: 04-02 Materiality Assessment, EFRAG SR TEG meeting 4 September 2023