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Do ESG-Characteristics of an Industry Influence the Firm Performance of European Companies with High ESG Disclosure Scores?

Mémoire présenté par :
Alice-Ann BAMS

Pour l'obtention du diplôme de :
Master en gestion de l'entreprise – Tri-Diplomation

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Promoteur :
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"The greatest threat to our planet is the belief that someone else will save it."

Robert Swan (OBE).

Table of Content

List of Abbreviations

CLT	Central Limit Theorem
EPS	Earnings per Share
ESG	Environmental, Social and Governance
PRI	Principles of Responsible Investments
RI	Responsible Investment
ROA	Returns on Assets
ROE	Returns on Equity
SDG	Sustainable Development Goals

List of Figures and Tables

List of Figures

List of Tables

Chapter 1: Introduction

In the last decades, the world has seen a rising interest in the concept of sustainability. *Sustainability* is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" by the United Nations (2022, paragraph 2) commission in 1987. This idea emerged due to the growing frequency of extreme weather occurrences, which disrupted global markets and damaged infrastructures, as well as the 2008 financial crisis, which had an impact on both the commercial and public sectors (Billio et al., 2021). The financial crisis has emphasised the issues of having bad governance and policies for companies leading to the collapse of the global banking system. One reason behind this major crisis is the use of the Shareholder Theory, which advances that the sole goal of companies is to satisfy their shareholders by maximising profits and firm performance. Fortunately, another theory was advanced so-called the Stakeholder Theory, which states that companies' goal is not to solely satisfy shareholders but rather all the stakeholders with whom the company is doing business. Companies and international bodies are shifting from the first theory to the second as they acknowledge the importance of considering other dimensions than the shareholders.

Many regulations and organisations have been created in the past few years to pursue a sustainability direction. For example, the United Nations created the Sustainable Development Goals and the Principle of Responsible Investments to set clear sustainable objectives. In addition, the Paris Agreement was signed during the COP 21 to engage nations toward reducing climate change impacts. In contrast, at a European level, the European Green Deal has been signed to make Europe a carbon-neutral continent by 2030. Finally, the financial sector has not been left out as sustainable finance has evolved tremendously, introducing several regulations about financial disclosure and non-financial reporting, and leading to a new type of investment, so-called responsible investments.

Responsible investments have been put at the forefront of the financial world as it allows investors to take into account environmental, social, and governance (ESG) aspects, long-term prosperity, and market stability (Walker, 2021). Many different types of responsible investments do exist, but ESG Integration is the one which interests the most investors in comparison to the others. ESG investing is different from pure commercial investing by considering factors other than purely short-term performance and commercial risks linked to that performance. Consequently, many rating agencies have started to rate companies based on their ESG performance as it is being done for credit ratings. This classification allows and helps purpose-driven investors to select the companies they will invest in based on the ESG scores they are given.

The whole bustle resulting from this new type of investment led many researchers and academics to wonder if companies were to engage themselves to have a good ESG

performance, they would show higher financial performance. Overall, three results tend to be observed across the literature. On the one hand, some researchers (Alareeni & Hamdan, 2020; Al-Najjar & Anfimiadou, 2012; Balatbat et al., 2012; Cek & Eyupoglu, 2020; Friede et al., 2015; Naeem et al., 2022) have found evidence that a positive relationship exists between ESG scores and firm performance. This signifies that having a good ESG score positively influences the enterprises' performance. On the other hand, others (Di Tommaso & Thornton, 2020; Duque-Grisales & Aguilera-Caracuel, 2019; Friede et al., 2015; Hillman & Keim, 2001) have found that a negative relationship exists between the two variables meaning that the ESG scores will negatively influence firm performance. Lastly, a few (Friede et al., 2015; Junius et al., 2020) have found no statistical relationship between the variables. This means that no relationship is found between ESG scores and firm performance.

In addition, some academics have recently questioned whether there could be a difference in ESG performance depending on the industry sectors they are part of. Once again, opinions and findings on the subject differ. Some advance that the industry in which the companies are part does not influence their ESG rating (Doyle, 2018; Matakanye et al., 2021), while others state that the industry sector of which the companies are part does influence their ESG scores, as it influences how the companies will consider ESG factors (Park & Jang, 2021; Onciou et al., 2020; Champagne et al., 2021).

Although the literature has found evidence that a possible relationship exists between ESG scores and firm performance and that the ESG scores could be impacted by the industry sectors in which companies are part, no evidence has been found regarding a possible link existing between all three factors. In other words, no evidence has been found regarding a possible connection between the industry sectors, ESG scores, and firm performance.

This thesis will help to close this gap by studying the following research question:

"Do ESG-Characteristics of an industry influence the firm performance of European companies with high ESG disclosure scores?"

To perform this analysis, a quantitative approach will be observed. Secondary data will be retrieved from the Bloomberg database. The overall distribution will span a 72-months' timeframe covering every month from January 2016 until December 2021 of the European companies comprised in the STOXX 600 Index.

Analysing and answering this research question will provide further knowledge on ESG, its potential impact on company performance in Europe, and how industry sectors affect this outcome. Additionally, it will make it possible for businesses and investors to comprehend the potential variations which may exist among the three factors. Finally, this thesis may inspire future research and enhance the literature regarding this subject by motivating others to conduct the same study over a different period or place.

To address the research problem, the thesis is structured as follows. First, chapter 2 provides the reader with an extensive review of the past literature regarding the subject and some relevant research findings. From these reviews, hypotheses are built throughout the chapter.
Then, the research design, as well as where, how, and which data have been collected, are explained in Chapter 3.
The descriptive statistics of the overall distributions and the normality are provided in the first part of Chapter 4, while the descriptive statistics of the two sub-distributions between companies having high versus low ESG disclosure scores are provided in the second part of the chapter.
From then on, the three hypotheses are tested in Chapters 5, 6, and 7 of this thesis. Each of them is organised in three parts. Firstly, the methodology used is explained through the data selected to perform the analysis, the model used as well as the assumptions and conditions that are needed to be respected to execute the model. Note that the first and third hypotheses were answered using multilinear regressions, while the second has been answered using the One-Way ANOVA test. Secondly, the statistical results are provided for every hypothesis. Thirdly, a discussion section is added to affirm or infirm the hypothesis and explain the possible implications it might have.
The last chapter presents the reader with a conclusion, the practical implications, and the limitations of the research.

Chapter 2: State of the Art of ESG Implementation

To investigate whether ESG characteristics of an industry might influence European companies' financial performance, this chapter aims to provide the reader with a theoretical background and the current state of the research regarding this topic.

2.1 Shareholder Theory versus Stakeholder Theory

The way people are doing finance has evolved tremendously over the years. Two famous theories known as “The Shareholder Theory” and “The Stakeholder Theory” shaped this evolution. Those theories were the first to advance that some companies could obtained financial benefits by considering other dimensions such as shareholders, stakeholders, the environment, etc. In that sense, they are the first significant theorems to explain the importance of considering sustainability in today’s world in a theoretical manner.

2.1.1 Shareholder Theory

The Shareholder Theory was advanced in 1962 by Milton Friedman. This theorem mentions that a company's primary responsibility is to maximise its shareholders' profits (Friedman, 1962). In that sense, managers should reinvest the investors' money into projects that provide the highest positive returns (Tse, 2011). This theory has been widely accepted among practitioners mainly due to the concept of agency costs (Tse, 2011).
Agency costs occur when the owners and management of a company disagree, and a resulting conflict exists between the two (Carlson, 2020). Two forms of agency costs can occur. The first sort happens when managers utilise resources to further their own objectives at the expense of the shareholders' objectives (Carlson, 2020). The second form occurs when shareholders use resources to supervise the management and to prevent the first type from occurring (Carlson, 2020). The second type of agency cost emphasises the idea that managers' incentives have to be highly aligned with the ones of the shareholders. One way to measure managers' performance is by using financial incentives such as the share price (Tse, 2011). To maximise the present value of the firm (and of the shareholders), managers can maximise the net present value of all the future cash flows either by increasing the cash flows value itself or by decreasing the value of the cost of capital/expanding the value of the growing interest (Tse, 2011). The Shareholder theory, as it stands, considers solely the long-term objectives and benefits for the shareholders.

The Shareholder Theory comes with drawbacks. Increasing future cash flows while lowering as much as possible the cost of capital led to major questionable problems such as the financial crisis of 2008 (Tse, 2011). In addition, linking managerial practices to financial measures impelled managers to invest in high-risk investments to maximise their wealth no matter the risks encountered by the company (Rajgopal & Shevlin, 2002; Sanders & Shevlin, 2002 in Tse, 2011). Managers are seen as overconfident in their capabilities and, hence, take on riskier investments. They may also believe their decisions

are correct and will yield higher results (Tse, 2011). Finally, one major criticism of this theory is the idea that only the owners' interests are being considered instead of taking into account the interests of all parties (Abu, 2021).

2.1.2 Stakeholder Theory

The Stakeholder Theory was advanced in 1984 by Edward Freeman. Freeman (2010) created the stakeholder approach to propose a new process to manage an organisation more effectively. This concept is opposed to the Shareholder Theory as it encourages managers to consider every stakeholder in their decision-making, not only shareholders (Clarkson, 1995). Moreover, it contains internal stakeholders such as employees and external ones such as suppliers and communities with whom the companies are doing business (Tse, 2011). Nevertheless, many advantages of this theory have been advanced throughout time. For example, having a stakeholder approach motivates employees to work harder while customers might be more willing to pay a higher price for the products and services (Choi & Wang, 2009). In addition, suppliers are more eager to undertake knowledge spillovers, and the company might have a considerable competitive advantage (Choi & Wang, 2009). In contrast, firms which fail to engage with their stakeholders properly might face serious consequences such as losing essential customers or employees (Tse, 2011).

One example of this theory is the company Tesla by Elon Musk. Tesla's share value has declined by more than 40 per cent since the 4th of April 2022 (Ewing, 2022). This company has a reputation for following more of a shareholder approach by always maximizing the profits of its CEO. Moreover, various scandals such as supply chain issues with their suppliers in Asia, social scandals advancing discrimination among the company and a lawsuit against Musk for sexual harassment led the enterprise to be removed from the ESG S&P 500 Index. This index lists companies that meet specific environmental, social and governance standards and advanced that Tesla did not respect the basic requirements by exhibiting discrimination and poor working conditions (Ewing, 2022). Overall, it proves that treating the different stakeholders poorly could impact every company as a whole, and, in this case, lousy ESG performance led to a decrease in stock value.

The Stakeholder Theory comes with some drawbacks as well. One issue managers can face is that managing multiple stakeholders may confuse them regarding which objectives they should pursue first (Tse, 2011). Then, in addition to the two dimensions mentioned (Shareholder VS Stakeholder), recent events led to think that a third dimension should be included (Tse, 2011). Managers should add a sustainable and environmental perspective to complement the scope of business of companies (Tse, 2011). Finally, while the Shareholder Theory has a clear and defined goal, namely to maximise the wealth of the corporation, the stakeholder theory is somewhat unclear about what the final objective should be (Tse, 2011).

2.1.3 Shareholder and Stakeholder Theories: Impacts and Consequences

Nonetheless, Freeman (2010, p.12) mentioned in his book: "Despite these differences, we believe that Friedman's maximizing shareholder value view is compatible with stakeholder theory. After all, the only way to maximise value sustainably is to satisfy stakeholder interests". As a result, it appears that the two theories might be regarded as complementary in some way. If reusing the example of Tesla, they have lost some value by not considering all their stakeholders. Even their long-time followers are having doubts about whether they should keep their investments or not (Ewing, 2022). Hence, it seems that to obtain sustainable growth and value, it is becoming a fundamental requirement to ensure that all the stakeholders are satisfied, as even one of the largest companies in the world faces the consequence of bad managerial decisions and a lack of governance.

Furthermore, a consequence which prevails nowadays is greenwashing. Greenwashing occurs when an organisation's management team makes incorrect or overtly deceptive assertions regarding the sustainability of a product or service or company operations in general (Peterdy, 2022). Nowadays, with the increasing importance of ESG, not only is the environmental dimension part of greenwashing, but also social and governance are included in this greenwashing aspect. This consequence comes from a larger assumption that is made when talking about the shareholder and stakeholder theories which are that the markets are efficient and all investors have access to the same amount of information. However, efficient market theory only works if all information is transmitted perfectly and instantly to everyone and when all market participants behave perfectly rationally, which is not the case when greenwashing is in place (CFI Team, 2022a).

Finally, looking at the impacts the two approaches might have, it has already been mentioned that following those theorems will impact the company's financial value. Yet, there are also some ethical and societal impacts from using those approaches. For example, when using the Stakeholder Theory, some positive impacts which are not quantifiable can be observed, such as better job satisfaction in the workforce, scientific discoveries which benefits everyone, improved way of life of the communities in which the company is part and improved competitive ecosystem which helps companies thrive (Wright, 2022).

In conclusion, two principal theories have shaped how corporations are doing business over the years. Although the Shareholder Theory has been widely accepted across companies, the positive impacts of the Stakeholder approach, whether it is on society or on financial value, are now gaining in importance and are becoming mandatory for companies to survive.

2.2 New Taxonomy: Sustainable Finance

As a consequence to the idea of considering the impacts corporations have on society, one concept emerged and became undoubtedly crucial in the last decades: the concept of sustainability. Sustainability is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" by the United Nations (2022, paragraph 2) commission in 1987. Since then, many countries have tried to improve their sustainability efforts. But looking at the current climate change menaces, new goals needed to be implemented (United Nations, 2022).

To improve these sustainable objectives, different taxonomies have been created. Furthermore, many international organisations have highly increased their support for improving sustainability such as the World Wildlife Fund, Greenpeace and Oceana.

In 2015, the United Nations decided on 17 goals, the so-called Sustainable Development Goals (SDG). These goals aim to reduce poverty and ensure everyone obtains a certain quality of life (UNDP, 2022). Those goals cover a broad range of subjects, from ending poverty and providing good education quality to climate actions and clean energies, as shown in Figure 1 below (UNDP, 2022). However, all those objectives are to be considered as a whole and base themselves on three pillars: economy, social and environment (Sustainable Development Goals Belgium, 2022).

Figure 1: Sustainable Development Goals (United Nations Brussels, 2021)

Continuing in this direction, the Paris Agreement was signed in 2015 at the COP21 to keep global warming under two degrees increase (European Commission, 2022d). In addition, it is helping countries tackle the consequences of climate change like major floods and forest fires (European Commission, 2022d). However, a difference is to be noted between the SDGs and the Paris Agreement. The latter is the first international climate accord that legally binds the 190 parties of the agreement (European Commission, 2022d).

In addition, the United Nations created the Principles of Responsible Investments (PRI), which are principles that entail investors to incorporate responsible investments (UNPRI, 2022b). Responsible investment is a practice of implementing environmental, social and governance factors in active ownership and investment decisions (UNPRI, 2022b). From 2005 to 2021, the number of signatories has increased from 63 to 3826, with respectively $6,3 trillion and $121,3 trillion assets under management (UNPRI, 2022a). There are six different principles with which signatories must comply with, being (UNPRI, 2022b):

> (1) *We will incorporate ESG issues into investment analysis and decision-making processes*
> (2) *We will be active owners and incorporate ESG issues into our ownership policies and practices*
> (3) *We will seek appropriate disclosure on ESG issues by the entities in which we invest*
> (4) *We will promote acceptance and implementation of the principles within the investment industry*
> (5) *We will work together to enhance our effectiveness in implementing the principles*,
> (6) *We will each report on our activities and progress towards implementing the principles*

Thus, the principles intensely focus on the ESG factors and have the final objectives to better align with the more special interests of the society (UNPRI, 2022b).

Looking at the European Commission, it presented in 2019 the European Green Deal, which has the goal of making Europe a carbon-neutral continent in 2030 (European Commission, 2022b). In that sense, the European green deal investment plan was implemented to encourage long-term investments (European Commission, 2022b). In addition, it will provide improved diversity, good quality water, energy-efficient housing, better public transportation, an increased circular economy, and independent and competitive global enterprises (European Commission, 2022a).

Furthermore, sustainable financing is critical to meeting the policy goals outlined in the European Green Deal as well as the EU's international obligations on climate and sustainability (European Commission, 2022b). It accomplishes this as a supplement to public funds by channelling private investment into the transition to a climate-neutral and equitable economy. Thus, sustainable finance will ensure that investments promote a resilient economy and long-term recovery of the Covid-19's effects. The European Union actively supports a transition towards developing a financial system that intends to promote long-term growth. (European Commission, 2022b). To reach the climate and energy objectives, the EU will need to invest around 350 billion Euros more per year over the 2021-30 decade than it did before. In that sense, the financial sector will play a critical role in achieving these objectives. It has the potential to re-direct investments toward more sustainable technologies and enterprises, fund long-term growth in a sustainable

way, and contribute to developing a low-carbon, climate-resilient and circular economy (European Commission, 2022b). As a result, the European Commission has been working since 2018 to develop an extensive policy agenda for sustainable financing: the action plan on financing sustainable growth and the development of a renewed sustainable financial strategy (European Commission, 2022b).

Lastly, The Sustainable Finance Disclosure Regulation (Regulation (EU) 2019/2088) is another significant component of the Action Plan. It intends to increase openness on the degree of sustainability at the entity and product level. This new legislation requires institutional investors, asset managers, and advisers to report the incorporation of sustainability risks and negative repercussions in their investments. Sustainability reporting is also progressing with the proposal of the Corporate Sustainable Reporting Directive, which would update the Non-Financial Reporting Directive (Directive 2014/95/EU), which has been in effect since 2018. This new rule, which is set to take effect in 2024, will compel all big and publicly traded corporations in the EU to comply with specific sustainability reporting criteria.

Overall, the shift from shareholder to stakeholder theory, as well as the new taxonomies, led to a trend passing around in the investment world known as Sustainable Finance or Responsible Investments. This new trend lead investors and corporations to question themselves whether some financial advantages exist for corporations working in a sustainable manner or not.

2.3 From Responsible Investment to ESG Integration

Responsible investment is defined as being a way for investors to take into consideration environmental, social and governance (ESG) factors as well as lifelong prosperity and stability of the market (Walker, 2021). Bloomberg estimates that the total sustainable assets will reach $41 trillion by the end of 2022 and continue to grow daily (Kishan, 2022). The major players implementing this type of investment are the United States, Europe and then Japan, mainly due to the regulations which have been put in place in those countries, as explained in the previous section (Kishan, 2022).

Responsible investment (RI) creates different sorts of value creation, such as direct financial returns for investors, higher engagement, and non-financial advantages (Walker, 2021). On the one hand, economic value and engagement are created by engaging in significant ESG strategies to have excess returns, lower risks and volatility and better shareholder satisfaction (Walker, 2021). Furthermore, if the idea of responsible investment reached most investors, a decrease in volatility could affect the market as a whole, affecting every investor and society (Walker, 2021). On the other hand, responsible investment leads to a non-financial value which entails a better quality of life and environment, better ESG performance encouraging other corporations to engage in

RI and, finally, improved stability regarding markets once the majority adopts sustainable investment (Walker, 2021).

When discussing responsible investment, the concept of ESG is widely used interchangeably (Walker, 2021). However, responsible investment consists of many different types of investments, ESG integration being one of it (Walker, 2021). To differentiate the types of responsible investments, it is necessary to look at the type of securities a fund is holding (Walker, 2021). For example, *Ethical Investment* considers investing in companies that engage in activities considered ethical by the investor, usually excluding alcohol, pornography, tobacco businesses, etc. (Walker, 2021). Then, another type of investment is *Green Investment*. In this form of investment, green assets are targeted, such as low-carbon vehicles and waste management companies, while *Socially Responsible Investment* consider methods which address social and environmental criteria when selecting corporations (Walker, 2021).

In addition, investors can make two types of ESG investments. *Best in Class (ESG) Investments* consist of funds which take into account solely companies which reach a certain level of ESG score (Walker, 2021). The score given to every company will depend on how the criteria are weighted by the rating agencies. This variation can depend on the sector the company is in (Walker, 2021). Usually, the companies that perform better than the average in each industry in terms of ESG performance and financial performance are selected (Walker, 2021). Finally, *ESG Integration* is a more practical way of implementing ESG in portfolios. Indeed, this form of investment is achieved by analysing the level of ESG integration companies are at and then choosing the ones that best fit the investors' needs (Walker, 2021). No benchmarking is done against the other companies present in the selected sectors.

Hence, a broad panel of investments are performed under responsible investments. However, investors and fund managers prefer some of them over others. For example, in their 2020 review, the Global Sustainable Investment Alliance (2020, p.11) advanced that the three favoured strategies were (1) *ESG Integration*, (2) *Negative/Exclusionary Screening* and (3) *Corporate Engagement and Shareholder Action*. Yet, looking uniquely at Europe, ESG Integration turned out to be the least of the three preferred ways as they invested only $4,140 billion as opposed to the United States, which invested $16,059 billion in ESG Integration in 2020 (GSIA, 2020). Moreover, the proportion invested in responsible investments in opposition to the total amount of assets managed in Europe has decreased over the years. It turned out that sustainable assets have gone from 58,8% in 2014 to 41,6% in 2020 over total assets (GSIA, 2020). This variation has been explained by the shift in European legislation (see Section 2.2) in recent years and significant changes in how responsible investment is defined (GSIA, 2020).

Finally, the flourishing interest in responsible investment and, more precisely, ESG integration has never stopped growing. It is expanding to many diverse asset classes such

as mutual funds, corporate bonds and private equity over the globe. This increased interest prompted the selection of ESG Integration as the focus of this thesis.

2.4 ESG Integration

The concept of ESG has evolved over the years, as mentioned in the first part of this thesis. Still, it relies on the assumption that investors and society will benefit from implementing ESG information (van Duuren et al., 2016). Hence, the main goal to regroup three ethical backbones has stayed constant over time, each pillar representing specific objectives and targets.

2.4.1 Environmental, Social and Governance Pillars

The *Environmental* pillar of ESG focuses mainly on environmental factors such as climate change, pollution, deforestation, land exploitation and biodiversity loss (Billio et al., 2021, p.1427). In that sense, it assesses how well companies are doing in reducing the negative impacts their activities may have on the environment. In other words, it values the endeavour of companies in terms of energy efficiency, waste, water and resource management, and greenhouse gas emissions (Billio et al., 2021, p.1427). Moreover, the Paris Agreement mentioned in Section 2.2 of this thesis shows that this pillar is getting increasing importance whether it is by companies and the public or by the governments and research sphere.

Second, the *Social* pillar is about gender policies and equalities, human rights protection, labour standards, workplace safety, as well as public health and income distribution (Billio et al., 2021, p.1427). Thus, this factor affects the well-being of employees and the communities in which the enterprises are doing business. In the light of the recent Covid-19 pandemic, this pillar has come back to the forefront after being put aside behind the environmental and governance components. The crisis highlighted how important workforce, community and customers are to an enterprise's well-being (GSAM, 2020). In addition, it seems that companies which invest in their people will tend to outperform competitors in the long run and will be more resilient to future unexpected events (GSAM, 2020).

Last, the *Governance* pillar considers the managerial aspects of the companies, such as the independence of the board of directors, the rights of shareholders, the remuneration level and package of managers, the control procedure, and the respect of the law (Billio et al., 2021, p.1427). Good governance management will avoid agency problems such as adverse selection and moral hazards, and the massive costs linked to them. This pillar has a more extended history than the other two have as major scandals occurred like the Enron Scandal or the most famous 2008 Financial Crisis. Finally, there is increasing evidence that the governance aspect of ESG will yield higher corporate returns if implemented correctly (Tang, 2019).

For each of the three ESG integration pillars, information is collected and analysed by rating agencies to provide investors with as much information as possible (van Duuren et al., 2016). The amount of data available has increased drastically from around 20 companies disclosing ESG information in the 1990s to 8,500 in 2014 (Kotsantonis et al., 2016, p. 10). This significant level of disclosure reinforces once more the importance of considering ESG data while making a financial investment in today's world.

2.4.2 Drivers of ESG Integration

The first section (Shareholder Theory and Stakeholder Theory) explained the theoretical background behind the relatively recent subject of sustainable finance and the more specific concept of ESG integration. On the one hand, the shareholder theory mentions that the sole purpose of a company is to make money and provide high dividends. On the other hand, the stakeholder theory advances that companies need to pay attention to every stakeholder to be competitive, not only the shareholders. Therefore, this second theory aligns more with Responsible Investment and ESG Integration concepts. Henceforth, RI is generally considered to be driven by the values investors believe in rather than making a profit. However, in their article, Derwall et al. (2011) found out that two types of sustainable investors exist: *Value-driven* investors versus *Performance-driven* investors.

Value-driven investors believe that engaging in sustainable investment will benefit them from non-financial benefits. In their article, Riedl & Smeets (2017) wanted to find out why investors hold RI funds. They found out that regardless of the underperformance of the funds in which they invested, investors are willing to continue to invest in these due to the overall ethical perspective it procures. Hence, value-driven investors are willing to pay a premium to invest in concordance with their beliefs (Riedl & Smeets, 2017). This idea was later confirmed by Delsen & Lehr (2019), who advanced that a large majority of their respondents will favour sustainable investments even if they must pay a premium or receive lower benefits. Finally, looking at the profile of those investors, millennials are twice more likely to invest in companies which correspond to their environmental and social expectations (Bendersky et al., 2019).

Performance-driven investors will invest in sustainable investments to achieve higher financial performance. Their profit-seeking objective is the only driver that motivates them to engage in this type of investment. Amel-Zadeh & Serafeim (2017) mention in their research that the primary motivation to integrate ESG information into portfolios is the performance relevance, the ethical considerations being the least important. In addition, the full ESG integration seems to be the most profitable way to gather high financial performance in opposition to negative screening (Amel-Zadeh & Serafeim, 2017).

Although the mentioned above researchers have strictly separated the drivers of ESG integration into two distinct categories (Amel-Zadeh & Serafeim, 2017; Delsen & Lehr,

2019; Derwall et al., 2011; Riedl & Smeets, 2017), others (Ballestero et al., 2012; Nilsson, 2009) have found that investors could be driven by the two simultaneously. In the first study, the authors propose a new financial-ethical bi-criteria model to combine the value-driven and performance-driven aspects of responsible investments (Ballestero et al., 2012). Hence, they advanced that investors cannot be classified into one defined category because a relatively small number of investors are solely driven by ethical motivations.

Finally, Jonas Nilsson (2009) divided investors into three categories that overlap with the three different motivations of investors mentioned above. Firstly, the investors who care mostly about financial performance. Secondly, the investors who care mostly about social responsibility. Lastly, investors who care about both. It turned out that responsible investors value both financial returns and social responsibility when they invest into sustainability (Nilsson, 2009). Ultimately, there is no absolute rule about why investors invest in RI and ESG.

2.5 ESG Ratings and ESG Disclosure

With more and more investors implementing ESG integration in their investment strategies, the number of companies reporting ESG data is also on the rise. In fact, as already mentioned, there were no more than 20 companies reporting this type of data in the 1990s while more than 8,400 companies were doing so in 2014 (Kotsantonis et al., 2016). Furthermore, many data providers have decided to provide their customers with numerous ESG information, major agencies being Refinitiv Thomson Reuters, MSCI, Bloomberg and Sustainalytics (Billio et al., 2021). Those providers offer an extensive database covering thousands of companies. For example, Thomson Reuters divides its ESG information into over 400 metrics for 5,000 companies, while MSCI covers 6,000 companies and includes around 1,000 data points on ESG policies (Kotsantonis et al., 2016, p.14). Finally, the Bloomberg database covers more than 11,300 companies and 69 countries (Kotsantonis et al., 2016, p.14). All those mentioned above provide companies with ESG ratings that evaluate their environmental, social and governance risk exposure.

Like credit ratings allow investors to screen firms for creditworthiness, ESG rating organisations provide a mechanism for investors to screen companies for ESG performance. ESG ratings and credit ratings, however, differ in at least three significant ways (Berg, 2018). First, whereas the concept of creditworthiness—the likelihood of default—is quite straightforward, the definition of ESG performance is less so. It is a notion founded on varied and changing ideals. An explanation of what ESG performance implies is thus a crucial component of the service that ESG rating agencies provide (Berg, 2018). Second, ESG reporting is still developing, unlike financial reporting requirements, which have evolved and converged over the previous century. ESG disclosure reporting requirements vary, and as many of them are optional or only applicable in specific countries, firms have a lot of freedom in deciding what and how much information to disclose. ESG ratings provide investors with a service by compiling and combining data

from a variety of sources and reporting standards. Because of these two distinctions, it is noticeable why the discrepancy between ESG ratings is much more apparent than the variance between credit ratings (Berg, 2018). Third, unlike credit raters, ESG raters are compensated by the investors who employ them rather than the businesses that they rate. As a result, the issue of ratings shopping, which is suggested as a potential cause for credit ratings to diverge, does not apply to ESG rating providers (Berg, 2018).

Looking at the ESG rating agencies, the latter cannot be compared to one another because they use different evaluation methodologies to obtain their ESG ratings (Billio et al., 2021). One probing example of this difference is the divergence in the number of indicators used to evaluate companies (Billio et al., 2021). Looking at the two extremes in the business, MSCI defines ESG ratings based on 37 criteria, while FTSE Russel bases them on 300 ESG criteria (Billio et al., 2021, p.1431). In addition, the weighting procedures vary significantly between the providers, and only a tiny proportion will publish how they weigh the information (Billio et al., 2021). This difference may confuse investors who wish to invest in sustainable finance.

As there is no common standardisation for the reporting of ESG performance, the level of heterogeneity of rating agencies is really high (Billio et al., 2021). In their paper, Chatterji et al. (2016) determined why such heterogeneity exists among the rating systems. They found out two major explanations for this divergence. On the one hand, there is a lack of theorisation of the concept of CSR, leading every rater to have a different definition for it. Billio et al. (2021) advanced the same argument in their paper. They mentioned that the heterogeneity among agencies is mainly due to a lack of a common definition of ESG and standard metrics. On the other hand, Chatterji et al. (2016) mentioned that each rater has its own way of measuring ESG performance to keep a certain identity on the market. This particular way of measuring ESG leads to increasing confusion for the investors. Berg et al. (2019) corroborate this second argument by advancing that the major issue for raters is how ESG is being measured by every one of them. In addition, they mentioned that the problem of having a common definition is not as important as opposed to Chatterji et al. (2016) and Billio et al. (2021). Instead, they emphasised the disagreement concerning which categories of ESG data are more critical than the others. Furthermore, they discovered a rater effect. Ratings given were correlated among the different categories, meaning that if one company has a good score in one of the categories, this company will tend to have good ratings in the other categories too (Berg et al., 2019).

Thus, to improve homogeneity among rating agencies, it is necessary to create a common definition of ESG investment that everyone will accept along the way. Then, raters will need to be more transparent regarding their score evaluation and methodologies. This level of transparency would allow third parties to cross-check the results. Finally, implementing those changes will boost investors' confidence in this type of investment, allowing them to make thoughtful decisions.

Lastly, regarding the concept of ESG disclosure, multiple views are mentioned. In his article Shaikh (2022) reports different studies, especially the one by Hummel and Schlick (2016). They indicate that high-quality sustainability disclosure resulted in better sustainability performance, reflected in market and capital market involvement. Yet, companies with inadequate ESG practices can nonetheless get a high ESG score and even display a better score than a company with higher ESG procedures but lower disclosure practice, as long as the first exhibits robust disclosure practice (Doyle, 2018). Thus Doyle (2018) stated that extensive disclosure practices are critical to achieving good ESG scores. The rating system fosters an environment where the focus is on disclosure rather than the underlying hazards that rewarding corporations with greater transparency expose. This rating disparity, as well as its possible biases, casts doubt on ratings' capacity to expose organisations' true sustainability performance, posing a significant hurdle to further increasing ESG adoption and achieving a sustainable economy.

Overall, introducing new regulations and frameworks toward a standard implementation of ESG disclosure and ESG ratings will enable investors and companies to be more consistent regarding their investment methodology and might reinstitute the lost trust in the industry. In other words, if the ESG rating agencies manage to convince investors of the validity of their ratings, investors might engage more into companies implementing ESG which could lead to improve financial returns for the companies. This assumption will be review in the following part.

2.6 ESG Performance and Firm Performance

It goes without saying that the ESG investment market is constantly increasing. This uprising interest among investors led researchers and academics to draw themselves to the subject. Indeed, many studies have been realised to discover if there is a significant link between ESG performance and firm financial performance. While some researchers have found a positive relation between ESG scores and firm performance (Alareeni & Hamdan, 2020; Al-Najjar & Anfimiadou, 2012; Balatbat et al., 2012; Cek & Eyupoglu, 2020; Friede et al., 2015; Naeem et al., 2022), other studies have found a negative relation between the two (Di Tommaso & Thornton, 2020; Duque-Grisales & Aguilera-Caracuel, 2019; Friede et al., 2015; Hillman & Keim, 2001). Finally, some studies, such as the one from Junius et al. (2020), found out that there is no significant influence of the ESG scores on firm performance.

Consistent with the first set of findings, Alareeni & Hamdan (2020) decided to investigate if a relationship between corporate disclosure of ESG data and firms' operational (ROA), financial (ROE) and market performance (Tobin's Q) does exist. This study used the data from the S&P500 companies as well as the Bloomberg ESG database. It turned out that ESG disclosure is positively related to the three measures of financial performance (Alareeni & Hamdan, 2020).

Implementing the ROA and Tobin's Q values alone, Naeem et al. (2022) also detected a positive impact of ESG score on firm value and profitability. Furthermore, another research (Balatbat et al., 2012) has used a more extensive range of financial ratios such as return on invested capital, earnings per share, price-to-earnings ratios and many more. However, the results this time showed a weak positive correlation between the different variables.
Finally, a major study was developed in 2015 by Friede et al., who decided to find aggregate evidence between ESG and firm performance among 2000 studies. They used two different methods to evaluate the study results. The first is a vote-count study which aims to count how many studies displayed positive, negative and nonsignificant effects and select the one with the highest result as the winner (Friede et al., 2015). The second method used is a meta-analysis that combines the results of many scientific studies by using statistical tests and assuming that each result has a certain error level. Overall they reviewed around 2200 studies on the subject (Friede et al., 2015, p.211). As a result, they found that about 90% of studies have a nonnegative relation between ESG and firm performance.

Examining research that has found a negative relationship between the two variables, Di Tommaso & Thornton (2020) have looked at this relationship in the banking sector and more precisely on the risk-taking behaviour of such enterprises. They found out that high ESG scores are related to lower bank value and higher risk-taking behaviour. The high ESG scores led to overinvestments of banks and in consequence to a reduced financial value. Moreover, firm financial performance and its relationship with ESG scores in emerging markets were investigated by Duque-Grisales & Aguilera-Caracuel in 2019. Their results advance a negative association between the two, meaning that multilatinas with the highest ESG scores will underperform the ones with lower scores. Finally, of the 2200 studies analyzed in their research, Friede et al. (2015) still have 10% of their studies which displayed a negative relation between ESG and firm performance.

Lastly, some recent studies have found that there is no link between the two factors and that one does not influence the other (Junius et al., 2020; Landi & Sciarelli, 2018). For exemple, Junius et al. (2020) have used listed companies from the ASEAN countries to assess if there is a significant relationship between the variables. As findings, they advanced that there is no significant influence from ESG scores on firm performance. One reason for this non-influence is that ESG scores are not yet included in firm performance measurements.

This extensive analysis of ESG performance and firm performance led to the following hypothesis:

H1*: European companies with high ESG disclosure scores show better firm performance*

This hypothesis will verify if the major European companies displaying high ESG disclosure scores show a relationship between ESG disclosure score and firm performance as it is advanced from most studies on the topic.

2.7 ESG Performance and Industry Sectors

ESG ratings, as mentioned in Section 2.5, vary significantly between companies and depending on the rating agencies which rate them. However, the sector can also affect the companies' ESG performance.

In his report, Doyle (2018) mentioned a bias around the industry sector the companies are part of. He claims that rating agencies do not adequately incorporate company-specific risks and variances in business models leading to companies in the same industries being unjustly judged using the same model. In that sense, agencies declare to norrmalise the ratings by sectors, but by doing so, it seems that they do not consider the company-specific risks leading to a bias for investors. In addition, the industry ratings given by the multiple agencies vary considerably. These differences in industry ratings might emerge from differential information availability. Therefore, it is somewhat predictable that large, mature, dividend-focused corporations will score higher than less mature companies. Overall, Doyle (2018) believes that the given ESG ratings are not differentiated within the industries.

Another point of view on the subject is advanced by Matakanye et al. (2021). In their article, authors gathered multiple studies claiming that industries should be sensitive to local societies' demands on their operating licenses. Certain industries are subjected to greater public scrutiny than others due to increased stakeholder demands and the desire for greater openness and compliance. Indeed, businesses from varied industries have various goals or various stakeholders. However, the article's main objective is to evaluate if organisations in multiple industries behave differently to varied stakeholders' interests, demands, and pressures, which may alter their priorities when deciding which ESG actions to undertake. Lastly, the study discovered that industry has a considerable impact on the sustainable performance of a firm represented in their selected index, which is being consistent with previous research. As a result, it is established that a company's ESG rating is not dictated by the industry to which it belongs.

In opposition Park & Jang (2021) adopt another opinion on the topic. They believe that the weights corporations assign to ESG are determined by industry features, which vary by sector due to industry specificities. While governance difficulties are largely sector-neutral, social and environmental variables are strongly sector-relevant. Furthermore, they show that ESG weights change not just by industry but also by country, with varying ecological, economic, geographic, and political aspects. Current ESG indicators, according to Park & Jang (2021), do not always account for country-specific and/or

industry-specific management settings. As a result, it is necessary to investigate the ESG criteria based on industry differences.

In that sense, the substance and focus of ESG disclosures vary by sector. ESG reports must adapt to the interests of stakeholders based on robust materiality matrices applicable to the firm and industry in which it works (Oncioiu et al., 2020). Oncioiu et al. (2020) imply that significant discrepancies in ESG disclosure by corporations are attributable to varied social settings, nation classifications, and stakeholders, with companies in riskier industries using ESG disclosure to demonstrate responsibility (Bantan & Thomas, 2021; Oncioiu et al., 2020).

Lastly, this finding is consistent with Champagne et al. (2021)'s assertion that ESG priorities differ by sector, with capital-intensive industries such as coal, oil, natural gas, and chemical being more vulnerable to environmental issues than labor-intensive industries such as retailing, which are more vulnerable to social problems associated with human rights issues and compliance with international labor standards (Champagne et al., 2021).

This discussion leads to the second hypothesis which will be explored in this thesis:

H2: *The average ESG disclosure score of European companies varies per sector*

The objective of the hypothesis is to see if the mean ESG disclosure score statically varies depending on which industry the European companies are in.

2.8 ESG Disclosure, Firm Performance, and Industry Sectors

In the above sections, the current state of the art of ESG integration has been explained advancing multiple hypotheses which will be tackled throughout the rest of this thesis. The first hypothesis addresses the relationship between ESG disclosure and firm performance to see if one can influence the other. Even though many studies have advanced that a positive relationship exists between ESG performance and firm performance, the data and the geographic area change from one study to another. Thus, this relationship will be analysed again using a definite data set, as explained in the following chapter.

On the other hand, the second hypothesis solely looks at the relationship between ESG disclosure and industry sectors to acknowledge if those are dependent or not. Some academics have found some intra- and inter-dependence between ESG disclosure scores and the industry sector they are part of. This hypothesis will allow to test if this inter-dependence also exists using this dataset.

Finally, the last hypothesis, as follow, will be analysed to determine if the results found in the first two hypotheses provide the same outcomes when the variables are put together. On that account, this final hypothesis will consider the relationship between ESG disclosure and financial performance and whether this relationship is sector dependent for companies with high ESG disclosure scores. In that sense, a sub-classification between the disclosure scores (HIGH VS LOW) will be made to study if this allocation makes a difference and is consistent with our expected results.

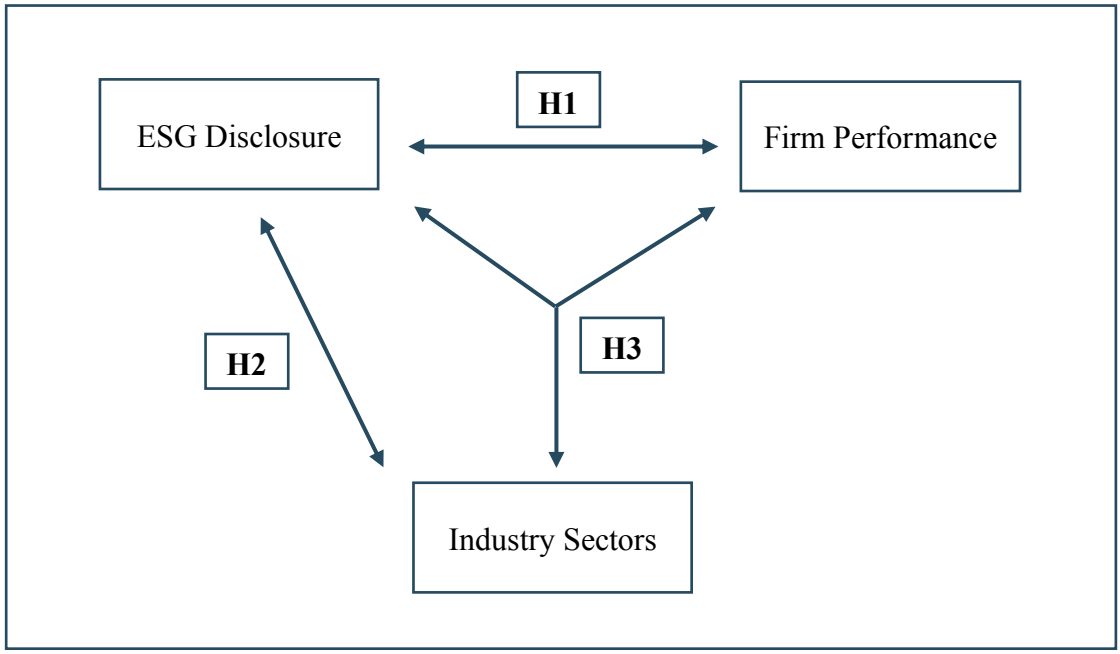
These hypotheses have been chosen to help answer the research question of this thesis. In addition, no studies have been found, to the best of this research's knowledge, to tackle this specific subject. This is the reason why those specific hypotheses have been chosen with the objective to hopefully fil a gap in the current literature on the subject.

Hence, the last hypothesis is the following:

H3: *The relationship between ESG disclosure and firm performance is sector dependent for companies with a high ESG disclosure score.*

In addition, the Figure 2 below provides a summary of the different hypotheses and the relationship which exists among the variables used in this thesis.

Figure 2: Hypotheses overview



Chapter 3: Research Design and Data Collection

This thesis will observe a quantitative approach to answer the multiple hypotheses and the research question. In that sense, secondary data has been retrieved to obtain a clear picture of characteristics and relationships that may exist as well as the extent to which they apply. This way is preferred over a qualitative manner as it will allow gathering a wide range of data making the results more accurate and less biased. Moreover, it will enable the study to be repeated using a different sample size or population. Finally, the provided results could be considered more relatable and generalizable by basing the conclusions on statistical outcomes.

To perform this research, data has been retrieved from the Bloomberg database. This database is one of the most used databases nowadays in the finance world as being the global leader in financial data and insight (Bloomberg, 2022). Furthermore, Bloomberg allows customers to gather real-time data as well as historical data for more than 300,000 customers in the world. Thus, all our needed information, whether it was to qualify the firm performance (i.e. ROA and ROE), the ESG disclosure scores, and the control variables, have been collected using the same Bloomberg terminal.

The next section of the chapter will explain why the Bloomberg ESG disclosure scores database has been preferred over the other database such as MSCI or Refinitiv. Then, the sample selection and the different variables will be explained. Finally, this chapter will end with a summary of all the variables used throughout the thesis.

3.1 Bloomberg & ESG Disclosure Scores

To quantify the ESG performance of our portfolio of firms, the Bloomberg ESG Disclosure Scores have been used. Bloomberg's Environmental, Social and Governance data collection is widely developed as it provides ratings for over 11,800 businesses in more than 100 countries (Bloomberg, 2022). The offering comprises as-reported statistics, calculated ratios, and historical data dating back to 2016 (Bloomberg, 2022). This global coverage aspect is one of the reasons this database has been preferred over others such as MSCI and RobeccoSAM. Looking at the number of criteria used to qualify ESG scores, Bloomberg used around 120 criteria, while MSCI has approximately 37 criteria (Billio et al., 2021). In addition, Bloomberg provides ESG data which are organised into the three ESG topics as follows (Billio et al., 2021; Bloomberg, 2022):

1. **Environment**
    - Air quality
    - Climate change effects
    - Water and energy management
    - Materials and waste
    - Carbon emissions

- Pollution

2. **Social**
    - Health and safety
    - Discrimination
    - Diversity
    - Human rights
    - Community relations

3. **Governance**
    - Compensation
    - Audit risk and oversight
    - Board independence, structure, and tenure
    - Shareholders' rights
    - Executive compensation
    - Takeover defense

In that sense, the database covers a broad range of ESG topics and tries to make a rigorous analysis by considering many quantitative details instead of only subjective aspects (Bloomberg, 2022). Furthermore, its analysts standardise ESG data and verify that the latter will cover at least 80% of a company's activities and employees to reflect its operations. Furthermore, making all data consistent in terms of units ensures that data reported by companies is comparable over time and across companies. Last, by using daily updated content, the customers are guaranteed that the content used is up to date at any time. All the above reasons lead to using the Bloomberg database to gather data in this thesis.

Looking at the ESG scores themselves, the rating providers used different methodologies. For example, Bloomberg, as mentioned above, will base its ratings on many other criteria, which will be weighted to give the companies a score ranging from 0 to 100 (0 being the worst and 100 being the best). In addition, it uses the companies' reports and publicly available information and makes companies' direct contact while basing its principles on international bodies (Billio et al., 2021). Overall, this gives the customers a compounded ESG Disclosure Score related to the company they are interested in.

3.2 Sample Selection

To gather the data that matters to this thesis's purpose, several filters have been applied to Bloomberg' database. The different companies and variables kept for further analysis are developed in below sub-sections.

3.2.1 STOXX 600 Index

The selected sample comprises the companies' information in the STOXX Europe 600 index. This index is derived from the STOXX Europe Total Market index by considering only 600 companies representing capitalised enterprises in around 17 countries in the European area (Qontigo, 2022). Taking this index ensures the viable condition of having a high enough amount of data while not having to analyse the whole index.

In addition, the data was retrieved monthly from January 2016 until December 2021. The choice to gather data on a monthly basis starting in 2016 was for two reasons. On the one hand, taking monthly rather than yearly dataset allows for more precise results and a broader database. On the other hand, based on the new taxonomies and regulations one can see that most of those have been decided upon before 2016. Henceforth, starting the dataset after this date seemed to be a good base, sustainability being considered a reality at this time. Overall, the data spans a 72-months period.

Furthermore, as explained in the following sub-sections, different variables had to be collected to quantify the ESG performance and firm performance of each 600 companies in the defined timeframe.

3.2.2 ESG Performance's Variables

Regarding ESG performance, the following sets of variables have been gathered for each company: *ESG Disclosure Score*, *Environmental Disclosure Score*, *Social Disclosure Score* and *Governance Disclosure Score*. The first one is the overall score given to the companies in the index, while the three others are the individual scores obtained in each dimension. As mentioned previously, the given score range between 0 and 100. Looking at the database, the lower overall ESG disclosure score is 1,08, while the highest is 75,3. On the other hand, the dimension which scores the highest is the governance one with a score of 99,31, while the one with the lowest score is the environmental one, with nine enterprises having a score under 1.

Those variables will be used as independent variables throughout the thesis as the objective is to acknowledge the impact and dependence on the firm performance and its dependence on the different sectors.

3.2.3 Firm Performance's Variables

To quantify firm performance, two ratios are being used. The first one is the *ROA* (Return on Assets) which indicates the firm's profitability and tells how well a company performs. Then the second is the *ROE* (Return on Equity), which represents the financial performance of the companies. Those two ratios have been chosen as they represent the firm performance and the results investors get on their investments. Hence, if investors invest in a company with good ESG performance because they believe it is profitable, the

impact should be seen in the firm performance ratios. In addition, those two ratios have been used in other studies providing a way of comparison later. Lastly, those two ratios will be used as dependent variables when answering the first and third hypotheses.

3.2.4 Industry Classification

As a classification between the different industry sectors in which the companies are part will be made for the second and third hypotheses of this research, the companies' datasets have been classified in the eleven following industries (CFI Team, 2022b):

1. **Industrials** – Companies in the industrial sector span from airlines and railroads to military weapons makers. Because the number of enterprises is so diverse, the industry is divided into sub-sectors, with aerospace and defence, and construction and engineering being the two main businesses. Some European companies being part of this industry are Easyjet, Securitas and Adecco Group.

2. **Materials –** Companies in the materials industry supply the raw materials required for other industries to function. The raw materials include mining firms that supply gold, zinc, and copper and forestry companies that provide wood. Container and packaging firms are examples of companies that are generally not linked with materials yet are in the industry. Examples of firms which are part of the materials industry are Glencore, Anglo American and Air Liquide.

3. **Financials –** All businesses concerned with finance, investment and the transportation or storage of money are included in the financial industry. It comprises banks, credit card firms, credit unions, insurance companies, and mortgage real estate investment trusts. Companies in this area are often relatively stable, as many are older, well-established businesses. Some companies included are Deutsche Bank, HSBC Holdings and Zurich Insurance Group.

4. **Consumer discretionary –** Discretionary consumer goods are non-essential products or services. Economic conditions and individual affluence determine the demand for these goods. Cars, jewellery, sporting items, and technology equipment are examples of products that can be found in this sector. At the same time, trips, hotel stays and dining in a fine restaurant are examples of experiences that can be found in this industry. Thus, examples of companies that provide such experience are LVMH, Ferrari, Adidas, and Hermes.

5. **Information technology –** Firms that create or distribute technology products or services, including internet corporations. Computers, microprocessors, and operating systems are examples of technological developments. Because of the tremendous growth of technology-based enterprises, this industry has witnessed much change in recent years. Example of companies in this sector includes Nokia et Logitech International.

6. **Health care –** This sector consists of medical supply firms, pharmaceutical corporations, and scientific-based activities or services that attempt to better the human body or mind. Examples of companies are Novo Nordisk and Astra Zeneca, the latter being well known for the vaccination campaign against the propagation of Covid-19.

7. **Consumer staples –** Consumer staples firms offer all of life's basics. Food and beverage firms, domestic product providers, and personal product suppliers are all included. People are familiar with consumer staple firms because they see their items in stores daily. Nestle, Carlsberg and L'Oreal are examples of consumer staples products.

8. **Energy –** The energy sector encompasses all enterprises involved in the oil, gas, and consumable fuels industries. This comprises firms that locate, drill for, and extract the commodity. It also includes firms that refine the material and those that provide or produce the equipment required in the refinement process. Examples of companies in this sector are Total and Shell.

9. **Communication services –** Companies that keep people connected make up the communication services industry. This covers internet service providers and phone plan providers. Media entertainment, interactive media and services enterprises are among the more intriguing segments of the sector. Some companies in this industry are Vodafone, Proximus and Ubisoft Entertainment.

10. **Utilities –** Electricity, water, and gas are supplied or generated by utility firms to buildings and households. Many utility companies are expanding their use of renewable energy sources. Utility companies include Orsted and Engie.

11. **Real estate –** The real estate sector is land and improvements such as buildings, fixtures, roads, structures, and utility systems. Property rights confer land ownership, modifications, and natural resources such as minerals, plants, animals, water, etc. Examples of enterprises that can be found in this industry are Big Yellow Group and Covivio.

In addition, the 600 companies have been classified in the above industries as shown in Appendix 1, the Industrial, Financial and Customer Discretionary sectors being the ones with the most enterprises in the index.

Inter-industry analyses and comparisons will be made in a following chapter of this thesis, meaning that the data will be classified into sub-groups, which will then be compared against one another, with the industry type not being a variable on its own.

3.2.5 Control Variables

Lastly, some control variables have been collected to be added to limit the influence of cofounding and other extraneous variables to have a consistent model. Six control variables have been gathered such as:

1. **Net income/Profit**
2. **Market capitalisation**
3. **Revenue**
4. **Earnings per share**
5. **Share price**
6. **Total return**

Those variables have been collected because they are highly linked to firm performance and may influence the coefficients of the independent variables. However, based on the different analyses which will be made in the following sections of the thesis, some variables will be used while others will be used for other tests.

In conclusion, the final dataset consists of 43,160 data points for 12 different variable types, as shown in Table 1 below, covering a 72-month period from January 2016 to December 2021 and based on the 600 European companies of the STOXX 600 Index.

Table 1: Variable summary

Dependent Variables	ROE ROA
Independent Variables	ESG Disclosure Score Environmental Disclosure Score Social Disclosure Score Governance Disclosure Score
Control Variables	Net income/Profit Market capitalisation Revenue Earnings per share Share price Total return

Chapter 4: Data Statistics Summary

This section entails analysing the data mentioned in the previous chapter and ensuring that those are fit for future statistical tests. As most of the same data will be used multiple times over the different hypotheses, it has been decided that an independent chapter regarding statistics summary will be made. To gather the statistical results, *IBM® SPSS Statistics* will be used throughout the whole research. This software platform derives valuable insights from the database, while advanced statistical processes aid in accuracy and quality decision-making. All aspects of the analytics lifecycle are covered, from data preparation and management through analysis and reporting (IBM, 2021). This analytical software has been preferred over others like *Microsoft Excel* or *R for Statistical Computing* because it offers a wide array and specifically hand-made statistical analysis tools and does not require prior knowledge to be used.

Overall, this chapter will provide the reader with descriptive analysis and tests for normality. The descriptive analysis will summarise the entire dataset of 43,160 data points for each of the different variables. In addition, measures of central tendency such as mean, median, maximum, and minimum, as well as measures of dispersion such as standard deviation, skewness and kurtosis, are among the features of interest that will be interpreted in the sub-sections 4.1 and 4.3.

Regarding the tests for normality, those will be performed using the Kolmogorov-Smirnov test. This test acknowledges if variables follow a particular type of distribution, in this case, the normal distribution. The normality condition is verified in this chapter as it is an assumption needed to realise the statistical analyses of the following chapters.

In the last part of this chapter, the overall sample has been divided into two categories based on the disclosure scores displayed. On the one hand, a LOW sample has been created for companies having an ESG Disclosure Score lower or equal to 49,94 (mean), accounting for 19 532 data points. On the other hand, a HIGH sample has been created for companies having an ESG Disclosure Score higher than 49,94, accounting for 21 204 data points.

4.1 Descriptive Statistics: All Variables

This section performs a descriptive analysis of the two independent variables (enterprise performance), the four dependent variables (ESG performance) and the six control variables.

Table 2 and 3 below exhibit the descriptive statistics outputs, including all the variables needed throughout the thesis. It is important to note that the scale among the different data differs. For example, ROA and ROE are on a percentage basis, while the other ESG

Disclosure Scores are on a scale of 0-100, as disclosed in the data section. Lastly, the control variables are all based on a regular scale, meaning that one equals one.

Table 2: Descriptive statistics output including all the variables (Part 1)

	N	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
ROA LF	41970	147,29	-49,09	98,20	5,5094	,03699
ROE LF	41309	1672,66	-612,92	1059,74	15,0268	,12408
ESG disclosure score	42574	79,74	1,08	80,82	49,9452	,05614
Governance disclosure	42574	100,00	,00	100,00	81,1850	,06203
Social Disclosure	42574	73,22	,00	73,22	32,7591	,05896
Environmental Disclosure	42574	83,72	,00	83,72	35,7898	,09166
Eps T12M	42128	2235,06	-205,17	2029,89	5,5927	,18350
Price D-1	42998	122199,98	,02	122200,00	648,5503	16,68526
Total return D-1	42998	70,43	-47,53	22,90	-,1278	,00879
NI/PROFIT	42280	222650000000	-35210000000	187440000000	1641394420,85	24883278,613
Market Cap	42935	999258520000	431480000	999690000000	33378091828.7	316327606,527
Revenue year	42313	446580992640	-14170000000	432410992640	20438213632.2	179722999,474
Valid N (listwise)	40736					

Regarding the number of observations on the population, this number variate as some data was missing for some variables for some months. Furthermore, extreme outliers have been removed after reviewing the dataset to reduce data variations. All data combined lead to a valid N of 40 736 data points.

Looking at the means, the Governance Disclosure Scores scored the highest of the four ESG-related variables, averaging 81,18. The full ESG Disclosure Score comes in second with an average score of 49,94, while the Social and Environmental variables provide a score of 32,76 and 35,79, respectively. This signifies that companies have more facilities respecting governance's regulations which is the only dimension for which enterprises got a score of 100. One reason for this could be linked to the financial crisis faced in the last century leading to higher demand from regulators to respect governance protocols. In addition, specific regulations regarding social and environmental aspects are not fully developed yet and are in a blurred area.

When considering the minimum and maximum statistics, the market capitalisation variable has the highest statistic values of over billions of euros. This indicates that the companies traded in the index are massively and publicly traded European companies. Thus, it will need to be considered when advancing limitations as the selected portfolio might not represent all the types of companies that exist, since it is mainly composed of large multinationals.

Table 3: Descriptive statistics output including all the variables (Part 2)

	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ROA LF	7,57737	57,416	2,103	,012	17,161	,024
ROE LF	25,21972	636,034	5,943	,012	329,762	,024
ESG disclosure score	11,58396	134,188	-,309	,012	,005	,024
Governance disclosure	12,79835	163,798	-1,384	,012	2,534	,024
Social Disclosure	12,16541	147,997	,192	,012	-,256	,024
Environmental Disclosure	18,91238	357,678	-,057	,012	-,681	,024
Eps T12M	37,66422	1418,593	44,138	,012	2298,494	,024
Price D-1	3459,84801	11970548,240	21,199	,012	516,525	,024
Total return D-1	1,82237	3,321	-,450	,012	21,959	,024
NI/PROFIT	5116524895.41	2.618E+19	12,468	,012	308,189	,024
Market Cap	65545492178.7	4.296E+21	5,504	,012	45,736	,024
Revenue year	36969243788.2	1.367E+21	4,317	,012	26,240	,024
Valid N (listwise)						

Concerning the volatility of the data, except for the ESG variables, which are not displaying a high standard deviation compared to their means, all other variables seem to have a highly volatile behaviour. Volatility level could interfere with the results obtained in later stages of the research as it might impact the possible relationship found among the variables. From a financial perspective, high volatility usually displays higher risk for investors. Hence, it looks like the chosen index will fit better risk-seeking investors.

Lastly, two statistic outputs left are skewness and kurtosis. These outputs help to measure the shape of a distribution. Skewness defines if a population is asymmetrical or not depending on the sign displayed next to the value. A negative value indicates that a tail exists and is located on the left side of the distribution, while a positive value indicates that the tail is located on the right side. A value of zero will indicates that no tail exists, and the distribution is perfectly symmetrical.

Four other variables are within the limit of -0,5 to 0,5: ESG Disclosure Score, Social Disclosure Score, Environmental Disclosure Score and, Total Return. This suggests that their distributions are almost symmetrical, and a little tail to the left remains for three of them, while Social Disclosure is skewed to the right. On the contrary, EPS, Price D-1 and NI/Profit manifest a high amount of skewness. Hence, those are heavily skewed to the right. It could once more have some incidence when treating them in later stages and need to be kept into consideration.

Based on a normal distribution, the kurtosis value indicates whether or not a distribution has heavy or light tails. On average, a distribution that displays a normal curve will have a kurtosis value of three. If a distribution creates fewer and less extreme outliers than the normal distribution, it should indicate a value lower than three. Nonetheless, a distribution with more outliers will display a value higher than three.

Looking at the values displayed, the four ESG data points have a value lower than three, meaning that they produce fewer outliers than the normal distribution. However, all the others show numbers over three, signifying that the distributions have more outliers than a normal one. EPS, Price D-1 and NI/Profit exhibit extremely high values. This is consistent with the results obtained in the part about skewness. Thus, these variables are more likely to present a highly skewed histogram with many outliers.

4.2 Tests for Normality

This sub-section will develop the normality tests realised to prepare data and ensure that they match future assumptions. Three types of outputs will be reviewed. First, the test of Kolmogorov-Smirnov has been made, resulting in a particular p-value to test the level of normality. Second, the different histograms have been extracted to verify the abovementioned condition using skewness and kurtosis. Lastly, Q-Q Plots have been created to visualise the fit between the line and the residuals.

The Kolmogorov-Smirnov Goodness of Fit Test (K-S test) determines whether your data and a known distribution have the same distribution by comparing them. The test is frequently used as a test for normality to determine whether your data is normally distributed. More specifically, the test contrasts the distribution produced by your data, the empirical distribution function, with a known hypothetical probability distribution (the normal distribution in this case).

Depending on the statistical results of the test, the null hypothesis will be accepted or not. In the case of a p-value lower than the acceptance level, the null hypothesis will be rejected, meaning that at least one value of the empirical distribution does not match the normal one. On the contrary, if the p-value is high enough, the null hypothesis is confirmed signifying that the observed distribution matches the normal distribution.

Table 4 depicts the statistics output for the Kolmogorov-Smirnov normality test. When looking at the significance levels, all the values are lower than ,000, meaning that the null hypothesis must be rejected on a 0,05-confidence level. Thus, the quantitative variables are not considered to be normal, even the 4 ESG variables which got through the kurtosis test.

Table 4: Statistics output for tests of normality (Kolmogorov-Smirnov)

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
ROA LF	,143	41970	,000
ROE LF	,188	41309	,000
ESG Disc.	,023	42574	,000
Gov Disc.	,129	42574	,000
Soc Disc.	,045	42574	,000
Env Disc.	,039	42574	,000
Eps T12M	,392	42128	,000
Price D-1	,426	42998	,000
Total Return	,076	42998	,000
NI/ PROFIT	,299	42280	,000
Market Cap	,310	42935	,000
Revenue Year	,288	42313	,000

Looking at the histograms that can be found in Appendix 2, it can be noticed that the normality assumption is not respected for all the variables. The least skewed distributions are the ROA, ROE, ESG Disclosure, Social Disclosure and Total Return. Those empirical distributions display a rather good normal curve even though some outliers can be depicted. In opposition, the rest of the control variables show highly skewed to the right distributions that coincide with the skewness results obtained in the descriptive statistics output.

Finally, when two sets of quantiles are plotted in opposition to one another, the result is a scatterplot known as a Q-Q plot. The points should form an approximately straight line if both sets of quantiles were drawn from the same distribution. When considering the plots in Appendix 3, the previous results obtained are once more verified as the sole plots to match best the normal line are the ESG distributions. The others do display highly skewed results. A reason behind this result can be advanced. In fact, most control variables are financial measures that do not allow negative results. Thus, most of them show a right tail with no negative data.

One may wonder if there is an issue in not having empirical distributions following the shape of a normal distribution. Multiple remarks must be made regarding this point of attention. The normal distribution is essential as many variables are distributed normally when randomly taken and are easier to use in other statistical tests as most of those tests are derived from the normal theory. In this way, it is easier and more promising to realise

statistical tests with distributions that follow the normal curve. Yet, this does not mean that the future tests of this thesis will not work correctly and will not provide satisfying results. The Central Limit Theorem (CLT) confirms this idea by stating that the distribution of sample means approaches a normal distribution as the sample size increases, no matter how the population is distributed. By having a sample size of more than 40 000 data points for each variable, the normality issue should not pose problems in the later stages of the research. In addition, this high amount of data is a reason why the log version has not been chosen. When taking the log, some bad data can appear good although they are not, while outliers might not appear as outliers anymore and might have totally different effects on the distributions.

4.3 Descriptive Statistics: High VS Low ESG Disclosure Distributions

To terminate this chapter about the descriptive statistics of the variables, the database is divided into two sub-categories: LOW and HIGH ESG disclosure scores. This separation has been made as the primary goal of this thesis is to test if ESG performance does influence the firm performance of companies with high ESG scores. Furthermore, it has been divided solely into two sub-populations and not more to make sure that the CLT still applies by keeping the population large enough. This can be seen as a limitation as having more sub-groups could have proposed more specified results, but it also offers ideas for future research.

The data have been sorted out to create these new portfolios based on their ESG Disclosure Scores from the lowest to the highest. Then, the mean value found from the entire panel (see Table 2) allowed to divide the distribution into two distinct datasets. Hence, the low ESG score distribution goes from 1,08 to 49,94 (mean), while the high ESG score goes from 49,95 to 80,82, as seen in Tables 5 and 6, respectively.

In addition, the spread and range of ESG disclosure scores are smaller for companies with high scores than those with low ESG scores. This phenomenon can be explained by the idea that it is harder to obtain outstanding overall ESG scores, while companies that do a lousy job will more easily get bad scores from rating agencies.

Another interesting aspect of this descriptive output is the data about ROA and ROE. The range is more prominent for both ROA and ROE of companies having low ESG scores. This means that the company's performance in this population is more likely to show fluctuated results than in companies with high ESG performance. The same behaviour can be observed in the EPS and Price variables. All other variables display higher marks in the portfolio with high disclosure scores.

Table 5: Descriptive statistics output including all the variables for LOW ESG scores (Part 1)

	N	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
ROA LF	20037	147,29	-49,09	98,20	6,3080	,06298
ROE LF	19714	1248,65	-188,91	1059,74	16,3295	,19247
ESG disclosure score	20530	48,86	1,08	49,94	40,3250	,05310
Governance disclosure	20530	98,62	,00	98,62	74,7219	,09404
Social Disclosure	20530	52,24	,00	52,24	24,5557	,05890
Environmental Disclosure	20530	65,33	,00	65,33	21,6041	,09515
Eps T12M	20111	2235,06	-205,17	2029,89	6,8698	,36908
Price D-1	20533	122199,98	,02	122200,00	803,9548	33,70034
Total return D-1	20533	70,04	-47,53	22,51	-,0328	,01318
NI/PROFIT	20218	213710000000	-26270000000	187440000000	1493201627,79	42612040,058
Market Cap	20530	987308520000	431480000	987740000000	27836236933.8	429686429,362
Revenue year	20219	339730000000	-14170000000	325560000000	14808367348.9	211493409,887
Valid N (listwise)	19532					

Table 6: Descriptive statistics output including all the variables for HIGH ESG scores (Part 1)

	N	Range	Minimum	Maximum	Mean	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
ROA LF	21933	95,98	-37,95	58,03	4,7798	,04060
ROE LF	21595	939,04	-612,92	326,12	13,8374	,15917
ESG disclosure score	22044	30,87	49,95	80,82	58,9047	,04195
Governance disclosure	22044	59,57	40,43	100,00	87,2043	,05719
Social Disclosure	22044	57,83	15,39	73,22	40,3990	,06683
Environmental Disclosure	22044	64,42	19,30	83,72	49,0012	,08405
Eps T12M	22017	738,10	-52,10	686,00	4,4262	,09750
Price D-1	22465	23449,71	,29	23450,00	506,5108	8,32207
Total return D-1	22465	38,59	-15,69	22,90	-,2147	,01171
NI/PROFIT	22021	81390000000	-35210000000	46180000000	1777564318,35	27366596,760
Market Cap	22367	999215500000	474500000	999690000000	38474678763.3	458950159,170
Revenue year	22053	432622442640	-211450000	432410992640	25614843915.2	280472909,196
Valid N (listwise)	21204					

When observing the volatility, no apparent differences can be observed whether it is between high and low portfolios (Tables 7 and 8) compared with the results of the entire distribution (Table 3). This signifies that only the four ESG scores have low volatility by having their standard deviation lower than their means. However, the difference between the means of the rest of the variables and their standard deviation is lower than previously observed. Hence, the data seems less volatile than before when separated into two distinct distributions.

Regarding the skewness' level, there are some differences between the above results in Table 3 and the two outputs in Table 7 and Table 8. For companies with a low ESG score, the following variables show a negative statistic result: ESG Disclosure Score, Governance Disclosure Score, Social Disclosure Score and Total Return D-1. In addition,

these variables will exhibit left tails. Thus, the distribution looks more spread than before as only Social Disclosure and Environmental Disclosure are in fall in the accepted range. Lastly, concerning kurtosis, there is no difference that can be noticed. The four ESG data points have a value lower than three, meaning that they produce fewer outliers than the normal distribution.

Withal, for companies with a high ESG score, only two variables have a negative skew result: ROE and Governance Disclosure Score (see Table 8). ROE having a left tail is entirely unexpected as it has been positive in every other tests. Furthermore, the ESG Disclosure Score does not present a negative sign while it has been the opposite previously and is not comprised anymore in the accepted range of -0,5 to 0,5. Thus, the variable is less symmetrical than before. The same behaviour is observed for the kurtosis value, with ESG Disclosure Score having a negative value consistent with the skewness for the first time. Overall, the other variables show a constant behaviour across portfolios.

Table 7: Descriptive statistics output including all the variables for LOW ESG scores (Part 2)

	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ROA LF	8,91438	79,466	2,199	,017	15,908	,035
ROE LF	27,02338	730,263	12,525	,017	414,007	,035
ESG disclosure score	7,60794	57,881	-1,134	,017	1,361	,034
Governance disclosure	13,47500	181,576	-1,215	,017	1,703	,034
Social Disclosure	8,43996	71,233	-,181	,017	-,101	,034
Environmental Disclosure	13,63395	185,885	,156	,017	-,715	,034
Eps T12M	52,33983	2739,458	33,941	,017	1282,455	,035
Price D-1	4829,03600	23319588,703	16,140	,017	281,436	,034
Total return D-1	1,88930	3,569	-1,125	,017	32,930	,034
NI/PROFIT	6059006560.21	3.671E+19	14,575	,017	322,136	,034
Market Cap	61566733535.0	3.790E+21	5,531	,017	45,344	,034
Revenue year	30072994543.1	9.044E+20	4,214	,017	23,283	,034
Valid N (listwise)						

Table 8: Descriptive statistics output including all the variables for HIGH ESG scores (Part 2)

	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ROA LF	6,01336	36,161	1,071	,017	7,603	,033
ROE LF	23,38972	547,079	-3,432	,017	174,556	,033
ESG disclosure score	6,22800	38,788	,666	,016	-,201	,033
Governance disclosure	8,49177	72,110	-1,348	,016	2,712	,033
Social Disclosure	9,92210	98,448	,219	,016	-,560	,033
Environmental Disclosure	12,47873	155,719	,221	,016	-,629	,033
Eps T12M	14,46701	209,294	19,376	,017	671,315	,033
Price D-1	1247,33954	1555855,929	5,210	,016	41,277	,033
Total return D-1	1,75453	3,078	,295	,016	8,760	,033
NI/PROFIT	4061059116.03	1.649E+19	3,553	,017	29,523	,033
Market Cap	68638754399.3	4.711E+21	5,494	,016	45,573	,033
Revenue year	41650935274.5	1.735E+21	4,156	,016	23,838	,033
Valid N (listwise)						

In conclusion, this chapter analysed all the descriptive statistics of the variables that will be used throughout the following chapters. It serves as a basis for interpretation and helps to see if the distributions are fit for use while acknowledging their possible weaknesses. It should be noted that the outputs analysed throughout this chapter will not be investigated again in the following chapters as the distribution used will be reused later. Considering the variables, although the results obtained might look unexpected, the population's size should enable reliable results for future tests.

Chapter 5: European Companies, ESG Disclosure Score, and Firm Performance

This chapter will tackle the first hypothesis of the thesis. Therefore, it tests if European companies with a high ESG Disclosure Score exhibit a better firm performance than those with a low ESG Disclosure Score. The chapter's primary goal is to revalidate previous studies explained in Section 2.6 of the thesis. Most researchers have found a positive relationship between ESG scores and firm performance (Alareeni & Hamdan, 2020; Al-Najjar & Anfimiadou, 2012; Balatbat et al., 2012; Cek & Eyupoglu, 2020; Friede et al., 2015; Naeem et al., 2022). Accordingly, although the dataset chosen differs from one study to the other, the results are expected to be positively significant.

To realise this detailed analysis, times series data described in the data section of this thesis will be used. Furthermore, the descriptive statistics will not be reviewed as they have been extensively explained in the last part. Finally, this chapter will be organised as follow: the methodology and the model used will be presented, followed by a thorough analysis of the results and a discussion of the hypothesis tested.

5.1 Methodology

5.1.1 Data

Initially, the data panel included the companies contained in the STOXX 600 index from 2016 to 2021. This panel was made of more than 43 000 observations. After dividing the overall distribution into two distinct sub-distribution (low versus high) and accounting for missing values, the low distribution's observations amounted to 21 328. In contrast, the high distribution amounted to 21 658 observations. Even though the overall data set is divided into two, it is still considered large enough to process with the analysis.

To perform the first analysis, ROA and ROE will be used as dependent variables and ESG Disclosure as the independent variable. In addition, Market Cap, Revenue and EPS have been added as control variables based on different studies such as Junius et al. (2020) and Naeem et al. (2022). Net Income, Total Return, and Price have also been added as control variables. The latter have been chosen because they are highly connected to the dependent variables (Al-Nimer et al., 2013; Hikmah et al., 2022; Ilmiyono, 2019; Rakhman et al., 2019). All in all, those variables have been added to strengthen the analysis results.

5.1.2 The Model

A regression model is an equation that depicts the connection between a dependent variable and one or more explanatory factors (Montgomery et al., 2021). A linear

regression analysis will be used to model the relationship between firm performance and ESG performance. The parameter Beta depicts the effect the second has on the first. Firstly, the linear relationship between only the two variables has been tested using simple linear regressions. However, as could be expected, the results did not prove themselves satisfying as ESG Disclosure alone cannot predict ROA/ROE. Secondly, stepwise regressions using all the variables have been made. Stepwise regression is a model that allows for choosing the variables that best predict the dependent variable by maximizing F-statistic and R^2 (Tempelaar & Kerkhoffs, 2015). This is done by adding/removing one by one every predictor until it reaches the best model possible. Using this type of regression increases the chances of having a good model.

Overall, the regression models for ROA and ROE are specified as the following:

$$ROA_i = \alpha + \beta1*ESG\_Disclosure_i + \beta2*Market\_Cap_i + \beta3*Revenue_i + \beta4*EPS_i + \beta5*Net\_Income_i + \beta6*Total\_Return_i + \beta7*Price_i + \varepsilon$$

$$ROE_i = \alpha + \beta1*ESG\_Disclosure_i + \beta2*Market\_Cap_i + \beta3*Revenue_i + \beta4*EPS_i + \beta5*Net\_Income_i + \beta6*Total\_Return_i + \beta7*Price_i + \varepsilon$$

In the models, "i" is for the distribution used (high or low), "α" is the intercept while "β" is the slope of the population parameter, and "ε" is the error term (Montgomery et al., 2021; Pickwick & Sewelén, 2021). As this hypothesis aims to see if there is a relationship between ESG score and firm performance for companies with a high ESG score, four regression analyses will be made using the high and low portfolios for each firm performance indicator. The regression models are identical for the high and low sample populations.

5.1.3 Assumptions and Conditions for Multilinear Regression

When doing statistical analyses, many assumptions and conditions need to be respected. In the case of multilinear regression, four major conditions have to be respected in addition to the fundamental premise that quantitative data are used: *Linear Assumption, Independence Assumption*, *Equal Variance Assumption* and *Normality Assumption* (Tempelaar & Kerkhoffs, 2015). Moreover, a test for multicollinearity has been added to acknowledge the correlation between the variables.

5.1.3.1 Linear Assumption

The regression model implies that the relationship among the variables is linear. As the model is made of multiple predictors, the linearity assumption needs to be verified for each predictor individually (Tempelaar & Kerkhoffs, 2015). The scatterplots depicting the relationship between the predictors with the dependent variables can be found in

Appendix 4. As illustrated in the scatterplots, some variables show a strong linear relationship with the dependent variables in both distributions, such as ESG Disclosure, Market Cap and Revenue. In addition, the sample composed of high ESG scores also depicts a strong linear relationship with the stock price.

Regarding the other variables, it is not because they do not display a strong linear relationship that they do not respect the linear condition. In fact, the scatterplots do not necessarily need to show strong linear relationships; they just need not demonstrate curvilinear relationships (Tempelaar & Kerkhoffs, 2015). This is the case here. Hence, it can be said that the linearity assumption is respected.

5.1.3.2 Independence Assumption and Randomisation Condition

This assumption suggests that the errors depicted in the actual underlying regression model have to be independent of each other (Tempelaar & Kerkhoffs, 2015, p.562). Moreover, the *Randomisation Condition* should also be respected as the randomised collection of data reassure that the distributions are representative of a selected population (Tempelaar & Kerkhoffs, 2015). In this research, data collected can be recognised as being independent of one another. The data have been collected using a wide range and based on a wide array of companies that are independent of each other. In addition, the randomisation condition is respected as the final distribution is randomly obtained. Some company data are missing for certain variables meaning that those will be excluded randomly. This exclusion/inclusion of data is randomly made based on the available enterprise's information indicating that the independence assumption is respected.

5.1.3.3 Equal Variance Assumption

The equal variance assumption assumes that the errors of all values in every predictor should be roughly the same. To validate the assumption, scatterplots between residuals and predicted values of the regression are made to check for the *Equal Spread Condition*. If the residual plots show no pattern and no evidence of changing spread is recognised, the assumption should be validated (Tempelaar & Kerkhoffs, 2015). Looking at the scatterplots in the Appendix 5, the assumption should be validated as no significant spread change can be noticed among the variables except for some outliers from here and there. Note that some specific statistical tests providing p-values can be done to verify this assumption but are not available on the statistic tool used for this study. Hence, only visual evidence will be provided in this research to approve this assumption.

5.1.3.4 Normality Assumption

When assuming normality, it is assumed that the errors around the resulted regression follow a normal curve (Tempelaar & Kerkhoffs, 2015). This assumption has been tested for every variable in Section 4.2 of the thesis. As all the variables display more or less normal curves and the number of observations is large, this assumption should be

respected. To be entirely sure about it, the histograms of residuals have been built in Appendix 6. The results are positive with the assumptions as the histograms depict unimodal and symmetric outcomes. The normality assumption is validated.

Under all the above assumptions and conditions, stepwise multilinear regression can be performed.

5.1.3.5 Multicollinearity

In a regression model, multicollinearity develops when independent variables are correlated. Because independent variables ought to be independent, this association is problematic. It can be challenging to fit the model and comprehend the findings if there is a significant enough correlation between the variables. The idea behind the regression is that you can change the value of one variable without impacting the others. However, if variables are correlated with each other, a change in one variable will provoke a change in another. Thus, it reduces the model's validity as variables cannot be evaluated independently from the others.

To evaluate the degree of collinearity among the variables, the Variance Inflation Factor (VIF) can be used. The higher the VIF, the less the variable is helpful in the regression model (Tempelaar & Kerkhoffs, 2015, p.622). If the VIF display a value higher than ten, a problem of collinearity exists (Naeem et al., 2022). When looking at the outputs, none of the regression depicts high collinearity among the variables, as shown in Table 11, 14, 17 and 20. The highest value depicted is 3,689, and the lowest is 1,002.

As no correlation and multicollinearity are found in the distributions, the stepwise regressions will be performed on the two distributions. Throughout the thesis, a significance level of 5% is applied to the statistical test to check for significance. The following section will provide the analysis of the regressions' results.

5.2 Results

As explained in the chapter's introduction, the descriptive statistics will not be explained again as they have been presented in chapter 4.3. Hence, the reported results of the multilinear regressions are depicted and analysed for each sample population.

5.2.1 The Impact of High ESG Disclosure Scores on Accounting-Based Firm Performance

The stepwise model this thesis uses allows finding the best set of variables to predict the dependent variable. In this case, the best model uses all available variables.

The model Summary in Table 9 shows an R-value of ,484, meaning that the correlation between the actual values of ROA and the predicted value of ROA is 48,4% correlated.

In addition, the R^2 tells how much a variation in the dependent variable is explained by the model. In this case, the seven predictors explain 23,5% of the variation in ROA. Adjusted R^2 helps to acknowledge if the variable that has been added to the model is useful or if it reduces the predictivity of the model (Tempelaar & Kerkhoffs, 2015). In this case, the Adjusted R^2 has a value almost identical to $R^{2,}$ meaning that added variables do make sense. As the stepwise method has been used, the values below are the best that can be expected using these variables. Furthermore, the R^2 value seems relatively low but is an accepted amount for the financial field as other studies have previously used such results (Cek & Eyupoglu, 2020; Junius et al., 2020; Pickwick & Sewelén, 2021).

Table 9: Model summary of ROA_HIGH

Model Summary[h]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
7	,484[g]	,235	,234	5,26151

g. Predictors: (Constant), NI/PROFIT, Revenue year, Eps T12M, Price D-1, Total return D-1, ESG disclosure score, Market Cap

h. Dependent Variable: ROA LF

An F-test has been made to verify if the model created is good and reliable. The idea behind the null hypothesis of the test is that all the predictors' coefficients are zero, and the regression model does not predict the dependent variable better than if the mean value was used (Tempelaar & Kerkhoffs, 2015). However, if the test turns out significative, then at least one of the predictor's coefficients is not equal to zero and is significative. Checking for the model at hand, the F-test has a significance level of ,000 (Table 10), meaning that the null hypothesis is rejected, and the dependent variable is better off using the predictors than not using them.

Table 10: F-Statistics of ROA_HIGH

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
7	Regression	183788,266	7	26255,467	948,415	,000[h]
	Residual	599376,209	21651	27,684		
	Total	783164,475	21658			

a. Dependent Variable: ROA LF

h. Predictors: (Constant), NI/PROFIT, Revenue year, Eps T12M, Price D-1, Total return D-1, ESG disclosure score, Market Cap

The regression coefficients are shown in Table 11. All variables turn out to be significant by having a p-value lower than 5%. The ESG disclosure score variable has a beta coefficient of ,032 with a significative p-value lower than ,001. Some positive relationships do exist between ESG disclosure score and ROA for the distribution having a high ESG performance.

Table 11: Regression coefficients of ROA_HIGH

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
7	(Constant)	2,357	,341		6,902	<,001	1,687	3,026		
	NI/PROFIT	6,405E-10	,000	,433	55,016	,000	,000	,000	,572	1,749
	Revenue year	-4,524E-11	,000	-,313	-43,572	,000	,000	,000	,683	1,463
	Eps T12M	,057	,003	,136	21,311	<,001	,052	,062	,862	1,160
	Price D-1	,001	,000	,116	18,348	<,001	,000	,001	,887	1,127
	Total return D-1	,127	,020	,037	6,228	<,001	,087	,167	,998	1,002
	ESG disclosure score	,032	,006	,033	5,499	<,001	,021	,043	,982	1,019
	Market Cap	1,563E-12	,000	,018	2,227	,026	,000	,000	,551	1,816

a. Dependent Variable: ROA LF

5.2.2 The Impact of High ESG Disclosure Scores on Financial-Based Firm Performance

This second regression uses ROE as the dependent variable. As shown in Table 12 below, the R-value and R^2 are slightly lower than in the previous model. In this case, they amount only to 14,5%, but as the regression model is the one that fits the best with the predictors, this level of prediction is accepted.

Table 12: Model summary of ROE_HIGH

Model Summary[h]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
7	,381[g]	,145	,145	21,62589

g. Predictors: (Constant), NI/PROFIT, Price D-1, Revenue year, Market Cap, Eps T12M, Total return D-1, ESG disclosure score

h. Dependent Variable: ROE LF

Furthermore, the model is accepted once more as the null hypothesis regarding the F-statistics is rejected as having a p-value of ,000. Therefore, using the predicted model is better than using ROE's mean value.

Table 13: F-Statistics of ROE_HIGH

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
7	Regression	1696712,835	7	242387,548	518,277	,000[h]
	Residual	9971388,538	21321	467,679		
	Total	11668101,373	21328			

a. Dependent Variable: ROE LF

h. Predictors: (Constant), NI/PROFIT, Price D-1, Revenue year, Market Cap, Eps T12M, Total return D-1, ESG disclosure score

Lastly, checking for the regression coefficients, all the coefficients have a p-value equal to zero or lower than ,001. This implies that every coefficient is significant and possesses a relationship with the dependent variable. For example, the ESG disclosure score has a coefficient of ,080, which is higher than the one previously found. Overall, both ROA and ROE have a positive significative relationship with ESG disclosure score in the distribution of high ESG performance.

Table 14: Regression coefficients of ROE_HIGH

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
7	(Constant)	6,815	1,414		4,819	<,001	4,043	9,587		
	NI/Profit	2,191E-9	,000	,380	45,449	,000	,000	,000	,572	1,749
	Price D-1	,003	,000	,169	25,174	<,001	,003	,003	,887	1,127
	Revenue year	-9,843E-11	,000	-,175	-22,888	<,001	,000	,000	,683	1,463
	Market Cap	-2,255E-11	,000	-,066	-7,756	<,001	,000	,000	,551	1,816
	Eps T12M	,066	,011	,041	5,954	<,001	,044	,087	,862	1,160
	Total Return D-1	,379	,084	,028	4,482	<,001	,213	,544	,998	1,002
	ESG disclosure score	,080	,024	,021	3,325	<,001	,033	,127	,982	1,019

a. Dependent Variable: ROE LF

5.2.3 The Impact of Low ESG Disclosure Scores on Accounting-Based Firm Performance

The third multilinear regression to be analysed is using the distribution with low ESG scores and ROA as the dependent variable.

When looking at the model summary, the R-value amount to ,302. This value indicates the correlation between the actual values of ROA and the predicted ROA. Values made by the model. On the other hand, R^2 amounts to ,09. This value is relatively low and could have been better if using different predictors, but as the objective is to test for high ESG performance, the same regressions have been done to the low ESG score portfolio.

Although the R-values are not proven to be high, the F-statistic value in Table 16 is still significant with a p-value of ,000. The model created using the predictive variables is better than not using it.

Table 15: Model summary of ROA_LOW

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,302[a]	,091	,091	8,43966

a. Predictors: (Constant), Total return D-1, Price D-1, Market Cap, ESG disclosure score, Revenue year, NI/PROFIT, Eps T12M

b. Dependent Variable: ROA LF

Table 16: F-Statistics of ROA_LOW

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	142309,774	7	20329,968	285,422	,000[b]
	Residual	1413516.20	19845	71,228		
	Total	1555825.97	19852			

a. Dependent Variable: ROA LF

b. Predictors: (Constant), Total return D-1, Price D-1, Market Cap, ESG disclosure score, Revenue year, NI/PROFIT, Eps T12M

Finally, when looking at the coefficients, two changes can be noticed from the two regressions above. Firstly, the last variable, the so-called Total return, has a p-value of ,126, meaning that it is not statistically significant (see Table 17). Secondly, the ESG disclosure score has a significative p-value (p = < ,001) but displays a negative coefficient, meaning that a negative relationship exists between ROA and ESG performance.

Table 17: Regression coefficients of ROA_LOW

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	7,712	,331		23,299	<,001	7,064	8,361					
	ESG disclosure score	-,041	,008	-,035	-5,061	<,001	-,057	-,025	-,048	-,036	-,034	,956	1,046
	Price D-1	,000	,000	,100	7,774	<,001	,000	,000	,068	,055	,053	,276	3,625
	NI/PROFIT	3,785E-10	,000	,261	29,351	<,001	,000	,000	,224	,204	,199	,578	1,730
	Market Cap	1,648E-11	,000	,116	12,352	<,001	,000	,000	,146	,087	,084	,518	1,932
	Revenue year	-6,445E-11	,000	-,220	-26,064	<,001	,000	,000	-,047	-,182	-,176	,644	1,553
	Eps T12M	-,007	,002	-,041	-3,195	,001	-,011	-,003	,073	-,023	-,022	,273	3,659
	Total return D-1	,049	,032	,010	1,529	,126	-,014	,111	,014	,011	,010	,998	1,002

a. Dependent Variable: ROA LF

5.2.4 The Impact of Low ESG Disclosure Scores on Financial-Based Firm Performance

The last multilinear regression to be analysed is using the distribution with low ESG performance and ROE as the dependent variable.

As illustrated in Table 18, the R-value is once again relatively low, with a value of ,169. R^2 and Adjusted R^2 have a value of ,029 and ,028, respectively, showing the lower results of the four regressions models. This can be explained the same way as for ROA. Using the portfolio of low ESG performance just for a comparison with the high ESG portfolio, the model drawn might not be the most optimal for the portfolio at hand.

Nonetheless, even though the model might not be the most optimal, the F-value is considered as significant (Table 19). This value is reassuring and signifies that ROE is better predicted using the whole model than its mean value.

Table 18: Model summary of ROE_LOW

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,169[a]	,029	,028	26,68517

a. Predictors: (Constant), Total return D-1, Price D-1, Market Cap, ESG disclosure score, Revenue year, NI/PROFIT, Eps T12M

b. Dependent Variable: ROE LF

Table 19: F-Statistics ROE_LOW

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	410147,319	7	58592,474	82,281	<,001[b]
	Residual	13906564.0	19529	712,098		
	Total	14316711.3	19536			

a. Dependent Variable: ROE LF

b. Predictors: (Constant), Total return D-1, Price D-1, Market Cap, ESG disclosure score, Revenue year, NI/PROFIT, Eps T12M

As illustrated in Table 20, many predictors are not significant. Only NI/profit and Revenue are significant at a 5% level, while Market cap is significant at a 10% level. This signifies that no relationship exists between ROE and the other variables mentioned previously except for the three variables mentioned previously. ESG disclosure score has a non-significative p-value of ,396, meaning that no relationship does exist between ESG score and ROE in this distribution.

Table 20: Regression coefficients ROE_LOW

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	15,065	1,056		14,268	<,001	12,995	17,134					
	ESG disclosure score	,022	,026	,006	,849	,396	-,029	,073	-,002	,006	,006	,956	1,046
	Price D-1	,000	,000	,033	2,475	,013	,000	,001	,029	,018	,017	,274	3,654
	NI/PROFIT	7,708E-10	,000	,175	18,878	<,001	,000	,000	,145	,134	,133	,578	1,731
	Market Cap	1,088E-11	,000	,025	2,572	,010	,000	,000	,077	,018	,018	,518	1,932
	Revenue year	-8,720E-11	,000	-,098	-11,133	<,001	,000	,000	-,005	-,079	-,079	,643	1,555
	Eps T12M	-,003	,007	-,005	-,373	,709	-,016	,011	,041	-,003	-,003	,271	3,689
	Total return D-1	,153	,103	,011	1,491	,136	-,048	,355	,012	,011	,011	,998	1,002

a. Dependent Variable: ROE LF

5.2.5 Summary of the Statistical Results

To conclude, four regressions have been realised using ROA and ROE as dependent variables and ESG disclosure score as the independent variable. The first two regressions have been made using the distribution of high ESG performance companies. In comparison, the last two regressions have been made using the distribution of low ESG performance companies. All regressions have somewhat low R, R^2, and adjusted R^2 values, which are balanced with the high significance level of the F-test. Concerning the coefficients' values, the first two regressions presented significant results for every predictor. More specifically, the ESG disclosure score in both regressions depicts a significant result and a positive coefficient at a 5% level. Henceforth, a positive relationship does exist between ROA/ROE and ESG disclosure score for companies with

higher ESG performance. The opposite is illustrated in the two last regressions. A significant negative relationship is found between ROA and ESG disclosure scores for companies having lower ESG performance. In contrast, no relationship exists between ROE and ESG disclosure of companies in the same distribution.

5.3 Discussion

With the rising interest in sustainability, many studies have tried to prove that a relationship does exist between ESG and firm performance. Some of them, like Alareeni & Hamdan (2020) and Balatbat et al. (2012), have found a positive relationship between the two, while others, such as Duque-Grisales & Aguilera-Caracuel (2019) and Di Tommaso & Thornton (2020) have found a negative relationship between ESG and firm performance. In addition, Junius et al. (2020) and Landi & Sciarelli (2018) found no connection between the two variables. However, most studies on the subject have found a positive relationship as analysed and explained by Friede et al. (2015) in their study gathering more than 2000 different research tackling this problem.

Based on previous results found in the literature, the first hypothesis of this thesis is to see if European companies with high ESG disclosure scores show better firm performance than the ones with low disclosure scores. As developed in the results Section 5.2, the dataset made of companies showing higher disclosure scores displayed positive and significative results corresponding with the observed results of the litterature. On the other hand, the dataset made of companies offering lower disclosure scores showed either a negative relationship or no relationship between the variables. From these results, the first hypothesis is confirmed. Therefore, European companies with high ESG disclosure scores will improve and show better firm performance than the others as the relationship between ESG disclosure score and ROA/ROE is positive. Thus, enhancing their ESG scores will allow them to improve their financial- and accounting-based performance.

This suggests to companies and managers that making efforts to have a good ESG score will positively influence the enterprise's overall performance. However, if they do not commit themselves to have a good ESG score, it might negatively affect the firm and decrease their ROA value (the results being non-significative for ROE).

Chapter 6: European Companies, ESG Disclosure Score, and Industry Sectors

In the sixth chapter of this research, the companies contained in the STOXX 600 will be separated into 11 sectors to compare their average ESG disclosure scores. The second hypothesis will be tested: the average ESG Disclosure score of European companies varies per sector. The chapter's primary goal is to see if industries' average ESG disclosure score statistically varies across industry sectors.

To realise this analysis, the overall distribution will be divided into the respective industry sectors. Firstly, the methodology, including the data used, the statistic model and the assumptions and conditions, will be disclosed. Then, descriptive statistics of the average ESG disclosure score will be presented, followed by the results of the One-Way ANOVA test and the Tukey Post Hoc test. Lastly, the discussion section will approve the hypothesis and explain the managerial consequences.

6.1 Methodology

6.1.1 Data

To perform this second analysis, a dataset made of 34 705 observations is used. The overall dataset has been reduced to account for missing values and to use solely the companies that have been part of the STOXX 600 during the whole timeframe (2016 – 2021). Furthermore, the companies have been separated into the industry sectors as explained in Section 3.2.4 of the thesis and as shown in Appendix 1.

A comparison of the industries' ESG scores will be performed to affirm or infirm the second hypothesis. To do so, two types of data are needed. On the one hand, the ESG Disclosure scores will be required to compare the means between each other. On the other hand, the industry types are also needed to classify the different means. Moreover, as quantitative nominal data is necessary to perform the analysis, the industry types have been classified using numbers following the same classification as in the data section: 1 = “Industrials”, 2 = “Materials”, 3 = “Financials”, etc.

6.1.2 One-way ANOVA Test

One of the most famous statistical tests is the “single factor experiment with two levels” (Tempelaar & Kerkhoffs, 2015, p.705). This type of experiment allows testing whether two means are equal thanks to a two-sample t-test. The issue is that this methodology allows comparing only two groups. The idea behind the test is that the F-statistic verifies the null hypothesis stating that all means are equal to each other (Tempelaar & Kerkhoffs, 2015). The One-Way ANOVA Test is performed when more than two groups are used.

This test is called an Analysis of Variance, but the null hypothesis is about the population's means, as shown below (Tempelaar & Kerkhoffs, 2015).

$$H_0 = \mu_1 = \mu_2 = \mu_3 \ldots = \mu_k$$
$$H_1 = \textit{At least one mean is different}$$

In the null hypothesis, "μ" is the corresponding mean per industry which is indicated with "k". In addition, a One-Way ANOVA is performed as only one independent variable is used with different levels. In this case, only the industry sectors variable is used, with each sector representing a different level. Note that the chance of getting Type 1 errors increases when testing multiple values. Type 1 error occurs when a null hypothesis is rejected, although that hypothesis is true.

As the objective of this hypothesis is to see if the means of the 11 industries statistically differ, the whole distribution will be used.

6.1.3 Assumptions and Conditions for One-Way ANOVA

Assumptions and conditions to compare means are less numerous than for the regression analysis. However, in this case, three previous assumptions must be respected: the *Independence Assumption*, the *Equal Variance Assumption*, and the *Normal Population Assumption*.

6.1.3.1 Independence Assumption and Randomisation Condition

The independence assumption and randomisation condition entails making sure that the individual observations collected are independent of each other. This assumption tends to be respected as the companies contained in the industry sectors do not have anything else in common with the sectors. Furthermore, some random sorting has been carried out by removing from the database the observations that did not contain every datapoint needed. Overall, the first condition is validated.

6.1.3.2 Equal Variance Assumption

ANOVA test assumes that the true variance of the different groups that will be treated are the same. There are multiple ways of checking that the condition is met. One way is by creating a boxplot with the 11 sectors to observe if they all possess roughly the same spread. As depicted in Appendix 7, all variables have their mean comprised between 47 and 63, which amounted to a difference of 16 data points. Visually, even though the observed difference is not striking, it should still be considered. In addition, the boxes' spread of energy and utility sectors is relatively more minor than the others.

Consequently, a second test has been performed to check for the variance's spread. To do so, the residuals values have been plotted against the predicted values. This test is helpful

as the condition will not be accepted if the residual plot shows larger values. In addition, this test is a good indicator to know if the variables used need to be re-expressed or not (Tempelaar & Kerkhoffs, 2015). The outcomes of the scatterplot between residuals and predicted values can be observed in Appendix 8. Looking at it, no sign of unequal spread can be detected as all the different lines are almost as long as the others.

In conclusion, the equal variance assumption is approved, but it needs to be kept in mind that the tests which have been effectuated above are subjective. In that sense, a Post Hoc test considering that variances are unequal will be performed on top of the others to corroborate results.

6.1.3.3 Normal Population Assumption

When assuming normality, it is assumed that the resulted errors follow a normal curve (Tempelaar & Kerkhoffs, 2015). Section 4.2 of the thesis examined this assumption for each variable, displaying great results for the ESG disclosure score alone. Hence, this assumption should be accepted since all variables have more or less normal curves and there is a large number of observations. To be sure, a residual histogram has been produced in Appendix 9. The histogram shows a skewer distribution with a tail on the left. However, the general shape of it tends to reach the normal curve. The Q-Q plot clearly illustrates that the residuals follow a normal form, indicating that the normality assumption is accepted.

As the three assumptions have been validated independently from each other, the results of the ANOVA and Post Hoc tests will be analysed in the following part of the thesis.

6.2 Results of the ANOVA of the Overall Distribution

The overall distribution will be used in this part to answer the second hypothesis. In that sense, there is no distinction between companies with high ESG disclosure scores and those with low ESG disclosure scores.

6.2.1 Descriptive Statistics: ESG Disclosure Scores per Industry Sectors

The statistical test will be performed to check whether the means between the different industry sectors differ statistically. Foremost, the descriptive statistics of the ESG disclosure scores are depicted. As the basic descriptive statistics for the whole population have been significantly explained previously, they will not be re-explained again. However, the descriptive statistics showing the means of ESG disclosure scores per sector are shown in Table 21 below.

Firstly, the amount of data varies drastically depending on the sectors. The first industry, so-called Industrials, has the highest number of observations with N = 7040, followed by

Financials with N = 6292 and Consumer Discretionary with N = 3707. On the other hand, the industry numbering the lowest number of observations is the Energy sector with 878 observations. Those numbers make sense as they coincide with the number of companies present in their respective industry sectors: the companies with the highest number of companies have the highest number of observations and vice versa.

Secondly, looking at the means, the Utility industry has the highest mean of 61,40 while Information Technology has the lowest one with a mean of 47,02. This could be considered suspicious as the energy sector is considered by most to make the least for the environment. Moreover, note that although the means do show a difference in the table below, it has not been proven yet that they are significantly different.

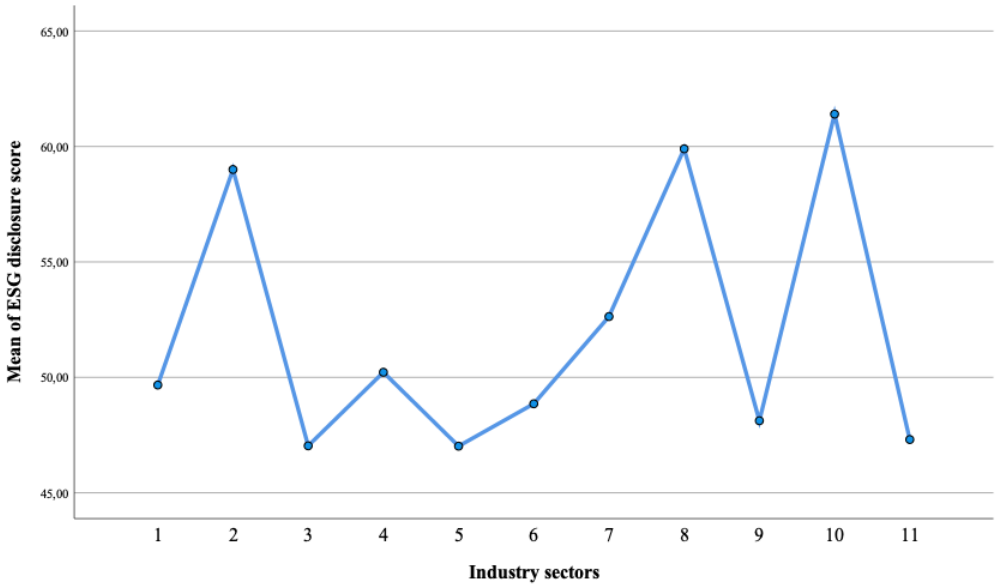
Table 21: Descriptive statistics for ESG disclosure score per industry

ESG disclosure score

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	7040	49,6703	9,98210	,11897	49,4370	49,9035	14,30	75,77
2	3252	59,0059	10,41211	,18258	58,6479	59,3639	23,24	80,82
3	6292	47,0373	9,26852	,11685	46,8082	47,2663	18,23	71,02
4	3707	50,2231	10,91066	,17920	49,8718	50,5745	14,99	73,93
5	1852	47,0226	10,68435	,24827	46,5356	47,5095	21,91	66,25
6	2933	48,8584	12,66993	,23395	48,3997	49,3171	14,82	75,36
7	2889	52,6351	11,82512	,22000	52,2037	53,0664	15,20	77,27
8	878	59,9014	7,69862	,25982	59,3915	60,4113	30,29	72,86
9	2188	48,1238	10,64235	,22752	47,6776	48,5700	12,09	65,74
10	1989	61,4039	8,49946	,19058	61,0301	61,7776	29,28	78,91
11	1683	47,3095	10,38506	,25314	46,8130	47,8060	12,38	63,25
Total	34703	50,8830	11,31610	,06075	50,7640	51,0021	12,09	80,82

Finally, a graph showing the means in an illustrative way can be found in Figure 3. It depicts that all means range between 45 and 65. The industries with the highest mean are Utilities (10), Energy (8) and Materials (2), while the ones with the lowest are Financials (3), Information Technology (5) and Real Estate (11).

Figure 3: Graph plotting ESG disclosure means per industry



6.2.2 One-Way ANOVA Test and Post Hoc Test

The ANOVA test has a null hypothesis in this case stating that the population mean ESG disclosure scores are equal across all industries. ANOVA results can be found in Table 22. The results are significant to a 5% significant level. Furthermore, the F-value is large enough as the minimum required value to accept the test is 1,84. This signifies that the null is rejected. Therefore, at least one of the means is not equal to the others.

Table 22: ANOVA outputs

ANOVA

ESG disclosure score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	697804,591	10	69780,459	646,254	,000
Within Groups	3745932.45	34692	107,977		
Total	4443737.04	34702			

This part could be ended here as it is proven that there is a difference between the means. However, as an added contribution and to push the data analysis further, a Post Hoc test will be performed to acknowledge which industries have different means. Many various Post Hoc tests do exist. In this research, the Tukey test will be used to verify which means differ.

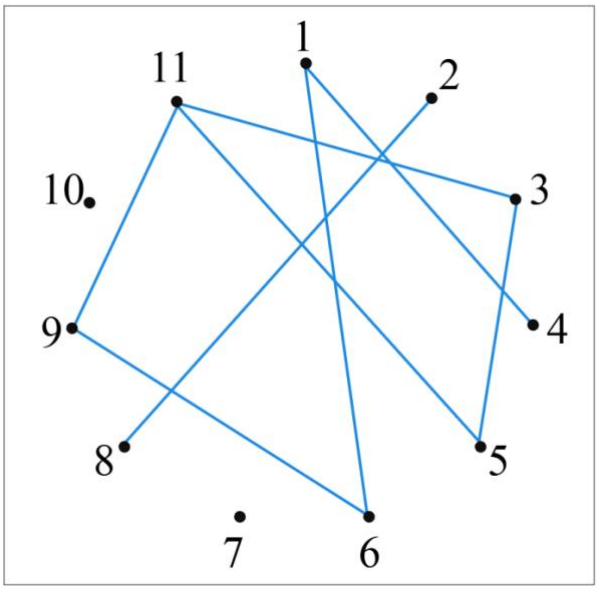
The Tukey HSD (Honestly Significant Difference) test is considered a Post Hoc test because variables have already been collected when comparing them. The test's purpose

is to concentrate on the most considerable value of the difference between the two group means. Tukey HSD test does that by comparing all possible pairs of means to determine which ones are significantly different from the others. Due to the length of the table showing Tukey HSD test results, it has been placed in Appendix 10 of the thesis.

When looking at the table, it can be observed that almost all the sectors have significantly different means from each other by having a p-value = <,001. This significant value implies that the mean difference that exists between two sectors is significantly important and should be considered. Two industries have their means substantially different from all the others at a 5% significance level: Consumer Staples (7) and Utilities (10). Utilities being the sector with the highest mean of ESG score, this signifies that it does really have a higher ESG disclosure score.

Nonetheless, the nine sectors left are all somehow interconnected. For example, Financials (3) and Information Technology (5) means are not significantly different from each other, nor are they from Real Estate (11) mean. Real Estate (11) mean is not substantially different from Financials (3) and Information Technology (5) but is also not different from Communication Services (9). Communication Services (9) mean is not significantly different from Real Estate (11), of course, but also from Health Care (6), and so on. All the connections across industries are displayed in Figure 4 below. A line between two numbers implies that the means of the two sectors are not significantly different.

Figure 4: Graphical representation of the industries having high p-values



Overall, the main idea that should be taken out is that the industries showing the highest and lowest ESG disclosure scores are significantly different from one another. However, note that the means that display relatively close values in Figure 3 were not entirely different (see Figure 4).

As a final note, the equal variance assumption is accepted based on visual outcomes only; another Post Hoc test to compare the means has been performed. Games-Howell's Post Hoc test does the same as Tukey HSD test with the difference that it assumes that variances are not equal. Games-Howell test provided the same results as Tukey. Therefore, only the Tukey results are presented in this research.

6.2.3 Summary of the Statistical Results

To conclude, a one-way ANOVA test has been performed using the complete distribution to compare the means of ESG disclosure scores obtained per sector. Firstly, the descriptive statistics of the means have been developed. Utilities scored the highest while Information Technology had the lowest. Secondly, the one-way ANOVA test is performed to confirm that the means are significantly different from one another. The result shows a low p-value indicating that the industry average scores are statistically different. Lastly, the Tukey HSD Post Hoc test was executed to investigate which sectors are statistically different. Utilities and Consumer Staples means can be considered substantially different from the rest. Thereupon, the Utility industry has the highest mean ESG disclosure score. Finally, the remainder sectors showing close mean values tend not to have statistically significant mean differences.

6.3 Results of the ANOVA of the Low VS High Distributions

To help answer the third and final hypothesis, an ANOVA test will also be performed on the two separate distributions. This is done to ensure that the industries in which companies are categorised as having high ESG disclosure scores have their means that are significantly different as well and if the industries' order, in this case, is the same or not as the one found in Section 6.2. The same is done with sectors in which companies are categorised as having low ESG disclosure scores and for the same reasons.

The ANOVA results are shown in Table 23 and Table 24 below. They both have a significance level lower than 5%, meaning that the null hypothesis is rejected. Thus, both distributions have means which differ significantly from one another.

Table 23: ANOVA outputs for the low distribution

ANOVA

ESG disclosure score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28784,292	10	2878,429	57,311	<,001
Within Groups	776825,336	15467	50,225		
Total	805609,629	15477			

Table 24: ANOVA outputs for the high distribution

ANOVA

ESG disclosure score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	159945,219	10	15994,522	527,461	,000
Within Groups	582637,650	19214	30,324		
Total	742582,869	19224			

In addition, the means plots have been created to illustrate which industries in each of the distributions have the highest mean scores and if some differences exist between the overall distribution compared to the other two. Figure 5 illustrates the sectors' means of the low distribution, while Figure 6 demonstrates the sectors' means of the high distribution. Looking at the industries having the highest means, both distributions have the same three sectors on top of the overall distribution by having Utilities (10), Energy (8) and Materials (2). However, the order does differ a little as the low distribution does have first Utilities, then Materials and finally Energy. In contrast, the high distribution does have first Materials, then Utilities and finally Energy.

Regarding the low end, none of the distributions has the same three industries at the bottom of their list. The overall distribution has, as mentioned before, Financials (3), Information Technology (5) and Real Estate (11) for the last three industries. The low distribution, on the other hand, has Health Care (6), Information Technology (5) and Communication (9) at the bottom, while the high distribution has Information Technology (9), Financials (3) and Information Technology (5).

Figure 5: Means plots of the low distribution

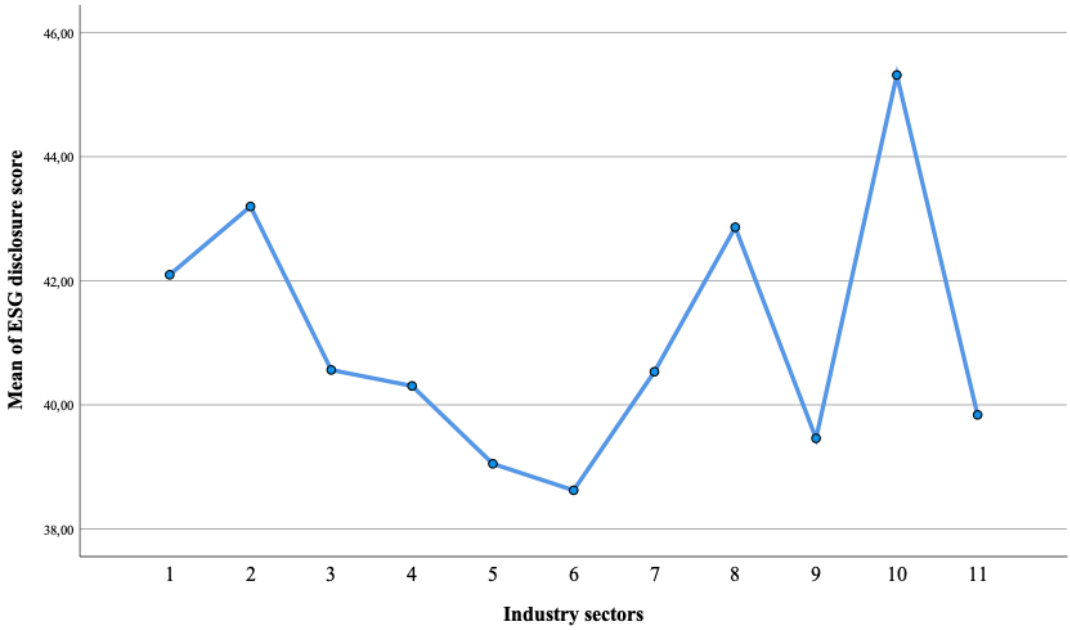
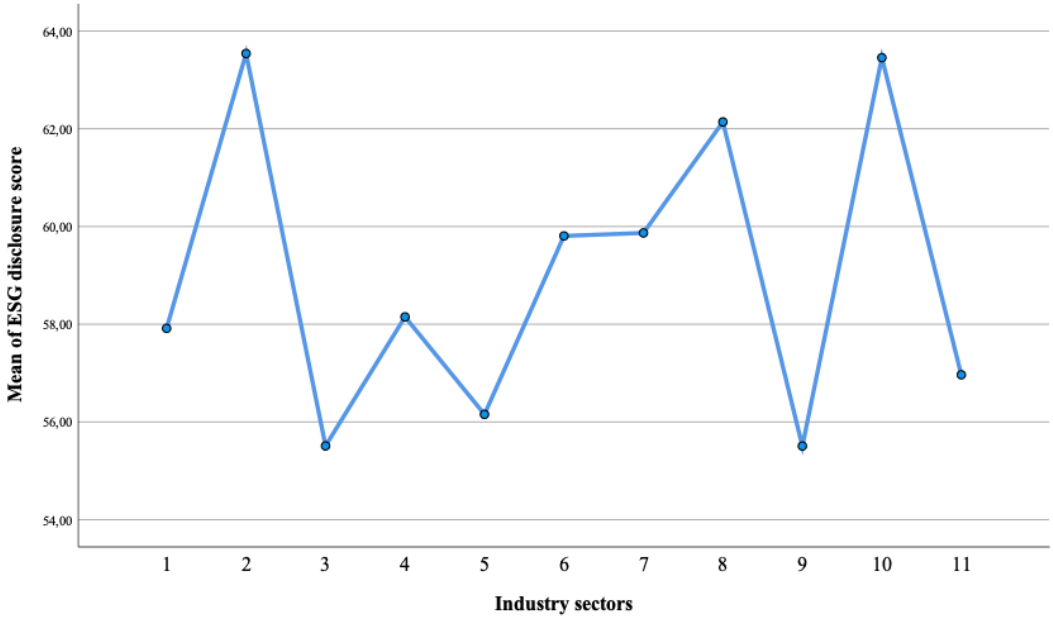


Figure 6: Means plots of the high distribution



To conclude, even though the overall distribution is divided into two sub-distributions between companies with low versus high ESG disclosure scores, when those distributions are sorted out by industries, ESG disclosure scores differ significantly. In addition, some differences exist across the distributions in the classification of which industries have the highest means and which ones have the lowest.

6.4 Discussion

Not many researchers have tackled whether there is a difference in ESG scores across industries. For the ones who did some research, like Doyle (2018) and Matakanye et al. (2021), their respective results did not provide evidence that ESG performance varied across industry sectors. While other studies (Champagne et al., 2021; Oncioiu et al., 2020; Park & Jang, 2021) have found that the industry in which the enterprises are doing business affects more or less their ESG scores. However, some distinctions are made between the individual E, S and G impacts and the countries where the enterprises are doing business.

Due to variable results and the limited availability of studies on the subject, one can wonder if European companies' ESG disclosure scores vary per sector (H2). As displayed in Section 6.2, the one-way ANOVA test produced significant results. The ANOVA test's null hypothesis is that every industry's means are equal. The null has been rejected because the p-value has a p-value significant at a 5% interval. This confirms the second hypothesis of this thesis, and it affirms that the means vary per industry. Regarding the European enterprises, it seems that the Utility sector scores the highest ESG disclosure scores while Information Technology scores the lowest.

As having a good ESG disclosure score is becoming increasingly important, companies that want to stay competitive should pay attention to the average scores their competitors are having and the average score of the industry they are part of. It appears logical that an enterprise with lower ESG performance than the average industry's performance might lose some competitive advantage over those with a higher score.

Regarding researchers and ESG rating agencies, it is interesting for them to acknowledge that differences do exist across industries. In addition, researchers might pay more attention in the future to add an industry variable to their models when comparing companies with ESG performance and researching more on these industry differences and the reasons behind them. Lastly, regarding rating agencies, it would be interesting for them to consider even more than before the industry in which companies are part of. For example, the industry sector can lead to some surprising ESG disclosure scores when it is known that the sectors with the best scores are Utilities and Energy.

Chapter 7: European Companies, ESG Disclosure Score, Firm Performance, and Industry Sectors

The section will tackle the last hypothesis of this research. As the previous hypotheses have been validated, it is known that companies with high ESG scores do have a positive relationship between their ESG disclosure and firm performance, and that the average ESG disclosure score varies per sector. Those results lead to the third hypothesis being the following: the relationship between firm performance and ESG disclosure is sector dependent for companies with high ESG disclosure score.

To realise this analysis, the overall distribution has been divided into 22 sub-distributions. Firstly, the methodology section is composed of information about the data used and the 22 distributions. Then, the regression model as well as the assumptions and conditions needed to perform them are explained. Secondly, the statistical results will be provided and explained. Finally, the discussion part will affirm or infirm the third hypothesis and will provide managerial and research implications.

7.1 Methodology

7.1.1 Data

To analyse this hypothesis, the two sub-distributions made first of companies with high ESG disclosure scores and second of companies with low ESG disclosure scores have been divided into 11 industry sectors. This led to the creation of 22 sub-populations. All of them have a different number of companies in their portfolios. The eighth industry, the Energy sector, has the lowest number of predictors with N = 101. On the opposite, the industry with the highest number of observations is the first industry, Materials, with N = 3598. As a portfolio of minimum N = 50 is considered large enough (Tempelaar & Kerkhoffs, 2015), more than 100 observations are good.

The same variables as in section 5.1.1 have been used to perform the analysis. The dependent variables are ROA and ROE, while the independent variable is the ESG disclosure score. To be consistent with the previous model, the same variables have been used as well as the same control variables. Thus, EPS, Price, Total Return, Market Cap, Revenue and Net Income have been added to control and help reach a better fit for the model.

To ease the use of multiple regressions, *IBM® SPSS Statistics* allows generating what is called dummy variables (N-1 for N regressions required). Since 11 regressions are considered (one per industry sector), the use of this technique would increase the number of variables of 10 for both ROA and ROE. However, to keep the model as simple as possible, this functionality was not used in this thesis. Instead, the populations have been

divided into 22 distributions using the same variables and methodology as previously explained.

7.1.2 The Model

To model the relationship between firm performance and ESG performance in the 11 industry sectors, the same multilinear regressions have been used as the ones used for H1. This option has been chosen over the one using dummy variables to ensure that the outcomes could be comparable, as mentioned before. Furthermore, the stepwise model has not been used in this part of the research because the model has been proven correct and should be used consistently across distributions to allow for better and more reliable comparisons.

The regression models for ROA and ROE are specified as the following:

$$ROA_{ij} = \alpha + \beta1*ESG\_Disclosure_{ij} + \beta2*Market\_Cap_{ij} + \beta3*Revenue_{ij} + \beta4*EPS_{ij} + \beta5*Net\_Income_{ij} + \beta6*Total\_Return_{ij} + \beta7*Price_{ij} + \varepsilon$$

$$ROE_{ij} = \alpha + \beta1*ESG\_Disclosure_{ij} + \beta2*Market\_Cap_{ij} + \beta3*Revenue_{ij} + \beta4*EPS_{ij} + \beta5*Net\_Income_{ij} + \beta6*Total\_Return_{ij} + \beta7*Price_{ij} + \varepsilon$$

In the models, "i" is for the distribution used (high or low), "j" is for the industry sector (from 1 to 11), "α" is the intercept, while "β" is the slope of the population parameter, and "ε" is the error term (Montgomery et al., 2021; Pickwick & Sewelén, 2021). As this hypothesis aims to see if the relationship between ESG performance and firm performance is sector-dependent, 44 regressions will be made. This number is because the 11 sectors are divided into the high and low ESG scores, respectively, leading to 22 distributions. Then, each of these 22 distributions needs to be run two times to account for ROA and ROE, leading to a total of 44 regressions. The regression models are identical for all the populations' samples.

7.1.3 Assumptions and Conditions for Multilinear Regression

When doing multilinear regression, four major conditions have to be respected in addition to the basic assumption that quantitative data are used: *Linear Assumption, Independence Assumption*, *Equal Variance Assumption* and *Normality Assumption* (Tempelaar & Kerkhoffs, 2015). As those four specific conditions and multicollinearity have been explained extensively in Sections 5.1.3 and 6.1.3, they will not be re-explained again to avoid repetitions. Also note that for size reasons, the 44 outputs, scatterplots and graphs will not be explained one by one; instead, the most important findings will be reported.

Regarding the assumptions, most of them have already been verified two times. This is the case for Independence, Equal Variance and Normality assumptions. As the data have just been reduced into smaller sets but have not been modified anyway, the first two assumptions are again confirmed. Concerning Normality, the populations have been reduced, which can question the normality of the sample size. However, the smallest sample amount of 101 data points which is still higher than the minimum size required for the CLT to hold true. The Normality assumption is therefore accepted as well.

Continuing with the Linear Assumption, the scatterplots between the dependent variable and one of the other variables have not been confirmed yet. Yet, to verify every variable, 308 (= 7 variables x 2 dependent variables x 22 distributions) scatterplots would be needed. In that sense, those 308 scatterplots will not be provided in this thesis for size and space reasons. Nonetheless, this assumption has been verified by randomly checking for some of the distributions. As the results have proven themselves positive beforehand and when verified randomly, the linear assumption is accepted.

Regarding multicollinearity, eight regressions out of the 44 have shown large VIF (larger than ten) for some of the variables. Fortunately, none of the variables having a high VIF score was the independent variable. Thus, to make sure that those high collinearities impact the beta of the ESG disclosure score variable in some way, the eight regressions have been performed using the stepwise method again to provide for the best fit. When making the stepwise approach, the VIF were vastly reduced, but the independent variable's value did not change. This signifies that despite the high VIF value, the relationship between the dependent and independent variables is not affected by it. In conclusion, the multicollinearity that may exist between some variables does not seem to affect the results and hence allows for approval of this condition.

Finally, as the assumptions have been validated, the regression results can be presented and analysed in the following part of this study.

7.2 Results

As descriptive statistics have been explained in their own chapter, they will not be reviewed once more over here. Accordingly, this sub-chapter will directly provide the statistical results of the multilinear regressions and a summary of those results.

7.2.1 Model Summary and F-Test

Appendix 11 depicts all the model summaries and F-tests of the 44 regressions. The appendix is organised by dependent variables, then sectors, and finally low and high ESG disclosure score distributions. As previously explained, those results will not be analysed individually because of their size.

When looking at the model summaries, most of the R, R^2 and Adjusted R^2 values have increased dramatically compared to the results of the first four regressions (Section 5.2). This is a good indicator as it means that the model fits well the dependent variable and helps predict it. Although some got extremely high values like sector 8 with an R^2 of 98,8% for the low distributions, some got extremely low values like sector 7 with a score of 0,053 for the low distribution using ROE as the dependent variable. This low score is observed because the model does not perfectly fit the variables. When using the stepwise method, the model that best predicted the variables was a model with fewer predictors. However, as the independent variable's beta was not modified using the stepwise method, the regression with seven predictors was preferred over the stepwise one to allow for comparison across the regressions.

Concerning the F-tests, all regressions disclosed a significance level of either p-value <,001 or p-value = ,000. This signifies that all regressions are significant at a 5% significance level. The null hypotheses of the F-test are rejected, and all the models predict better the dependent variable using the predictors than if they were not using them. It also means that at least one of the predictors has a beta value higher than zero.

In conclusion, all regressions are significant at a 5% level and display higher R^2 values than before.

7.2.2 Regressions Results

Many regressions have been performed to account for all distributions. To facilitate the reading of this research, Table 25 has been created below. This table contains the beta values of the independent variable so-called ESG Disclosure score. Those values have been listed from the official regression outputs. The numbers written in red and green show that the value obtained is significant at a 5% significance level. The difference between them is that the red numbers show a negative relationship between ESG disclosure and ROA/ROE. In contrast, green values indicate a positive relationship between ESG disclosure and ROA/ROE. Lastly, the numbers written in black signify that no relationship exists between ESG disclosure and ROA/ROE as they are not significant at a 5% level.

The idea behind those regressions is to test the third hypothesis, which states that the relationship between ESG Disclosure scores and ROA/ROE is sector dependent on the distribution having companies with high ESG scores. In contrast, the relationship is not sector-dependent for companies with low ESG scores. So, when looking at companies in the high distribution, the relationship between ROA/ROE and ESG disclosure score should be significantly positive for the sectors having the highest means. At the same time, it should be negatively significant for industries with the lowest means (see Section 6.3). On the opposite, no relationship between the variables in the low distribution for the hypothesis to be validated as they should not be sector dependent.

Looking at the results, Utilities (10), Energy (8) and Materials (2) were the top three of both distributions. However, when checking for the high distribution, only the Energy sector shows a significant positive relationship between ROA and ROE with ESG disclosure, while the Utility sector has a significant positive relationship between ROE and disclosure score. However, the others depict a significantly negative relationship between the dependent and independent variables. Further, the low distribution also has a significant positive relationship with the Energy sector. A negative relationship for Materials as well as between ROA and ESG score of Utilities. However, no relationship is found between ROE and ESG disclosure score of the Utility sector.

Table 25: ESG disclosure score's outputs from the regressions

ROA			ROE		
Sector	LOW	HIGH	Sector	LOW	HIGH
1	-,049	,021	1	,113	-,046
2	-,558	-,117	2	-,644	-,353
3	-,186	-,065	3	-,373	-,211
4	,100	,145	4	,490	1,154
5	-,128	-,001	5	-,644	-,352
6	,067	,227	6	,248	,268
7	,076	-,056	7	,477	-,259
8	,043	,374	8	,333	1,778
9	-,070	-,015	9	,282	-,082
10	-,065	-,032	10	-,024	,377
11	,024	-,357	11	,028	-,509

Legend:
- Negative and significant at a 5% level
- Positive and significant at a 5% level
- Not significant at a 5% level

In general, no standard rule can explain why this result is obtained or not. Thus, it does not appear that the relationship between the dependent and independent variables can be considered as sector dependent in the distribution of companies having a high ESG disclosure score, neither is it sector dependent or not sector dependent for companies having low ESG disclosure scores.

7.3 Discussion

To the best of this thesis knowledge, no research has been done to link all three dimensions, so-called ESG performance, firm performance, and industry sectors. Some researchers have proven that a relationship exists between ESG performance and firm performance. In contrast, others have demonstrated that ESG performance could differ depending on the industry in which the companies are doing business. However, no one has tried to prove whether the relationship between ESG performance and firm performance could be sector dependent.

This is where the third hypothesis lies in the academic world. The objective was to prove that the relationship established between ESG disclosure scores, and enterprise performance also exist and is sector dependent for companies with a high ESG disclosure score. Unfortunately, this hypothesis cannot be accepted and confirmed due to the results obtained in the above analysis. It does not seem that the relationship observed between the variables is sector dependent for companies with a high ESG disclosure score, neither it is for companies with a low ESG disclosure score.

These findings can have different impacts on future research. In fact, it can open a path towards having other studies tackling the same subjects but using another population and database. In addition, this academic thesis provides new knowledge on the vast and recent subject of ESG, which is still relatively blurry about the real consequences it might get for the future. Also, it can encourage other studies about how the ESG ratings are given to the sectors and if these might influence the results obtained here.

Lastly, regarding managerial implications, it has been confirmed that a good ESG disclosure score influences firm performance positively and that the scores given to companies diverge per industry. However, it has not been proven that this relationship between the dependent and independent variables is sector dependent. Instead, the results are showing more of an unexpected way. Thus, managers can assume that having a good ESG score is better than having a low ESG score as it does influence the firm performance in the case of a higher ESG disclosure score. Although, even if the companies' average score varies per industry, the relationship between the two is not sector dependent. This implies that managers and companies might not be affected by the competitors in their sector but rather need to be above the overall average to enjoy the advantages of having a higher ESG disclosure score.

Chapter 8: Conclusion, Limitations and Further Research

The ESG sphere is expanding and changing rapidly, leading to an impressive number of studies on the subject. Existing research has looked at the relationship which may exist between firm performance and ESG performance. The findings diverge, with some discovering evidence that a relationship exists between the two, whether positive or negative, while others have found that no relationship exists at all. In addition, other recent studies have checked if a difference could be observed across the ESG performance of companies in different industries. Once more, divergent result has been observed. Some academics have found that a difference is noticeable, while others found out that no difference at all could be noticed. In that sense, those two subjects have been studied in great detail. Nevertheless, no studies have been found incorporating ESG performance, firm performance, and industry sectors altogether.

This thesis aimed to fill the research's gap by finding evidence of a possible sector dependence on ESG performance and firm performance. To do so, the research was separated into three distinct sections. To start, the first analysis helped confirm previous studies that a relationship does exist between ESG performance and firm performance, especially when using companies with higher ESG disclosure scores. Then, the second analysis also confirmed some studies by proving that ESG disclosure scores vary per sector. Lastly, the final analysis tried to observe the same relationship between ESG performance and firm performance but separated the companies into their respective sectors.

The first analysis was conducted using stepwise multilinear regression and confirmed the expected results. There is a significant positive relationship between ESG disclosure scores and firm performance for European companies having high ESG disclosure scores. Regarding companies with low ESG scores, a significant negative relationship between the variables is found for the accounting-based firm performance. In contrast, no relationship at all was found for the financial-based performance.
The second analysis also confirmed some preliminary results observed in the literature, which stated that the average ESG disclosure scores vary per sector. Through the use of a One-Way ANOVA test, the mean scores observed in every sector have been tested statistically, finding that the average ESG disclosure scores are different across industries.
The final analysis, on the other hand, did not confirm the results which could have been expected. When checking the regressions' outcomes for the industries with the highest mean scores, no significant positive relationship was observed for all the regressions. The regressions displayed rather unexpected results and were not observed to be dependent on their industry sector.

Overall, a final answer can be given to the research question. Ultimately, the ESG-characteristics of an industry cannot be said to influence the firm performance of European companies with high ESG disclosure scores.

This study is novel as it studies major European companies found in the STOXX 600 Index and discloses data from a recent period. Furthermore, it was the first study on ESG disclosure scores to have classified the whole population into sub-distributions dividing companies having high versus low ESG scores. Therefore, even though a non-positive result was obtained for the research question, some implications can be retrieved from the whole study.
To begin, this research adds to previous ones by confirming that ESG performance positively affects the accounting- and financial-based performance of firms having high ESG disclosure scores (H1). This can encourage managers and enterprises to follow a sustainable direction to obtain higher ESG scores as it will likely provide them with higher performance.
Moreover, as the average ESG score varies per sector (H2), companies just need to consider their sector to define their competitive advantage. For example, suppose a company is part of the energy sector which displays a higher average score compared to the other industries. In that case, the managers will need to improve their own average ESG score above the industry's mean to reach a competitive advantage.
Lastly, companies' performance is not dependent on the industry sector they are in (H3). Thus, although companies should consider having good average ESG disclosure scores to be competitive against the other industries in their sector, if they want improved firm performance, they should consider having an ESG score above the average of all industries not only above the average of the sector they are in.

The previous implications must be taken with caution as they are drawn from analyses with limitations. To start, the portfolio was made of major European companies. In that sense, no small to middle size enterprises are represented in the research. However, adding these companies to the research population could modify the research outcomes. In addition, the results could have been different if the data had been divided into more than two portfolios. Finally, intangible assets (ESG disclosure scores) are difficult to quantify. Although, as mentioned in the literature review, all agency ratings have their own way of measuring and providing ESG scores, using another agency could provide different findings than the ones observed throughout the research.
Regarding the regression models, the stepwise model has been used to find out which control variables could best explain the dependent variable. However, this can be seen as a limitation as no known and tested models have been reused to test the first and the last hypotheses. Moreover, the third analysis poses two extra limitations. On the one hand, it needs to be acknowledged once more that the number of enterprises comprised in each industry differs greatly. This difference could impact the regressions' outcomes as the normality assumption could be less validated for sectors showing a low number of companies. On the other hand, due to the number of distributions and regressions performed, some assumptions have been approved by selecting some of the industries

randomly. Hence, maybe an assumption has been accepted while not all the conditions were confirmed.
Lastly, concerning the second analysis, the equal variance assumption was confirmed solely based on graphical manners. Thus, no statistical tests have been performed to ensure this could be accepted. However, the Games-Howell Post Hoc test was performed, providing satisfying results, and reducing the consequence of this limitation.

To finish, this thesis allows for future research to be realised. Future studies could focus on other geographical areas and other periods using the same methodologies exposed in the present research. In that sense, it would be of interest to effectuate the same research using the individual Environment, Social, and Governance scores to see if a major difference can be observed. Furthermore, instead of limiting the investigation to two sub-distributions, it would be interesting to check whether the same findings are observed when dividing the overall distributions into more than two. In addition, a study investigating the reasons behind the means' difference across ESG disclosure scores in the industry sectors could be considered of added value for the academic world. Finally, a study investigating what influences the difference in the value of the ESG disclosure score variable when regressed using the different sectors as distributions would also fill in a literature gap.

On a final note, it seems that the world is just starting to hear about Environmental, Social and Governance factors, and the latter is not yet to be stopped from expanding.

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