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Analyzing the Impact of ESG Ratings on Firm Valuation: A Comparative Study of Different Industries in the Nordics

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ABSTRACT:

Companies are facing an increasing demand for nonfinancial disclosure to respond the sustainability crisis. Stakeholders are increasingly supporting companies that assess their ESG practices more effectively. As Nordic companies are thought to be leaders in ESG practices, it is crucial to understand how sustainability initiatives may impact financial performance.

This thesis aims to investigate whether companies' ESG scores affect the firm valuation in the Nordic listed companies in 2013-2023. The data for this study comprises a total of 546 companies, and it is obtained from LSEG. One accounting-based and market-based metric is used as a proxy for companies' financial performance. The random and fixed effects panel regression models are applied to answer the first research question of whether the ESG scores affect the firm valuation. The answer to the second research question, studying the industry differences, is achieved by applying the Pooled OLS model.

The results of this research varied. Empirical findings of this thesis indicate that ESG scores positively affect Tobin's Q and negatively affect ROA. The results of the industry-specific panel regression model were heterogeneous. Both positive and negative statistically significant results are found depending on the industries.

KEYWORDS: ESG, Nordic countries, Socially Responsible Investing, Industry Analysis, Firm Performance, Tobin's Q, ROA

Contents

Figures

Tables

1 Introduction

Corporate Social Responsibility (CSR) and sustainability in businesses are now recognized as crucial themes in business-related discussions. This is due to problems, such as climate change, being a central consideration in modern society. Consumer behavior has evolved significantly, and nowadays, responsibility plays a crucial role in shaping it, such as buying ethically produced clothes, favouring companies that treat their employees fairly, or repairing items instead of replacing them. For investors, a responsible alternative to traditional investing has also emerged.

One way to define responsible investing is by considering the environmental (E), social (S), and governance (G) factors when making an investment decision. Environmental factors include, for example, combatting climate change and reducing greenhouse gas emissions. Social factors include ensuring living wages across the supply chain and promoting workplace inclusion and diversity. Governance encompasses establishing anti-corruption policies and having an independent and diverse board of directors. Essentially, ESG is a set of measures and practices used to assess the non-financial performance of companies. Environmental, social, and governance (ESG) aspects of companies have been identified as increasingly important for the long-term success and value creation of companies (Friede et al., 2015). To encourage companies to disclose their ESG impact, several ESG disclosure requirements have been developed, such as the Global Reporting Initiative (GRI), the Corporate Sustainability Reporting Directive (CSRD) by the European Union, and the UN Principles for Responsible Investments (PRI).

Several previous studies have supported the theory that different ESG disclosures can improve a company's financial performance and market value (Ferrell et al., 2016; Albuquerque et al., 2019; Ademi & Klungseth, 2022). On the other hand, ESG is being criticized more and more by academics, politicians, and the media for being ineffective. According to researchers, there is weak evidence that ESG-focused businesses provide a higher positive return (Garcia et al., 2007; La Torre et al., 2020). In particular, from the perspective of stakeholder theory, which presents that companies should consider the

interests of all stakeholders, not just shareholders, corporate responsibility can strengthen stakeholder relationships, reduce business risks, and enhance competitive advantage (Freeman, 1984).

ESG components create different challenges for companies depending on the industry in which they operate. Banks are criticized for poor governance, and manufacturing companies for their environmental harm (Capelle-Blancard & Petit, 2017). Companies in controversial ESG industries, including mining, energy, and chemicals, often achieve better ESG results (Garcia et al., 2017; Cai et al., 2012). Despite criticism for their core operations, these industries invest significantly in CSR activities to increase stakeholder trust (Bae et al., 2021). Considering that many industries encounter diverse ESG-related issues, it is therefore essential to examine more deeply how ESG scores affect different industries.

1.1 Purpose of the Study

The purpose of this study is to analyze how ESG ratings affect the valuation of Nordic companies and whether the effects differ between industries. This research compares the relationship between companies' ESG scores and two company valuation metrics chosen to represent corporate financial performance. The valuation metrics chosen for this study are one accounting-based method and one market-based method, which aligns with previous literature (Albuquerque et al., 2019). The sample of this study includes Nordic active listed companies between 2013 and 2023. All 5 Nordic countries are included in this study, despite the size differences between countries. As a metric for ESG performance, a combined ESG score is obtained from LSEG.

The Nordic countries have been at the forefront of responsible investment and ESG practices, and the region's strong social and institutional background creates a unique context for researching the ESG impacts (Jansson & Biel, 2011; Mähönen, 2014). This study aims to generate new insights into the link between ESG factors and firm value by

using quantitative methods and insights from previous literature. Although the correlation between companies' ESG scores and firm valuation has been widely studied in recent years, there have been inconsistent results depending on the methodology and geographic location of the study (Velte, 2017).

This research contributes to previous literature by analyzing the effects of the industry and a sample of Nordic listed companies. By conducting an industry-specific analysis of the correlation between ESG scores and firm value, this study contributes to the ongoing discussion among academics, investors, and corporate management.

1.2 Research Questions of the Study

This study introduces the following research questions:

1. How do ESG ratings affect firm valuation?
2. How does the impact of ESG ratings on firm valuation vary across different industries?

The research questions are formulated by utilizing previous studies related to the topic.

1.3 Structure of the Study

This thesis is divided into eight main chapters. Following the introduction, the second chapter presents the concept of sustainable finance, its history, and different subfields. In the third chapter, corporate social responsibility theories are presented. In the fourth chapter, previous studies relevant to the topic are explained. After the background knowledge about the topic, the thesis will move to explain more about the research conducted. In chapter five, the data used in this study is presented. This chapter describes the data used in this study and where the data is retrieved from, followed by the methodology chapter presenting the methodologies applied in this study. In the seventh chapter, the results of the study are presented, complemented by a discussion

of the results. Lastly, the eighth chapter is the conclusion of the thesis, which will summarize the theoretical chapters and the findings of the study.

2 Sustainable Finance

Sustainable investing is a rapidly changing field. Due to its evolving nature, the boundaries in the terminology related to the topic are vague. Since the concept of sustainable finance became topical, many different definitions for it have been established. Swiss Sustainable Finance (2024) defines sustainable finance as “any form of financial service integrating environmental, social and governance (ESG) criteria into the business or investment decisions for the lasting benefit of both clients and society at large” (Swiss Sustainable Finance, 2024).

However, other definitions for sustainable finance have also been made. According to Zadek and Flynn (2013), terminologies such as “sustainable finance”, “green finance”, and “green investment” are used vaguely or as synonyms in the field of sustainable investing, which results in obscure differences between them. Starks (2023) states that there are no clear definitions of ESG, SRI and CSR and how the concepts differ which often leads to misunderstandings about their impact on investors, markets, and companies. This complicates analyzing investor behavior and the regulations related to this topic.

Caplan et al. (2013) state that responsible investing can be divided into three main categories. The first category is socially responsible investing (SRI), in which the portfolios are constructed by excluding certain stocks by negative screening. The second category is impact investing, in which people are investing in companies that strive to achieve environmental and social missions. In third there is ESG investing, in which ESG aspects are included in the process of analyzing investments (Caplan et al., 2013). Although these approaches are all included in the category of responsible investing, they differ significantly in their objectives.

2.1 ESG

Responsible investing and the methods associated with it are constantly evolving. In ESG investing the investors analyze the environmental aspects of the company in addition to financial figures. The environmental factors include for example combating climate change and reducing greenhouse gas emissions. Social factors consider, for example, the protection of human rights and equal treatment in society. The governance principles include preventing corruption and bribery and ensuring the ethics of companies' production chains (Silvola, Landau 2019).

The goal of responsible investing is to improve returns and reduce risks by incorporating consideration of the ESG factors into investment decisions. There is no one right way to take these ESG issues into consideration, but investors can choose the tools and approaches that suit them best. By reviewing the ESG factors, they also have the opportunity to find competitive advantages in companies that have not yet been priced by the market (Finsif, 2020).

According to Aramonte and Zabai (2021), the ESG market is continuously growing. This can be seen in various debt and equity instruments classified as sustainable according to rating agencies. The modern sustainable debt market includes, for example, green, social and sustainability-linked bonds as well as loan products with green or sustainability-linked labels. These instruments enable financing sustainable projects either in the form of loan or a bond. The latest addition to these is the sustainability-linked loans, whose interest rates are linked to the borrower's performance in meeting ESG targets (Larsen, M., 2019). In addition, sustainable finance offers various equity-based options in addition to debt instruments. In the past few years, significant growth has been achieved by especially ESG and SRI equity funds and ESG-focused exchange-traded funds (ETFs) (Aramonte & Zabai, 2021).

The connection between ESG factors and investment profits was formalized by United Nations in 2006 when they presented the Principles for Responsible Investing (PRI). PRI

is a collection of practical instructions that investors can voluntarily adopt. The purpose of PRI's is to help institutional investors in decision making that aims to both maximize the financial performance and social good (PRI, 2024). The six principles consider ESG incorporation into investment decisions and ownership policies and practices, requiring sufficient ESG disclosures from investees as well as the collaboration of PRI signatories in ESG initiatives and issues.

According to the Global Sustainable Finance Review 2022 (GSIR), sustainable investment assets under management have grown by 20% since 2020. The Global Sustainable Investment Alliance (GSIA) and the Principles for Responsible Investment (PRI) joined forces to standardize definitions and provide guidelines in the field of sustainable investment. They identified five sustainable investment approaches. The first approach they identified is screening, where investors apply rules based on pre-defined criteria to determine whether the investment is allowed. The second approach is ESG integration, which involves constantly considering ESG factors in investment analysis and decision making to improve risk-adjusted returns. The third approach is thematic investing in which investors focus on specific trends or developments by selecting assets related to them. The fourth approach is stewardship, which involves the use of investors' rights and influence to protect the long-term overall value of customers and stakeholders, including the ESG resources on which their interest depends. The last approach is called impact investing which refers to investing that aims to deliver a measurable, positive social and/or environmental impact together with financial returns. (GSIA, 2022).

The use of ESG ratings in investment decisions and research has been especially popular in Europe, but sustainability criteria are also rapidly gaining popularity in other parts of the world (International Trade Center, 2019). The use of broad ESG classifications means that sustainability is not measured in a single way, but by a wide range of evaluators and classifications. These ratings aim to assess companies' sustainability and communicate this information to investors, shareholders, and other financial actors. However, sustainability ratings and analyses are often based on companies' own assessments

(Escrig-Olmedo et al., 2019), which may limit comparability between industries and generate inconsistencies.

Nowadays, even more companies have an ESG rating from at least one ESG score provider. The ESG score ratings are available from many third-party rating agencies, such as Bloomberg, MSCI, and the London Stock Exchange Group (LSEG). The lack of uniform standards makes it difficult to compare ratings issued by different providers (European Commission, 2023) because the rating agencies use varying assessment criteria to measure ESG performance. According to Soana (2011), ESG ratings are based on subjective methods and consist of several different factors, which is why comparing scores from different providers can lead to differences in the ethical ratings of the same companies. ESG ratings significantly impact on the decisions of investors, asset managers and other stakeholders, which is why the European Commission released a regulatory proposal in June 2023 that seeks to guarantee the reliability and transparency of ESG ratings.

Because there is no consistency between ESG ratings from various rating agencies, investors find it challenging to make consistent choices. According to Rau and Yu (2024), for majority of rating agencies, the overall ESG scores range from 0-100. Boffo and Patalano (2020) examine major ESG rating agencies like Thomson Reuters, Bloomberg, and MSCI and assess the variations in their ratings. For instance, Thomson Reuters uses publicly accessible data to evaluate the companies on a scale of 0-100 on ten distinct themes. On the other hand, Bloomberg uses equally publicly available data and provides a score between 0 to 100, but their company data base is smaller. In contrast, MSCI utilizes a seven-point rating system that ranges from AAA (highest) to CCC (worst).

ESG ratings have faced severe criticism in the United States. According to Engler (2024), several US states have proposed anti-ESG laws, but many have been modified or overturned in court. This is due to political power imbalances, current legislation, and concerns about the economic impact of laws (Engler, H., 2024). Also, in Europe, ESG

regulations have increased. A component in the European Green Deal, the Corporate Sustainability Reporting Directive (CSRD), entered into force in January 2023 (European Commission, 2022). Implementing the CSRD strengthened the regulations and expanded the range of reporting requirements for a larger group of businesses. Through the Non-Financial Reporting Directive (NFRD), the EU has already mandated ESG reporting from major companies since 2017. However, the ESG performance of member states still varies greatly (European Commission, 2022).

The impact of companies' ESG performance varies significantly between industries. According to several studies, industries with more stakeholder pressure, such as energy, mining, and chemicals, are more motivated to invest in sustainability initiatives (Cai et al., 2012; Garcia et al., 2017). ESG is not only a strategic choice but often a reactive measure regarding reputation management. Garcia et al. (2017) state that ESG performance is generally higher in sensitive industries, where the operational environmental and social risks are more visible. This implies that companies in these industries may use ESG practices to address stakeholder concerns. Although companies in some industries might profit from ESG investments, the results are inconsistent across all situations. Bae et al. (2021) discovered that regulated industries are more likely to survive a crisis.

2.2 Socially Responsible Investing

Socially Responsible Investing (SRI) refers to investment strategies that consider ethical, social, and environmental factors in addition to financial returns when making investment decisions. SRI aims to combine the investor's values and financial objectives so that investments support responsible and sustainable development (Renneboog et al., 2008).

SRI traditionally has many different methods that can be used in it. GSIA and PRI have identified three different screening approaches that can be utilized in SRI: negative screening, best-in-class screening, and norm-based screening. The first screening

method is negative screening, which excludes companies or industries considered as unethical or irresponsible by specific criteria, such as defense, alcohol, and tobacco industries (Zhang, J & Shuang, Z. I., 2021). According to Zhang and Shuang (2021), negative screening is the top strategy in Europe as an SRI behavior. On the other hand, best-in-class screening emphasizes investing in companies that are superior in, for example, environmental responsibility, working conditions, or good governance (Revelli & Viviani, 2015). Best-in-class screening represents a proactive approach in environmental, social, and governance policies, with a wide range of constructive investment options and critical examination and evaluation (Lehtonen, T., 2012). According to Starks (2023), in norm-based screening, investors base their decision-making on their values, such as religion or avoidance of child labor and hurting animals. On the other hand, some investors do not follow the screening approaches but prefer firms risk and return opportunities over the potential negative side-effects.

According to Finland's Sustainable Investment Forum ry (Finsif, 2021), there are many different variations of negative screening, one of which is the norm-based negative screening popular in the Nordic countries. In this case, international standards such as labor rights, corruption, human rights, and environmental issues, as mentioned in the UN Global Compact, are being used as an exclusion criterion. Also, a focus on international standards and influencing target companies as a result of non-compliance is one of the main approaches in Nordic countries. (Finsif, 2021).

In recent history, SRI has evolved from traditional value-based investing towards a broader sustainability-based approach that considers the economic importance of ESG factors (Friede et al., 2015). Nowadays, SRI strategies also include an impact investing approach, where the investor searches for measurable environmental or social benefits in addition to financial returns.

The results have shown that SRI investments do not necessarily lead to lower returns when comparing to traditional investment instruments. Several analyses have found that

SRI portfolios can provide as good or even better risk-adjusted returns than conventional investments (Friede et al., 2015). This has increased the popularity of SRI among investors and asset managers.

2.3 ESG and SRI in the Nordics

The Nordic countries have been leading the integration of responsible investing and ESG factors into investment decision-making. The Nordic region has strong social institutions, high environmental awareness and a developed culture of corporate responsibility, which is reflected in the behavior of companies and investors (Falkenberg & Brunsæl, 2011).

Responsible investing has become widely institutionalized in the Nordics, and many pension funds and asset managers have adopted ESG integration as part of their investment process. For example, the Norwegian oil fund (Government Pension Fund Global) is one of the world's largest investors with sustainability criteria and clear ethical guidelines for its investment choices (Mähönen, 2014).

Investors in the Nordic countries use both negative screening and positive screening techniques, as well as ESG integration, which involves including ESG considerations into financial analysis to identify opportunities and threats (Jansson & Biel, 2011). For example, the fight against climate change and respect for human rights have been highlighted as priorities in Nordic investment strategies.

The Nordic countries have a higher level of ESG reporting compared to the global average. This increases the investors' ability to evaluate corporate responsibility and incorporate ESG considerations more systematically into valuation (Falkenberg & Brunsæl, 2011). In the Nordic investment environment, the importance of ESG factors in company valuation appears stronger than in many other markets, making the focus on the region interesting for this study.

2.4 ESG and SRI History

Corporate social responsibility (CSR) as a concept is not new. According to Carroll (2015), the roots of the concept could easily be traced back hundreds of years, but as of financial literature, the roles of executives and the social performance of corporations started to appear for the first time in the 1930s and 1940s. In the following decades, the social expectations towards companies started to change, resulting in CSR as concept to start shaping more (Carroll, 2015).

Sustainable finance has developed as an answer to the sustainability crisis and financial liberalization (Lagoarde-Segot, 2019). Many economic models have been created at a time when environmental considerations were left unaddressed. The framework for these models was the Industrial Revolution in the 19th century when both the workforce and capital were limited resources. At that time, people assumed nature and its services were unlimited resources, which resulted in the natural emissions being abundant and carbon emissions being minimal. These models are still being used today even though they no longer reflect entirely the current situation. (Schoenmaker, D. & Schramade, W. 2019). Now we are in a continuing process of transitioning to more circular economy.

The role of ESG factors became even stronger in the 2020s as institutional investors, such as pension funds, adopted them as integral parts of their investment strategies (Friede et al., 2015). In today's world, ESG and SRI approaches have become mainstream and played an important role in the global financial market's development.

3 Corporate Social Responsibility Theories

This chapter focuses on evaluating different theories connected with corporate social responsibility (CSR). The stakeholder theory, legitimacy theory, signaling theory, institutional theory, principal-agent theory, and shared value creation theory are included in this chapter.

3.1 Stakeholder theory

Studies that focus on the effect of ESG often use firm value as a primary indicator. Many previous studies adopting stakeholder theory have found a positive correlation between ESG actions and firm value (Ferrell et al., 2016; Friede et al., 2015). Stakeholder theory, developed by Freeman (1984), challenges the traditional view that a company's only responsibility is to maximize the shareholders' value. According to the theory, companies should consider all stakeholders in their decision-making including employees, customers, suppliers, local communities, and the environment (Freeman, 1984). This extends the company's responsibility beyond financial performance to include social and ethical aspects. The theory emphasizes that long-term success is achieved by generating value for all stakeholders, which requires trust, openness, and balance between different interests. In this way, companies can combine sustainability and business objectives to achieve sustainable success (Freeman, 2010).

3.2 Legitimacy theory

According to legitimacy theory, the justification for the existence of companies is based on norms and values of society, and their actions should be in line with these (Suchman, 1995). Companies can strategically establish and maintain legitimacy by aligning their actions with the expectations of society, strengthening their public image, and by choosing conducive operating environments. ESG and other corporate responsibility matters help the companies maintain their social license, which is dependent on

society's perceptions. This also affects companies' reporting practices and stakeholder relations (Suchman, 1995).

3.3 Signaling theory

Signaling theory focuses on reducing information asymmetry between two parties. Originally developed to study the labor market (Spence, 1978), the theory has since been extended to new fields, such as finance and business communication. Information asymmetry occurs when a company has more knowledge about its activities than external stakeholders. Companies can reduce this asymmetry by sending signals such as voluntary reports or information about sustainability measures, which improves the decision-making of stakeholders (Spence, 1978; Connelly et al., 2011).

The four key components of signaling theory are the signal, the sender of the signal, the receiver, and the receiver's feedback (Taj, 2016; Connelly et al., 2011). Signals sent by the company management can communicate information about issues related to for example environmental, social, or governance (ESG) practices. Stakeholders receive the signals and interpret those, which can lead to, for example, investment decisions or other behavioral changes (Herold & Lee, 2017)

In the ESG context, signaling theory can provide a helpful framework for understanding how companies communicate with external stakeholders who do not necessarily have similar information as internal stakeholders (Bénabou & Tirole, 2010; Zerbini, 2017). Sustainability reports can act as signals, that indicate companies' engagement with sustainability and standardized behavior, which helps to achieve regulatory legitimacy and competitive advantage in the marketplace (Reber et al., 2022). High ESG performance companies can utilize a positive communication approaches to show their quality and decrease information asymmetry (Sun, 2023).

According to signaling theory companies can also utilize their sustainability measures as a strategic tool. Voluntary sustainability actions like publishing ESG information can be a

sign of a company's engagement in sustainable development. This reduces information asymmetry and helps build trust and credibility among stakeholders (Spence, 1978; Connelly et al., 2011). Therefore, signaling theory offers a concrete theoretical foundation to understand companies ESG actions and, for example, its exploitation in business communications and how to operate in international markets.

3.4 Institutional theory

Institutional theory focuses on how organizations not only act to maximize economic benefits, but also adapt to wider social and cultural expectations to ensure their legitimacy and long-term survival (DiMaggio & Powell, 1983). Companies usually adopt ESG practices in reaction to external pressures including investor demands and different regulations.

According to institutional theory, companies face three main types of pressure. The first is coercive pressures, for example, regulatory requirements; the second is normative pressures, including professional standards and societal expectations; and lastly, mimetic pressures, for example, copying other successful companies (Scott, 2014). Therefore, ESG strategies can be seen to gain acceptance and trust from stakeholders rather than as tool for improving business performance.

Previous studies on the topic have shown that institutional pressures can be used as a way to explain the differences in the scope and quality of corporate responsibility activities across different industries and geographical areas (Marquis & Qian, 2014). Especially in the Nordic countries, where the expectations of sustainability are high, institutional factors can explain the impact of ESG ratings on firm valuation more effectively than market-based mechanisms alone.

3.5 Principal-Agent theory

Principal-Agent theory focuses on the power and information asymmetries within organizations that arise between a principal and an agent (Jensen & Meckling, 1976). According to the theory, agents do not always act in the best interest of the principal but may optimize their own benefit, which can lead to agent costs. ESG strategies can act as a mechanism to reduce agency costs and to protect firm value.

ESG reporting and accountability measures can improve corporate transparency and reduce uncertainty among shareholders about management actions (Ferrell et al., 2016). According to Ferrell et al. (2016), transparent ESG communication can signal that management is pursuing long-term value creation, which can then reduce the principal-agent trust gap and lower the firms' cost of capital.

Previous studies have shown that strong ESG measures can indicate an effective management and reduce opportunistic behavior (Krüger, 2015). This is important for investors and other external stakeholders that want to evaluate management motivation and the company's long-term risk profile.

3.6 Shared value creation theory

Shared value creation theory is based on the idea that companies can simultaneously increase their business competitiveness and contribute to social welfare (Strand & Freeman, 2015). The theory argues that sustainability activities such as reducing environmental impacts, promoting employee well-being, and supporting communities are not just forms of charity, but can create real economic value for the company.

Strand and Freeman (2015) state that creating shared value requires active stakeholder engagement and the business integration with the Sustainable Development Goals. In this way, businesses can generate innovations and market opportunities that respond to economic and social needs. In the Nordic countries, shared value thinking is especially

strong, as companies face strong stakeholder pressure to integrate sustainability into strategic management (Strand & Freeman, 2015). This suggests that ESG factors act not only as a risk management tool, but also as enablers of business growth. In the next chapter, previous studies relevant to the topic of this thesis are presented.

4 Previous research

In the past decade, there has been an increase in the volume of research on CSR and how it relates to financial performance. Studies have examined, for example, whether strong ESG practices have a positive impact on a firm's market value, financial performance, and risk profile. However, the studies have shown conflicting results depending on the research design, the metrics used, the industries analyzed, and the geographical location. The purpose of this chapter is to discuss previous literature and its findings relevant to the topic.

4.1 Positive impact

Ferrell et al. (2016) study the relationship between CSR and firm value, which is in their study measured by Tobin's Q. The authors gathered ESG ratings from MSCI to measure CSR. The study's sample is large, and it includes 4,700 companies from 60 different countries from 2002 to 2013. As a result, Ferrell et al. (2016) find that CSR and firm value have a positive correlation.

Ademi and Klungseth (2022) investigate the relationship between companies' ESG scores and their financial performance, focusing on the U.S. S&P 500 companies. With a sample of 150 companies and 5,750 observations, the results of their study show that companies with superior ESG scores performed financially better than companies with lower ESG scores. The authors used the accounting-based metric ROCE to test the impact of ESG ratings on a firm financial performance and the accounting-based metric Tobin's Q on firms' market valuation (Ademi & Klungseth, 2022).

Fatemi et al. (2018) study the effects of U.S. companies' high and low ESG scores on firm value. The authors use the 2SLS model as a first stage regression model and Tobin's Q as a second stage model. The authors find that high ESG combined scores increase firm value, and low ESG combined scores decrease firm value. They also found that ESG disclosure undermines the firm value. The authors analyzed the environmental, social,

and governance factors separately. Their findings suggested that environmental strengths increase the firm value and environmental weaknesses decrease the value. When looking at the social and governance factors, they found that weaknesses in both areas decrease the firm value, and strength in neither of those increases it (Fatemi et al., 2018).

According to De la Fuente et al. (2022), positive ESG factors can increase firm value in many ways. The authors state that a good ESG rating can improve a company's reputation, reduce risks, attract financing, or improve efficiency. Albuquerque et al. (2019) findings show that companies with higher ESG scores tend to have lower systematic risk and higher firm valuation. The authors examine 4,670 companies in the United States in 2003-2015. Tobin's Q is a measure for firm value and CSR is measured as ESG ratings from MSCI. The authors also notice that consumer-facing industries have stronger effects (Albuquerque et al., 2019).

Ahmad et al. (2024) study the impact of ESG score on firm financial performance. As a measure of firm financial performance, the authors utilize Tobin's Q and ROA. Ahmad et al. (2024) gather a sample of 687 companies from the years 2013-2023 from Asian emerging markets. The authors find a statistically significant positive correlation between ESG and financial performance of companies. Similar to Ahmad et al. (2024), Kampoowale et al. (2024) conducted a study with 976 firm-year observations from Malaysian publicly listed companies from 2016 to 2023. The authors examine the relationship between board gender diversity (BGD) and financial performance, focusing on ESG performance. They measure financial performance with Tobin's Q, ROA, and ROE and find statistically significant results for all the variables (Kampoowale et al., 2024). The authors also conclude that women on boards significantly increase ESG performance.

El Ghoul et al. (2011) examine the correlation between CSR and the cost of equity capital. The authors have gathered a sample of 12,915 firm-year observations from the United

States during 1992-2007. The results of the research conducted by El Ghoul et al. (2011) indicate that companies and sectors with strong ESG performance have lower costs of equity capital compared to companies with poor ESG performance. Lins et al. (2017) studied a sample of 1,673 U.S. companies during the financial crisis of 2007-2008. They find that companies with high ESG scores perform 4%-7% better than companies with low ESG scores.

Velte (2017) uses a sample of 412 firm-year observations from 2010-2014 from German companies. The author evaluates the correlation between ESG and company performance metrics Tobin's and ROA. The results indicate that ESG has a positive impact on ROA but no impact on Tobin's Q (Velte, 2017). The author also evaluates the ESG components separately, and finds that governance factors have the highest statistical significnce on firm value.

Li et al. (2018) analyze the potential impact of superior environmental, social, and governance disclosure on company value. The authors utilized a sample of 350 companies in the UK between 2004 and 2013. Li et al. (2018) measure firm value with ROA and Tobin's Q. As a result, they discovered a positive correlation between firm value and ESG disclosure (Li et al. 2018).

In their research, Gillan et al. (2021) investigate the differences between ESG and CSR. The authors argue that ESG as a concept is broader than CSR. Gillan et al. (2021) state that traditionally, CSR has referred to companies' corporate action to promote social responsibility. On the other hand, ESG includes governance directly, while CSR includes governance issues indirectly through environmental and social considerations. From an investor's perspective, ESG factors are important drivers of portfolio risk and return, and eventually they will lead to profit maximation (Gillan et al., 2021).

Boulhaga et al. (2022) state that internal controls and ESG ratings can improve company performance. The authors use Tobin's Q as a proxy for firm value. As a sample, they used

French listed companies in the SBF 120 index between 2012 and 2018. The ESG data in their study is obtained from the Thomson Reuters database. The findings by Bouldaga et al. (2022) indicated that internal control is the reason why ESG scores improve corporate performance.

4.2 Negative impact

Bongiovanni and Fiandrino (2024) investigate how the COVID-19 pandemic affects firm's environmental performance. Their study showed that companies with high environmentally sustainable practices have lower returns during the pandemic. High environmentally sustainable companies are more volatile to unexpected global changes in demand, and their environmental efforts did not protect them from market turbulence (Bongiovanni & Fiandrino, 2024).

Garcia et al. (2007) used a sample of 110 European companies during 1998-2004. The authors are examining whether CSR affects company performance. They divide their sample into two groups of 55 companies. The first sample group is companies in the Dow Jones Sustainability Index (DJSI), and the second is companies in the Dow Jones Global Index (DJGI) (Garcia et al., 2007). As a result, the authors find differences between their two sample groups. Garcia et al. (2007) find a short-term negative correlation between the variables.

La Torre et al. (2020) examine how ESG components affect stock returns. The authors analyzed the companies included in the Eurostoxx50 index from 2010 to 2018. As a method the authors used a two-step methodology to analyze the performance of companies. Their study revealed that the correlation between the ESG index and the stock returns was very weak or absent, but for a few companies, investing in ESG led to higher returns. Those companies that investing in ESG affected positively were mostly in the energy and utilities sectors (La Torre et al. 2020).

Liu et al. (2025) investigate the impact of ESG on firm value. The authors 6002 firm-year observations between 2009 and 2019 of U.S. listed companies as a sample. Company performance is measured with Tobin's Q. The authors utilize the OLS regression model to draw results. In conclusion, the authors find a significant negative correlation between the variables (Liu et al., 2025).

4.3 Neutral impact

Vu et al. (2025) examine the relationship between ESG scores and expected returns across 23 developed markets. Their findings indicated a weak relationship between the variables. The study showed that while the correlation between ESG scores and stock returns is weak, there is found evidence of underperformance of high ESG portfolios in comparison to low ESG portfolios in some specific time periods. The findings of Vu et al. (2025) support the argument that markets incorporate sustainability into their pricing.

Humphrey et al. (2012) investigate whether companies' corporate social performance (CSP) correlates with their cost of capital and risk. As a sample, the authors use 256 companies from 2002 to 2010 in the UK. They integrate both general and industry-specific data in their study to receive more comprehensive results. The authors find no correlation between the variables in either general or industry-specific studies. Humphrey et al. (2012) found results that industries with a high ESG score have a negative correlation with CSP. However, the results do not show statistical significance.

4.4 Other research

Edmans (2023) argues in his paper that ESG practices are transforming from a niche subfield into a mainstream practice. He states that as ESG is a set of value-relevant factors, it is essential and nothing special. He argues that any academic should care about the long-term value drivers in the company. As for the argument that ESG is nothing special, the author highlighted that ESG should not be put on a pedestal in comparison to other value drivers. Companies and investors praise their commitment

to ESG but sometimes they are valuating ESG higher than the long-term value, which may be harmful. Many debates related to the importance of ESG would be solved if ESG could be seen as a part of long-term value creation, and a complete consensus on ESG assessments is not needed (Edmans, 2023).

Berg et al. (2022) studied the differences of ESG ratings between six different ESG rating agencies. According to the authors, the differences make it challenging to evaluate companies, portfolios, and funds, which is the main purpose of the ESG ratings. The divergences also decrease the incentives for companies to improve their ESG performance because different agencies give mixed signals about what actions are required and expected from them. According to Berg et al. (2022) this can lead to upfront underinvestment in ESG improvements. Also, the authors state that it is more difficult for markets to factor the ESG performance of companies to price formation, even though ESG can affect value or investor preferences. The authors state that rating agencies should become more transparent with their measurement practices and methodologies.

Al Hawaj and Buallay (2022) examined a sample of 3,000 companies from seven industries in 80 countries in 2008-2017. The research measures company performance with different metrics, such as Tobin's Q, ROA, and ROE. Their research findings revealed that ESG has a positive impact on ROA, especially in manufacturing, energy, tourism and retail industries. ESG and ROE also positively correlate, but only in retail and industrial sectors. The authors also found a positive correlation between ESG and Tobin's Q in the retail, industrial, and tourist industries. The correlation between ESG and firm performance in the banks and financial sectors was negative (Al Hawaj & Buallay, 2022).

5 Data

This chapter presents the data used in this study, followed by dependent, independent, and control variable specifications. The Nordic countries in this study include Finland, Sweden, Norway, Denmark, and Iceland. ESG performance is assessed using company-specific ESG ratings, and financial performance is measured by Tobin's Q and Return on Assets (ROA). The data used in this study is provided by the London Stock Exchange Group (LSEG), formerly known as Refinitiv.

The initial sample includes Nordic active listed companies in the period of 2013-2023. Firstly, the companies with no single ESG score from the research period are excluded, resulting in 646 companies. For companies that had not reported ESG scores for all the years in the sample period, it is assumed that the ESG score for the missing years is the same as the ESG score in the previous year reported. Also, companies lacking any firm-year observations for financial variables are excluded. Research and development expenditures are an exception due to fewer firm-year observations being available. The missing values in the data are replaced as zeros. The data also consisted of companies listed on the stock exchange in the middle of the time period. To avoid the loss of observations, these companies were included in the study. Companies not in operation in 2023 were not included in the sample.

Table 1. The comparison between the number of active listed firms in the initial sample and the number of firms with ESG scores.

	Initial sample	**Final sample**
	Number of listed firms	Number of firms with ESG rating
Nasdag Copenhagen	173	70
Nasdaq Helsinki	202	91
Nasdaq Iceland	35	12
Nasdaq Stockholm	926	376
Oslo Stock Exchange	341	97
Total	**1677**	**646**

Table 1 presents the initial sample used in the study, which consists of the active listed companies in the Nordics, and the final sample, which consists of the companies that have reported at least one ESG score during the study period. There were a total of 1,677 active listed companies in the initial sample in the Nordics between 2013 and 2023. From these, 646 companies had reported ESG scores. The variation in ESG data coverage across markets and companies is a commonly identified challenge in sustainability-related research (Berg et al., 2022). This is also reflected in the sample size of this research.

Later, the companies listed in more than one market were removed from the sample. Processing a data set is in line with approved practices in quantitative research related to CSR, which aims to ensure the reliability of findings and the cohesion of the analysis (Cheng et al., 2014). After including these criteria in the dataset, the final sample consisted of 646 companies whose data was included in this research.

ESG data availability was particularly high in Norway and Sweden, which might be explained by more active sustainability reporting and investor (Berg et al., 2022). Many of the companies in Nasdaq Iceland were excluded from this study because they lacked either ESG scores or firm-year observations. Overall, the dataset covers a set of companies in five different Nordic countries, including both large international concerns and smaller local companies.

5.1 Dependent variables

Dependent variables in quantitative business research represent the phenomena that are explained or modeled by selected independent variables. The most common dependent variables used in ESG research are measures of firm value or financial performance, which can be used to assess the impact of sustainability factors on a company's financial position (Fatemi et al., 2018; Velte, 2017). Several methods have been developed over the years to estimate the economic value of a company. These

methods can be divided into three main categories: cash flow-based, market-based, and accounting-based (Damodaran, 2012).

In this thesis, the dependent variables are Tobin's Q and Return on Assets (ROA), which provide two different perspectives on measuring firm value and performance that complement each other. The values for Tobin's Q and ROA are calculated for every year of the sample period using the year-end data throughout the study. In the following paragraphs, the dependent variables chosen for this study are presented more in detail.

Damodaran (2012) highlights that valuing a company is a key part of academic economics and practical financial analysis. The author states that valuation aims to determine a company's real or market value, reflecting its future cash flows, risk profile, and expectations of the business environment. A firm's value is an important metric for investors and analysts, management, and other stakeholders to support strategic decision-making.

Tobin's Q is a market-based measure calculated by dividing the market value of a company by the replacement cost of its assets (Chung & Pruitt, 1994). Tobin's Q is used widely when assessing firm's strategic positioning, growth potential, and market confidence in its future performance. According to Ahmad et al. (2024), especially in ESG research, Tobin's Q is used to examine how investors price the corporate sustainability actions and how these are reflected in the market value.

Many previous studies have shown a positive correlation between ESG performance and Tobin's Q, especially in industries where stakeholder expectations and regulation are higher (Velte 2017; Fatemi et al. 2018). Tobin's Q describes the ratio of the market value of a company to the replacement cost of its assets and indicates how efficiently the company creates value from the investor point of view. A value over 1 suggests that the market values the company more than its assets would cost to repurchase. According to Chung and Pruitt (1994), this usually indicates growth potential and investor confidence.

On the other hand, Tobin's Q lower than 1 can indicate weak productivity or market skepticism. Since the ratio combines market and financial statement information, it is useful in ESG research when studying the correlation between sustainability and firm valuation (Fatemi et al., 2018). The following equation measures Tobin's Q:

$$Tobin's\ Q = \frac{Market\ Capitalization + Debt}{Total\ Assets},$$

where *Market Capitalization* is the company's share price multiplied by the number of shares outstanding, *Debt* is the company's current short-term and long-term debt, and *Total Assets* is the company's book value of its total assets from the balance sheet. The second dependent variable used in this study is the Return on Assets (ROA).

ROA is an accounting-based measure of efficiency, and it measures how effectively a company uses its assets to generate profit (Velte, 2017). A high ROA value usually indicates strong operational efficiency, while a low ROA can indicate inefficient use of capital (Demirkan et al., 2009). ROA provides a perspective on the company's internal profitability and operational efficiency. Generally, ROA higher than 5% is interpreted as good, and ROA less than 2% can indicate a weak performance. Kampoowale et al. (2024) state that ROA values vary across different industries, and are often lower in capital-intensive industries than in technology or service companies. The following equation measures ROA:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

where *Net Income* is the company's net icome at a spesific time and *Total Assets* is the book value of the company's total assets from the balance sheet. By including both Tobin's Q and ROA as dependent variables in this study, a comprehensive perspective on the impact of ESG ratings on firm valuation can be presented since both accounting-based and market-based methodology is used.

5.2 Independent variables

The independent variable used for this study is the company-specific yearly ESG score provided by the London Stock Exchange Group (LSEG). LSEG provides ESG scores for over 9,500 companies worldwide and is one of the most widely used third-party ESG rating agencies in academic financial research (Cheng et al., 2014). ESG scores issued by the rating agencies tend to reflect a differing picture of a company's sustainability performance (Zumante & Lāce., 2021). According to Zumante and Lāce (2021), measuring a company's ESG performance is challenging because it includes multiple areas that are difficult to measure. In this research, the ESG total score is being utilized as measure of ESG performance.

ESG scores are based on information reported by companies that are being collected, for example, from annual reports, sustainability reports, reliable news sources, and websites. The LSEG methodology uses more than 750 ESG indicators. These indicators are divided into ten categories that form the three ESG dimensions: environment (E), social responsibility (S), and governance (G). The final ESG score is a combination of these three dimensions (LSEG, 2024), which figure 1 illustrates.

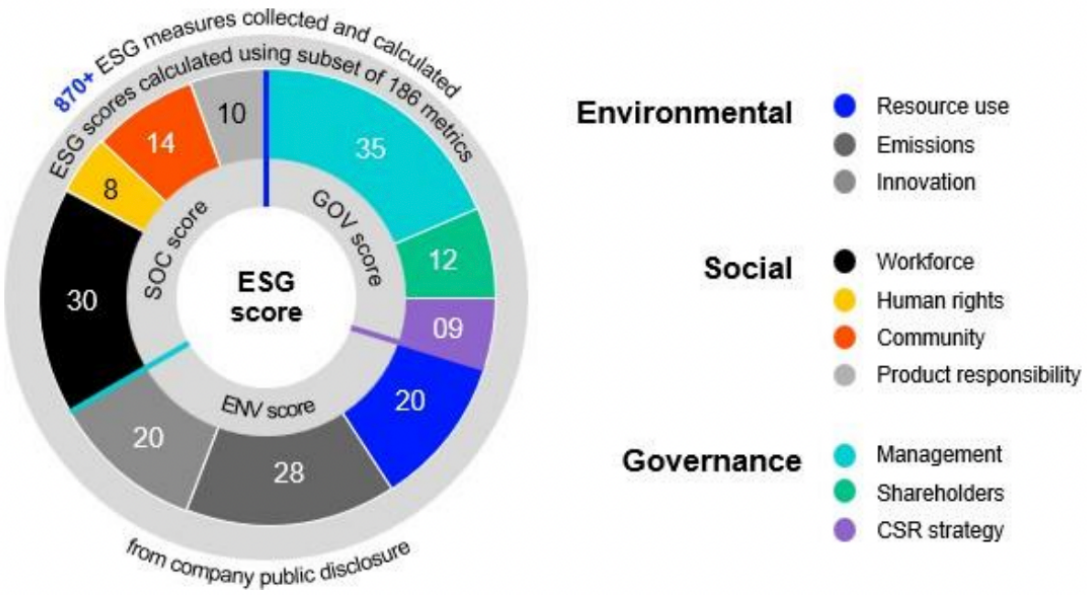

Figure 1. Construction of ESG metrics. Source LSEG (2024).

According to LSEG (2024), the ESG scores vary from 0 to 100 and are divided into four categories:

- 0-25 (D-class) = poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly
- 25-50 (C-class) = satisfactory relative ESG performance and a moderate degree of transparency in reporting material ESG data publicly
- 50-75 (B-class) = good relative ESG performance and above-average degree of transparency in reporting material ESG data publicly
- 75-100 (A-class) = excellent relative ESG performance and a high degree of transparency in reporting material ESG data publicly

A high ESG score suggests that a company is performing effectively in different areas of sustainability, while a low score may indicate weaknesses in operations or reporting. This study uses the overall ESG scores as an independent variable. The scores are collected per company for every year. Some companies have only reported one ESG score during the examined time period. In these instances, this score is used throughout

2013-2023. Furthermore, to avoid substantial decrease of sample size, the ESG score from previous reported year is used in case of missing yearly ESG score.

5.3 Control variables

This study uses control variables in addition to the previously identified dependent and independent variables. The control variables are chosen based on previous literature examining the relationship between ESG and firm financial performance (Cheng et al., 2014; Broadstock et al., 2021). This study incorporates control variables, including industry categorization, financial leverage, research and development (R&D), and company size.

The first control variable is the industry. According to previous research, the impact of ESG on firm value is strongly dependent on industry-specific factors such as consumer expectations and different regulations (Fatemi et al., 2018; Zaiane & Ellouze, 2023). The companies in the sample are divided into 11 industry groups according to the Global Industry Classification Standard (GICS). This study utilizes dummy variables in the regression model to control industry-specific effects. Consumer discretionary will serve as a base category in the analysis to avoid dummy variable trap.

The second control variable utilized in this study is financial leverage. Financial leverage is defined as a ratio of a company's total debt to its total assets. The leverage can affect both the market value and the risk profile of the company. According to Broadstock et al. (2021), a higher leverage can weaken the positive effects of ESG on firm value especially during a crisis situations (Broadstock et al., 2021).

Research and development (R&D) is the third control variable chosen for this study. R&D is included in the study because it can affect the firm's future growth expectations and valuation. Innovative companies may gain a higher reputation in the market regardless of their ESG performance (Fatemi et al., 2018). To measure R&D, R&D expenditures are divided by sales.

Company size is the fourth control variable in the study. Firm size may impact a company's financial performance and stakeholder orientation (Ariño et al., 2010). This variable is one of the most commonly used control variables in determining firm value. Large companies can benefit from an economy of scale, more efficient ESG reporting and better investor visibility (Cheng et al., 2014). Size is measured as a natural logarithm of total assets. In table 2 below, the control variables and the formulas to calculate those are summarized.

Table 2. Summary of control variables.

Control variable	Proxy for	Definition
Industry	Industry where the firm operates	Categorized into 11 different groups according to Global Industry Classification Standard
Financial leverage	Firm risk	Total debt / Total assets
R&D	Research and development intensity	R&D expenditures / Revenue
Size	Firm size	Natural logarithm of Total assets

These variables are included in the regression models to estimate the impact of ESG scores on the companies' market value and profitability by using Tobin's Q and ROA. Table 3 presents a summary of the dependent and independent variables utilized in this research.

Table 3. Summary of dependent and independent variables.

Variable	Proxy for	Definition
Dependent variable		
Tobin's Q	The ratio of the market value of a firm's assets to the replacement cost of those assets	(Market capitalization + Debt) / Total assets
ROA	Profitability	Net income / Total assets
Independent variable		
ESG score	Company specific overall ESG performance	Rating from 0-100 from LSEG

In the following chapter, the descriptive statistics of the data set are presented.

5.4 Descriptive statistics

This subchapter presents the key statistical indicators of the data used in this study. First, the final sample is presented by the countries where the companies operate in, followed by how the sample is divided between different industries. After that, table 6 illustrates the descriptive statistics of the sample data, including the dependent, independent, and control variables. The table shows the key statistical indicators for the variables, including mean, median, standard deviation, minimum and maximum values, and total observations. The descriptive statistics of the sample are gathered by using Gretl.

Table 4. Number of companies in each country after the screening process.

Country	Number of companies
Sweden	314
Norway	87
Finland	74
Denmark	59
Iceland	12
Total	**546**

Table 4 presents the final dataset, which includes the distribution of companies by country in the five Nordic countries after the screening process. The final sample consists of 546 companies from five different countries. Most companies are located in Sweden with 314 companies, followed by Norway with 87, Finland with 74, Denmark with 59, and Iceland with 12 companies. Sweden's clear majority in the data is explained by its large stock market and high level of ESG reporting that has also been associated with the Nordic institutional environment in the previous literature (Berg et al., 2022). Only 12 companies from Iceland were selected from the screening process, which can limit the ability to draw reliable conclusions about this market.

The companies in the sample are categorized into 11 different industry groups based on the Global Industry Classification Standard (GICS) classification: Energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, communication services, utilities, and real estate (MSCI, 2023). GICS is an internationally widely used industry system developed by the MSCI and S&P Dow Jones indices. It divides companies by their primary business into 11 main sectors, enabling comparative analysis. This standard supports both academic research and investor analysis, and its use increases the reliability of industry comparisons (MSCI, 2023).

Table 5. Number of companies in each industry.

Industry group	Number of companies
Energy	27
Materials	56
Industrials	109
Consumer Discretionary	65
Consumer Staples	24
Health Care	77
Financials	57
Information Technology	75
Communication Services	21
Utilities	6
Real Estate	29
Total	**546**

Table 5 shows the industry distribution of the sample. Industrials represent the largest industry group with a total of 109 companies, whereas utilities comprise only 6 companies. The distribution of firms by industry is significant for the reliability of the analysis and the overall validity of the results because it shows which different sectors are represented in the data. The industries with a larger number of companies in the data, such as industrials and health care, have a stronger impact on the statistical results than industries with a lower number of companies, such as utilities and communication services.

In addition, the size of the industry might explain the variation in ESG scores or Tobin's Q. Industries that include more companies in the study may present more reliable trends, while industries with fewer companies may show greater variation. Therefore, studying the industry distribution supports both the interpretation of the statistical analysis and its conclusions.

Table 6. Descriptive statistics.

Variable	Mean	Median	St. dev	Min	Max	Observations
Tobin's Q	3,70	1,32	17,34	0,00	723,40	6028
ROA	-0,01	0,04	0,31	-12,12	3,42	6028
ESG score	41,25	39,45	19,64	1,24	93,42	6028
Financial Leverage	0,31	0,22	2,31	0,00	118,50	6028
R&D	2,47	0,00	89,36	-0,01	6290,00	6028
Size	14,99	15,03	2,52	6,44	22,62	6028

Table 6 shows the descriptive statistics of the sample. The mean Tobin's Q is 3,70, and the median is 1,32, which suggests that companies' market values are typically higher than their balance sheet values. The exceptionally high maximum value of 723,40 suggests that there are individual, potentially fast-growing companies in the data set. At the same time, a high standard deviation of 17,34 indicates that there is a considerably large variation in company values.

ROA is, on average, -0,01, which indicates poor profitability in the whole data set. However, the median is positive 0,04, indicating that most firms are profitable. The ROA values vary between -12,12 and 3,52, which indicates that there is a significant variation in profitability across companies.

When looking at the control variables, the mean financial leverage is 0,31. However, the standard deviation and the maximum value suggest that the data includes companies with a significantly high level of debt. The mean R&D is 2,47% of total assets, but as the median is 0, it indicates that most companies do not report any R&D expenditures,

which might distort the final regression models. The exceptionally high maximum value of 6290,00 and the high standard deviation of 89,36 indicates that there are possibly individual companies with a high reseach intensity with positive growth expectations for the future. Size has a standard deviation of 2,52 and a range of values between 6,44 and 22,62, indicating that the data includes both small and large companies.

Overall the metrics indicate that there is significant economic and structural variation in the data, which supports the use of regression models later in the study. In the Table 7, the yearly ESG scores collected for the companies in each industry are presented.

Table 7. Mean ESG scores by industry group.

Industry group	Mean	2013-2018 Mean	2019-2023 Mean
Utilities	51,62	52,19	50,94
Materials	49,01	46,98	51,44
Consumer Staples	48,42	45,53	51,90
Communication Services	42,80	41,26	44,65
Industrials	42,44	39,55	45,90
Energy	42,38	39,30	46,08
Consumer Discretionary	42,04	39,10	45,57
Real Estate	40,15	37,51	43,31
Financials	37,99	35,39	41,11
Health Care	36,80	33,31	40,99
Information Technology	35,61	34,02	37,52
Total	**42,66**	**40,38**	**45,40**

Table 7 presents the mean ESG scores by different industry groups for 2013-2023 and over two five-year sub-periods. The table illustrates that utilities, materials, and consumer staples sectors have the highest mean ESG scores during the study period. Financials, health care, and information technology have the lowest mean ESG scores during the study period. ESG scores have increased positively when comparing the 2013-2018 mean to the 2019-2023 mean in all other industries except in utilities, but that can be explained by the utility sector containing the lowest number of companies. Since

many companies in the sample did not report ESG scores for the whole study period, the 2013-2018 mean includes observations from the 2019-2023 mean category.

Industry-specific differences in ESG performance are consistent with the previous literature that argues that environmental risks and regulatory pressures in the industry guide companies to develop their sustainability practices (Lins et al., 2017). For example, in the materials and utilities sector, the higher ESG score may reflect the external pressure to report sustainability issues, while in the health care and technology sector, the ESG impact is often lower (Fatemi et al., 2018). Lin et al. (2021) stated that the impact of ESG ratings on company valuation is not consistent across industries. Industry-specific differences in ESG ratings can be partly explained due to investors' expectations and environmental regulations. The importance of regulation and environmental questions are strongly present in financial and energy sectors. The ESG ratings can have a significantly higher impact on the company's valuation than in sectors where environmental and social factors are not at the center of business, such as real estate and information technology (Candio, P., 2024).

The positive trend in the ESG scores for 2013-2023 suggests that ESG has become institutionalized as part of the corporate strategy in the Nordics. This trend may be related to investors' growing expectations about sustainability, which has been seen as one of the main drivers for the increase in ESG reporting in different sectors (Lins et al., 2017).

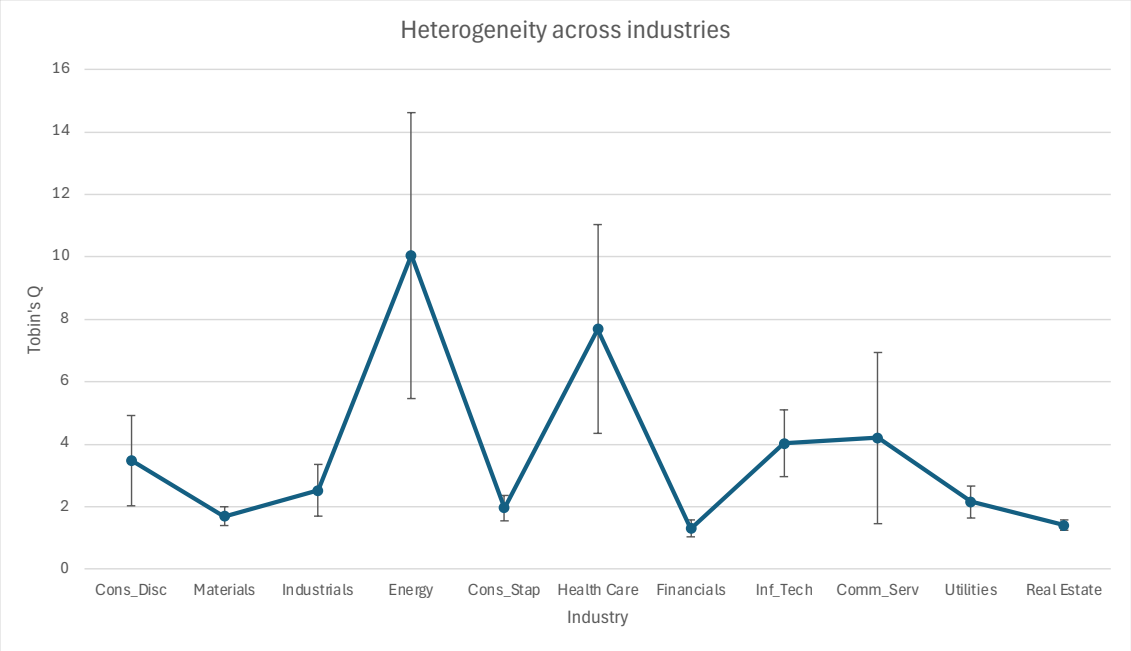

Figure 2. The mean Tobin's Q across industries.

Figure 2 illustrates the variation of Tobin's Q between different industries. This shows that the company's valuation factors differ depending on the sector. The 95% confidence intervals shown in figure 2 provide essential information about the statistical reliability of the observations. In the energy and health care sector, the wide confidence intervals suggest that the values of Tobin's Qs fluctuate greatly. According to Veeravel and Sadharma (2021), the energy sector can have a higher Tobin's Q as the ESG strategies can reduce the regulatory risk and improve the company's reputation. Smaller confidence intervals in materials and real estate sectors suggest that the values of Tobin's Q's fluctuate less in these sectors. Overall, figure 2 shows that the effect of Tobin's Q are not homogeneous in all of the industries.

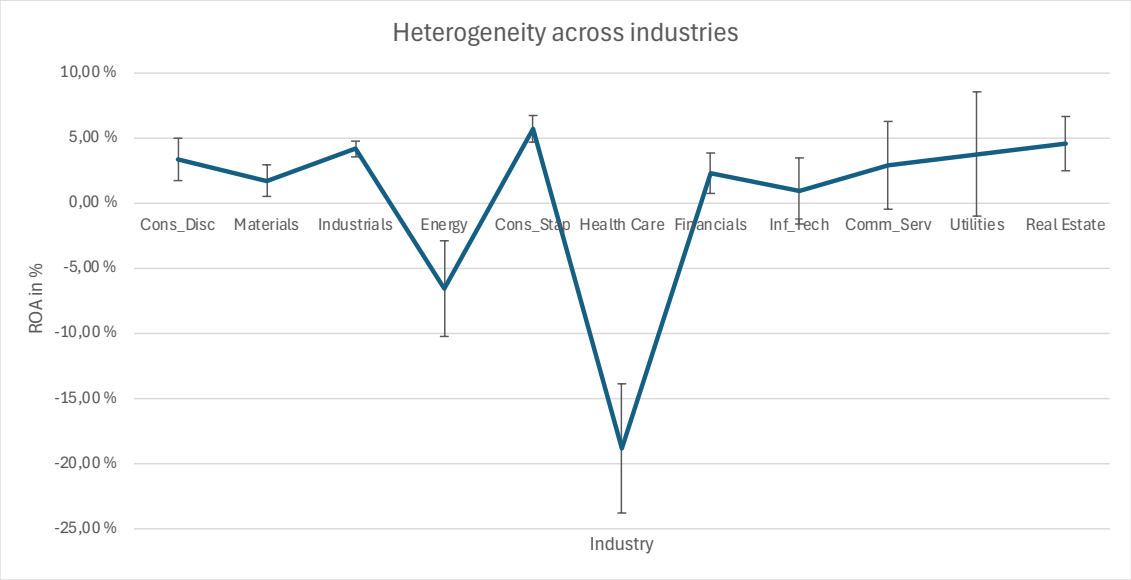

Figure 3. Mean ROA across industries in percentages.

The mean return on assets (ROA) across different industries is presented in the above figure 3. The numbers in the figure are reported as percentages for interpretability, and 95% confidence intervals are being used. The figure shows a significant variation in the profitability between different industries, which reflects differences, for example, in capital structure, investment needs, and business models. The negative ROA values in health care and energy sector suggest that firms operating in these industries are on average less efficient in capital allocation or face higher losses, which can result from high regulation and capital intensity (Dasilas & Karanović, 2025). The large confidence interval in health care industry suggest that the values inside the industry vary a lot.

Industries such as consumer staples, industrials, and real estate achieve the highest positive ROAs, which suggests a more operationally efficient use of assets. This supports previous findings that financial performance can vary strongly across industries (Fatemi et al., 2018; Velte, 2017).

The heterogeneous distribution of ROA is similar to the results of Tobin's Q, which was presented previously. Both measures show that the firm value or profitability is neither linear nor homogeneous across all sectors. However, where Tobin's Q reflects investors' expectations through market value, ROA reflects the actual accounting profitability of the company. For example, technology and communication services companies appear to achieve above-average values on both of these measures, which may suggest that ESG measures' benefits are being realized internally and externally (Broadstock et.al., 2021). This suggests that the impact of ESG is not only reflected in market value but can also be reflected in the operational efficiency of companies, depending on the industry structure, the competitive landscape, and the integration of ESG strategies into business operations.

Table 8. Pearson's correlation matrix.

	ESG score	Financial Leverage	Size	R&D	Tobin's Q	ROA
ESG score	1,0000					
Financial Leverage	-0,0441*	1,0000				
Size	0,5274*	-0,0628*	1,0000			
R&D	-0,0188	-0,0018	-0,0074	1,0000		
Tobin's Q	-0,0833*	0,2494*	-0,2324*	-0,0004	1,0000	
ROA	0,1750*	0,0123	0,2536*	-0,0236	-0,4103*	1,0000

Correlations above 0,0253 are statistically significant at the 5% level based on a two-tailed test.

Table 8 presents the results of the Pearson correlation matrix between the dependent, independent, and control variables. The correlation results are given a significance level of 5%. As can be seen from the table, the independent variable ESG score shows a significant correlation with all other variables except R&D. The correlation is significantly positive when looking at ROA and negative when investigating Tobin's Q. Also, control variable size is significantly positive with ROA and significantly negative with Tobin's Q. Control variable R&D shows a very weak correlation with both the dependent variables which can be due to many companies not reporting R&D expenditures. According to the

results of the Pearson's correlation matrix, there is no serious multicollinearity problem. The results of the correlation matrix are in line with previous studies (Albuquergue et al., 2019; Fatemi et al., 2018).

5.5 Research hypotheses

The study's main research questions investigate whether there is a correlation between the companies' ESG scores and firm valuation. The firm valuation is measured by Tobin's Q and ROA throughout the study. An additional research question is created to answer if the results vary depending on the company's industry. The research questions are transformed into a testable scientific analysis by the research hypotheses. Converting this analysis into research methodology by obtaining statistically significant results, makes it simple to prove or disprove the analysis. The main hypotheses the research wants to prove are the following:

1.) H1: ESG scores affect firm valuation positively.
2.) H2: The ESG scores and firm valuation correlation varies between industries.

6 Methodology

This study will be quantitative because the thesis examines ESG factors and their relation to firm value in different industries. The study focuses on the five Nordic main markets; Nasdaq Helsinki Ltd, Nasdaq Stockholm AB, Nasdaq Copenhagen A/S, Nasdaq Iceland hf, and Nasdaq Oslo ASA.

The data used in this study consists of observations from several companies over many years, it is called panel data. In a data set like panel data, each observation has a cross-sectional and temporal dimension. The main benefit of panel data is that it improves the accuracy of the estimates and allows for better control of heterogeneity (Baltagi, 2008., p. 3-4; Wooldridge, 2010., p. 281-282).

The panel data also brings specific modeling challenges. Hsiao (2014) states that companies often have characteristics that remain the same over time, such as business model, organizational culture, or industry position. These firm-specific characteristics that do not change over time can affect both the ESG scores and the firm financial performance. Controlling those is important for the model's reliability (Hsiao, 2014., p.5-7). Two alternative panel regression models are typically used to incorporate these fixed effects: the Fixed Effects (FE) model and the Random Effects (RE) model (Greene, 2012., p. 392-393).

6.1 Choosing the model

The data used in this study consists of several yearly observations from many different companies; it is reasonable to use a panel regression model that considers the variation between different companies and time. Panel data makes it possible to control for firm-specific variables that are not dependable on time. Otherwise, these variables could influence the analysis of how ESG scores affect a company's profitability and valuation (Baltagi, 2008., p. 3-4; Wooldridge, 2010., p. 281-282).

In the first regression model to test the correlation between the variables of the research, the Fixed Effects (FE) and Random Effects (RE) models are compared. To support the choice between these models, Hausman's test is used to assess which model type generates more reliable and consistent estimates (Hausman, 1978., p. 1252–1255). A second regression model is created to assess the effects of the industry on the study. The second regression model is the Pooled Ordinate Least Squares (OLS). The regression models are estimated using the Gretl software.

6.2 Regression model 1

In this chapter, the first regression model is explained in more detail. In the first regression model, two different models are compared, called the Fixed Effects (FE) and the Random Effects (RE) model. According to Wooldridge (2010, p. 286–287), the FE model is used when firm-specific effects are correlated with the explanatory variables, and that is why holding them constant improves the internal reliability of the model. On the other hand, the RE model is suitable when firm-specific differences are random and not systematically related to the explanatory variables in the model (Hsiao, 2014., p. 5-7).

As mentioned previously, the main objective of this study is to assess the impact of ESG scores on company valuation and profitability. Due to this being the study's objective, the following panel regression models are estimated with Tobin's Q and ROA as dependent variables. The regression equations are as follows:

$$Tobin'sQ_{i,t} = TobinsQ_{i,t} + \beta_1 \times ESG_{i,t} + \beta_2 \times Leverage_{i,t} + \beta_3 \times R\&D_{i,t} + \beta_4 \times Size_{i,t} + \beta_5 \times Industry_{i,t} + \mu_i + \varepsilon_{i,t},$$

$$ROA_{i,t} = ROA_{i,t} + \beta_1 \times ESG_{i,t} + \beta_2 \times Leverage_{i,t} + \beta_3 \times R\&D_{i,t} + \beta_4 \times Size_{i,t} + \beta_5 \times Industry_{i,t} + \mu_i + \varepsilon_{i,t},$$

where *i* represents the firm-specific subscript and *t* represents each year as a subscript. β is the regression coefficient, *TobinsQ* and *ROA* are the constant terms of the regression

model, $ESG_{i,t}$ is the combined score of environmental, social and governance performance of the company, $Leverage_{i,t}$ is the ratio for financial leverage, $R\&D_{i,t}$ is the company's R&D expenditures divided by sales, $Size_{i,t}$ is the natural logarithm of total assets, $Industry_{i,t}$ represents the industry-specific effects using dummy variables based on GICS classification, μ_i is the firm-specific unobserved effect and $\varepsilon_{i,t}$ is the idiosyncratic error term.

The regression models are estimated using both the FE and RE models. The final decision is made on based on Hausman's test, which tests whether the firm-specific effects are correlated with the variables used in the model (Hausman, 1978). If the test results indicate a correlation, the FE model is used, and otherwise, the RE model is used.

6.3 Regression model 2

In addition to the regression models presented in the previous chapter, the study also applies another regression model. The second panel regression model is Pooled Ordinate Least Squares (OLS) and it is conducted to answer the research question about how the impact of ESG ratings on firm valuation varies across different industries.

$$Tobin'sQ_{i,t} = \beta_0 + \beta_1 \times ESG_{i,t} + \sum_{k=2}^{11} \beta_k \left(ESG_{i,t} \times Industry_k\right) + \gamma_1 \times Size_{i,t} + \gamma_2 \times R\&D_{i,t} + \gamma_3 \times Leverage_{i,t} + \mu_i + \varepsilon_{i,t},$$

$$ROA_{i,t} = \beta_0 + \beta_1 \times ESG_{i,t} + \sum_{k=2}^{11} \beta_k \left(ESG_{i,t} \times Industry_k\right) + \gamma_1 \times Size_{i,t} + \gamma_2 \times R\&D_{i,t} + \gamma_3 \times Leverage_{i,t} + \mu_i + \varepsilon_{i,t},$$

where *i* represents the firm-specific subscript and *t* represents each year as a subscript. β_0 is the constant term, β_1 measures the ESG's effect on the dependent variable for the

base industry, β_k measures the difference in ESG score's effect for industry *k* versus base industry, γ is the coefficient for the control variables, μ_i is the firm-specific unobserved effect and $\varepsilon_{i,t}$ is the idiosyncratic error term. The results of the regressions and Hausman's tests are presented in detail in chapter 7.

7 Results

In this chapter the results for the regressions stated in methodology chapter are presented. In the first regression, the impact of company's ESG score in Tobin's Q and ROA is tested and analyzed. Later in the chapter the effect of ESG score is tested towards each industry. The regression results are presented in tables 9 and 11. The Hausman's test results are illustrated in table 10. After that the robustness tests are also conducted for the Pooled OLS model.

7.1 Impact of ESG score on financial performance

In table 9 below, the effect of companies' ESG score on their financial performance is examined. Both the FE and RE models are applied for Tobin's Q and ROA, which are the dependent variables in this study. The impact of independent variable and control variables is included in the regression. After conducting the regression table, the Hausman test is applied to analyze which models are more effective. The sample period of 2013 to 2023 is used when conducting the regression analysis.

Table 9. Fixed and random effects regression results for Tobin's Q and ROA.

	Fixed Effects		Random Effects	
Variable	**Tobin's Q**	**ROA**	**Tobin's Q**	**ROA**
ESG score	0,1267***	-0,0014***	0,1355***	-0,0004
	(0,0294)	(0,0005)	(0,0212)	(0,0004)
R&D	-0,0007	0,0000	-0,0004	0,0000
	(0,0020)	(0,0000)	(0,0020)	(0,0000)
Size	-6,4654***	0,0499***	-3,9217***	0,0393***
	(0,2525)	(0,0045)	(0,1864)	(0,0033)
Financial Leverage	1,46***	0,0043**	1,6396***	0,0036**
	(0,0951)	(0,0017)	(0,0918)	(0,0016)
Constant	94,7848***	-0,6964***	54,8140***	-0,5494***
	(3,5521)	(0,0634)	(2,6634)	(0,0480)
Observations	5981	5981	5981	5981
R^2	0,1670	0,0225	0,1129	0,1107
F Statistic	9,7119	9,4423	-	-

Industry dummies are included in all models. Standard errors are in the parentheses.
Significance levels: * p < 0,10; ** p < 0,05; *** p < 0,01.

Table 9 shows the FE and RE regression results for Tobin's Q and ROA. The regression analysis aims to identify how company's ESG score affects its financial performance. The financial performance is being measured by Tobin's Q and ROA. The analysis is conducted for both FE and RE panel models. In addition to the ESG score, the control variables for the regression are R&D, size, and financial leverage. Dummy variables are used in all models to control for the differences by the industry. Industry 1 is set as a reference group for dummy variables used when conducting the regression model. Industry 1 represents Consumer discretionary.

When looking at the models analyzing Tobin's Q, the ESG score has a positive and statistically significant effect in both models. In the FE model, the coefficient is 0,1267, and in the random effects model, it is 0,1355. This finding suggests that a higher ESG

score is associated with a higher valuation of the company which indicates that investors value ESG initiatives. This finding is consistent with previous literature (Albuquerque et al., 2019; Boulhaga et al., 2022) On the other hand, for ROA, the effect of the ESG score is negative and only statistically significant in the FE model, where the coefficient is -0,0014. According to this finding, investing in ESG initiatives is not profitable and could reduce shareholder value. In the RE model, the result is not statistically significant. This makes the first hypothesis true when considering Tobin's Q but incorrect for ROA. Thus, the conflicting findings indicate that the relationship between ESG and firm valuation is dependent on the measures applied to evaluate the firm value. In addition to ESG score, in many models, the firm size and financial leverage are statistically significant. The R^2 values that explain how much of the variation in the dependent variable is explained by the explanatory variables in the model, range between 0,022 and 0,167 in the conducted regression. The model selection is controlled by the results of the Hausman's test.

Table 10. Hausman's test.

Dependent Variable	**Chi-square**	**df**	**p-value**	**Preferred Model**
Tobin's Q	267,712	4	less than 0,0001	Fixed Effects
ROA	22,677	4	0,0001	Fixed Effects

The Hausman's test is conducted for both the FE and RE models. The test statistic for Tobin's Q is $x^2(4)=267,712$, and the p-value <0,0001. For the ROA model, the test statistic is $x^2(4)=22,677$, and the p-value is 0,00001. In both models the p-values are very small, indicating that the FE model is considered statistically more reliable for both dependent variables. As mentioned above, for both dependent variables, the results in the FE model are statistically significant.

7.2 ESG rating effects on different industries

When examining the study's second research question about how the impact of ESG ratings on firm valuation varies across the different industries, another regression model is made. The Pooled Ordinary Least Squares (OLS) model is used to answer the question.

Dummy variables are created for the different industries, and Consumer discretionary is named industry 1, which serves as a reference category and is referred to with a name constant in the table. The sample period of 2013 to 2023 is used when conducting the regression model. The two dependent variables in the regression model are Tobin's Q and ROA.

Table 11. Pooled OLS model.

	Depedent variable	
Variable	**Tobin's Q**	**ROA**
ESG score	0,0751***	0,0006***
	(0,0136)	(0,0002)
R&D	−0,0007	−0,0000
	(0,0024)	(0,0000)
Size	−1,9912***	0,0285***
	(0,1206)	(0,0022)
Financial Leverage	1,7795***	0,0030*
	(0,0914)	(0,0016)
Materials	−0,6240	−0,0295*
	(0,9028)	(0,0161)
Industrials	0,1248	0,0060
	(0,7747)	(0,0138)
Energy	7,3325***	−0,0968***
	(1,1275)	(0,0201)
Consumer Staples	1,0137	−0,0102
	(1,1800)	(0,0211)
Health Care	3,0677***	−0,1787***
	(0,8452)	(0,0151)
Financials	4,4423***	−0,0811***
	(0,9670)	(0,0173)

Information Technology	−1,1666	0,0280*
	(0,8545)	(0,0152)
Communication Services	0,5175	0,0120
	(1,2380)	(0,0221)
Utilities	1,5630	−0,0428
	(2,1006)	(0,0375)
Real Estate	2,0191*	-0,0336*
	(1,1198)	(0,0200)
Constant	28,6292***	-0,4200***
	(1,6651)	(0,0297)
Observations	5981	5981
R^2	0,1273	0,1145
F-Statistic	62,1386	55,0846

Standard errors are in the parentheses. Significance levels: * p < 0,10; ** p < 0,05; *** p < 0,01.

Table 11 presents the results of the pooled OLS model, which is used to clarify whether companies' ESG scores affect differently between different industries. According to the results, ESG scores are statistically significant and correlate positively with Tobin's Q and ROA. This suggests that companies with a higher ESG rating can be both more profitable and valued in the market. The effect of R&D is very similar for both the pooled OLS model and the FE and RE results. This is mainly due to many companies not having reported R&D expenditures. The effect of the size variable on Tobin's Q remained negative and statistically significant in the Pooled OLS model as well, but the strength was smaller. Financial leverage has a smaller significance for ROA in the OLS model than in the FE and RE models.

The most important part of the OLS model is the analysis of the dummy variables created for the industries. Several different industries were found to be statistically significant, which confirms the hypothesis that the impact of ESG varies across different industries. For example, the energy, health care, financials, and consumer discretionary sectors have a robust positive correlation in Tobin's Q model but a negative effect in the ROA

model. This can reflect the market expectations and cost structures in the sector. Also, the information technology and real estate industries show a statistically significant correlation, at least in either of the models, suggesting that the importance of ESG may vary depending on how central sustainability issues are to the business model of the industry (Wu & Chang, 2022; Veeravel et al., 2024). The results for real estate and consumer staples are statistically weaker, which is in line with previous literature suggesting that the importance of ESG may have a lower impact in these sectors because the investors might prioritize business growth and profitability over sustainability objectives (Wu & Chang, 2022).

Previous research states that the effect of ESG ratings on company valuation is not linear, but in fact, depends on the company size, capital risk, and industry-specific factors (Lin et al., 2021). The R^2 of Tobin's Q model is around 12,7% and for the ROA model 11,5%, which indicates how much of the variation in the dependent variable can be explained by the independent variables. In both models, the F-statistics indicate that the models are overall statistically significant.

7.3 Robustness checks

The reliability of the previously mentioned OLS regression model is evaluated by three different robustness tests conducted for both Tobin's Q and ROA. The first test completed is the Jarque-Bera test, which measures the normality of residuals. The second test is White's test, which measures the heteroskedasticity. Lastly, the Variance Inflation Factor (VIF) is also conducted to measure the multicollinearity of the variables. The results are presented in table 12.

Table 12. Jarque-Bera, White's test, and VIF.

Robustness Test	Tobin's Q	ROA
Jarque-Bera	$X^2(2)$ = 888344,640	$X^2(2)$ = 20538,160
P-value	0,000	0,000
White's Test	TR^2 = 767,231	TR^2 = 198,569
Unadjusted R-squared	0,128	0,033
P-value	0,000	0,000
VIF	2,169 (Industrials)	2,169 (Industrials)

Table 12 illustrates the results of the three different robustness tests. The normality of the residuals was tested using the Jarque-Bera test, the results of which show that the normality assumptions are rejected in Tobin's Q and in ROA because the p-values are less than 0,001. The White's Test is used to test the heteroskedasticity of the sample. The results show statistically significant heteroskedasticity in both Tobin's Q and ROA because the p-value is less than 0,000. This suggests that the constant variance assumption is not met, which may lead to inefficient estimators and incorrect t-tests unless a robust variance-covariance matrix is used (Greene, 2018). Lastly, the multicollinearity is examined using the VIF values.

Table 13. Full table of VIF values for variables.

Variable	VIF
ESG score	1,5980
Financial Leverage	1,0140
Size	2,0490
R&D	1,0050
Materials	1,7000
Industrials	2,1690
Energy	1,3540
Consumer Staples	1,3260
Health Care	1,9600
Financials	1,9470
Information Technology	1,9600
Communication Services	1,2840
Utilities	1,0870
Real Estate	1,4290
Values larger than 10,00 may indicate a collinearity problem	

All the VIF values in the table are below the commonly used limit of 10,00 (Wooldridge, J.M., 2013), suggesting that there is no severe multicollinearity. The highest VIF value obtained from the table is 2,169 for the industrials sector, which is also well below the limit of 10,00. Therefore, the correlations between variables are unlikely to bias the regression results significantly.

8 Conclusions

This study aimed to find out how ESG ratings affect Nordic Companies' valuation and investigate whether the impact varies between industries. The study was conducted as a quantitative study, using firm-level data of Nordic listed companies between 2013 and 2023. The ESG scores used as an independent variable were provided by LSEG. Dependent variables such as Tobin's Q and ROA were used to measure firm valuation. The study included control variables for industry, size, financial leverage, and R&D and the regression results were conducted using FE and RE models and the Pooled OLS model.

Even though the research contributed to existing literature, the study faced limitations. One important limitation was in regard to the ESG score. Different ESG data providers use different classifications to combine the ESG scores. When comparing the results of this research to previous literature, it is important to notice that different data sources may give conflicting results. Also, as reporting ESG scores is a relatively new measure for companies, many companies in the data set had only a few reported ESG scores during 2013 to 2023. In these scenarios, the ESG score was assumed to remain the same during the whole study period. The data also included companies listed on the stock exchange in the middle of the time period, but those were still included to avoid loss of observations. The results of this study were also distorted as there were only six companies in the utilities industry due to the sample of companies.

Numerous prior studies have examined whether a company's ESG score impacts its value. The findings of the previous research have varied depending on the time period, variables used, and geographic location of the study. Generally, the most recent studies have also found statistical significance between companies' ESG ratings and firm value.

When looking at the results of this research, as suggested by Hausman's test results, the FE model was more suitable for interpreting the data in the first regression model to test the correlation between ESG scores and dependent variables. The study revealed differences between the effect of ESG score on Tobin's Q and ROA. The panel regression

results for the FE model showed that ESG scores have a statistically significant positive relationship with Tobin's Q and a more moderate but still statistically significant negative relationship with ROA. All control variables except R&D displayed statistically significant results for dependent variables, but the effect was varied, either negative or positive. Therefore, the mixed findings conclude that the correlation between ESG and firm valuation depends on the metrics used to assess company valuation.

The second regression model analysed the effects of variables by the industries in which the companies were categorized in based on the GICS classification. By utilizing dummy variables, the second hypothesis of the research was tested. The results for the second regression varied extensively depending on the industry. The effect of the ESG score for Tobin's Q illustrated the strongest statistically significant positive correlation in the energy, consumer discretionary, and financial sectors, where regulatory pressures and expectations of responsibility are higher. The ESG effect on ROA in these sectors was negatively statistically significant. Information technology was the only industry with a small positive statistical significance for ROA.

As this study focused on all of the Nordic countries that contained a widely varying number of companies, future research could investigate these countries separately to learn whether the effects vary between countries. Future studies could also include other firm profitability measures such as ROE, EBIT, or EPS to provide valuable information for stakeholders. In addition, extending the study to a longer-term or event-based analysis could deepen the understanding of how ESG developments affect valuation over time. Examining the relationship between ESG and company value in different market situations, such as crises or political changes would also be useful. The role and emphasis of institutional investors in ESG analysis also provide an interesting area for future research.

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