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ESG Scores and Firm Performance in the Nordics

An Empirical Study of the Link Between ESG Scores and Profitability, Firm Value and Cost of Capital in the Nordics

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Abstract

The relationship between environmental, social, and corporate governance (ESG) performance and profitability, firm value, and cost of capital in the Nordics is explored in this thesis. The influence of ESG is examined using pooled OLS, random, and fixed effect regressions on 340 publicly traded Nordic companies. The data is obtained from Thomson Reuters' database and spans the years 2013 to 2019. Our findings reveal that there is no statistically significant relationship between individual and combined ESG factors and firm profitability (i.e., ROE). However, the social pillar score and ESGC performance have a positive and significant effect on the firm value of Nordic firms through their idiosyncratic risk profile (*higher profitability and lower exposures to tail risk*) For the cost of capital we found a positive relationship with ESGC and the social pillar, while the environmental pillar showed a negative effect on WACC. This effect is gained through both their idiosyncratic risk profile and their systematic risk profile (*lower costs of capital and higher valuations*).

Acknowledgments

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1. Introduction

Our societies and the environment will face increased pressures in the future. Particularly, climate change and social disparities are all having an impact on how business is conducted. Firms are often blamed for the world's negative developments due to their environmental incompetence, poor product quality and safety, and dishonest commercial tactics (Edmondson and Koh, 2019). As a result, businesses are increasingly being held accountable for their behavior. Corporations are therefore required to operate in a socially responsible manner, and sustainability issues have recently emerged on the financial industry's agenda. The necessity of incorporating environmental, social, and governance (ESG) risk considerations into business analysis has become the standard, requiring companies to assess the advantages and costs of resource reallocation (PwC, 2020). Especially for the Nordics, the focus on climate change and sustainable investments has increased during the last decade, where more Nordic firms disclosed ESG reports on their business investments and activities. Skeptics claim that firms' ESG efforts are only a window dressing gimmick, that allows firms to leave out bad news (Porter et al, 2019), while other claims that sustainable ESG investments lead to greater profitability and firm value (Dalal & Thaker, 2019).

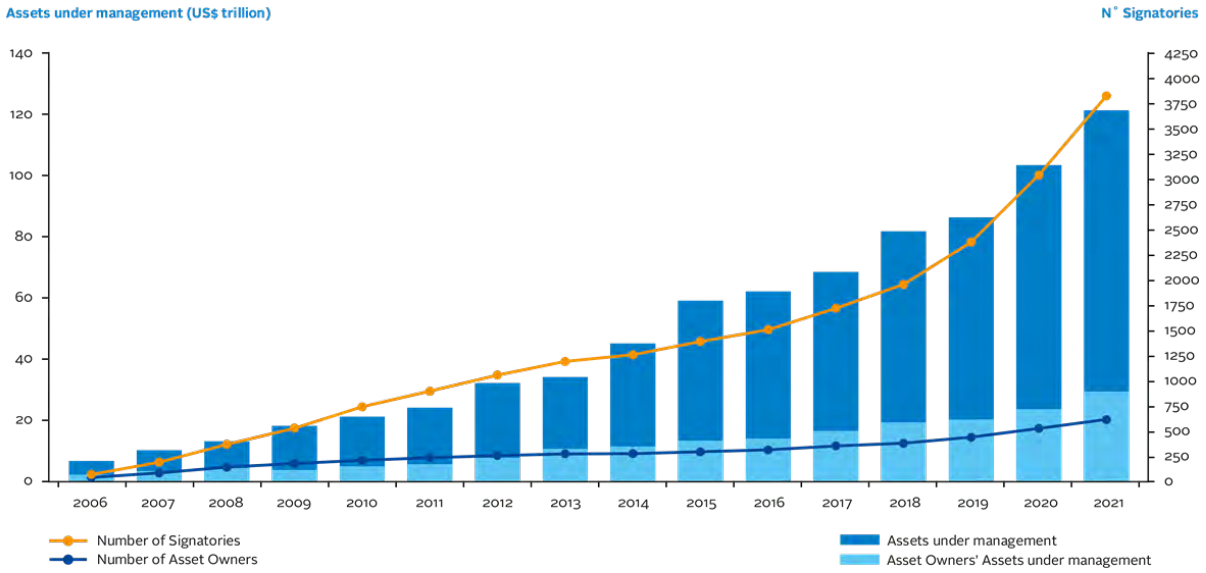
For the Nordics, a bright moment was in 2017, which is also one of the peak years in our study. That year, 94% of Danish firms, 89% of Norwegian firms, 88% of Swedish firms, and 82% of Finnish firms filed Corporate Social Responsibility (CSR) reports (Blasco & King, 2017). This places the Nordic countries among the top ten countries in the world for corporate responsibility reporting, within annual financial reporting, and it also means these four Nordic countries report significantly higher on CSR compared to the average countries. This report from KPMG conducted by Blasco & King (2017), also emphasized that 78% of the world's largest corporations now include financial and non-financial data in their yearly financial reports. This indicates that companies around the world believe corporate responsibility data is important to investors.

This leads us to a great method to evaluate the responsibility investments among firms and demonstrate the rise of ESG investments, which is utilizing the United Nations Principles for Responsible Investment (PRI). PRI is an international organization that encourages investors around the world to include ESG concerns when making investment decisions. Member firms

participate by signing the PRI's six fundamental principles and reporting on their progress on a regular basis[1].

As illustrated in figure 1 below, it shows a tremendous increase in the number of signatories to these practices as well as the increase in the assets under management of the companies involved. Both have grown significantly, and as of March 31, 2021, more than 3500 investors, with US$122 trillion in assets under management, have signed up to follow these principles (UN Principles for Responsible Investments, 2021). This demonstrates that awareness about ESG issues among prominent investors has increased substantially, as it includes some of the world's largest and most influential investors.

Figure 1. The growth of ESG investing from 2006 to 2021.



Source: UN Principles of responsible investing, (2021)

True evidence supporting this development can be found in the findings of Pagano, Sinclair, and Yang (2018), who found that during the period 2006 to 2016, the net value of ESG-considered investments in global assets surged 15-fold, from USD 4 trillion to USD 60 trillion.

[1] UN Principles of responsible investing (2021), we will:
1: Incorporate ESG issues into investment analysis and decision-making processes.
2: Be active owners, incorporate ESG issues into our ownership policies and practices.
3: Seek appropriate disclosure on ESG issues by the entities in which we invest.
4: Will promote acceptance & implementation of the Principles within the investment industry.
5: Will work together to enhance our effectiveness in implementing the Principles.
6: Each report on our activities and progress towards implementing the Principles.

According to Morningstar (2021), annual flows into US sustainable funds averaged around $5 billion between 2014 and 2018, rising to more than $20 billion and $50 billion in 2019 and 2020, respectively. Sustainable fund assets under management in the United States grew from $30 billion in 2010 to $240 billion in 2020. Retail and institutional investors have stated a preference for companies with a high environmental, social, and governance (ESG) imprint, either directly or indirectly (Lioui & Tarelli, 2022). The ESG hallmark has become fundamental in financial markets, alongside the usual economic drive for risky investments. Furthermore, international institutions such as the United Nations and the European Union, as well as NGOs and shareholders exert pressure (De Spiegeleer et al., 2020). Therefore, there is no doubt that ESG has become a hot topic in the recent decade (Lioui & Tarelli, 2022). This can be seen in parallel with the rise of customers who expect accountability from businesses and investors who want to make ethical investments. Since the financial crisis of 2008, this trend has accelerated. Stakeholders have been more critical of how businesses operate, and the desire for firms to be held accountable for environmental, social, and ethical issues has grown (Papadopoulos & Araujo 2020).

There are two dominating views on how much sustainable responsibility should be placed on corporations, despite the fact that the discussion of sustainability is growing and gaining ground. On the one hand, we have Brown, Helland, and Smith (2006), who shows that corporations incur an agency cost when they spend money on CSR activities that are not counterbalanced by shareholder return. These activities represent agency costs, as the agent's wealth grows at the expense of the shareholders' potential. This view is often aligned with Milton Friedman’s (1970) widely known shareholder theory. According to this profit maximization theory, a company's primary responsibility is to increase profits while disregarding ethical concerns. This must be accomplished without violating any laws or regulations. Mansell (2013), on the other hand, provides clear evidence that corporations can follow stakeholder interests without diminishing or reducing the wealth of shareholders, while still complying with the ethical standards of the shareholder theory. That is why Epstein (2008) also states that companies no longer have the possibility to achieve economic growth unless this growth is achieved through socially and environmentally sustainable activities. Where finding a balance between economic success, social responsibility, and environmental protection can contribute to gaining a competitive advantage. For these reasons Epstein (2008), argued that solving social and environmental issues should be a powerful motivating factor for CEOs.

Moreover, nowadays investors do also consider a firm`s performance on the ESG factors in addition to its financial performance when making investment decisions. As a result, this has led to the trending view that the contribution of corporations towards sustainable development is a major concern of investors, creditors, government, and other environmental agencies (OECD, 2021). This strong growing attention on ESG among firms, investors, and society as a whole has opened the room for questioning how ESG efforts create value? This is highly relevant and connected to the growing pressure on public companies to become more sustainable (Meixell & Luoma, 2015), which is very present in the Nordic countries (Kristensen et al, 2019).

Many previous studies have examined the benefits of corporate sustainability performance in regard to corporate financial performance (Whelan et al., 2021). Most of these studies focus on the relationship between ESG ratings and stock performance. However, the findings have been ambiguous. In their analysis of past studies on the association between stock performance and ESG rating, Halbritter and Dorfleitner (2015) discovered that the degree and direction of the influence are highly reliant on the rating provider, the firm sample, and the specific subperiod. According to the findings, investors should no longer expect extraordinary gains from trading a portfolio composed of highly rated ESG companies. Other research has looked at the link between ESG ratings and more explicit financial performance metrics including Weighted Average Cost of Capital, Tobin's Q, and Return on Equity. However, few publications have looked at all of these indicators at once, and no one has looked at the relationship between ESG ratings and all of these factors in the Nordics, as far as our investigation could tell.

The Nordic countries have been global leaders in terms of sustainability for decades (Sachs et al., 2020). Based on the (SDG Index, 2020), which measures a country’s overall progress towards achieving all 17 SDGs, the five Nordic countries — Sweden, Denmark, Finland, Iceland, and Norway – are ranked at the top. Here Sweden, Denmark, and Finland are the top three countries in the Sustainable Development Report (SDG) 2020 Index, while Norway is ranked sixth. However, according to the RobecoSAM (2021), Country Sustainability Ranking, which is a comprehensive framework for measuring nations' performance on various ESG metrics, ranks Sweden, Finland, Norway, and Denmark as the top four countries out of 150. In addition, ESG has an important integration aspect in the investment process, and no other region has implemented the normative focus to the same extent as the Nordics (Boyd, 2019).

Especially Sweden and Finland score high on healthcare, education, and social security infrastructures (Scanlon, 2022; Kuusipalo et al. 2021; Torp, 2020). Along with Norway, these three countries receive excellent ratings in the category of "Climate Change and Energy." Therefore, it is no surprise that Scandinavian countries consistently throughout history ranked well on key ESG indicators, given their long history of cooperating with each other to promote sustainable development on a national and international level (Scanlon, 2022).

In recent years, the region's financial sector has under the so-called “Nordic model” been transformed into an international powerhouse for ESG[2] and nearly half of Nordic institutional investors invest in impact strategies (Siermann, 2022). This explains why 9 out of 10 Nordic investors are interested in impact investing, with 43% currently investing in impact strategies and another 22% planning to invest in the future[3] (Siermann, 2022). Furthermore, the NN Investment Partners' survey of Nordic institutional investors (2019), verifies that ESG is now the standard in the Nordic asset management industry, with Sweden and Denmark leading the way. In terms of ESG policy, Swedish and Danish pension funds prioritize climate change and divest the most from carbon-intensive companies. Moreover, the Norwegian sovereign wealth fund excludes firms violating fundamental ethical norms, human rights, manufacturing certain types of weaponry, basing their operations on coal, or producing tobacco (Scanlon, 2022). As a prudent investor, the Norwegian sovereign wealth fund has evolved into a responsible investor, serving as a model and influencing other institutional investors to do the same (Halvorssen, 2021).

As Finland commits to becoming carbon neutral by 2035, prominent Finnish municipalities are implementing ambitious climate plans to achieve carbon neutrality by 2030. In terms of climate promises, the Finnish government is not alone. Norway has similarly established a carbon-neutral target for 2030. Sweden intends to be carbon neutral by 2045. Iceland now plans to be carbon-neutral by 2042, eight years ahead of the government's deadline. Denmark passed a new Climate Act in June 2020, with the goal of reducing greenhouse gas emissions by 70% within 2030 (Scanlon, 2022)[4].

[2] This is also argued and supported by Worldfavor (2022).
[3] This based on (NN Investment Partners' survey, 2019) among Nordic institutional investors conducted by Kirstein A/S.
[4] Along those lines (Marsh & Kishan, 2021; Roncalli et al, 2021; Roncalli, 2020) also argues that ESG investments, and climate change risk management, in particular, have become mainstream and that ‘the market has now caught up’.

Despite all these major transition goals of the Nordic societies and countries, it is exciting to study and ask the questions: are *ESG investments in the Nordic countries profitable, do they contribute to increasing firms' value, and does it reduce firms' cost of capital?*

Our goal in this study is therefore to examine how ESG scores affect profitability, firm value, and cost of capital of companies in the Nordics. Utilizing the ESG combined score and ESG pillar scores as a proxy for ESG and measurements for Corporate Social Performance (CSP), with the ESG database score of Refinitiv (2021), serving as our primary score. Because Refinitiv (2021) provides the most coverage of the available scores, this method is also strongly supported by Dorfleitner et al (2015), which states that ESG is a measurement tool used to rate organizations based on their corporate responsibility.

1.1 Motivation and purpose of this thesis

Our huge interest in sustainability within finance, and a desire to learn more about ESG performance, aligned with future aspirations towards professionally working with sustainable investments are our main motivations to investigate this study. For this reason, we want to dive deeper into how better sustainability can significantly influence the performance of a firm's profitability, valuation, and cost of capital. According to a meta-study of ESG in fields such as management, accounting, finance, and economics, by Friede et al. (2015), the authors concluded that roughly 90% of the studies found a positive relationship between ESG and financial performance (Friede et al. 2015). However, most of these studies focus on a certain financial dimension and not a holistic approach. Furthermore, the majority of previous studies have been focused on the American market and European markets, leaving a momentous gap in the literature, and causing companies originating from the Nordic region to be under-examined. In addition, none of these studies have formally isolated the Nordic countries and companies only for themself and then drawn conclusions. As a result, the goal of this thesis is to fill this gap by looking into the relationship between ESG and financial performance in the Nordics to highlight findings that will be valuable to responsible investors, financial analysts, policymakers, and other associated institutions.

1.2 Limitation

This study is restricted to Nordic countries from 2013 to 2019. Due to the scarcity of data in previous years, this specific time period has been chosen. Moreover, only publicly traded

corporations aligned with their noted country stock exchanges are included. The reason for only including publicly traded corporation's stems from the fact that relatively few private companies' had their financial balance sheets[5] and ESG score data less widely available compared to publicly traded companies. This constraint is not considered a concern for publicly traded corporations as the Refinitiv Eikon Datastream[6] is rich in providing ESG score ratings and financial results data for publicly traded firms, including betas and interest rate costs measurements (Refinitiv 2021).

The impact of the Covid-19 crisis on a firm's financial and nonfinancial results is not taken into account in this study. Mainly due to the still-ongoing effects and the unknown long-term consequences. Several public companies have experienced shocks in their stock price which is affecting the market capitalization[7], higher inflation which is affecting their interest costs rates, and changes in demand due to the effects of the Covid-19 pandemic (Bjertnæs et al., 2021). Therefore, in order to assemble a more reliable regression analysis, we have concluded to not include the years 2020 and 2021 in this study. In addition, transaction costs and taxes expenses are excluded from this analysis. For the purpose of catching pure profitability measurements, EBIT[8] (earnings before interest and taxes) results for all companies have been used.

1.3 ESG and measurement bias

ESG investing is used by about a quarter of the world's professional-managed investment funds, comprising about $30 trillion in assets (Henisz, Koller & Nuttal, 2019). These increases in investment funds for firms with high ESG scores may significantly shift the demand for ESG stocks and contribute to an increase in the value of ESG-rated stocks relative to stocks that do not have an ESG rating (Galema et al, 2008). If this is the case, our

[5] A balance sheet is a financial statement that reports a company's assets, liabilities, and shareholder equity.
[6] The full name is Thomson Reuters Eikon Datastream Refinitiv.
[7] Stock shocks that affect the market capitalization of a firm, through a change in the number of outstanding stocks. MC=Market capitalization; equal to the current stock price multiplied by the number of outstanding stock shares.
[8] Profitability measurement EBIT is calculated as revenue minus expenses excluding tax and interest measures.

dataset may already contain ESG *measurement biases*, as rising demand for companies with high ESG scores may have already increased their firm value in prior fiscal years[9].

Our 7-year study may not produce acceptable significant results when compared to previous research, which spans through longer periods of time. Because the study of Eccles, Ioannou, and Serafeim (2014), claim that the relationship between sustainability and financial performance is only significant in the long run and not in the short run. Their paper also looked at both the accounting and financial performance of companies, and they found evidence that highly sustainable firms were significantly outperforming low sustainable firms in the long run (Eccles et al., 2014).

Lastly, Gregory (2021) has theoretically demonstrated why ROE, ROA[10], and Tobin's Q are not good measures of corporate financial performance for ESG criteria. Essentially this is "due to E, S, and G criteria affecting productivity and debt costs, which causes measurement error in the dependent variables of regressing ROE, ROA, and Tobin's Q on E, S, and G criteria where the measurement error is correlated with the independent variables" (Gregory, 2021. p.1). As a result, estimators are skewed, and standard errors are inflated. In order to investigate this, we have conducted a skewness and kurtosis test within the part of the descriptive statistics. The result from these tests indicates that the performance of the Nordic companies on the individual ESG pillars has a significant variation and these correlated measurement errors are not present in our study.

1.4 Research questions

The primary purpose of the study is to analyze and examine if Nordic public companies gain more financial value through their ESG scores, by testing for a relationship between ESG scores and corporate financial performance, including both accounting and market performance. ESG scores will be retrieved from the Thomson Reuters Refinitiv (2021) database, as well as Return on Equity (ROE), Tobin's Q as measurements of corporate financial value, and WACC as a measurement of a firm's capital cost. For these purposes, and

[9] The difference between the observed and real value is known as a measurement error (Wooldridge, 2016, p. 288). Only if the measurement error in the dependent variable is statistically related to one or more of the explanatory variables in the regression, does it induce biases in the OLS estimation.
[10] Return on Assets (ROA) is a financial ratio that indicates how profitable a company is in relation to its total assets (Berk and Demarzo, 2019).

since this research differs from previous studies, the main objective of this study will aim to answer the three following research questions:

RQ1: How do ESG ratings contribute to a firm's overall profitability?

RQ2: How is a firm's market valuation driven by ESG rating?

RQ3: How does ESG rating affect the cost of debt?

We will analyze these questions and construct alternative interpretations based on the results of our investigation, with the purpose of motivating further research. As a supplement to the research questions, three hypotheses based on a previous literature review have been developed. These hypotheses reflect the expected outcomes of the analysis and will be used to answer the research questions:

H1a: There is a significant positive relationship between ESG factors and the profitability of Nordic public companies.

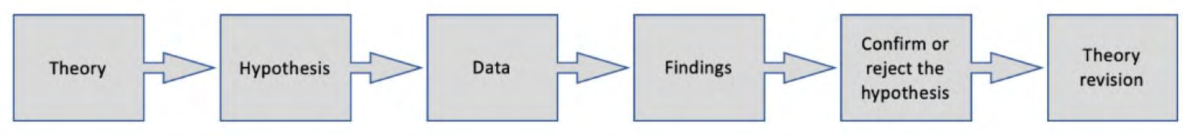
H1b: There is a significant positive relationship between ESG factors and the firm value of Nordic public companies.

H1c: There is a significant negative relationship between ESG factors and the cost of capital of Nordic public companies.

1.5 Deductive Research Design

Our research design for this study is based on the foundation steps of the deductive theory and quantitative methodology approach. This theory, according to Bryman and Bell (2015), is the best to employ when looking at the relationship between research and theory. The deductive approach is broken down into six steps, as seen in Figure 3. The first phase entails a thorough examination of the theory and previous research. Then the hypothesis is developed, data is collected, and the findings are presented. The researcher then validates or rejects his or her hypotheses and links them to the theory (Bryman & Bell, 2015).

Figure 2. The deductive research and quantitative methodology approach.



Source: Bryman and Bell (2015, p.23)

2. ESG

This section provides a brief introduction to ESG, its individual pillars, ESG ratings, and weaknesses related to ESG ratings.

2.1 Introduction to ESG

ESG is a modern investment term that is commonly used interchangeably with sustainability. It refers to the three main elements (environmental, social, and governance) and is used to assess a company's long-term viability (Boffo & Patalano, 2020). Sustainability is most commonly referred to in finance as "Socially Responsible Investing" (SRI), "Sustainable Investing," "Corporate Social Responsibility" (CSR), and, more recently, "Environmental, Social, and Governance" factors (ESG). Although the definitions range slightly, they all center on ESG issues, with the goal of improving firms and portfolios across these dimensions for all stakeholders (De Spiegeleer et al., 2020). Climate change, pollution, working conditions, human rights, and corruption are examples of ESG-factors (UN Principles of Responsible Investing, 2022). The relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP) has been a central subject in sustainable finance research. The association between CFP and ESG criteria, as a proxy for CSP, has been studied in over 2200 empirical research (Friede, Busch, & Bassen, 2015). While most studies have discovered that investing in ESG activities increases financial performance (Whelan et al. 2021), others have discovered negative consequences. Lee et al. (2009), for example, find that ESG investment reduces financial performance and argue that this could reflect a cheaper cost of equity capital for firms with high ESG scores. The third set of scholars comes to the conclusion that there is no link between ESG scores and financial performance (Horváthová, 2010).

2.2 The Three Pillars of ESG

Environmental, Social, and Governance components are the three pillars of ESG. In practice, they are the three key features to use when measuring the sustainability and ethical impact of an investment (Bush et al, 2020; Sisto, 2020). Viewed from an investing approach, these ESG pillars have a critical impact on a company's success and market returns. Managers and investors can utilize the three pillars individually to analyze and compare specific criteria or

issues for individual organizations, as well as to see how they perform in comparison to others (Sisto, 2020). As a result, a company's success in each of the pillars may have a significant impact on assessing its long-term potential and hazards.

2.2.1 Environmental

The environmental pillar encompasses a wide range of issues, but in general it focuses on how a firm acts as a steward of the environment. Normally, the environmental pillar often receives the greatest attention because climate change is one of the most important environmental challenges that shareholders, money managers, and institutional investors examine (Collin, 2009). Not only do violations of environmental laws often lead to hefty fines, but climate change also has an impact on all businesses, posing a systematic risk (Collin, 2009). To address this, businesses have begun to position themselves strategically to deal with the greater elastic sensitivity effects of climate change. As a result, recognizing the impact of environmental sustainability on financial performance is essential (KPMG, 2018).

2.2.2 Social

The social pillar examines how a company maintains connections with employees, suppliers, consumers, and the society in which it operates (S&P Global, 2020). As a means of improving these ties, a firm can choose to harness social concerns and issues. Human rights, safety, and child labor play a significant influence in investing decisions in an age when information spreads instantly and investors may watch and act on a company's social conduct in seconds (Russo et al., 2021). Social media has an impact on social norms and is effective in spreading new ideas and norms in responsible consumption and investing. Social concerns may have an impact on the financial performance of any company, but they are especially critical for consumer-facing industries, which rely on a positive social reputation and brand value (Collin, 2009).

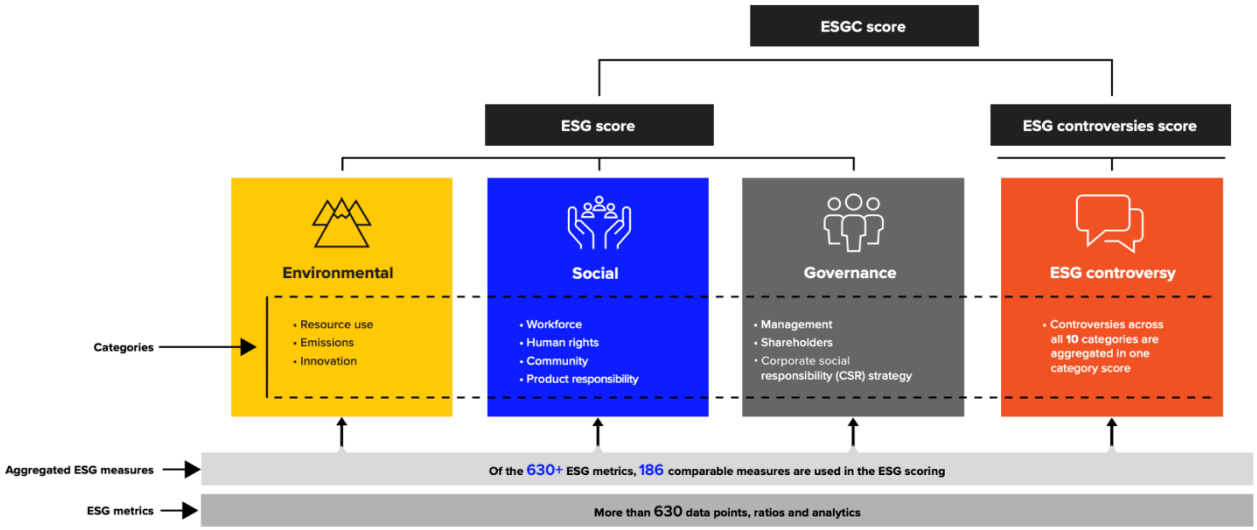
2.2.3 Governance

Lastly, the governance pillar depicts how a corporation handles leadership, executive compensation, internal controls, and shareholder rights. The governance pillar, in contrast to the environmental and social pillars, focuses on how a corporation functions within rather than how its actions influence the world. Monitoring and reporting on the company's performance

are required for governance evaluation. Investors want to know if a company's accounting systems are accurate and transparent and if investors are given the opportunity to vote on crucial issues (Collin, 2009). Poor corporate governance has been found to negatively impact a company's financial performance (Collin, 2009). As a result, a growing number of investors have grown more vocal in advocating for corporate governance reforms, particularly after the Great Recession (Hill, 2020, p.2).

To summarize, we used Refinitiv's (2022b) definition of ESG score and data in our research. Each of the pillars is broken into main divisions that comprise multiple different topics, as seen in figure 2 below. This figure also shows the relationship between the different scores, how the ESG scores are connected, constructed, and finally accumulated to represent one individual ESG combined (ESGC) score per Nordic firm.

Figure 3. The three Pillars of ESG.



Source: Environmental, social, and governance scores from Refinitiv (2022b).

2.3 ESG Scores

To quantify sustainability, most studies rely on ESG data from sustainability rating agencies. There are more than 100 ESG rating firms, according to a report issued by Sustainable Insight Capital Management (2016). The key ESG rating sources include companies like MSCI, Sustainalytics, Bloomberg, and Thomson Reuters. An underlying weakness is how these agencies genuinely evaluate ESG scores, and what sustainable and responsible (SR) investors and researchers want the scores to measure (Drempetic, Klein, & Zwergel, 2020).

The fundamental purpose of ESG measurements is to accurately represent a company's performance on a particular ESG issue (Kotsantonis & Serafeim, 2019). The percentile rank scoring system is used to calculate the scores (Reuters, 2021). The computation is based on evaluations of a company's ESG performance in comparison to others, and it will vary depending on how many companies are worse than the current one, how many have the same value, and how many have no value at all. Furthermore, the ESG score is made up of three equally weighted pillars: environmental, social, and governance, and it ranges from zero to one hundred. A score of 100 indicates exceptional performance while a score of 0 indicates bad performance. Each pillar is assessed using over 450 data points, including water usage and human rights policies, all of which are based on the publicly available information (Drempetic et al., 2020)[11]. Once a year, the ESG Score is released in the Thomson Reuters database. The scores are the weighted sum of all relevant industry indicators, omitting quantitative variables for which data is not publicly available. Aligned with Refinitiv's (2022b) basic definition of ESG score, this following formula is also the fundamental formula used in our research to determine the ESG scores for Nordic firms:

$$score = \frac{no.of\ companies\ with\ a\ worse\ value\ \frac{no.of\ companies\ with\ the\ same\ value\ including\ current\ one}{2}}{no.of\ companies} \quad (1)$$

This ESG score, in equation (1), measures a firm's ESG performance based on publicly available data that can be verified, and must not be confused with the definition of ESGC score– which overlays the ESG score with ESG controversies to provide a comprehensive evaluation of the firm's sustainability impact and conduct over time (Refinitiv's, 2022b).

2.4 ESGC and Controversies score

ESGC scores provide a balanced and comprehensive scoring of a Nordic firm`s ESG performance, based on the reported facts relevant to the ESG pillars, with the ESG controversies overlay acquired from worldwide media sources (Refinitiv's, 2022b). The main goal of ESGC score is to deduct the ESG performance score from unfavorable media reports. This is accomplished by factoring the impact of significant ESG issues into the total ESGC

[11] Thomson Reuters has one of the largest databases on ESG Scores, with over 9000 public companies worldwide and 2100 in Europe, and the database has been utilized in various empirical research (Refinitiv, 2021).

score (Refinitiv's, 2022b). Corporate ESG news stories that put a company in the spotlight, such as events involving employee health, tax fraud, customer safety, or the environment, are known as ESG controversies (Refinitiv's, 2022b). If a scandal happens throughout the year, the company is penalized through their ESG controversies score, which impacts their total ESGC score and grading. If there are fresh events relating to the same unfavorable event, the impact of the event may still be seen in the following year. The ESG controversies score also considers the market size bias that large-cap corporations face because they receive more media attention than smaller-cap companies (Refinitiv's, 2022b).

2.5 Weaknesses connected to ESG rating

Our ESG scores and credit scores are both single datapoint representations obtained from multiple datapoint analyses. However, the reliability and validity of the two scores differ greatly. The average correlation between credit scores from various rating agencies is 0.986, while the average correlation between the six possibly most generally utilized ESG rating firms is only 0.46 (Lopez & Contreras, 2020). This can be viewed as a weakness for this study, but financial information offers less opportunity for subjective interpretation than non-financial information, which is why there is such a poor correlation across rating agencies. Kotsantonis & Serafeim (2019) go even further by arguing there is a significant inconsistency in the way different rating agencies report ESG data and it is worse than you think it is. In addition, when there is publicly available information, ESG data providers disagree even more. As a consequence, the challenge arises when researchers are trying to analyze the effects of ESG investment and performance (Kotsantonis & Serafeim, 2019).

A common practice in literature is to use one ESG score dataset from a single rating agency. As a result, the findings of our research are highly dependent on the ESG measurement scores from Refinitiv (2021). This can cause a *measurement error* or *reverse causality* weakness that can affect our results and analysis (Krüger, 2015)[12]. We tried to avoid this by using several ESG score data from other ESG rating agencies. To tackle the issue of various ESG rating outcomes from multiple agencies is to suggest a noise-correction technique (Berg et al,

[12] Especially measurement error, which " *is an issue in research that examines the value implications of CSR because of the difficulty in accurately quantifying CSR given the qualitative nature of many CSR-related issues* " (Krüger, 2015).

2021), in which we instrument ESG ratings with ratings from other ESG rating agencies. This procedure is similar to the classical errors-in-variables problem.

However, the challenge is that the different ESG rating agencies did not have the same ESG scores for all the same companies that we collected for our study[13]. This made screening and filtering using various pillar variables exceedingly difficult. Therefore, we will only use ESG scores from Refinitiv (2021), regardless of the high level of disagreement among ESG rating agencies. This decision is acceptable according to the findings of Gianfrate et al. (2019), who found that even when the research method and underlying definition of the rating agencies are aligned, the different rating agencies will still come to different outcomes. The issue with these differences is that results are difficult to generalize. Another reason why Refinitiv (2021) has been chosen is because Refinitiv operates with one of the largest ESG content gathering systems in the world, with both algorithmic and human procedures. Over 150 content research experts have been trained to collect ESG data by Refinitiv, resulting in a well-established index (Refinitiv, 2022a).

[13] Our study can have significant flaws in that we solely used ESG scores for Refinitiv (2021), Which is also our primary source of information for all the other variabels. In our analysis, these ESG scores are used as a proxy for Nordics ESG performance.

3. Theoretical Framework

The following section will go through different economic theories that can be used to better understand the link between ESG and firm performance. The theories chosen are the most commonly utilized theories among scholars looking into the relationship between ESG and company performance (Whelan et al. 2021). According to the comprehensive meta-study by Whelan et al. (2021), these theories are the *Stakeholder theory*, *Porter's hypothesis*, *Legitimacy theory*, and the *Resource-based view*. In addition, we have included *Agency theory* which can help to explain how ESG could have a negative relation to financial performance and eventually sacrifice the stockholders' wealth. Table 1 shows Whelan et al. (2021), meta-study results when previous papers described a finding (positive, negative, or neutral) and tried to explain it through the lens of a social science-derived model of the world.

Table 1. Results from theories on the link between ESG and firm performance

Indicator variables	Count	Positive	Neutral/mixed	Negative
Social science theories				
Stakeholder theory	80	57%	34%	9%
Porter's hypothesis	40	57%	28%	15%
Resource-based view	64	55%	36%	9%
None	74	32%	57%	11%

Source: Whelan et al. (2021)

According to Deegan (2014) any attempt to regard stakeholder theory and legitimacy theory as distinct ideas would be incorrect due to their obvious similarities. As Deegan and Blomquist (2006) state: Both theories view the organization as part of a larger social system in which it influences and is influenced by other organizations in society. Stakeholder theory gives a more precise resolution by referring to specific groups within society, whereas legitimacy theory examines society's expectations in general (stakeholder groups). Because different stakeholder groups will have different perspectives on how an organization should operate, stakeholder theory admits that there will be several social contracts 'negotiated' with distinct stakeholder groups, rather than a single contract with society as a whole. Stakeholder theory expressly relates to concerns of stakeholder power, and how that power affects a stakeholder's ability to 'coerce' the organization into meeting the stakeholder's expectations

(Deegan & Blomquist, 2006). For these reasons, we have decided to not include the legitimacy theory in our study.

3.1 Stakeholder and Shareholder Theory

The shareholder theory (also known as the Friedman doctrine) contends that in a free market economy, a company's social obligation is to grow profits and that a company's sole responsibility is to its shareholders (Friedman, 1970). Friedman states that it is the individuals who should tackle social concerns rather than businesses. Businesses fulfill their social obligation by maximizing profits and providing individuals liberty to fulfill their specific social responsibilities (Friedman, 1970). Shareholders should be the only ones who participate in corporate social efforts, rather than management acting on their behalf. A company should only invest in ESG if it is the most profitable alternative, according to the theory. Opponents claim that the idea promotes short-term management and allows unethical practices (Danielson et al., 2008).

In reaction to Friedman's shareholder theory, R. Edward Freeman proposed the stakeholder theory in 1984. Stakeholder theory is a subcategory of theories that are antagonistic to the shareholder viewpoint. According to Freeman and Philips (2002), in order to maximize shareholder value over time, businesses must create value for all stakeholders. Since shareholders, customers, employees, suppliers, authorities, and others who are affected by the firm's operations are all stakeholders. According to the hypothesis, considering all stakeholders' wants and interests in a strategic management plan can improve a company's financial performance (Jones, Harrison, & Felps, 2018). Similarly, failure to manage stakeholder relationships can result in a drop in financial performance. Instead of focusing solely on shareholder wealth, the company should seek to increase the wealth of all stakeholders without favoring one over the other. This hypothesis establishes a theoretical link between CSR and a firm's competitive advantage (Jones, Harrison, & Felps, 2018). This may explain why investors are enticed to invest in companies that do well in terms of ESG characteristics, in the hope of gaining a long-term competitive edge.

3.2 Porter’s Hypothesis

The typical viewpoint among economists and managers on environmental preservation is that it imposes an increased cost on businesses, lowering their worldwide competitiveness

(Ambec et al., 2011). Environmental restrictions (ER) such as technology standards, environmental fees, or tradable emissions permits compel businesses to devote certain resources (labor, capital) to pollution reduction, which is inefficient. Technological standards limit the technologies and inputs that can be used in the manufacturing process. Firms are charged for their emissions pollution, which was formerly free as a by-product of the manufacturing process. These fees compel capital to be diverted away from productive projects (Ambec et al., 2011).

A number of scholars, including Michael Porter (Porter, 1991) and his collaborator Claas van der Linde (Porter and van der Linde, 1995), challenged the established viewpoint. Based on case studies, the researchers argued that pollution is frequently a waste of resources and that reducing pollution could contribute to an increase in resource productivity. More restrictive but well-designed environmental laws, particularly market-based mechanisms such as taxes or emissions permits, can spur innovation and, in certain cases, partially or entirely offset the costs of compliance (Porter and van der Linde, 1995). Their theory is simply schematic represented in Figure 4 below:

Figure 4. Summarizes the primary causal linkages involved in Porter's Hypothesis

Here environmental restrictions can lead to "innovation offsets" that not only increase environmental performance but also partially—and sometimes more than fully—offset the higher cost of regulation, as Porter and van der Linde initially articulated this relationship (Ambec et al., 2011). Porter and van der Linde (1995) go on to argue that regulations may result in these outcomes for at least five reasons (Ambec et al., 2011):

Firstly, regulation alerts businesses to potential resource inefficiencies and technology advancements. Secondly, information-gathering regulations can have a significant impact by

raising company awareness. Third, legislation minimizes the risk that investments in environmental protection will be profitable. Fourthly, the regulation puts pressure on businesses to innovate and progress. Fifth, regulation evens out the playing field during the transition.

The theory has been questioned for not being compatible with the profit-maximizing company assumption (Palmer et al. 1995). Indeed, the theory is based on the notion that businesses frequently overlook profitable opportunities. Furthermore, even if consistently profitable economic opportunities are overlooked, how might environmental legislation alter this reality? Are regulators in a better position to spot these lucrative business prospects than managers? According to Ambec et al (2011), this is a misinterpretation of the Porter hypothesis, which states that *well-designed laws*, not all regulations, lead to innovation. Second, it does not claim that the cost of regulation is always offset by innovation—that is, that regulation is always a free lunch. Instead, it asserts that in many cases, the cost of regulation will be more than covered by these improvements. In other words, in many circumstances, there may be a free lunch.

3.3 Resource-based view

In contrast to previous research that focused on the external environment as a determinant of industrial organization performance, the resource-based theory asserts that a firm's internal competencies and capabilities are linked to its performance (Thukral, Sharma & Bhattacharya, 2019)[14]. In particular, resources of organizations that are valuable, rare, imperfectly imitable, and imperfectly substitutable (VRIN) are the main sources of sustainable competitive advantage for sustained superior performance (Barney, 1991)[15]. The underlying strategy of a firm's resources is beneficial if it allows it to "exploit opportunities or neutralize threats" in the firm's surroundings (Barney, 1991). However, resources cannot be seen in isolation from the external marketing environment. A resource that is useful in one type of industrial organization may be useless in another (Collis and Montgomery, 1997). In addition, Grant (1991) distinguished between tangible and intangible resources. Financial reserves and physical assets such as plant, equipment, and raw material stocks are examples

[14] The RBV adopts a 'inside-out' or firm-specific approach to understanding why businesses thrive or fail in the marketplace (Dicksen, 1996).
[15] Resources that are valuable, rare, imperfectly imitable, and non-substitutable (VRIN), can help a company gain a competitive edge and improve its performance (Grant, 1991)

of tangible resources. While intangible resources include brand, technology, and human resources, which again include company culture, employee learning and development, and employee dedication and loyalty. That's why Dierickx and Cool (1989) argue very strongly that non-tradable factors must be developed by firms because they cannot be solved in factor markets. Thereby the profitability is likely to rise higher[16].

Moreover, (Dierickx & cool, 1989) agree with Barney (1986) correctly pointing out, profits exist because of product market imperfections and firms can thereby only obtain greater than normal returns from implementing their product market strategies when the cost of resources to implement those strategies is significantly less than their economic value, but (Dierickx & cool, 1989) added it's necessary to account for the opportunity cost of those assets. Which fits perfectly with the study, since WACC can be viewed as a measurement for alternative cost. As mentioned, Resource-Based View can focus on creating skills, knowledge, and corporate culture within the organization, which can contribute to a long-term competitive advantage (Vrontis et al., 2021). These boost a company's intangible assets, resulting in inimitable, unique, and irreplaceable resources that improve the company's success (Barney, 1991). In fact, intangible asset development and management is a critical component of CSR and financial performance (Surroca et al., 2010). The benefits of CSR on performance are also based on an improvement in reputation, consumer confidence, and the image that the company may communicate to the market (Bianchi et al., 2019). If gaining a competitive advantage is critical to improving a company's performance, it is also true that CSR investments are influenced by performance (Surroca et al., 2010). Surroca et al. (2010) go even further, claiming that high performance leads to further CSR spending, which leads to increased financial performance, creating a virtuous cycle. The company's innovation process plays an important role in the virtuous cycle.

Like all other management theories, it has its detractors. The criticisms are divided into eight categories according to Kraaijenbrink et. al. (2010): 1) The RBV has no managerial implications; 2) The RBV implies infinite regress; 3) The RBV's relevance is too limited; 4) Sustained competitive advantage (SCA) is not obtainable; 5) The RBV is not a company theory; 6) VRIN/O is neither necessary nor sufficient for SCA; 7) A resource's worth is too

[16] Dierickx and Cool (1989) say that the sustainability of a firm's asset position depends on how easily assets can be substituted or imitated. Imitability is linked to the characteristics of the asset accumulation process: time compression diseconomies, asset mass efficiencies, inter-connectedness, asset erosion, and causal ambiguity.

ambiguous to allow for helpful theory; 8) The definition of a resource is impractical. However, Kraaijenbrink et. al. (2010), argue that the RBV's standing is not threatened by the first five criticisms. They are either inaccurate or irrelevant, or they apply only when the RBV is taken to its logical or impractical extreme; better defining the RBV and its variables can contain these five criticisms. However, the last three criticisms raise more serious issues that must be addressed if the RBV is to completely realize its potential to explain SCA, particularly outside of predictable stable situations (Kraaijenbrink et. al. 2010).

3.4 Agency Theory

Since management makes the final call on whether to invest in ESG, another perspective on corporate ESG investments can be derived from Agency Theory (Jensen & Meckling, 1976). The principle-agent problem occurs when the agent (managers) makes choices on behalf of the principal (shareholders) when there are conflicts of interest and asymmetric information. Increases in the company's ESG score may be motivated by management's desire to improve their own reputation, such as by seeming more environmentally friendly, at a cost to shareholders. Increased personal reputation through ESG investments, according to Surroca and Tribó (2008), could be part of management's anchoring strategy to limit the likelihood of replacement, which has particularly detrimental consequences on financial performance. According to this viewpoint, ESG expenditures will be a waste of money and will most likely harm the company. Such investments may imply weak management and make businesses less resilient during times of crisis (Surroca & Tribó, 2008).

4. Literature review

This literature review includes both empirical research and meta-analysis that have studied the effect of ESG, as a score and through the individual pillars. In order to find evidence from previous research which can support our hypotheses about the relationship between ESG and profitability, firm value, and capital costs. Finally, we will present a table with the results of some previous studies that are pertinent to this paper.

4.1 The link between ESG scores and profitability

The link between ESG practices and profitability has been studied in the past, but most studies concentrate on a specific dimension or subcomponent of ESG (Han et al., 2016). Clark, Feiner, and Viehs (2014) argue that as many as 85% of ESG studies only examine one facet of ESG (ie. governance), and not all three at the same time.

According to Aggarwal (2013), Narver conducted the first study on the CSR and financial performance link in 1971. Griffin and Mahon (1997) looked at 62 results from 51 previous studies that looked at the link between CSR and financial performance. They discovered that 33 studies showed a favorable relationship, 20 studies indicated a negative relationship, and nine studies had no conclusive findings. Furthermore, Orlitzky, Schmidt, and Reynes (2003) completed a meta-analysis of 52 empirical studies, and they concluded that CSR had a significant positive correlation with firm profitability. In addition, they found that ESG measures were even higher correlated with the accounting-based indicators of a firm's performance such as ROE, rather than with market-based measures such as share price. The relationship between ESG, its pillars, and company performance in Nordic enterprises is the topic of this research. It is anticipated, based on past related literature that:

H1a: There is a significant positive relationship between ESG factors and the profitability of Nordic public companies.

4.2 The link between ESG scores and firm value

Previous research on ESG and firm performance revealed mixed results across economies using *accounting metrics* (Lee et al., 2013; Tang et al., 2012) and *market-based measurements* (Aboud & Diab, 2018; Lo & Sheu, 2007).

The link, on the other hand, has been supported by a variety of institutional and firm-level factors. According to Fatemi et al. (2018), ESG investments improve business value while flaws diminish it, with disclosures acting as a moderator since more disclosures mitigate the negative effects while enhancing the good ones. Wong et al. (2020) discovered that developing economies had a constant positive relationship. They discovered that ESG investments cut a firm's cost of capital, resulting in a large boost in Tobin's Q. Investors, on the other hand, predict weaker short-term growth and lower growth discounts for companies with higher ESG scores (Patel et al., 2020).

These findings suggest that in the short run, investors may prefer to wait, watch, and cut their expectations in forward-looking measures. CSR practices may benefit businesses that are exposed to severe financial or environmental risks. CSR investment strategy will benefit businesses with consistent sources of income and limited resources to invest. On the other hand, firms with low environmental or financial risks may not benefit from CSR efforts, and such spending may be harmful to the firm's value (Lu et al., 2021). As a result, specific businesses, such as firms within the energy and chemical industries, that operate in high-risk environments and have greater stakeholder duty, require strategic ESG management in their operations (Blacconiere & Northcutt, 1997; Blacconiere & Patten, 1994). Furthermore, over-investment in CSR had no positive influence on corporate value during the global financial crisis of 2008 (Buchanan et al., 2018). However, in general, the majority of previous studies reveal favorable links between sustainability and firm value (Atan et al., 2018), hence it is projected that;

H1b: There is a significant positive relationship between ESG factors and firm value of Nordic public companies.

4.3 The link between ESG score and cost of capital

In their research, Clarkson et al. (2011) found that companies that actively manage and communicate ESG concerns often have a lower risk profile, which in turn could affect valuation through lower discount rates and the cost of capital. The cost of capital is the rate of return that outside capital sources demand on their investments in the company. As a result, corporate executives pay attention to the cost of capital because it is the minimum acceptable rate of return that any venture must achieve, in order to please its investors (Berk and Demarzo, 2019). It is also known as the firm's long-term opportunity cost of the financing itself, and it has been demonstrated to be essential in capital budgeting planning, valuation

standards, and mergers and acquisitions (Berk and Demarzo, 2019). This is further supported by (Kumar et al., 2016), who prove that companies with high ESG performance have demonstrated their ability to reduce their risks, increase returns, and be more robust in times of crisis. As a result, firms with high ESG performance can often be viewed as less risky by equity and debt providers. Because capital providers modify their risk and return expectations accordingly, they are generally willing to accept lower returns and lending rates (Kölbel and Busch 2017).

Corporate finance and investment decisions are heavily influenced by the cost of capital. When making investment and financing decisions, valuing financial assets, and allocating their investment portfolios, global firms and investors are increasingly considering environmental and social concerns. As a result, there is a growing recognition that improved environmental (or sustainability) performance leads to lower capital costs. This is supported by the leading authors in this field (Gianfrate, G., Schoenmaker, D., & Wasama, S., 2019). who have concluded that most of the studies suggest there is a negative relationship between sustainability and the cost of capital. This means that a firm's sustainability performance increases the firm's value, and this valuation effect is partially realized through decreased capital costs. However, there are other extrinsic factors that have a significant impact on this correlation between sustainability and the cost of capital (Gianfrate et al, 2019). These findings can be applied to the current study, leading to the following hypothesis:

H1c: There is a significant negative relationship between ESG factors and the cost of capital of Nordic public companies.

Table 2 below, is a brief summary of significant previous research around the topic of our thesis. All research, as expected, demonstrates either a positive or non-correlation between ESG scores and financial performance.

Table 2. Overview of relevant previous research

Study	Country /Region	Methodology	Focus	Dep.var	Main Findings
Sharfman & Fernando (2008)	U.S. firms	Cross-sectional data regression	E	WACC	Significant negative relationship for WACC
Gouhl et al. (2011)	U.S. firms	Pooled cross-sectional time-series regressions	ESG combined	Cost of Equity (COE)	Significant negative relationship for COE
Goss & Roberts (2011)	U.S. firms	Single equation regression and Instrumental variable regression	ESG combined	Cost of Debt (COD)	Significant negative relationship for COD
Jang et al. (2013)	South Korea firms	Cross-sectional data regression	CSR (KEJI Index)	ROA, Tobin's Q, & WACC	Positive significant for all
Eccles et al. (2014)	U.S. firms	Matched samples of U.S firms	High vs. low Performance (ESGP)	Stock price	Positive relationship between market return and ESG performance.
Velte (2017)	Germany firms	Correlation & regression analysis	ESG Performance (ESGP)	ROA Tobin's Q	ESGP has a positive impact on ROA, but null and Insignificant impact on Tobin's Q
Atan et al. (2018)	Malaysia firms	Panel data regressions	ESG	ROE, Tobin's Q, & WACC	Insignificant for ROE & Tobin's Q and positively significant for WACC
Dahlberg & Wiklund (2018)	Nordics firms	Random effects generalized least squares	ESG combined & E, S, G	ROA, Tobin's Q	Positive significant relationship for Tobin's Q, no significant relationship for ROA
Minutolo et al. (2019)	U.S. firms	Market cap, Sales & Tobin's Q by quartile	ESG	ROA, Tobin's Q	Positive relationship between ESG disclosure and Tobin's Q.

Dalal and Thaker (2019)	India firms	(Random effect) Panel data regression	E, S, G	ROA, Tobin's Q	Positive significant relationship for both
Khoury et al. (2021)	East Asia firms	Panel data regressions	ESG combined & E, S, G	ROA, ROE	Positive significant for ROE and ROA
Nguyen et al. (2022)	U.S. firms	Two-Stage Least Squares regression	ESGC	ROA, ROE & Tobin's Q	Positive significant for all

5. Data and Methodology

This chapter presents the data and the methodology used in this research. The first subsection presents which sample selection and data filtering criteria have been used to collect the data sample, followed by which sample data has been collected, and then a more comprehensive discussion of how each regression variable is measured. The next subsection gives an overview of the six regression models that will be used to test the hypotheses. And finally, valuable insights from descriptive statistics and data diagnostics are highlighted to determine which regression models (pooled OLS, fixed effects, and random effects) should explain the results of findings in the analysis.

5.1 Sample selection and data filtering

The initial sample data collected from the Thomson Reuters Refinitiv (2021) database was based on a total of 1671 Nordic companies, where 863 of them had complete ESG and financial data from 2013 to 2019. Further, the following sample selection and data filtering criteria were conducted in order to collect the final sample data:

Country of Exchange: Only publicly listed companies listed on the Norwegian, Swedish, Danish, and Finnish stock exchanges are included, while Iceland is excluded from the research. Iceland was excluded from the analysis due to insufficient data availability from Nasdaq Iceland, which contains very few firms with ESG assessments, making it incomparable in regard to financial market size and the importance of sustainable investment (Scholtens & Sievänen, 2013).

Including financial institutions: The exclusion of financial institutions is not supported in this study and therefore included. This is because the huge interest in ESG investment has caused additional funds to flow into tackling ESG issues, resulting in more focus on sustainable business models in the financial services industry (Schoenmaker & Schramade, 2018). This is supported by Cornett et al. (2016), who after correcting for endogeneity found that financial institutions such as banks tend to be rewarded for being socially responsible, as their ROE is positively and significantly related to CSR scores[17]. The authors also discover that the largest

[17] Cornett et al. (2016) use ROE (net income/common equity) as their main measure of bank financial performance instead of ROA and Tobin's Q.

banks engage in much more socially responsible activities than smaller banks. Another main practical reason for including financial institutions is due to their rich dataset, which contributes to diversity in the analysis. This is therefore a relative contrast to Eccles et al. (2014), who excluded all types of financial institutions in their study. This was based on the fact that financial institutions' service has a fundamentally different business model and that is why many of the environmental and social policies are not likely to apply to financial institutions (Eccles et al, 2014). Other scholars such as (Lo & Sheu, 2007; Velte, 2017) have also chosen to exclude financial institutions in their studies.

Random sampling: Both dependent and independent variables in this study are the results of random sampling as regressors are rarely fixed in econometric applications. This decision matches our initial applications to collect cross-sectional data, panel, and time-series data. Consequently, our large-sample approach will not pose any additional conceptual or mathematical difficulties and we will fulfill the basic requirements to utilize a panel regression model for this study (Stock & Watson, 2003).

Excluded companies: All companies which did not have ESG scores were excluded from the dataset because they were not considered significant, and this filtering process leads to selection bias. These data filtering criteria were necessary in order to generate a dataset that was as representative as possible. Furthermore, companies with no yearly returns or market values were excluded, because this information is required to compare the relationship ESG scores have with ROE, firm value, and WACC. In addition, this is required as this research is conducted on panel data regressions such as pooled OLS, fixed effects, and random effects.

Survivorship bias: In order to eliminate survivorship bias, both active and inactive enterprises are employed in the analysis, and this is based on the recommendations of Eliwa, Aboud, & Saleh (2019)[18].

High v.s Low ESG rating filtering was avoided: Early in the research process, we filtered the ESG ratings based on high-rated ESG companies versus low-rated ESG companies. The 30% highest rated companies were included in the high ESG portfolio, and the 30% lowest-rated companies were included in the low ESG portfolio. Then a t-test was conducted to analyze this filtering strategy against a comparison of how ESG was affecting ROE, Tobin's Q, and WACC. As a consequence, all of these results were too significant, as highlighted in

[18] This sample includes X active companies and Y dead companies in total.

Appendix tables: A - D, and this led to the conclusion that this filtering strategy will provide insignificant results due to an insignificant filtering basis. For this reason, this filtering strategy is avoided. Results from this research process also show that the years 2013 to 2019 have the most reliable data set samples when conducting testing of similar hypotheses.

One period lag of ESG: To examine the impact of ESG performance on Nordic firms' future financial performance, we use the one-year lag of ESG. This is consistent with the studies of (Atan et al., 2018; Velte, 2017), along with the literature's assertion that ESG performance will not instantly lead to better financial performance (Choi and Wang, 2009). Insofar, we compare the ESG performance scores of the year (t-1) towards the dependent variables who will maintain their initial values in the year (t), starting from 2013 to 2019[19]. This means the data utilized for ESGC and ESG pillar scores in the model estimation is from 2013 to 2019, while for other variables it is from 2014 to 2019.

Converted into e-based logarithmic (ln) form: All of the collected data are converted into e-based logarithmic (ln) form. In addition, a cause-and-effect analysis is included in the models since one cannot assume that ESG is the only variable affecting financial performance (Scholtens, 2008; Krueger, 2015)[20].

5.2 Sample collection and description

This section gives an overview of how and why the sample data for the independent, dependent, and control variables were obtained. As a result of several huge stumbles on mismatched data sample sets from other data collection agencies such as Bloomberg, Sustainalytics, and MSCI ESG, all the regression variables are therefore collected from Thomson Reuters Refinitiv (2021). Thomson Reuters Refinitiv is also extensively used in similar studies on our subject (Nuber et al., 2020; Dahlberg & Wiklund, 2018; Eccles et al., 2014).

[19] Branch of industry and year effects are adjusted for in the calculations, and a nation dummy is employed for further analysis.
[20] The models should include a cause-and-effect analysis because it is not clear whether the dependent ESG variables are the determinant of financial performance or vice versa (Scholtens, 2008).

5.2.1 Data Independent Variables - ESGC Scores and ESG pillar scores

Aligned with previous research, ESG scores have been used as a measurement tool to rate companies based on their corporate responsibility. For this reason, both datasets for the independent variables; ESG combined scores (ESGC) and the individual (E, S, G) pillar scores have been obtained from the Thomson Reuters Refinitiv (2021). This includes ESG scores for Norwegian, Swedish, Finish, and Danish companies, and consists only of publicly listed companies from their original stock exchanges in their respective countries, namely Euronext Oslo Stock Exchange, Nasdaq OMX Stockholm, Nasdaq OMX Helsinki, and Nasdaq OMX Copenhagen. For the purpose of analyzing the Nordic region as one unit, the data is collected in USD currency since this does not affect companies' returns. However, when structuring the variables for market capitalization, and market value, all data is first collected in their representative currency. Then, to distinguish high-valued corporations from low-valued companies, yearly average weighted exchange rates were used as benchmarks.

The main independent ESG variables utilized in this study are ESG combined scores, however, we have also included the deconstructed ESG scores, which is in contrast to a large portion of previous research. This is in order to provide a more comprehensive understanding of how the different ESG pillar scores affect firm probability, firm value, and cost of capital. As a result, we will use each of these ESG pillar scores as an independent variable to see which of the Environmental (E), Social (S), and Governance (G) pillars have the greatest impact on a company's financial performance.

5.2.2. Data Dependent variables - ROE, Tobin's Q, and WACC

Profitability, firm value, and cost of capital are the dependent variables in this study. Firm profitability is measured by Return on Equity (ROE), while firm value is measured by Tobin’s Q, and cost of capital is measured by Weighted Average Cost of Capital (WACC). For this purpose are both accounting and market measures methods utilized to quantify financial performance, in order to capture both historical and possible future performance of the Nordic enterprises (Velte, 2017). Accordingly, financial performance is measured in two ways: Return on Equity (ROE) and Tobin’s Q. In terms of market-based measurements, Tobin's Q and WACC are utilized.

ROE was chosen as the accounting-based measurement for firm profitability. According to Scott (2003), ROE is the single most important indicator for investors to measure a firm's management performance. ROE (net income/equity) measures the return for owners and is therefore one of the most used indicators of profitability (Strouhal et al, 2019). This is also supported by Zulkifli et al (2017), who state that the ROE ratio is used to measure income or income available to company owners (both ordinary and preferred shareholders) for the capital they invest in the company. In other words, ROE is a measure of the profits a company has earned on previous investments[21], where a high ROE may indicate the company is capable of identifying highly profitable investment opportunities (Berk & DeMarzo, 2019).

Tobin's Q is a widely used measure in research where firm value is to be examined (Velte, 2017; Cai, Jo & Pan, 2012). Similar studies conducted on Nordic countries by (Dahlberg & Wiklund, 2018; Langeland & Ugland, 2019), also used Tobin's Q to capture ESG`s effect on firm value. Furthermore, the use of Tobin's Q is supported by Velte's (2017) empirical research on German listed firms, which integrates both accounting-based (ROA) and market-based financial performance variables (Tobin's Q) in his model. This paper is highly relevant to the fact that the German market, being a highly developed country in Central Europe, is similar to the Nordic markets. That is why our financial performance sample data also includes aspects that assess financial performance for all stakeholders and not only the shareholders. Consequently, market-based measures and accounting-based measures are the most relevant features in this study.

Tobin's Q ratio has been chosen as a dependent variable over the price-to-book ratio. This is in line with the research of McNichols et al. (2015), which demonstrates that Tobin's Q measurements obtained greater explanatory power in predicting future investments than the price-to-book ratio by itself [22]. Since Tobin's Q is similar to the price-to-book ratio, the price-to-book ratio (P/B) has been chosen as a control variable for firm value[23], market mispricing, and a proxy for growth potential (Goss & Roberts, 2011). In fact, both P/B and Tobin's Q matrices seek to measure firm value, but the denominator is different. Where Tobin's Q uses total assets, while P/B uses the shareholder's equity (Marsat & Williams 2011). The Tobin`s Q ratio is calculated as the market value of a company divided by the replacement value of

[21] According to (Berk & DeMarzo, 2019, p.76 - 77), analysts frequently compare the firm's ROE by comparing its net income to its investment. Making ROE a measurement for return on investment (ROI).
[22] Notes that Price to book [P/B] ratio is also called market to book-ratio (Berk and Demarzo, 2019, p.61).
[23] (Sukmawardini & Ardiansari, 2011) use [P/B] ratio as a proxy for firm value and as a dependent variable.

the firm's assets. Thus, equilibrium is when market value equals replacement cost and it shows how a company's existing assets are valued in the market. Because the replacement values of a company's assets are difficult to estimate, it has been normal practice in the finance and accounting literature to calculate the ratio by comparing the market value of the firm's equity and liabilities with their corresponding book values (Choi and Wang, 2009). For these reasons, the same calculating procedure has also been utilized in our calculation of Tobin's q.

WACC is included in order to analyze if Nordic public firms actually get rewarded with a lower cost of capital after accomplishing better ESG performance. Since the ESG performance of Nordic companies is based on a one-year lag, makes WACC a perfect fit for this purpose, as it has long been used as a measure of a company's cost of capital, as well as a discount rate to forecast the future cash flows of a company which aims to estimate its fair intrinsic value (Ceron, 2012).

5.2.3 Data Control variables

Risk is included in this study both through systematic and unsystematic risk measures. Accordingly, the Beta factor (BETA) will be a proxy measure for systematic risk and the debt to assets ratio (Lev) will be a proxy for unsystematic risk (Fischer and Sawczyn, 2013). This is supported by Waddock and Graves (1997), who shows that corporate risk is linked to stakeholder relationships and financial performance. In addition, firms with higher ESG performance levels are considered to be less risky and their debt capital costs will be reduced (Orlitzky and Benjamin, 2001; Godfrey et al., 2009). Velte (2017) also argues that a higher ESG performance could indicate a lower risk, which makes it important to control for risk.

To control for financial risk, we will in this study replicate Velte (2017), who employed firm risk in the form of BETA - as a measure of systematic risk, financial leverage (the ratio of total debt to total assets) - as a measure of unsystematic risk, and firm size (the natural logarithm of total assets) - as a measure of firm size. All these three control variables used in Velte's (2017) regression model are likewise employed in our regression models, in addition to the dummy variable industry.

From a sustainable measures point of view, the interest coverage ratio is included as a control variable for WACC. This is because creditors routinely impose a minimum interest coverage

ratio in the firm debt contracts, which the firms must maintain on their future borrowing (Dothan, 2016). An interest coverage (IntCov) covenant sets a maximum on the ratio of interest payments a company can have relative to the firm earnings (Greenwald, 2019). In addition, Dothan (2016) found that even in the presence of information asymmetries or agency costs, corporations stretch to find and hold to their optimal interest coverage ratio covenant in their debt agreements. This demonstrates that an interest coverage ratio covenant may remove the incentive of stockholders to increase asset volatility either when asset volatility is unobservable or when covenants kick directly in to limit additional distress costs to enforce (Dothan, 2016).

The industry is included as a dummy variable since previous research shows that the difference in the different industries companies operate in, can be a basic force that contributes to creating different ESG results among firms[24]. For instance, Miralles-Quirós et al (2018) reveal that environmentally sensitive industries gain from higher governance and social scores, but their environmental score has no effect. But on the other hand, these unexpected performance gains in governance and social scores did not have any significant effect on market value. The authors conclude that the reason for such outcomes was due to investors in sensitive industries having already priced these issues into their environmental performance. Yoon et al (2018) confirm similar findings with regards to ESG pillars, where additional gains on the pillar scores S and G had no effect on firm value.

EBIT - (profitability) and Interest coverage rate (IntCov) are also included for the purpose of including additional financial variables into the control variables, which are essential for capturing effects on firm size, sales growth, profitability, and financial leverage. That is why most of these variables also were collected from the same source Refinitiv (2021) and these control variables are more comprehensively explained under the regression variables - section. Firm size (SIZE) is included as a control variable because larger companies can generate more earnings due to economies of scale and higher learning ability relative to smaller firms (Jang et al, 2013).

Based on these data filtering and collection criteria, we came to a final sample set consisting of 340 Nordic public companies. Represented by 60,6 % Swedish public firms, 18.9 % Norwegian public firms, 10% Finnish public firms, and 10.5 % Danish public firms. This is

[24] according to (Garcia et al (2017), do enterprises in controversial industries outperformed non-conventional firms in terms of ESG performance.

almost in line with the proportionate size originally collected from each country's stock exchange. Furthermore, Table 3, highlights the proportion of how many firms are collected from each industry in the final sample data. The sample firms were classified into 12 industry categories based on Standard Industry Code (TRBC Economic Sector Name). At a glance, it is clear that this sample is not normally distributed, with a relatively high skew towards the dominating sectors such as Industrials (19,71%), Consumer Cyclicals (17,06%), and Healthcare (12,35%). On the other hand, Academic & Educational services are underrepresented with 1,18% of the distribution. Table 1 below presents the proportion of how many firms are collected from each industry in the final sample data.

Table 3. How many firms are collected from each industry in the final sample data.

	TRBC Economic Sector Name	**Final Sample Firms**	**Firms in %**
1	Industrials	67	19,71 %
2	Consumer Cyclicals[25]	58	17,06 %
3	Healthcare	42	12,35 %
4	Consumer Non-Cyclicals[26]	37	10,88 %
5	Technology	33	9,71 %
6	Financials	29	9,71 %
8	Energy	22	6,47 %
9	Real Estate	21	6,18 %
10	Basic Materials	14	4,12 %
11	Utilities	13	3,82 %
12	Academic & Educational services	4	1,18 %
	Total firms in the final sample	340	

In the paper of (Drempetic et al, 2020) who examined the impact of firm size, a company's available resources for delivering ESG data, and the availability of a company's ESG data on the company's sustainability performance using Thomson Reuters ASSET4 ESG rating data. The authors discovered a substantial positive correlation between larger business size and ESG variables measures, which can be explained by organizational legitimacy. These findings raise the question of whether the ESG score's methodology favors larger companies with more resources while failing to provide responsible investment investors with the

[25] Consumer cyclicals include industries such as automotive, housing, entertainment, and retail (Refinitiv, 2021).
[26] Companies in consumer non-cyclicals industries are companies in which people will continue to consume their products even during an economic downturn (Khamaki et al, 2018). Companies in this industry often consume staple goods, food, gasoline, oil companies etc (Refinitiv, 2021).

information they need to make decisions based on their principles. As a result, from the conclusions of (Drempetic et al, 2020), we will not focus on interpreting the results from the industry dummy and firm size variable, in our analysis.[27] Because they indicate unreliable results.

Our research is based on historical data, and (Giese et al. 2019) argue that researchers often find a positive correlation between ESG information and financial success[28]. However, between these two links, researchers often fail to describe the economic mechanism that led to improved finances, because they primarily rely on historical data analysis. This is also connected to criticism of our applied methodology, which is addressed in a paper by Krueger (2015), where our empirical analyses of the link between ESG and financial achievement, do not clearly differentiate between correlation and causality. For the purpose of reducing this weakness, we will in the analysis of the results section (chapter 6), employ the theoretical frameworks by Giese et al. (2019), in order to interpret the economic mechanisms which contribute to these financial outcomes. The authors provide precise links for such effects by demonstrating that ESG information was transmitted to a firm's valuation and return performance, both through its *systematic risk profile* (lower costs of capital and higher valuations) and its *idiosyncratic risk profile* (higher profitability and lower exposures to tail risk)[29]. Idiosyncratic risk is also referred to as a specific risk or unsystematic risk.

5.3 Regression variables

This study uses a quantitative research design as it is the most appropriate method when the conditions of a big sample population are fulfilled as in this case, in order to answer the research question. Furthermore, the quantitative method was chosen because the goal is to test existing theories (Saunders et al., 2016), rather than generate new ideas or theories. For this reason, this section provides a deeper description of the regression variables used in the following multi-regression models.

[27] Because (Drempetic et al, 2020) recommend that responsible investors and academics in sustainable finance should reignite the debate over what sustainability rating agencies evaluate with ESG ratings, what exactly needs to be quantified, and whether the sustainable finance industry can meet its self-imposed goals with this measurement.
[28] A positive correlation exists when one variable decreases as the other variable decreases or one variable increase while the other increases.
[29] (Giese et al. 2019. p.1) came to these findings based on MSCI ESG data.

5.3.1 ESG - independent variables

As previously mentioned, the ESG Combined score (ESGC) and the individual (E, S, G) pillar scores are collected from Thomson Reuters Refinitiv (2021) as our main independent variables. Whereas the ESGC is an overall company score based on disclosed data on the environmental, social, and corporate governance pillars, with a controversy score added on top (ESGC)[30]. The score for controversies is based on 23 ESG controversy themes. If a controversy arises throughout the year, the firm involved is penalized, and this has an impact on their total ESG Combined Score and grading. Aligned with Iamandi et al. (2019), controversies should not be overlooked when assessing a company's ESG procedures. This is also another reason why the ESGC is included as the independent variable.

Since our main goal is to accurately measure the ESG performance of Nordic companies, we will examine the ESG variables and pillars from various perspectives. As a result, these varieties of ESG scores are used as independent variables. Throughout future steps, this study will analyze if ESG scores have influenced firm profitability, firm value, and the cost of capital. For this purpose, all three dimensions of ESG pillars; environmental, social, and corporate governance, have been tested individually in the regression including examining if the dimensions have an overall effect.

5.3.2 Dependent variables

Return on Equity (ROE)

Return on equity (ROE_{it}) is a proxy for calculating a company's profitability since the return on equity (ROE_{it}) is a ratio used to measure a company's ability to generate profits from shareholder investments in the company. This means ROE_{it} is a measure of how efficient a company is at generating profits, and it is calculated as the amount of net income as a percentage of shareholders' equity. Because shareholders' equity equals a company's assets minus its debt, ROE_{it} is considered the return on net assets (Bodie, Z., & Kane, A., 2020). A high ROE means that shareholders will receive high dividends and an increase in ROE will cause an increase in shares (Suroso, 2021). In the analysis, ROE_{it} is measured by the ratio of

[30] Refinitiv ESG Combined Score (ESGC) is an overall company score based on the reported information in the environmental, social and corporate governance pillars (ESG Score) with an ESG Controversies overlay (Thomson Reuters Refinitiv, 2021).

net income divided by the total amount of equity at the beginning of the fiscal year and is expressed as a percentage[31]. Given by the following formula;

$$ROE_{it} = \frac{Net\ Income_{it}}{Shareholders'\ Equity_{it}} * 100 \qquad (2)$$

Subsequently, ROE_{it} is predicted to have a positive relationship with Nordic firm's ESG performance.

Tobin's Q

Tobin`s Q is widely used to investigate if ESG impacts firm value (Velte, 2017; Friede et al., 2015; Revelli & Viviani, 2015; Lioui & Sharma, 2012; Marsat & Williams, 2011). As a consequence, this study will also use the same bridge to analyze if ESG scores have any impact on firm values. Chung & Pruitt's (1994) approximation of $TobinQ_{it}$ is employed in this study because the formula requires only basic financial and accounting information[32]. As shown in the formula below:

$$Tobin's\ approximate\ q_{it} = \frac{Market\ Value\ of\ Equity_{it} + Book\ Value\ of\ Debt_{it}}{Book\ Value\ of\ Debt_{it}} \qquad (3)$$

The numerator in the equation above, represents the enterprise value and the denominator represents the replacement cost which is assumed to be equal to the book value of the total assets of the firm[33]. The market value of Equity includes both common shares and liquidating value of the preferred stock, while the Book value of Debt includes both short-term debt and the book value of the firm's long-term debt. Similar to Jane (2013), have we in our calculations utilized the market value of debt instead of the book value of the debt asset, due to the difficulties in predicting asset replacement costs.

Another reason for utilizing $TobinQ_{it}$ as a measure for a firm's value performance is because it is unaffected by any accounting technique decision or modification, allowing the measure to be compared across different companies. Third, it reflects the value of future cash flows rather than focusing on previous profitability performances, reflected in accounting measures.

[31] Return On Equity is a profitability ratio calculated by dividing a company's net income by total equity of common shares. The company's actual value normalized to reflect the I/B/E/S default currency and corporate actions (e.g., stock splits), (Thomson Reuters Refinitiv, 2021).
[32] In addition, is this approximation higher correlated to the more theoretically correct compared to Lindenberg and Ross (1981) technique.
[33] $TobinsQ_{it}$ is therefore, defined as "the ratio of the market value of a firm to the replacement cost of its total assets..." (Chung & Pruitt, 1994, p.70).

Therefore, in the model of McNichols et al. (2014), Tobin's q more than one (q >1) indicates that the firm is expected to make positive economic profits in the future, but not otherwise. This order is consistent with Ross, Westerfield, and Jaffe (2005, p. 41) who declare: " firms with high q ratios tend to be those firms with attractive investment opportunities or a significant competitive advantage." Thus, Tobin's q serves as a barometer for the company's investment incentives (Smith, 2008). Simply meaning, Tobin q argues that a firm should invest in new ESG activities if the stock market will value the project at a higher value than its cost (that is, if the project's q is greater than 1). In this scenario, the market value of ESG is larger than its replacement cost, shareholders would then prefer the firm to make this investment rather than distribute its cost as dividends, gladly giving up $1 dollar of dividends in exchange for a $2 dollar increase in the value of their stock (Smith, 2008. p. 317).

On the other hand, the firm should compare the price it can get for selling its current ESG assets to the value that financial markets place on these assets. If the market value is less than the sale price (q < 1), the company is worth more dead than alive, and it should sell off its ESG assets and distribute the proceeds either through dividends or share repurchases (Smith, 2008). As a result, the weakness of Tobin's q is that it relies on the concepts of market value and replacement value.

Lastly, Tobin's Q indicates how the market values a company's existing assets. A low Tobin's Q ratio (between 0 and 1) indicates that the cost of replacing a company's assets is greater than its stock value. This suggests that the stock is currently undervalued. While a Tobin's Q ratio higher than 1, implies that the stock is overvalued (Wolfe & Sauaia, 2003). As a result, higher valued companies will have a higher Tobin's Q value compared to lower-valued companies.

Cost of capital (WACC)

How ESG performance affects the weighted average cost of capital ($WACC_{it}$) is the last dependent variable we are going to investigate in this analysis. $WACC_{it}$ has been chosen, since it represents the minimum return that a company must earn on its existing asset base, in order to satisfy its creditors, owners, and other providers of capital, or they will invest elsewhere. Furthermore, $WACC_{it}$ can be decomposed into the cost of equity (rE) and the cost of debt (rD), in order to gain further significant information about the magnitude of the company's capital structure components (Lorenz & Löffler, 2016). However, investors that

perform these decomposed calculations for the same companies often come up with different results (Miller, 2009), so a complete simplified calculation of WACC, including (rE & rD), has instead been chosen[34]. WACC represents a firm's cost of capital in which each category of capital is proportionately weighted[35]. In addition, did Dragota & Dobrin (2016), find that Nordic companies[36] choose to use both the non-debt tax shields and the debt tax shields as financial advantages which impact the level of their net income and implicitly their debt level. Consequently, assuming there is a tax shield effect, the WACC is calculated after subtracting tax savings. Aligned with the study of Atan et al. (2018), $WACC_{it}$ ($r_{WACC_{it}}$) follows the Modigliani & Miller (1958) formula:

$$r_{wacc_{it}} = \frac{D}{D+E} * r_E + \frac{E}{D+E} * r_D * (1 - T) \qquad (4)$$

Where, E = Market value of the firm's equity, D = Market value of the firm's debt, rE= Cost of equity, rD = Cost of debt and T = Corporate tax rate.

5.3.3 Control variables

In order to test the significance of the research, various control variables are required. We have chosen control variables that are in line with prior research (Orlitzky and Benjamin, 2001; Godfrey et al., 2009; Fischer and Sawczyn, 2013; Dothan, 2016; Velte, 2017) and serve to limit the influence of confounding and other extraneous variables (Hunermund & Louw, 2020).

Firm size ($SIZE_{it}$): The natural logarithm of the firm's book value of total assets, expressed in a hundred million USD, is used to calculate the firm size[37]. According to previous studies, larger firms can face higher cash flow turbulence and provide more collateral than smaller firms and still be viewed as less risky by lenders (Diamond, 1989; Goss & Roberts, 2011).

[34] The WACC calculations for all the public companies is collected from StarMine WACC incorporates, which has calculated the average WACC rate a company is expected to pay to its debt, equity, and preferred stockholders to finance its assets. Where each component of the capital cost is proportionately weighted in the same fraction as the capital structure (Refinitiv, 2021).
[35] Because WACC measures a company's cost to borrow money given the proportional amounts of each type of debt and equity a company has taken on. Where a company's debt and equity or its capital structure might include common stock, preferred stock, and bonds.
[36] This tax shield insight is based on the same four Nordic countries - Denmark, Finland, Norway & Sweden, as in this analysis.
[37] SIZE was measured by the book value of total assets. Book Value of Total Assets (in hundred million USD); Natural Log of Total Assets was used in the regression model.

Coupled with previous studies (Cho, Roberts, & Patten, 2010; Clarkson, Li, Richardson, & Vasvari, 2008), there is a positive relationship predicted between a firm (Size) and a Nordic firm's ESG performance.

Leverage (LEV_{it}): Computed as the ratio of total debt to total assets in the analysis is a measure of unsystematic risk (Velte, 2017), and is included due to the fact that larger companies often have economies of scale that are difficult to duplicate (Roberts & Dowling, 2002). Leverage in finance refers to the use of debt to finance or fund investments (Zhu et al., 2014). It is expected to find a positive relationship between leverage and the cost of capital, since Binsbergen, Graham, and Yang (2010) found that firms with a lower level of leverage are expected to have better solvency and a lower interest rate than firms with a higher level of leverage[38]. On the other hand, Nega (2017) found that leverage does not have a significant relationship with corporate social responsibility (CSR), measured by ESG activity scores and when controlled for ROE and total revenue. Consequently, the prediction of the relationship between leverage and ESG performance is unsettled. As a consequence, this analysis will examine the relationship between leverage and ESG performance among public Nordic firms.

$$Leverage_{it} = \frac{Total\ Debt_{it}}{Total\ Assets_{it}} \quad (5)$$

Beta ($BETA_{it}$): Measures the market risk, showing a relationship between stock volatility and market volatility and is used to control the systematic risk along different dimensions. The definition of Beta risk measures follows the description in Refinitiv (2021)[39]. The market Beta is estimated by regressing daily stock returns on all Nordic companies included in the analysis and on the related stock exchange, over the previous 5 years. Consequently, a positive coefficient is expected.

Price to book ratio (P/B_{it}): is computed as the market value of equity divided by the book value of equity and given by the formula below.

$$Price\ to\ Book\ Value\ Ratio_{it} = \frac{Market\ Value\ of\ Equity_{it}}{Book\ Value\ of\ Equity_{it}} \quad (6)$$

[38] This supports Fama and French (1992) theoretical assumption stating that higher leverage is expected to increase the cost of equity.
[39] CAPM Beta. A measure of how much the stock moves for a given move in the market. It is the covariance of the security's price movement in relation to the market's price movement. The calculation is based 5Y Beta.

The P/B ratio measures the market's valuation of a company relative to its book value[40]. From another perspective, the P/B ratio can tell if investors are overpaying for what values would remain in the company if the company went bankrupt tomorrow. In other words, if a firm liquidated all of its assets and paid off all of its debt, the value left would be its book value (Montier, 2010).

This means that the P/B ratio can help investors identify and avoid overvalued companies. Analysts often classify firms with low P/B ratios as value stocks, meaning that the company could be undervalued. On the other hand, firms with high P/B ratios are often classified as growth stocks, meaning that the company stock price could be overvalued. The higher the value of the P/B ratio, the more expensive the price of the stock so that it can increase the value of the company (Sukmawardini & Ardiansari, 2011). Normally a P/B ratio of one indicates that the stock price is equal to the company's book value. Meaning the stock price would be considered fairly valued (Berk & DeMarzo, 2019). However, P/B ratios should be compared with companies within the same sector. A good P/B ratio for one industry might be a poor ratio for another. For this reason, is it important to compare P/B to companies with a similar makeup of assets and liabilities (Berk & DeMarzo, 2019).

This also highlights why the P/B ratio is much more used in practice than the Tobin's Q ratio. The P/B ratio is frequently used in conjunction with return on equity (ROE), a reliable growth metric, which gives a vital reality check for investors seeking growth at a reasonable price. Large differences between the P/B ratio and ROE are frequently a red flag for investors, meaning that if a company's ROE is growing, then its P/B ratio should also be growing (Dayag & Trinidad, 2019).

Earnings Before Interest and Taxes ($EBIT_{it}$): is a profitability metric that determines a company's operational profit by deducting the cost of goods sold and operating costs from total revenue (Suroso, 2021). The $EBIT_{it}$ formula used in this analysis is:

$$EBIT_{it} = Revenue_{it} - COGS_{it} - Operating\ Expenses_{it} \qquad (7)$$

Where

Revenue: The net sales generated throughout the period.

Cost of Goods Sold (COGS): The direct costs incurred in the period.

[40] The P/B ratio can be calculated as - Market value / Book value (or the stock price / Book value per share).

Operating Expenses: The indirect costs incurred in the period.

Calculations based on this formula can assist creditors and investors in determining the company's financial health and ability to meet its obligations. $EBIT_{it}$ can also be calculated as a company's net income before income tax expenses and interest expenses are deducted. For this reason, *EBITit* is included as a control variable for firm probability given by ROE, as $EBIT_{it}$ is used to analyze the performance of a company's core operations without the costs of the capital structure and tax expenses impacting profit (Suroso, 2021). Another reason is due to the fact that EBIT does not need any additional modifications in financial practice, making it a pure profit margin metric (Strouhal et al., 2019).

Interest coverage rate ($IntCov_{it}$*):* is calculated by dividing a company's earnings before interest and taxes (EBIT) by its interest expense during a given period in the dataset, and the denominator is applicable to all industries. The formula used is:

$$Interest\ Coverage\ Ratio_{it} = \frac{EBIT_{it}}{Interest\ Expense_{it}} \qquad (8)$$

The interest coverage ratio *(*$IntCov_{it}$*)* is included as a control variable for WACC because *(*$IntCov_{it}$*)* is a debt and profitability ratio used to determine how easily a company can pay interest payments on its outstanding debt, by using internal cash flows. A higher interest coverage ratio therefore means that the firm has earned enough cash to pay its debt obligations, thereby lowering its debt costs (Álvarez-Botas & González, 2019). For this reason, a negative indication is expected for IntCov. In addition, interest coverage covenants, which set a maximum ratio of interest payments to earnings, are among the most popular provisions in firm debt contracts[41]. This formula is therefore frequently used by lenders, investors, and creditors to determine a firm's riskiness in relation to its present debt or future borrowing capabilities (Greenwald, 2019).

A larger coverage ratio is generally preferable, while the optimal ratio depends on industry-specific conditions (Palomino et al, 2019). The lower the ratio, the greater the company's debt expense burden, and the fewer resources it has to invest elsewhere. A firm's capacity to meet interest expenses may be questionable if its interest coverage ratio is below 1.5 or lower. As a

[41] Because creditors routinely impose a minimum interest coverage ratio, on a firm's future borrowing that the firm must maintain (Dothan, 2006).

consequence, the firm's ability to meet its interest obligations can cause solvency and is thus an important component in determining shareholder returns (Dichev & Skinner, 2002). For this purpose, will we also view *(IntCov$_{it}$)* as a control variable for ROE.

Industry dummy variables (IND$_{it}$): Measures if any of the industry codes have a more significant influence on ESG performance when they are compared relative to each other. The sample firms were classified into 12 industry categories based on Standard Industry Code (TRBC Economic Sector Name)[42]. *IND$_{it}$* is included as a control variable because the amount of stakeholder management and performance varies by industry (Velte, 2017). This is supported by Fischer and Sawczyn (2013)[43], who argue there may be differences in the degree of regulation and socially responsible requirements companies face due to the industry they operate. Lastly, the industry variable is also included as a control variable because CSR activities depend on the nature of the firm's products. As a result, companies in the manufacturing industry are more vulnerable to potential social disputes, compared to service industry companies and that is why manufacturing companies are more likely to engage in various CSR initiatives (Jang et al., 2013). A short summary of the respected variables is included in Table 4 below.

[42] These industry codes are: 1) Consumer Non-Cyclicals, 2) Consumer Cyclicals, 3) Real Estate, 4) Industrials, 5) Technology, 6) Energy, 7) Basic Materials, 8) Healthcare, 9) Financials, 10) Utilities, 11) Academic & Educational services, and 12) Basic Materials

[43] This argument is based on the findings of (Spencer and Taylor 1987).

Table 4. Presents a short summary of the respected variables included in the study.

Variables	Explanation
Independent variables	
ESGC – combined score	The Refinitiv ESG Combined Score (ESGC) is an overall company score based on information reported in the environmental, social, and corporate governance pillars (ESG Score) with an ESG Controversies overlay.
Environmental (E) pillar - score	The Environmental pillar measures a business's influence on living and non-living natural species, such as air, land, and water, as well as entire ecosystems. It measures how successfully a corporation employs best management practices to mitigate environmental risks and seize environmental opportunities to maximize long-term shareholder value.
Social (S) pillar - score	Through the application of best management practices, the social pillar measures a company's ability to build trust and loyalty with its employees, customers, and society. It reflects the company's reputation and the status of its operating license, both of which are important variables in determining the company's capacity to generate long-term shareholder value.
Corporate Governance (G) pillar - score	The corporate governance pillar measures a company's procedures and processes for ensuring that its board of directors and executives operate in the long-term best interests of its shareholders. It shows a company's ability to govern and regulate its rights and obligations through the development of incentives, as well as checks and balances, in order to achieve long-term shareholder value through the implementation of best management practices.
Dependent variables	
Return on Equity (ROE)	ROE = (Net Income / Shareholders' Equity) * 100
Tobin's Q	Measured as the equity market value divided by the equity book value of the firm.
Weighted Average Cost of Capital (WACC)	Calculated as (E/(D+E) * rE) + [D/(D+E) * rD * (1 - Tc)].
Control variables	
Firm size	The natural logarithm of total assets (firm size).
Leverage (Lev)	Total debt/total assets (unsystematic firm risk).
Beta (BETA)	Beta factor (Systematic firm risk).
P/B ratio	Measures the market's valuation of a firm relative to its book value.
Interest coverage rate (IntCov)	Is calculated by dividing a company's earnings before interest and taxes (EBIT) by its interest expense during a given period.
EBIT - (Profitability)	EBIT - Profitability measurement that calculates the company's operating profit by subtracting the cost of selling goods and operating costs from total revenue.
The industry as a dummy variable	The sample firms were classified into 12 industry categories based on Standard Industry Code (TRBC Economic Sector Name).

5.4 Estimation of Models

This study relies on panel regression models with data analysis to estimate the hypotheses. We are testing three different types of dependent variables, where we are first testing how ESGC affects ROE, Tobin's Q, and WACC, and then including the three E, S, G pillar scores

into the model. Consequently, six different regression models will be tested towards their respective dependent variables to analyze whether the three hypotheses hold.

Our panel data is obtained through a longitudinal study[44], where the same multiple entities (e.g. Nordic individual companies and countries) are observed at several time periods. The values of all the variables in this study are also registered at several time points for each individual company. Thus, our panel dataset consists of both time series and cross-sectional data. This is because panel data has a variety of advantages as compared to solely using time-series or simply cross-sectional data (Sheytanova, 2014)[45]. The additional data from both time series and cross-sectional data allows the panel data for more accurate estimations. As a consequence, the panel data estimate methods involve fewer assumptions and are frequently less difficult to use than other methods. Since they combine the values of using both cross-sectional data and time-series data, this adds further benefit in terms of problem-solving (Sheytanova, 2014).

In fact, our sample data fulfill the classification of being dynamic and unbalanced panel data, this makes several multi-panel regressions models the best fit for our study and that is why the chosen models are; time series regression, cross-sectional regression, and between-group cross-sectional regression models. This is mainly because the OLS estimators of the regression coefficients could have omitted variable bias[46]. Panel data regression was also chosen because we are studying changes in the dependent variables over time, making it possible to eliminate the effect of omitted variables that differ across entities but are constant over time (Stock & Watson, 2003). According to Stock & Watson (2003), all these three (pool OLS, fixed effect, and random effects) models must be considered in all panel regression models. As a consequence, ESG impact on the dependent variable will be tested by using all three static panel approaches.

[44] Panel data (also called longitudinal data) refers to data for *n* different entities observed at *T* different time periods, while a panel that has missing data for at least one time period for at least one entity is called an unbalanced panel (Stock & Watson, 2003, p. 54 & 363)

[45] This data inclusion strategy is supported by (Sheytanova, 2014), which states that "There are considerable advantages of using panel data as opposed to using only time series or only cross-sectional data". This is extensively more addressed by Frees (2004).

[46] When a statistical model leaves out one or more relevant variables, omitted-variable bias occurs. Omitted variable bias occurs when two conditions are true: (1) the omitted variable is correlated with the included regressor and (2) the omitted variable is a determinant of the dependent variable. The bias results in the model attributing the effect of the missing variables to those that were included (Stock & Watson, 2003, p.212).

Similarly, the use of several multiple panel regression models in this study is also supported by adopting past research (Atan et al., 2018; Velte, 2017) and adjusting it toward the Nordic countries. That is why the three static panel techniques used in this analysis are pooled OLS, fixed effects, and random-effects models. However, the results from the conducted Hausman test in the panel regression analysis will assist us to identify and determine the best estimator to interpret the results among these three regression models.

The Hausman test in the panel regression analysis for ROE and Tobin's Q will confirm that the fixed effect models (FE) have the most efficient estimators to interpret the relationship for the first two hypotheses (H1a and H1b). However, the Hausman test in the panel regression analysis for WACC will reveal that the pooled OLS (POLS) models have the most efficient estimators to interpret the relationship for the third and last hypotheses (H1c). As a consequence, the study focuses on the fixed effect (FE) estimators to explain the results for the two first hypotheses (H1a and H1b), and the pooled OLS (POLS) estimator to explain the results for the last hypotheses (H1c).

Moreover, the six models utilized to test the hypotheses in this study are highlighted below:

Models (1.1) and (1.2), are testing hypotheses H1a.

Models (2.1) and (2.2), are testing hypotheses H1b,

and Models (3.1) and (3.2), are testing hypotheses H1c.

Furthermore, the six regression models utilized in this study are as following;

First model - ROE

$$(1.1)\ L\_ROE_{it} = \beta_o + \beta_1 L\_ESGC_{it-1} + \beta_2 L\_SIZE_{it} + \beta_3 L\_LEV_{it} + \beta_4 L\_BETA_{it} + \beta_5 L\_P/B_{it} + \beta_6 L\_EBIT_{it} + \beta_7 L\_IntCov_{it} + \beta_8 L\_IND_{it} + \varepsilon$$

$$(1.2)\ L\_ROE_{it} = \beta_o + \beta_1 L\_E_{it-1} + \beta_2 L\_S_{it-1} + \beta_3 L\_\_G_{it-1} + \beta_4 L\_SIZE_{it} + \beta_5 L\_LEV_{it} + \beta_6 L\_BETA_{it} + \beta_7 L\_P/B_{it} + \beta_7 L\_EBIT_{it} + \beta_9 L\_IntCov_{it} + \beta_{10} L\_IND_{it} + \varepsilon$$

Second model - Tobin's Q

(2.1) $L\_TQ_{it} = \beta_o + \beta_1 L\_ESGC_{it-1} + \beta_2 L\_SIZE_{it} + \beta_3 L\_LEV_{it} + \beta_4 L\_BETA_{it} + \beta_5 L\_P/B_{it}$

$+ \beta_6 L\_EBIT_{it} + \beta_7 L\_IntCov_{it} + \beta_8 L\_IND_{it} + \varepsilon$

(2.2) $L\_TQ_{it} = \beta_o + \beta_1 L\_E_{it-1} + \beta_2 L\_S_{it-1} + \beta_3 L\_\_G_{it-1} + \beta_4 L\_SIZE_{it} + \beta_5 L\_LEV_{it}$

$+ \beta_6 L\_BETA_{it} + \beta_7 L\_P/B_{it} + \beta_8 L\_EBIT_{it}$

$+ \beta_9 L\_IntCov_{it} + \beta_{10} L\_IND_{it} + \varepsilon$

Third model - WACC

(3.1) $L\_WACC_{it} = \beta_o + \beta_1 L\_ESGC_{it-1} + \beta_2 L\_SIZE_{it} + \beta_3 L\_LEV_{it} + \beta_4 L\_BETA_{it} + \beta_5 L\_P/B_{it}$

$+ \beta_6 L\_EBIT_{it} + \beta_7 L\_IntCov_{it} + \beta_8 L\_IND_{it} + \varepsilon$

(3.2) $L\_WACC_{it} = \beta_o + \beta_1 L\_E_{it-1} + \beta_2 L\_S_{it-1} + \beta_3 L\_\_G_{it-1} + \beta_4 L\_SIZE_{it} + \beta_5 L\_LEV_{it}$

$+ \beta_6 L\_BETA_{it} + \beta_7 L\_P/B_{it} + \beta_8 L\_EBIT_{it}$

$+ \beta 9 L\_IntCov_{it} + \beta_{10} L\_IND_{it} + \varepsilon$

Where;

L_ROE_{it} = Return on Equity (ROE) for the firm i, in period t;
L_TQ_{it} = Tobin's Q for the firm i, in period t;
L_WACC_{it} = Weighted Average Cost of Capital (WACC) for firm i, in period t;
L_ESG_{it-1} = ESGC combined score for firm i, in period t-1;
L_E_{it-1} = Environmental pillar score for firm i, in period t-1;
L_S_{it-1} = Social pillar score for firm i, in period t-1;
$L\_\_G_{it-1}$ = Governance pillar score for firm i, in period t-1;
L_SIZE_{it} = Total Assets for firm i, in period t;
L_LEV_{it} = Leverage for firm i, in period t;
L_BETA_{it} = Beta factor for firm i, in period t;
L_P/B_{it} = Price to book ratio for firm i, in period t;
L_EBIT_{it} = EBIT for firm i, in period t;
L_IntCov_{it} = Interest coverage ratio for firm i, in period t;
L_IND_{it} = Industry dummy variables for firm i, in period t;
ε = Error term.

Note that the data utilized for ESGC and ESG pillar scores in the model estimation is from 2013 to 2018 (t-1), while for other variables it is from 2014 to 2019 (t), due to one-year lag of ESG.

Before moving on to descriptive statistics, the most general and frequently used panel data models (pooled OLS, fixed effects, and random effects) are discussed below in order to give the readers an overview of how these models are structured.

5.4.1 Pooled OLS model

The Pooled OLS model is a model that follows the basic assumption that the independent variables for all Nordic individual firms behave in the same way, with no presence of homoscedasticity or autocorrelation. In addition, it assumes, zero conditional mean of ε_{it}, independence across observations, *i,* and strict exogeneity of X_{it} (Greene, 2012). As a result, this makes ordinary least squares (OLS) the efficient estimator for the pooled model. Second, the pooled OLS estimator ignores the panel structure of the data, and it regards each observation as unrelated to the others observation, by ignoring panels and time (Sheytanova, 2014). This means the Pooled OLS model would not take advantage of the benefits of the panel data set, instead the Pooled OLS dependent variables are pooled together, both cross-sectional and time-series observations (Brooks, 2014). As a consequence, the coming Pooled OLS model has been expressed as:

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}. \qquad (9)$$

Another consequence is that the Pooled OLS model assumes average values of the variables, as well as their relationships being constant across all entities and throughout time (Brooks, 2014). This is one of the reasons why simple betas are used in the Pooled OLS, which means they do not account for cross-sectional or time-sectional properties. If the data does not contain fixed or random effects, the Pooled OLS will be utilized in our analysis (Brooks, 2014). These assumptions for the pooled model are the same as for the simple regression model (Greene, 2012), and this makes the pooled OLS model a very restrictive model because it requires all cross-sections to have the same intercept and slope coefficients (Atan et al., 2018).

5.4.2 Fixed effects model

In contrast to the Pooled OLS model, the fixed effects model suggests that the estimator has common slopes and variance but company-specific intercepts. The purpose of employing this

estimator is to account for all unobservable features of each Nordic company in the research (Atan et al., 2018). To control for the variation across companies, the model has one intercept for each company (α_i). Within each business, there is a difference that is not recorded by the control variables but is captured by the intercepts for each entity (Stock & Watson, 2003). The coming fixed-effects model for k factors has been expressed in the following way:

$$y_{it} = \alpha_i + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \varepsilon_{it}. \qquad (10)$$

We now have an individual-specific component α_i that determines a unique intercept for each individual company, while the slope parameters β are the same for all individual companies (Sheytanova, 2014). In the fixed-effects model, there is no constant term compared to the pooled model, where the constant term is given by β_0. The main reason for employing a fixed-effects model is that it can account for unobserved heterogeneity (Sheytanova, 2014). As a result, it also assumes that the panel data contains omitted variables that vary among entities but not across time (Stock & Watson, 2003). A major disadvantage of this process, however, is that we lose the ability to determine the effects of all the variables that influence (Y_{it}), but do not change over time (Brooks, 2014).

5.4.3 Random effects model

The random-effects model approach is like the fixed effects model, which provides various intercept terms for each entity, and these intercepts are consistent over time with the relationships between the explanatory and explained variables assumed to be the same both cross-sectionally and temporally (Brooks, 2014). The distinction between a fixed and random effect model is that the random effect model assumes that all entities are randomly selected and that is why the individual effect is random and not fixed, compared to the fixed effect model (Greene, 2012).

Another difference is that the random-effects model assumes that the intercepts for each cross-sectional unit appear from a common intercept α (which is constant across all cross-sectional units and over time) plus a random variable (u_i) that fluctuates cross-sectionally but is constant over time. u_i measures the random deviation of each entity's intercept term from the 'global' intercept term α (Brooks, 2014).

The individual-specific component ($\boldsymbol{\alpha}$) is not handled as a parameter in the random-effects model and thus is not calculated. Instead, it is treated as a random variable with a mean (μ) and variation of $\sigma^2\alpha$ (Sheytanova, 2014). Consequently, the random-effects model has been written as:

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + (\alpha_i - \mu) + \varepsilon_{it}. \qquad (*)$$

Since μ is the average individual effect. Then let $u_{it} = \alpha i - \mu + \varepsilon it$

As a result, the coming random-effects model (*) in the analysis has been written as:

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \cdots + \beta_k x_{k,it} + \mu_{it} \qquad (11)$$

The parameters (α and the β vector) are estimated consistently but inefficiently by OLS, as a result of the cross-correlations between error terms for a given cross-sectional unit at different points in time. That is why a generalized least squares (GLS) procedure is usually used instead (Brooks, 2014).

Next, the descriptive statistics of the final sample data are analyzed. Then, a correlation matrix is presented to check for any potential cases of multicollinearity.

3.5 Descriptive statistics

Table 5 below, presents the descriptive statistics for all the dependent, independent, and control variables included in the regression analysis. As can be seen, there are 20 076 observations included in the sample and as previously mentioned, all the ESG variables are rated as numerical scores from 0 to 100. This means the company with the highest ESG Combine (ESGC) score has an ESGC rating of 92.41, while the company with the lowest ESGC rating has a score of 0. The mean ESGC rating for all companies listed on the representative Nordic Stock Exchanges is 59.437. All the separate E, S, and G pillars scores have higher ESG maximum score levels than the ESGC score because the ESGC rating is an aggregate score. This was expected due to the penalization of the ESG controversies score which is included in the ESGC scores, but not included in the E, S, G pillars scores. As seen from the table, the Governance pillar score (G) has a lower mean and standard deviation than the ESGC score. Moreover, the ESGC variable has a relatively high standard deviation compared to the E, S, and G pillar scores. This indicates that the performance of the Nordic companies on the individual ESG pillars has a significant variation.

According to Stock & Watson (2003), the measurement of how the variables is distributed in comparison to a normal distribution is an important function of descriptive statistics. For this reason, the analysis of the skewness and kurtosis is included, where the skewness measures the lack of symmetry of distribution, while the kurtosis measure how much mass is in its tails of a distribution[47]. It is therefore a measure of how much of the variance of a random variable (Y) arises from extreme values. An extreme value of a random variable Y is called an outlier and the greater the kurtosis of a distribution, the more likely there are outliers. Accordingly, the standard measurement rule for the kurtosis of a normally distributed random variable Y is 3 (Stock & Watson, 2003), meaning a random variable (Y) with kurtosis exceeding 3, has more mass in its tails than a normal distributed random variable. Aligned with George & Mallery (2018), can a sample be considered to have normal distribution if the skewness lies between -2 to +2 and kurtosis between -7 to +7.

Examining the descriptive statistics table, the only variables that have a skewness of more than + 2 or less than -2 are; Firm size (2.177), BETA (2,189), EBIT (2.331), and P/B (-2.225). On the other hand, none of the variables have a higher kurtosis between -7 to +7. This implies that our sample does not have a disturbing distribution with extreme values or outliers according to the acceptable kurtosis values. However, the skewness of the distribution indicates there are values to be worried about. As a consequence, all variables have been winsorized at the top and bottom 99th percentiles of their distributions. As a result, the following descriptive statistics below are based on descriptive statistics of the variables after they have been winsorized.[48] Therefore, the issues of extreme outliers connected to kurtosis have been resolved, while the skewness issues have been resolved to the maximum degree of acceptance and while still avoiding manipulation of the data.

The standard deviation value of return on equity (ROE) is 32.3%, while the minimum and maximum values are -140.31% and 292.46%, respectively. From this, we can conclude that there is significant variation in the series of ROE. The positive skewness value of Tobin's Q (1.894) shows that the distribution of Tobin's Q is positively skewed. The kurtosis value i.e., 3.621 is greater than 3 which shows that the distribution is symmetric with a heavy tail (Lord

[47] The skewness of a distribution provides a mathematical way to describe how much a distribution deviates from symmetry and the kurtosis measures how light- tailed or heavy-tailed the sample data is relative to a normal distribution (Stock & Watson, 2003). (Stock & Watson, 2003, p.63 -64).
[48] According to (Zhao et al, 2018), winsorization of data is a method of trimming the sample to increase its robustness and computationally efficiency. a disadvantage is the maximum likelihood of estimators (MLE).

et al, 2021). In contrast, WACC has a kurtosis value i.e., 1.265, which is less than 3, meaning that the distribution has lighter tails than a normal distribution.

Table 5. Descriptive statistics for all the variables

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
ROE	20076	29.018%	32.3%	-140.31%	292.46%	1.728	5.507
Tobin's Q	20076	2.184	39.5	-0.83	9.76	1.894	3.621
WACC	20076	.021	.036	0.001	.6	1.086	1.265
$ESGC_{t-1}$	20076	59.437	26.851	0	92.41	0.091	-0.876
S_{t-1}	20076	66.903	28.539	0	96.41	-0.082	-0.854
E_{t-1}	20076	61.252	27.572	0	97.54	0.245	-0.891
G_{t-1}	20076	50.388	24.168	0	98.64	0.146	-1.067
Leverage	20076	12.575	24.456	0.1	14.9	1.721	3.057
Firm Size	20076	21.055	24.1	0	96.13	2.177	4.778
BETA	20076	.292	.556	0.067	9.16	2.189	5.424
EBIT	20076	9.072	44.66	-220.77	357.59	2.331	4.497
P/B - ratio	20076	2.509	57.62	-24.71	48.96	-2.225	3.457
Interest coverage	20076	-37.749	58.152	-102.5	200.17	-1.152	4.75

5.5.1 Correlation Matrix

Table 6 below, shows Pearson's correlation matrix for all the variables in the study. Where the correlation data reveal that the level of correlation between the variables spans a wide range.

Table 6. Pearson's correlation matrix

Variables	ROE	Tobin`s Q	WACC	ESGC	Lev	Size	BETA	EBIT	P/B	Int.Cov	S	E	G
ROE	1.000												
Tobins Q	0.247	1.000											
WACC	0.214*	0.101*	1.000										
$ESGC_{t-1}$	0.131*	-0.003	0.238*	1.000									
Leverage	0.051*	0.009	0.207*	0.213*	1.000								
Firm size	0.028*	-0.001	0.023*	0.141*	0.248*	1.000							
BETA	0.015*	-0.003	0.943*	0.281*	0.208*	0.040*	1.000						
EBIT	0.071*	-0.001	0.033*	0.343*	0.088*	0.125*	0.053*	1.000					
P/B	0.070*	-0.054	0.005	0.019*	0.021*	0.001	0.008	0.001	1.000				
Int.cov	0.012	0.029*	-0.241	0.011	0.013	0.005	0.006	0.007	0.132	1.000			
S_{t-1}	0.133*	-0.003	0.241*	0.979*	0.210*	0.129*	0.282*	0.346*	0.022*	0.010	1.000		
E_{t-1}	0.119*	-0.003	0.197*	0.952*	0.213*	0.163*	0.243*	0.385*	0.019*	0.009	0.933*	1.000	
G_{t-1}	0.123*	-0.003	0.239*	0.944*	0.197*	0.149*	0.282*	0.350*	0.012	0.009	0.899*	0.862*	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Normally, Pearson's correlation matrix is used to determine if the independent variables have perfect multicollinearity, which occurs when several independent variables in a model are exactly correlated, and it means that a variation in one independent variable can be completely explained by movements in another independent variable (Stock & Watson, 2003)[49]. The disadvantage of perfect multicollinearity can lead to skewed or misleading results when we are trying to figure out how well each independent variable (ESGC and E, S, G pillar scores) can be utilized most effectively to predict and understand the dependent

[49] Perfect multicollinearity occurs if one of the regressors is a perfect linear function of the other regressors (Stock & Watson, 2003, p. 226).

variables (ROE, WACC, Tobin's Q) in our multi regression models[50]. Two variables are considered to be perfectly multicollinearity if their correlation coefficient is +/- 1.0 (Stock & Watson, 2003).

Another problem that arises more often is imperfect multicollinearity, which refers to a state of near-perfect multicollinearity between the independent variables. The difference with imperfect multicollinearity is that an independent variable has a strong but not perfect linear function of one or more independent variables (Brooks, 2014). Because imperfect multicollinearity is the most common occurrence, it has become the defined meaning of multicollinearity. To test for near multicollinearity is not straightforward, but by closely studying the correlation matrix simple forms of multicollinearity can be detected. The rule of thumb states that; if the correlation is more than 0.8, serious multicollinearity is likely to exist (Studenmund, 2014).

As seen from the table, there is an imperfect multicollinearity relationship between all the independent variable ESGC and E, S, G pillar scores with respective values of (0.979, 0.952, and 0.944). Where they all have correlation values above 0.8 and are all significant at the 10% significance level. But this imperfect multicollinearity between the E, S, G pillars scores and the ESGC score was to be expected since the score is a combination of the three and thereby, they are constructed on the basis of the same raw input data. For this reason, we can dismiss this imperfect multicollinearity finding, and therefore conclude that none of the ESG variables have a high enough correlation to suspect multicollinearity.

Moreover, we can observe there are no imperfect multicollinearity relationships between the dependent and independent variables and there is no imperfect multicollinearity relationship among the dependent variables. We can, however, observe a relationship between the control variable BETA and the dependent variable WACC, with respective values of 0.943. Which is significant at the 10% significance level. Given the correlation of some of the variables, a variance inflation factor (VIF) test was conducted to investigate the tolerance for the presence of multicollinearity (Stock & Watson, 2003). If the VIF is higher than 10, severe multicollinearity problems might occur (Stock & Watson, 2003).

[50] When an independent variable is a perfect linear relationship of one or more independent variables, perfect multicollinearity arises, which violates the VI assumption for OLS regression models (Studenmund, 2014, p. 262).

5.6 Diagnostic test

3.6.1 Multicollinearity Test

A VIF test investigates how well an independent variable can be explained by the model's other independent variables. Accordingly, the VIF test shows to which extent multicollinearity has boosted and increased the variance of the estimated coefficient. In other words, the VIF test determines the degree of multicollinearity and if multicollinearity exists in the model or not (Stock & Watson, 2003).

In general, a VIF greater than 5 or a tolerance (1/VIF) less than 0.25 suggests the presence of multicollinearity, and further analysis is required (Studenmund, 2014). In addition, according to James et al. (2017), there is severe multicollinearity that needs to be adjusted when the VIF test result is greater than 10 or tolerance is less than 0.1. Table 7 summarizes the findings of the VIF test.

Table 7. Multicollinearity (Variance inflation factor) - Test

Variables	VIF	1/VIF
L.EBIT	1.41	.709
L.ESGC$_{t-1}$	1.336	.749
L.Firm Size	1.294	.773
L.Dedt/Total Assets	1.146	.872
L.BETA	1.072	.933
L.Price to book	1.061	.943
L.Interest coverage	1.01	.99
Industry	1.003	.997
Mean VIF	1.166	-

For the current model, the value of the VIF test is 1.166 which is less than 10, insofar multicollinearity should not affect our results and conclude there is no problem with multicollinearity in the model.

3.6.2 Hausman test for ESGC and ESG pillar scores.

The next part of the diagnostic test examines whether cross-sections are exposed to dependency. Cross-section dependency for the ESGC and the ESG pillar scores are examined by using the well-known method, the Hausman test. Considering it is a panel data analysis, the precision of the Hausman test is critical (Sheytanova, 2014).

A Hausman test uses a chi² distribution with 1 degree of freedom and it is used to determine whether to adopt a random effect or fixed-effects model (Sheytanova, 2014). Meaning that the Hausman test tests which of these models is the most efficient to interpret the results, given the sample and sample space. The underlying hypothesis is that the random-effects model is consistent and effective. That is why the null hypothesis in a Hausman test formulates that the random-effect model is the correct effect regression and therefore discards the fixed effect model. On the other hand, the alternative hypothesis of a Hausman test states the fixed-effects regression model is more appropriate and should be used instead of the random-effect model (Sheytanova, 2014). In general, a p-value of 1% significance level will determine whether to keep the null hypothesis or to reject the null hypothesis and then accept the alternative hypothesis (Stock & Watson, 2003). This is because a lower p-value indicates stronger evidence in favor of the alternative hypothesis and since statistically significant is commonly defined as a p-value of 0.05 or less (Stock & Watson, 2003).

A Hausman test for ESGC combined score will first be presented below, followed by a Hausman test for the individual E, S, G pillar scores.

Table 8. Hausman test for ESGC with fixed and random effects models.

	Fixed effect	**Random effect**	**Difference**	***Standard Error***
ESGC- Score t-1	0.0001078	.000996	-0.0008882	.0005222
Debt/Total Assets	-.0005172	-.0001975	-.0003197	.00042
Firm size	-.0000138	6.67e-06	-.0000205	.0001349
BETA	-0.0064056	-.0152701	.0088645	.0063162
EBIT	.000128	0001723	-.0000443	.0001012
P/B - ratio	-.0000859	.0087075	-.0087933	.0020972
Interest coverage	8.48e-06	.0000436	-.0000352	.0000116
Industry	-.0002146	-.0004764	.0002618	.0007135
Panel B Showing the P-value of the Hausman Test				
X²(8)	25.34			
P-value	0.0014			

The outcome of the Hausman Test is shown in Table 8, which determines which model is better between the Random-effect (RE) and Fixed-effect (FE) models. Here the significant p-value shows that we must reject the null hypothesis, as the p-value is significant at 0.00014. This is less than the 1% significant level we set as a condition to not reject the null hypothesis. As a consequence, the null hypothesis is rejected, and the fixed-effect model should be preferred over the random-effect when modeling ESGC combined score. This finding also strongly

suggests that the fixed-effects model should be implemented in the regression models.

Table 9. Hausman test for E, S, G pillar scores with fixed and random effects models.

	Fixed effect	**Random effect**	**Difference**	***Standard Error***
Social Score$_{t-1}$	.0002621	.0017179	-.0014558	.0006785
Environmental Score$_{t-1}$	-.0000635	-.0004606	.0003971	.0009579
Government Score$_{t-1}$	-.0000973	-.0004697	.0003724	.0005939
Debt/ Total Assets	-.0005233	-.0001699	-..0003533	.0004204
Firm size	-.0000123	7.74e-06	-.0000201	.0001355
BETA	-.0071821	-.0178602	.0106781	.0067721
EBIT	.0001294	0.000179	-0.0000496	.0001008
P/B - ratio	-.0000869	.0082085	-.0082954	.0020697
Interest coverage	8.06e-06	.0000387	-.0000306	.0000112
Industry	-.0002382	-.0005976	.0003594	.0007264
Panel B Showing the P-value of the Hausman Test				
$X^2(10)$	25.27			
P-value	0.0049			

Table 9 above highlights the result of the Hausman test deciding whether the Random-effect (RE) or Fixed-effect (FE) models are better for modeling the individual E, S, and G scores. The null hypothesis of the test states that the random-effect is better whereas the alternative hypothesis states that the fixed-effect is superior to explain the result. The decision to accept or reject the null hypothesis is again determined by the p-value.

Results of the significant p-value show again to reject the null hypothesis. The table above shows that the p-value is significant at 0.0049, which is less than the 1% significant level we set as a threshold for not rejecting the null hypothesis. Therefore, the null hypothesis is rejected, meaning that the fixed-effect model would be preferred over the random-effect model when modeling for the individual E, S, G scores.

5.6.3 Heteroskedasticity tests

Homoskedasticity (meaning "same variance") is an essential assumption in the ordinary least squares (OLS) regression models. It refers to a situation in which the error term (the "noise" or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables (Astivia & Zumbo, 2019)[51]. Simply put, it means that as the dependent variable's value changes, the error term for each observation does not change considerably. If homoskedasticity is not present, then a degree of heteroscedasticity is present, which increases as heteroscedasticity increases (Stock & Watson, 2003)[52].

Heteroskedasticity refers to a situation where the variance of the residuals is unequal over a range of measured values. This means that heteroscedasticity is present when the size of the error term differs across the values of an independent variable (Astivia & Zumbo, 2019). That is why heteroscedasticity is a violation of homoscedasticity and this may mislead the analysis results to become invalid. This is because OLS regressions assume that the residuals are drawn from a population with constant variance. In addition, OLS regressions by definition seek to minimize residuals in order to form the smallest possible standard errors and this gives equal weight to all observations, but when heteroscedasticity is present, the values with larger disturbances have a stronger "pull" effect than other observations (Baum & Lewbel, 2019).

[51] Statisticssolutions (2022), also have this same description.

[52] If the variance of the conditional distribution of u_i given Xi, var(u_i |Xi = x), is constant for I = 1,..., n and does not rely on x, the error term ui is homoskedastic. The error term is heteroskedastic otherwise (Stock & Watson, 2003, p. 190).

Therefore, the problem with too high heteroskedasticity does not bias the regression coefficients, but heteroskedasticity biases the standard errors and test statistics (Astivia & Zumbo, 2019).

Because of all these factors, it is necessary to first analyze the residuals. Therefore, the presence of heteroskedasticity is investigated by running a Breusch-Pagan Lagrange Multiplier Test and White tests. This is because the problem of heteroscedasticity arises when the variance in the models does not remain the same and since OLS regressions are based on the assumption of constant variance (i.e., homoscedasticity). As a consequence, heteroscedasticity is a violation of the OLS assumption, and we will therefore check the presence of heteroscedasticity within the model of Pooled OLS.

The below table 10, shows the test results checking for heteroscedasticity, where the null hypothesis of both the Breusch-Pagan test and White tests states that there is homoscedasticity in the Pooled OLS model. The decision to accept or reject the null hypothesis depends upon the p-value.

Table 10 below, shows that the null hypothesis is accepted[53]. This is due to the results of both the P-values of the tests (1.000 and 0.5812) are greater than 0.1 (the 10% significance level). This suggests that the Pooled OLS model does not have a heteroscedasticity, but rather a presence of homoscedasticity.

Table 10. Test of Hetroscedascity for Pooled OLS model

Breusch-Pagan Test		
	F-statistic:	0.30
	Obs*R-squared:	79.72
	P-value:	0.5812
White Test		
	F-statistic:	9.10
	Obs*R-squared:	79.42
	P-value:	1.000

[53] Since there is greater than a 10% chance of a result as extreme as the sample result when the null hypothesis is true, then the null hypothesis is retained.

5.6.4 Testing for autocorrelation in the panel data

Lastly, a Wooldridge test for autocorrelation in panel data is conducted. The Wooldridge serial correlation test was chosen to test for autocorrelation since it is compatible with panel data (Greene, 2012). The main reason why we are checking for autocorrelation is that serial correlation or autocorrelation is common in time-series data. A major consequence of ignoring autocorrelation when it is actually present is that positive autocorrelation leads to an underestimate of the standard error of the mean, while negative autocorrelation leads to an overestimate of the standard errors. Therefore, the standard errors may be incorrect and incorrect standard errors lead to incorrect conclusions and results (Stock & Watson, 2003). Lee (2017) defines autocorrelation as the degree of correlation between nearby observations and similarity between the values of the same variables over successive time intervals.

According to Wooldridge (2002), the Wooldridge test for serial correlation in panel-data models evaluates whether a serial correlation exists in the idiosyncratic errors of a linear panel-data model. The null hypothesis states that first-order autocorrelation does not exist. Moreover, according to (Wooldridge, 2002) we can conclude that the null hypothesis is rejected if the p-value remains significant (less than 0,1). Based on the test results of the Wooldridge table 10 below, we can conclude that the null hypothesis is accepted. This is because the p-value (0.5448) is greater than 0.1, indicating that the panel data model has no autocorrelation.

Table 11. Wooldridge test for autocorrelation in the panel data

H0: no first-order autocorrelation

F(1 , 11) = 0.411

Prob > F = 0.5348

6. Results from regression

6.1 Regression Results ROE

In order to conclude the findings of the panel regression models for ROE we examine the Hausman test between the fixed-effect (FE) and the random-effect (RE) models, which are found at the bottom of the regression table. This is based on the result that both these effect models (FE-RE) are preferred over the pooled OLS models (POLS), as seen in the two-row sections above the Hausman test between the (FE-RE) section. As previously mentioned, the Hausman test determines which effect model has the most efficient estimator to interpret the results of the model. The null hypothesis (H_0) of this Hausman test, states that the random-effect models (RE) are superior to the fixed-effect (FE) models to interpret the results of the models, whereas the alternative hypothesis (H_A), on the other hand, states that the is that fixed-effect (FE) models are better. The decision to accept or reject the null hypothesis (H_0) depends upon the p-value.

The results from the Hausman test section between the RE and FE models show a significant p-value for both models. This implies that we can reject the null hypothesis (H_0) and that the fixed-effect models would be preferred over the random-effect model when interpreting the effect ESGC and ESG pillar scores have on return on equity (ROE). Furthermore, the Hausman test also confirms that the fixed-effect (FE) models are the most efficient estimators to test if our H1a hypotheses can be accepted or rejected when we are studying this relationship between the ESG factors and ROE. As a result, we will only focus on the fixed effect models when ROE is the dependent variable.

The results of the fixed effect models are shown in columns (2) and (5). The results for the ESGC combined score are highlighted in column (2), while the results for the individual E, S, and G pillar scores are separated in column (5) in the regression model. Surprisingly, all of the variables in the model had an insignificant effect on ROE, as demonstrated in the results of columns (2) and (5). As a result, our H1a hypotheses must be immediately dismissed, as there is no significant evidence that either ESGC or ESG pillar scores have a positive impact on return on equity, which is employed as a proxy for firm profitability in this model.

To summarize, based on fixed-effect models, which were chosen over all other models, we can conclude that the calculations suggest that both ESG-combined and ESG pillar scores have no effect on the firm's profitability. Both fixed-effect models also conclude that ESG factors play no role in determining the firm's profitability. Hypothesis H1a stated there is a significant positive relationship between ESG factors and the profitability of Nordic public companies. This hypothesis is rejected because it has no statistically significant correlation between ESG and profitability. Similar to the findings of (Atan et al., 2018), our findings also reveal that organizations that disclose their ESG information, do not perform any better than those with less ESG information

Table 12. The Impact of ESG Factors on Firm Profitability

	(1)	(2)	(3)	(4)	(5)	(6)
	(Pooled OLS)	(Fixed Effect)	(Random Effect)	(Pooled OLS)	(Fixed effect)	(Random effect)
VARIABLES	ROE	ROE	ROE	ROE	ROE	ROE
L.ESG_Combined_score$_{t-1}$	0.00121***	0.000119	0.000876***			
	(0.000308)	(0.000537)	(0.000356)			
L.Social_pillar_score$_{t-1}$				0.00312***	0.000364	0.00216**
				(0.000842)	(0.00144)	(0.000838)
L.Environmental_pillar_score$_{t-1}$				-0.000754	-6.36e-05	-0.000543
				(0.000734)	(0.00161)	(0.000803)
L.Governance_pillar_score$_{t-1}$				-0.000462	-9.73e-05	-0.000470
				(0.000594)	(0.000882)	(0.000653)
L.Debt-to-total_assets	-0.000182	-0.000601	-0.000237	-9.85e-05	-0.000635	-0.000192
	(0.000234)	(0.000545)	(0.000302)	(0.000267)	(0.000532)	(0.000312)
L.Frim_size	6.29e-07	-1.38e-06	6.67e-07	7.35e-07	-1.23e-06	7.74e-07
	(1.77e-05)	(0.000137)	(2.16e-05)	(1.77e-05)	(0.000137)	(2.15e-05)
L.BETA	-0.0169	-0.00721	-0.0175	-0.0192	-0.00732	-0.0184
	(0.0149)	(0.0179)	(0.0161)	(0.0150)	(0.0172)	(0.0143)
L.EBIT	0.000159**	0.000128	0.000172**	0.000170**	0.000129	0.000179**
	(7.19e-05)	(0.000130)	(8.14e-05)	(7.40e-05)	(0.000131)	(8.35e-05)
L.P/B - ratio	0.0123***	-8.50e-05	0.00896***	0.0143***	-8.69e-07	0.00845***
	(0.00246)	(0.00347)	(0.00258)	(0.00238)	(0.00337)	(0.00248)
L.Interest_coverage_ratio	5.60e-05	8.51e-04	4.35e-05	4.99e-04	8.12e-02	3.91e-04
	(3.90e-04)	(4.07e-02)	(3.88e-06)	(3.97e-06)	(4.07e-06)	(3.91e-06)
Industry	-0.000768	-0.000385	-0.000729	-0.000848	-0.000368	-0.000637
	(0.00348)	(0.00323)	(0.00327)	(0.00331)	(0.00323)	(0.00312)
Constant	0.0448**	0.111***	0.0523**	0.0484**	0.113***	0.0546**
	(0.0225)	(0.0365)	(0.0243)	(0.0225)	(0.044)	(0.0249)
Observations	1,533	1,533	1,533	1,533	1,533	1,533

R-squared	0.048	0.002		0.051	0.002	
Number of id	340	340	340	340	340	340
Test between FE-POLS	1.84(0.0000)			1.81 (0.0000)		
Test between RE-POLS	21.51 (0.0000)			19.63 (0.0000)		
Hausman Test FE-RE	25.65 (0.0001)			25.58 (0.00052)		

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Fixed effect is more efficient than RE and POLS ***, **, * indicate that the values are significant at the 1%, 5%, and 10% levels.

4.2 Regression Results Firm Value

The Hausman test in the panel regression analysis for Tobin's Q also confirms that it is the fixed effect models (FE) which have the most efficient estimators to interpret the relationship for the second hypothesis (H1b). This result can be viewed at the bottom of the panel regression table. Once again, the decision to accept or reject the null hypothesis (H_0) depends upon the p-value. The results of the significant p-value show that we must reject the null hypothesis (H_0) as their p-values (0.0000) are significant for both fixed-effect (FE) models. Therefore, the null hypothesis (H_0) is rejected, meaning that the fixed-effect (FE) models would be preferred over the random-effect (RE) models when interpreting the effect ESGC and ESG pillar scores have on Tobin's Q. As a result, the focus of this section's research will be on how FE estimators can explain Tobin's Q results.

The results of the fixed effect models are shown in columns (2) and (5). The results for the ESGC combined score are highlighted in column (2), while the results for the individual E, S, and G pillar scores are separated in column (5). Here firm size, interest coverage rate, price to book ratio, industry, and BETA are statistically insignificant according to the results of the fixed-effect model in column (2), as their probability value is greater than the 10% significance level. This indicates that there is no link between these variables and firm value (Tobin's Q).

The variables EBIT, ESGC, and debt to total assets value (leverage), on the other hand, have a statistically significant impact on firm value. Debt to total assets value has a positive and significant effect on firm value at the 1% significance level. Likewise, EBIT does have a positive and significant effect on firm value at the 5% significance level. ESG combined scores also have a positive and a weaker significant effect on firm value, at the 10% significance level. This means that ESG combined scores affect firm value in a positive and significant way, in addition to firm leverage and firm profitability.

According to the results of the fixed-effect model in column (5), we can conclude that the variables of environmental pillar score, governance pillar score, price to book ratio, firm size, interest coverage ratio, industry, and BETA are all statistically insignificant since their probability value is greater than the 10% significance level. This suggests that these variables and Tobin’s Q have no relationship.

The variables EBIT, debt to total assets, and social pillar score, on the other hand, have a statistically significant impact on Tobin's Q. In fact, the results from the fixed-effect model in column (5) show that the social pillar score has a higher significance compared to the ESG combined score (0.00493*), in column (2). This means that the social pillar score (0.0221***), which is significant at the 1% significance level, has the highest impact on firm value compared to the other ESG pillar scores and ESG combined score. The fixed-effect model in column (5), also confirms that both firm leverage and firm profitability (EBIT) have a positive and significant association with firm value. These findings for the debt to assets ratio suggest that Nordic public firms with less leverage will gain higher firm value based on their ESG performance. This also means that a high leveraged Nordic firm is more valued by the market compared to low leveraged Nordic firms. This is because the market believes that high leveraged firms have the potential to be more valuable in the future. Similarly for EBIT, it means that Nordic firms which have a high leverage ratio are perceived to be more valuable in the future due to higher profitability.

Based on Giese et al. (2019), which can explain the economic mechanisms that leads ESG information to improve financial results within firms, we can argue that ESG performance (ESGC & S) has a positive effect on the firm value of Nordic firms through their idiosyncratic risk profile (higher profitability and lower exposures to tail risk). This is confirmed by the significant positive values on the leverage variable (0.00935***, 0.00862***), which is also our measurement for unsystematic risk. These conclusions are also supported by the positive significant values on the EBIT variable (0.00137**, 0.00203**).

To summarize, the fixed-effect (FE) models, which had the most efficient estimators to interpret the effects ESG components have on firm value, we can conclude that hypothesis H1b, which stated there is a significant positive relationship between ESG factors and the firm value of Nordic public companies, is accepted. This is because there is a positive significant relationship between the ESG combined score and firm value. In comparison to the ESG pillar scores, the same result is only accepted and positively significant for the social pillar score.

Table 13. The Impact of ESG Factors on firm value

	(1)	(2)	(3)	(4)	(5)	(6)
	(Pooled OLS)	(Fixed Effect)	(Random Eff)	(Pooled OLS)	(Fixed effect)	(Random Eff)
VARIABLES	Tobins_Q	Tobins_Q	Tobins_Q	Tobins_Q	Tobins_Q	Tobins_Q
L.ESG_Combined_score$_{t-1}$	-0.00148	0.00493*	0.00234			
	(0.00152)	(0.00259)	(0.00214)			
L.Social_pillar_score$_{t-1}$				-0.00316	0.0221***	0.00787**
				(0.00378)	(0.00469)	(0.00416)
L.Environmental_pillar_score$_{t-1}$				0.00522	-0.00724	-0.00393
				(0.00366)	(0.00524)	(0.00424)
L.Governance_pillar_score$_{t-1}$				-0.00427	-0.00278	-0.00347
				(0.0308)	(0.00384)	(0.00340)
L.Debt-to-total_assets	0.0224***	0.00935***	-0.0133***	0.0187***	0.00862***	-0.0194***
	0.00175	0.00274	(0.00189)	0.00173	0.00265	(0.00201)
L.Firm_size	0.000178	4.23e-05	6.47e-05	0.000143	0.000164	7.94e-05
	(8.31e-05)	(0.000578)	(0.000150)	(8.30e-05)	(0.000563)	(0.000163)
L.BETA	0.0676	0.0845	0.0838	0.0824	0.0623	0.0697
	(0.0651)	(0.0622)	(0.0602)	(0.0658)	(0.0634)	(0.0612)
L.EBIT	0.000133	0.00137**	-0.000924**	0.000138	0.00203**	-0.000866*
	0.000337	0.000522	(0.000429)	0.000346	0.000525	(0.000436)
L.P/B - ratio	0.0237	0.0235	0.0205	0.0289*	0.0185	0.0154
	(0.0124)	(0.0137)	(0.0142)	(0.0143)	(0.0132)	(0.0132)
L.Interest_coverage_ratio	0.000411**	0.000126	0.000181	0.000386**	0.000114	0.000167
	(0.000183)	(0.000163)	(0.000162)	(0.000184)	(0.000164)	(0.000162)
Industry	0.0170	0.00301	0.00635	0.0174	0.00216	0.00594
	(0.0146)	(0.0128)	(0.0127)	(0.0146)	(0.0128)	(0.0127)
Constant	1.532***	1.231***	1.357***	1.377***	1.176***	1.326***
	(0.114)	(0.145)	(0.132)	(0.145)	(0.167)	(0.143)

Observations	1,533	1,533	1,533	1,533	1,533	1,533
Number of id	340	340	340	340	340	340
Test between FE-POLS	6.11 (0.0000)			6.13 (0.0000)		
Test between RE-POLS	671.2 (0.0000)			670 (0.0000)		
Hausman Test between FE-RE	32.43 (0.0000)			43.22 (0.0000)		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Fixed effect is more efficient than RE and POLS ***, **, * indicate that the values are significant at the 1%, 5%, and 10% levels.

4.3 Regression Results Cost of Capital

In contrast to the two other previous panel regression models for ROE and Tobin's Q, the Hausman test in the panel regression analysis for the cost of capital (WACC) confirms that the pooled OLS (POLS) models have the most efficient estimators to interpret the relationship for the last hypothesis (H1c). When comparing it to the fixed effect (FE) and random effect (RE) models, the Hausman test reveals that the pooled OLS (POLS) estimators have the most efficient estimators to interpret the effects of ESG factors have on the cost of capital.

Similar to before, the null hypothesis (H_0) of the test states that the Pooled OLS models are superior, whereas the alternative hypothesis (H_A) states that the fixed-effect models are better. The decision to accept or reject the null hypothesis (H_0) depends upon the p-value. If the p-value is significant (less than 0.1), the null hypothesis (H_0) must be rejected. The results from the test show that for both Pooled OLS models (1) and (4) their p-value is 0.97 and 0.94, respectively. As a consequence, the significant p-value shows that the null hypothesis (H_0) is not rejected and the Pooled OLS is preferred over all the other models to test and interpret the effects ESG factors to have on WACC.

The results of the pooled OLS model are reported in columns (1) and (4) in the table below. According to the results of column (1), all the variables are statistically significant as their p-value is higher than the 10% significance level. This proves a link between all these variables and the weighted average cost of capital (WACC). Meaning that all these variables and ESG combined score have a statistically significant impact on the weighted average cost of capital. This specially, means that the ESG combined score has affected the capital cost of Nordic firms, in a positive and significant way at the 5% significance level.

Furthermore, the variables governance pillar score, EBIT, firm size, and interest coverage rate are statistically insignificant, according to the result in column (4) as their probability value is greater than the 10% significance level. This suggests that these factors and the weighted average cost of capital have no significant relationship. Environmental pillar score, social pillar score, debt to total assets, BETA, price to book ratio, and industry, on the other hand, have statistically significant effects on the weighted average cost of capital. The difference is that the environmental pillar score has a negative effect on WACC, while the social pillar score has a positive effect on WACC. In addition, firm leverage and the P/B ratio

are positively and significantly related to WACC. These findings imply that a company with a high ESG score will have a lower cost of capital, which will lead to an increase in the firm's value, which is confirmed by positive significant P/B - ratio values. These positive effect gains are gained through lower cost of capital and higher firm value. Furthermore, they are positively related to industry, and vary differently across the different industries in this study. Since the firm size is negatively and significantly associated with WACC, it means that the cost of capital is low for large Nordic firms and high for small Nordic firms.

Once again, we can utilize the economic mechanism channels found by (Giese et al. 2019), to argue that ESG performance (ESGC & S) has a positive effect on the capital cost of Nordic firms, both through their *idiosyncratic risk profile* (higher profitability and lower exposures to tail risk), and their *systematic risk profile* (lower costs of capital and higher valuations). This is confirmed by their relative strong significant positive values on the leverage variable (5.81e-05***, 0.000412***), which is aligned with our measurement for unsystematic risk in the regression model below. In addition, the conclusions on systematic risk profile for the Nordic firms is confirmed by the BETA values (1.24e-06*, 0.0419***), which is also the measurements for systematic risk in the regression model.

Table 14. The Impact of ESG Factors on cost of capital

	(1)	(2)	(3)	(4)	(5)	(6)
	(Pooled OLS)	(Fixed Effect)	(Random Effect)	(Pooled OLS)	(Fixed effect)	(Random effect)
VARIABLES	Wacc	Wacc	Wacc	Wacc	Wacc	Wacc
L.ESG_Combined_score$_{t-1}$	0.000564**	-0.000538*	5.82e-04***			
	(0.000302)	(0.000310)	(2.16e-06)			
L.Social_pillar_score$_{t-1}$				0.000412***	0.000544***	0.000352***
				(5.18e-05)	(7.65e-05)	(5.18e-05)
L.Environmental_pillar_score$_{t-1}$				-0.000290***	-0.000306***	-0.000290***
				(4.87e-05)	(8.94e-05)	(4.87e-05)
L.Governance_pillar_score$_{t-1}$				4.59e-06	-1.99e-05	4.59e-06
				(4.17e-05)	(6.42e-05)	(4.17e-05)
L.Debt-to-total_assets	5.81e-05***	0.000274***	-5.27e-05***	3.89e-05**	-3.42e-05	-3.89e-05**
	(2.15e-05)	(4.62e-05)	(1.76e-05)	(1.75e-05)	(3.71e-05)	(1.75e-05)
L.Firm_size	-5.27e-05***	-2.44e-05	-1.24e-06	-8.58e-07	1.31e-05	-8.58e-07
	(1.76e-05)	(3.75e-05)	(1.26e-06)	(1.24e-06)	(9.98e-06)	(1.24e-06)
L.BETA	1.24e-06*	1.15e-05	0.0426***	0.0419***	0.0415***	0.0419***
	1.26e-06	(1.01e-05)	(0.000987)	0.000984	(0.00115)	(0.000984)
L.EBIT	0.0426***	0.0427***	-1.07e-05**	-6.86e-06	4.46e-06	-6.86e-06
	(0.000987)	(0.00114)	(5.10e-06)	(5.18e-06)	(9.52e-06)	(5.18e-06)
L.P/B - ratio	1.08e-05**	4.75e-06	0.000678***	0.000483***	0.000447*	0.000463***
	5.10e-07	(9.56e-06)	(0.000164)	(0.000176)	(0.000243)	(0.000163)
L.Interest_Coverage_ratio	0.000654***	0.000478*	1.10e-06	1.06e-06	1.22e-06	1.06e-07
	(0.000172)	(0.000242)	(2.78e-06)	(2.76e-06)	(2.97e-06)	(2.75e-08)
Industry	1.09e-06**	1.64e-06	-0.000510**	0.000523**	-0.000503**	-0.000523**
	2.77e-06	(2.99e-06)	(0.000222)	0.000219	(0.000231)	(0.000219)
	0.00915***	0.00128	0.00915***	0.00920***	0.00301	0.00920***
Constant	(0.00167)	(0.00272)	(0.00178)	(0.00184)	(0.00273)	(0.00168)
Observations	1,533	1,533	1,533	1,533	1,533	1,533

R-squared	0.584	0.569		0.595	0.579	
Number of id		340	340		340	340
Test between FE-POLS	0.97 (0.6902)			0.94 (0.7915)		
Test between RE-POLS	0.000 (1.000)			0.0000 (1.0000)		
Hausman Test FE-RE	42.31 (0.0000)			38.56 (0.0000)		

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Pooled OLS is more efficient than RE and FE ***, **, * indicate that the values are significant at the 1%, 5%, and 10% levels.

7. Discussion

In this section, we will tie our findings to the theory and existing literature, one dependent variable at a time, and analyze the implications.

7.1 Findings

Our findings reveal that there is no statistically significant relationship between individual and combined ESG factors and firm profitability (i.e., ROE). Because the association is insignificant, firms with high or low ESG scores perform equally well or poorly. These findings are somewhat contrary to most studies that have investigated the link between ESG and ROE. The report by NYU Stern Center for Sustainable Business and Rockefeller Asset Management that investigated more than 1000 papers examining the relationship between ESG activities at organizations and their financial performance found that out of the 67 papers focusing on accounting-based measures, 46% found a positive link, 44% found no link and only 12% found a negative relationship (Whelan et al., 2021). This is also coherent with Huang's (2021) meta-study of 69 academic papers that found that the weight of empirical evidence shows a positive, statistically significant but economically modest ESG to corporate financial performance link.

However, the overall ESG score has a positive and significant impact on a company's firm value (Tobin's Q), but individually, only the social pillar of ESG has a meaningful impact on Tobin's Q. Our findings are consistent with the majority of previous research, which has found positive links between ESG and firm value (Atan et al., 2018).

The cost of capital (WACC) of a corporation is influenced positively by the combined ESG and social pillar, but negatively by the environmental pillar. The latter is in line with Bauer & Hann (2010), who examined the impact of good sustainability policies on a company's cost of debt and discovered that companies with superior environmental management systems have much lower credit spreads, resulting in reduced debt costs. From the standpoint of the firms, this link shows that the stronger the environmental ESG practice, the cheaper the firm's economic price for attracting capital. This suggests that increasing environmental initiatives can be a key driver of firm value creation and increased investor confidence. It is however interesting that the social pillar and the combined score had a significant positive relationship

with WACC. This suggests that companies with a high social agenda have a higher average cost of capital. This could be due to stakeholders' lack of trust in firms' social measures.

Lastly, our results would have been different if we had also avoided using the natural logarithm of beta and financial leverage, and instead used the natural logarithm of firm size as conducted by Velte (2017). However, our results showed that the correlation effects between financial average and firm sizes were too significant, and for this reason this was avoided.

7.2 Theoretical implications

Since we did not find any significant link that ESG performance had a positive impact on firm probability, we can say that this finding titles more in the direction of the shareholder theory. According to the shareholder theory standpoint (Friedman, 1962), CSR investments that do not surpass the minimum required level to generate shareholder value are considered capital destruction because they cannot be directly linked to the company's value generation. Jensen (1986) argues these same theoretical mechanisms, stating that excess in the hands of management may cause them to invest in ways that do not maximize firm value. While Aupperle, Carroll, and Hatfield (1985), go even further by arguing that the danger of wasteful behavior from management spending on CSR will put the firm at a financial disadvantage in contrast to competitors who spend less on CSR[54].

In terms of the stakeholder theory, it appears that the idea of adhering to all stakeholders by spending more on ESG activities does not increase return on equity, nor does it lower the cost of capital. The theory, however, is not causality. The stakeholder-focused view essentially promotes the benefits of ESG practices, which *can* help companies perform better financially. As previously stated, the majority of studies reveal a positive association. Furthermore, it appears that catering to all stakeholders by improving ESG efforts enhances the firm's value and cost of capital, bolstering the theory.

As far as the other theories go, the findings support Porter's hypothesis, which, similarly to stakeholder theory, claims that ESG laws can *occasionally* enhance innovation and, subsequently, profitability. This is to some extent coherent with our results, which find no

[54] This is because their research, which used a complex, forced-choice instrument to survey business CEOs, found no link between social responsibility and firm profitability (Aupperle et al, 1985).

significant improvement in firm profitability, but we do see an increase in firm value and a decrease in the cost of capital when it comes to the environmental pillar. However, if this is due to enhanced innovation as a result of environmental policies is difficult to say and should be investigated further.

In an ESG context, Resource-Based View focuses on explaining how a company's sustainable actions provide a competitive advantage and, as a result, superior financial performance. Our findings for ROE and our mixed findings for WACC do not support this. However, it is possible that environmental initiatives comply with the conditions of the VRIN-model and thereby provides a competitive advantage when it comes to raising capital, as our findings indicate that the cost is lower for companies with a strong environmental focus.

Finally, based on our findings, agency theory could be relevant. Some claim that a manager's motivation for raising the company's ESG score is to improve their own profile, such as by seeming more environmentally friendly, at the expense of shareholders (Surroca & Tribó, 2008). Our data contradict this since high ESG scores had no discernible detrimental impact on firm value or cost of capital. We did however not find a significant positive effect on ROE and for the combined and social score we found these efforts increase the cost of capital, indicating that Brown, Helland, and Smith (2006) argument that firms pay an agency cost when they spend money on CSR activities that are not offset by shareholder return, could be correct.

8. Conclusion

This study achieved to establish a link between Nordic companies' ESG scores and their financial performance, which is measured using three criteria: profitability, firm value, and cost of capital. Despite the fact that there have been some academic studies examining the relationship between ESG and financial performance, few studies have looked at multiple economic performance criteria. Furthermore, the majority of studies are from the United States, and the results are inconsistent.

According to our findings, there is no statistically significant link between the individual and combined ESG indicators and business profitability (i.e., ROE). However, while a company's overall ESG score has a positive and significant impact on its firm value (Tobin's Q), only the social pillar of ESG has a significant impact on Tobin's Q. Furthermore, one can argue that

ESG performance (ESGC & S) has a positive effect on the firm value of Nordic firms through their idiosyncratic risk profile (higher profitability and lower exposures to tail risk). The combined ESG has a positive and significant impact on a corporation's cost of capital (WACC), but only the social pillar is significantly positive, while the environmental pillar is significantly negative. Because of this one could argue that ESG performance (ESGC & S) has a positive effect on the capital cost of Nordic firms, both through their idiosyncratic risk profile (higher profitability and lower exposures to tail risk), and their systematic risk profile (lower costs of capital and higher valuations).

Our findings are to some extent consistent with prior research on the topic and can be attributed to the Stakeholder Theory, Porter's hypothesis, the Resource-Based View or the Agency Theory.

Our findings suggest that increasing environmental, social and governance initiatives *can* be a key driver of firm value creation and increased investor confidence. The findings of this study can be used by researchers and professionals to widen the central components of ESG connected to financial performance, firm value, and cost of capital. Furthermore, establishing incentives that emphasize the relevance of ESG practices and promote them would help firms in the Nordic region to be even more sustainable and competitive.

Despite its merits, the study has certain limitations. For starters, a limited number of Nordic companies and years are evaluated. Because ESG scores were only established fairly recently, the number of companies in the region which have ESG data is limited. Secondly, information was gathered from secondary sources, which is a relative weakness. Although the variables utilized are common in literature, it is preferable to use direct financial data from the firms.

8.1 Future studies

Future studies should look more into the external factors that affect the relationship between ESG score and profitability, firm value, and cost of capital in greater depth by acquiring more data. One could also investigate the conditions that allow companies and investors to benefit from a lower cost of capital by improvements in ESG performance score. Furthermore, this study is focusing on the Nordic as a whole and future studies could examine countries individually, including Iceland. Another suggestion is to run a comparison regression analysis

of the Nordics against the worst ranked ESG countries in the world such as China (Artman & Kullberg, 2019; sdgindex, 2018). Lastly, it would be interesting to conduct a similar study by multiple panel regression models. This model can be expanded by examining if there is a Nordic and Chinese ESG-efficient frontier, showing the highest attainable Sharpe ratio for each ESG pillar and ESG combined score. Furthermore, by combining the data sets for expected returns, risk free rate and dividing the result by the standard deviation of the assets or portfolio's excess return, it is possible to compute the empirical ESG-efficient frontier. This shows the costs and benefits of responsible investing in the Nordic countries relative to each other and compared to a portfolio of Chinese companies. Here an ESG-adjusted capital asset pricing model determines equilibrium asset prices, indicating when ESG boosts or decreases the required return (Pedersen et al., 2021). This topic will be very interesting to investigate, since the survey carried out by (NN Investment Partners' survey, 2019) found that despite the enthusiasm around ESG investments, one-fifth of Nordic investors said they have no plans to add ESG investments to their portfolios. In addition, on average, investors only devote 5% of their whole portfolios to impact funds (Sloley, 2020).

9. Bibliography

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7. Appendix

The ESG ratings of Nordic corporations are used to create value-weighted high v.s low portfolios. The high portfolio has 30% of the top-rated companies, while the low portfolio contains 30% of the lowest-rated companies. These ESG portfolios are rebalanced on a yearly basis and ESG scores are collected from Thomson Reuters Refinitiv (2021). The portfolios are analyzed using a t-test. In the period 2009 to 2019, the analysis has been undertaken on the Nordics as a whole, based on the individual countries (Norway, Sweden, Denmark, and Finland). Therefore, the methods in the Appendix tables A - D utilize a t-test to see if there is a significant difference between companies with high ESG performance and companies with low ESG performance. In addition, the relationship between ESG and financial performance was investigated by comparing three financial performance metrics (ROE, WACC, and TOBINQ) between the Low ESG and High ESG groups, excluding the Medium ESG group. The sample companies were divided into these three categories after each year.

<u>In short, the hypothesis can be summarized as</u>

Hypothesis 1: Firms with high ESG performance have higher profitability than those with low ESG performance.

Hypothesis 2: Firms with high ESG performance have lower capital costs than those with low ESG performance.

Hypothesis 3: Firms with high ESG performance have a higher value than those with low ESG performance.

We construct the following regression model to see if the ESG firm's efforts have an impact on their financial performance:

$$FP_{it} = \alpha_0 + \alpha_1 ESGC_{it-1} + \alpha_2 SIZE_{it} + \alpha_3 LEV_{it} + \alpha_4 \sum_j IND_{jt} + \varepsilon_{it} \quad (X, 1)$$

$$FP_{it} = \alpha_0 + \alpha_1 E_{it-1} + \alpha_2 S_{it-1} + \alpha_3 G_{it-1} + \alpha_4 SIZE_{it} + \alpha_5 LEV_{it} + \alpha_6 \sum_j IND_{jt} + \varepsilon_{it} \quad (X, 2)$$

Table A. Test for ESGC:

Financial Performance Year	ROE		Tobin Q		WACC	
	High CRS t-value	low CSR	High CRS CSR t-value	low	High CRS CSR t-value	low
2009	0.035	0.770	0.025	0.839	0	1
	-27.43***		-40.79***		-	
2010	0.059	0.75	0.041	0.833	0	1
	-22.90***		-36.55***		-	
2011	0.048	0.747	.0347	0.836	-	-
	-24.87***		-39.19***		-	
2012	0.053	0.749	.031	0.846	-	-
	-23.66***		-43.49***		-	
2013	0.053	0.737	0.0282	0.857	0.030	0. 847 -
	-23.96***		-49.59***		46.44***	
2014	0.065	0.737	0.034	0.864	0.034	0 .861 -
	-23.50***		-51.43***		50.68***	
2015	0.061	0.753	0.030	0.877	0.032	0.870
	-25.98***		-59.47***		-56.15***	
2016	0.069	0.735	0.034	0.871	0.034	0.861
	-24.19***		-59.14***		-56.06***	
2017	0.071	0.626	0.036	0.809	0.038	0.796
	-21.03***		-51.01***		-48.42***	
2018	0.072	0.593	0.039	0.782	0.036	0.787
	-20.63***		-49.16***		-52.06***	
2019	0.093	0.442	0.047	0.712	0.044	0.712
	-12.85***		-42.21***		-44.21***	

*** show Significant at 1%, ** show significant at 5% and * show significant at 10%

Table B. Test for E:

Financial Performance	ROE		Tobin Q		WACC	
Year	High CRS t-value	low CSR	High CRS CSR t-value	low	High CRS CSR t-value	low
2009	.1054 -19.39***	0.770	.0764 -29.65***	.8372	0 -	1
2010	.1114 -18.44***	.7581	.0775 -30.05***	.8374	0 -	1
2011	.0967 -19.71***	.7580	.0641 -33.01***	.8406	- -	-
2012	0.102 -19.09***	0.752	.0626 -35.70***	0.848	- -	-
2013	0.106 -19.44***	0.755	0.058 -41.19***	0.864	0.060 39.15***	0 .856 -
2014	0.123 -18.85***	0.753	0.062 -43.54***	0.872	0.065 42.06***	0 .870 -
2015	0.101 -22.33***	0.770	0.049 -52.8***	0.885	0.051 -50.17***	0.879
2016	0.098 -23.26***	0.768	0.047 -55.98***	0.887	0.05 52.97***	0.880 -
2017	0.101 -21.51***	0.707	0.051 -51.22***	0.850	0.053 -49.07***	0.841
2018	0.104 -21.19***	0.679	0.054 -50.05***	0.830	0.051 -52.94***	0.834
2019	0.134 -15.02***	0.589	0.067 -43.95***	0.781	0.062 -46.88***	0.787

*** show Significant at 1%, ** show significant at 5% and * show significant at 10%

Table C. Test for S:

Financial Performance	ROE		Tobin Q		WACC	
Year	High CRS t-value	low CSR	High CRS t-value	low CSR	High CRS t-value	low CSR
2009	.0729 -23.53***	.7945	.0509 -35.59***	.8549	0 -	1
2010	.0869 -21.01***	.7717	.0586 -34.13***	.8487	0 -	1
2011	.0887 -20.41***	.7580	.0567 -34.54***	.8424	- -	-
2012	.0862 -20.16***	.7466	.0543 -37.31***	.8467	- -	-
2013	0.103 -19.46***	0.75	.0578 -41.19***	0.864	0.061 38.69***	0 .855 -
2014	0.130 -17.56***	0.730	0.067 -41.03***	0.859	0.068 -40.32***	0 .8553
2015	0.116 -20.11***	0.746	0.057 -48.86***	0.874	0.059 -46.22***	0.8663
2016	0.134 -18.86***	0.733	0.064 -48.12***	0.869	0.067 -45.27***	0.858
2017	0.141 -15.34***	0.614	0.071 -41.41***	0.804	0.075 -39.14***	0.789
2018	0.138 -15.77***	0.598	0.073 -41.03***	0.785	0.070 -43.16***	0.788
2019	0.150 -9.83***	0.446	0.074 -37.12***	0.714	0.072 -38.93***	0.717

*** show Significant at 1%, ** show significant at 5% and * show significant at 10%

Table D. Test for G:

Financial Performance	ROE		Tobin Q		WACC	
Year	High CRS t-value	low CSR	High CRS t-value	low CSR	High CRS t-value	low CSR

2009	.0540	.7837	.0411	.8470	0	1	
	-25.36***		-37.20***		-		
2010	.0706	.7771	.0472	.8506	0	.966	
	-22.92***		-36.74***		-29.00***		
2011	.0752	.7849	.0494	.8608	-	-	
	-22.89***		-37.73***		-		
2012	.0592	.7735	.0362	.8616	-	-	
	-24.18***		-43.65***		-		
2013	0.707	0.785	0.036	0.881	0.061	0 .855	-
	-24.16***		-49.72***		38.69***		
2014	0.062	0.779	0.032	0.885	0.032	0 .882	-
	-25.87***		-55.73***		54.91***		
2015	0.065	0.789	0.031	0.894	0.034	0.887	
	-27.36***		-62.08***		-57.93***		
2016	0.067	0.776	0.032	0.892	0.034	0.884	
	-27.32***		-64.04***		-59.93***		
2017	0.096	0.675	0.049	0.828	.0525	0.819	
	-20.70***		-49.29***		-46.97***		
2018	0.109	0.622	0.055	0.795	0.053	0.800	
	-18.62***		-46.11***		-48.42***		
2019	0.201	0.435	0.097	0.703	0.094	0.704	
	-7.26***		-32.91***		-34.37***		

*** show Significant at 1%, ** show significant at 5% and * show significant at 10%