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The Nordic investors valuation of ESG

Is there a correlation between the ESG score and the stock price of companies listed in the Nordic markets?

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Abstract

This study investigates the relationship between the sustainability (ESG) disclosure and the stock price of the companies listed in the Nordic countries. We have analyzed a data panel consisting of 1350 firm-year observations from 153 firms during the years 2010-2019 using a modified Ohlson model. The results support a positive correlation between ESG performance and firm value in the Nordic countries. A further investigation into subcategories reveals that the environmental effect is the strongest. The social score provides a somewhat weaker but more significant effect, while the governance score does not provide any significant correlation with the firm value. A deeper investigation of the environmental category indicates that stock price has a significant positive relationship with both resource use and the lagged emission score. Interestingly, environmental innovation shows no significant correlation. We also find support for a delayed market response, as the lagged version of all variables gives stronger explanatory power and more significant results than the observation from the year of the examined market value. Overall, our study finds support that investors see value being created from positive changes in the ESG scores of companies. Therefore, from an investor perspective, this study finds support for the stakeholder theory. Interestingly, we also find that a higher ESG score is negatively correlated to return on assets when testing the causality, which supports the shareholder theory.

Keywords: ESG, sustainability, value relevance, stock price, shareholder theory, stakeholder theory, Nordic countries, slack resources theory, managerial opportunism hypothesis.

Preface

This master thesis has been completed as part of the master's degree in Business Administration at Oslo Metropolitan University. The thesis is a part of the compulsory education plan and amounts to 30 credits.

The purpose of this study has been to investigate how the investors valuate ESG performance for companies listed and located in one of the Nordic countries. This has been a very rewarding and educative process for us and will be highly relevant in our future careers as the environmental focus is more relevant now than ever.

We would like to thank our supervisor, Muhammad Azeem Qureshi, for his valuable insights and support throughout the process.

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1 Introduction

The world is currently facing large environmental problems, and the focus on environmentally friendly solutions has never been more relevant (UN Environment, 2019). It has been extensively debated and researched whether acquiring a good environmental, social and governance (ESG) score for a company is experienced by the market and the investors as either value-creating or value-destroying (Friede, Busch, & Bassen, 2015; Margolis, Elfenbein, & Walsh, 2011). Currently, the environmental challenges dominate the agendas of the largest conferences around the world, and it is highly relevant to explore which implications this could have for investors and companies.

The Nordic countries (Norway, Sweden, Denmark, Finland, and Iceland) are considered to be among the most environmentally aware countries in the world. All the countries placed in the top 15 of the world rankings according to the Environmental Performance Index by Yale Center for Environmental, Law & Policy (2018). Also, ISS publishes a report every year with a country ranking based on ESG scores. In their report from 2019, the Scandinavian countries are at the top of the list (Comble et al., 2019). For the first time during all the years the report has been published, a non-Scandinavian country – Switzerland – is among the three highest rated countries. The question of which effect the ESG performance has on the financial performance of a company has been investigated in several articles and studies. Though depending on the industry, part of the world, and period of time, the results have been far from unanimous (Amel-Zadeh & Serafeim, 2018; Clark & Viehs, 2014; Margolis et al., 2011).

In this study, we will examine the effect of environmental, social, and governance performance score on stock prices for companies listed in the Nordic markets. The Nordic countries were chosen since they, on a country-level, are renowned for being environmentally friendly. Our focus will be on whether a change in the ESG score provides a significant change in the market value of companies and, if so, to which specific subcategory the effect can be traced to. Another aim is to further investigate and isolate the effect from the environmental subcategory. The environmental effect was chosen for closer examination because of the environmental focus and top rankings in the Nordic countries. Based on previous research, we are curious to examine the investors' behavior. We want to test how investors in the Nordic markets react to changes in ESG score of listed companies. This will give us a notion of how the investors in these countries see and value corporate efforts to improve their ESG performance. Through

this study, listed companies will get an indication of whether to act and invest more or less in ESG and which effects these investments potentially have. Previous similar studies conducted in the Nordic countries (Dahlberg & Wiklund, 2018; Langeland & Ugland, 2019) used Tobin's Q to capture the effect from the market, whereas we decided to use the Ohlson price model and stock price as our dependent variable in line with earlier studies on the subject (De Klerk, de Villiers, & van Staden, 2015; Qureshi, Kirkerud, Theresa, & Ahsan, 2020; Semenova, Hassel, & Nilsson, 2010). The effects of ESG has been extensively researched, but we experience a knowledge gap when it comes to isolating the specific subcategories with the strongest effects. By examining this, we will provide companies with useful information surrounding which areas of ESG that investors value the most. To further extend the study of Dahlberg & Wiklund (2018), we will, as mentioned earlier, investigate the factors that make up the environmental score. Another motivation for testing the subcategories on the environmental part is that the factors related especially to governance and some of the social factors like product responsibility and regulation of the workforce are extensively regulated by the laws in the Nordic countries. This plausibly allows lesser room for the Nordic companies to distinguish themselves from their peers and be noticed by the investors as a value proposition. We expect that the environmental score will provide a channel where the Nordic companies can distinguish themselves from their peers in the Nordic capital markets. To our knowledge, this has not been done in other studies from the Nordic markets. To further examine ESG, we will test the causality between corporate social responsibility and corporate financial performance as this has been extensively debated in former studies (Farag, Meng, & Mallin, 2015; Lin, Law, Ho, & Sambasivan, 2019; Melo, 2012). This will also fill a knowledge gap from the Nordic markets as this causality hasn't been researched before to our knowledge.

Based on these considerations, we pose the following research questions to carry out this thesis:

1. *Is there a correlation between the ESG score and the stock price of companies listed in the Nordic markets?*
2. *How strong is the effect of the environmental score, compared to the social and governance score?*

This thesis is divided into six sections. After providing an introduction in section 1, we present corporate social responsibility in section 2 and provide an overview of its development over the years. A review of the relevant theories and the existing literature in this section helps us to identify the research gap, pose the research question, and formulate different hypotheses that

we examine in the thesis. In section 3, we present different models and the statistical method used, and in section 4, we describe the data. We present our results and their discussion in section 5. Our thesis ends with a conclusion and further research in section 6. We provide the bibliography at the end.

2 Theoretical framework and literature review

In this chapter, we explain the concept of environmental, social, and governance (ESG) and its development over time. For this purpose, we review the relevant theoretical and empirical literature to develop the theoretical framework, formulate research questions, and develop hypotheses to carry out this thesis.

2.1 Sustainability concepts

2.1.1 Corporate social responsibility and its history

Corporate social responsibility (CSR) refers to how a business behaves or involves in initiatives that benefit society. A common view of CSR is that companies take responsibility beyond creating financial value for shareholders; in other words, how companies are "giving back" to society. Examples of how a company can give back to society are through community involvement and charity, but also reductions in emissions, etc. Carter, Cale, and Grimm (2000, p. 219) define CSR as "Corporate Social Responsibility deals with the managerial consideration of non-market forces or social aspects of corporate activity outside of a market or regulatory framework and includes consideration of issues such as employee welfare, community programs, charitable donations, and environmental protection.".

Although CSR can be traced back to the Industrial Revolution, the modern era of CSR is said to have begun with Howard Bowen's (1953) publication "Social Responsibilities of the Businessmen," where he asks the question about what responsibilities to society may business people reasonably be expected to assume. During the 1960s, there was a higher focus on CSR where more people more actively wrote and engaged in the topic. Based on the increased attention around CSR, more companies had to pay higher attention to the environmental issues in society.

Even though CSR has existed for a long time, many associates it with recent decades. This could be explained by three main reasons: globalization, environmental threat, and emergence of different Non-Governmental Organizations (NGOs). Globalization leads to free-trade agreements with more international trading, which reduced the possibility of political intervention nationally. It limited the ability of public authorities to force companies to take social considerations into account through measures and regulations, as such things often were seen as a trade barrier. Another important factor in globalization was the big multinational companies

that localized labor-intensive production to low-cost countries with low wages and poor working conditions due to cost cuts. An example is when Nike became infamous in a report about the conditions at a factory in Vietnam that didn't live up to western expectations. The report was conducted by Ernst & Young and got leaked to an NGO, which made it public. It concluded that the workers were exposed to illegal levels of toluene and acetone without protective clothing or safety training, and were made to work excessive overtime hours in violation of Vietnamese law (Hammond, 1997). Usually, NGOs are not closely tied to governments or corporations, which allows them to be bolder and not as caught up in corporate politics as other companies. "Naming and shaming" is a tool used by NGO's to go after companies not living up to CSR expectations. In this case, Nike was forced to rethink its tactics following the unwanted attention and eventually went from being "the worst" of the globalization to become an example to follow for other big companies. This is just one example of how CSR has developed as a result of NGO's exposing big corporations and forcing them to act with integrity.

The rise of globalization was an important factor that sparked the focus around the challenges of global warming. In 1972, the United Nations Conference on the Human Environment was held in Stockholm. The conference was hosted by the United Nations (UN), and the UN Environmental Program (UNEP) was developed. The program was encouraging businesses to take action on world issues of environmental protection and human rights. UNEP formed The World Commission on Environmental and Development with Gro Harlem Brundtland at the helm later in 1983. Their goal was to unite countries behind the cause to pursue sustainable development. They published their final report, "Our Common Future", in 1987. The report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 43).

John Elkington introduced the famous concept of "The triple bottom line" in 1994. The concept addresses three bottom lines, profit, social and environmental, instead of the traditional approach of only profit. Elkington explains through the concept how a business can achieve sustainable development by integrating all three aspects in their business. The triple bottom line is a sustainability framework that examines a company's social, environmental, and economic impact. In the article, Elkington considers some of the ways in which businesses are developing the new "win-win-win"-strategies to simultaneously benefit the company, the customers, and the environment (Elkington, 1994, p. 90).

2.1.2 Responsible investments

Socially responsible investments (SRI) are defined as "an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis" (Goergen, 2012, p. 154). The former United Nations Secretary-General Kofi Annan invited some of the largest institutional investors in 2005 to join a process to develop different principles for defining responsible investments. They developed six principles related to ESG, aimed at dealing with issues like climate change and human rights. These principals were named PRI, and their goal was to encourage adoption of the principles and collaboration on their implementation by fostering good governance, integrity, and accountability; and by addressing obstacles to a sustainable financial system that lie within market practices, structures, and regulation (PRI, n.d.).

The earliest responsible investments were often based on ethical considerations tied to religious ideals from Judaism, Christianity, and Islam. Modern SRI is more based on varying personal ethical and social convictions of individual investors (Renneboog, Ter Horst, & Zhang, 2008). Auer and Schuhmacher (2016) posit that there are two types of socially responsible investors, value-driven investors (VDI) and responsible profit-seekers (RPS). While a VDI is concerned with the non-financial utility they derive from their investment and are willing to accept a loss in financial performance in exchange, an RPS would not invest in regions or industries where SRI does not provide financial benefits.

US SIF Foundation (2018) has measured the size of sustainable, responsible, and impact investments in the United States from 1995 until 2018. This measurement shows a compound annual growth rate of 13,6 percent. The total US-domiciled assets under management using SRI strategies grew from $8.7 trillion at the start of 2016 to $12 trillion at the start of 2018, which represents 1 in 4 dollars of the $46.6 trillion in total US assets under professional management. Without having the specific numbers for Nordic countries, we expect some similar results in growth rate for these countries.

2.1.3 Vice and virtue stocks

The terms "vice" and "virtue" are expressions defining whether the stock of a company is considered ethical or not. Lobe and Walkshäusl (2016) released a study where they examined whether an investment in vice stocks can financially outperform an investment in socially responsible (virtue) stocks. They labeled vice stocks as stocks related to adult entertainment,

alcohol, gambling, nuclear power, tobacco, and weapons. The study concluded with no compelling evidence that either sin stocks or socially responsible stocks outperform or underperform against market indices. The company's performance was measured through Sharpe ratios and four alternative asset pricing models, and the study covers a period from July 1995 to July 2007. Vice stocks can be related to companies with a bad ESG score, and the opposite with virtue stocks. Vide (2016) later posted the paper, "Does it pay to be good? An analysis of vice and virtue stock performance in the Eurozone", with a performance analysis of vice and virtue stocks in the Eurozone for the period between January 2005 and December 2014. A vice index was created out of listed Eurozone companies operating in selected vice industries, with a matching virtue index of companies in virtue industries. Their performance was evaluated through the Sharp ratio, the capital asset pricing model and the Carhart's four-factor model. This study supports the findings of Lobe and Walkshäusl, with no significant advantage or disadvantage when applying either of the investment strategies (Lobe & Walkshäusl, 2016; Vide, 2016). These results are relevant for our study, as they cannot find any evidence that socially responsible stock outperform market return. It is worth to mention that the companies in the studies are categorized only by industry and not by individual CSR ratings. Based on this, we expect that our results could potentially differ from the findings in the studies.

2.1.4 Environmental, social & governance

The term ESG was first introduced in the report "Who Cares Wins: Connecting Financial Markets to a Changing World" (World Bank, 2004). This report was made as a result of the earlier mentioned initiative by the United Nations Secretary-General Kofi Annan to develop guidelines and recommendations on how to better integrate environmental, social, and corporate governance issues in asset management, securities brokerage services, and associated research functions. These recommendations are aimed at all relevant parties in the financial sector, which includes analysts, financial institutions, companies, investors, pension funds trustees, consultant and financial advisors, regulators, stock exchanges, and NGOs. The ESG score is supposed to be an expression of a company's CSR activities in a measurable variable.

The first major barrier for ESG has been that companies have to report the numbers on their own initiative, which results in a lot of missing data on companies which chooses to not report. Not having data on the whole population complicates the degree it can be used as a decision-making tool for investors. The Global Reporting Initiative (GRI) is an independent international organization which was first to adopt global standards for sustainability reporting from

1997 (GRI, n.d.). GRI defines a sustainability report as a report published by a company or organization about the economic, environmental, and social impacts caused by its everyday activities. In 2017, 93% of the world's largest 250 corporations reported their sustainability performance in their annual reports, where 75% of them used GRI's standards (Blasco & King, 2017).

The second major barrier for ESG has been the absence of a generally accepted international framework when it comes to reporting ESG. This issue is discussed in a report published by the International Business Council (IBC) at the World Economic Forum, and the report was prepared in collaboration with Deloitte, EY, KPMG, and PwC. They address the issues of multiple ESG measurement and reporting frameworks, as well as lack of consistency and comparability of metrics (Deloitte, EY, KPMG, & PwC, 2020). In the report, they identified a core set of material ESG metrics. They recommended disclosures that could be reflected in the mainstream annual reports of companies consistently across industry sectors and countries.

The environmental perspective of ESG could be seen as the most discussed and important factor of the three, with the recent climate changes discussed to be caused by emissions from humans. Another factor is that environmental damage from emissions etc. in most cases can't be reversed, examples being the melting of the ice caps and burning of the worlds' rainforests. Thomson Reuters measures their environmental pillar through three main themes: resource use, emissions, and innovation. The scores are measured based on company-reported information. (Refinitiv, 2020).

2.1.5 Greenwashing

Greenwashing can be defined as a discrepancy between what the organization claim to be doing and their actual environmental performance, where the companies are misleading consumers by appearing more environmentally friendly than they actually are (Delmas & Burbano, 2011). De Jong, Huluba, and Beldad (2019) investigate how consumers react to different types of greenwashing. They look at different factors that lead to companies performing greenwashing; for example, a high CSR can positively affect their reputation, purchase intentions and consumer loyalty, and that a solid CSR can work as a buffer in times of crisis. The article describes a randomized 3 x 2 experimental study, where six experimental conditions were created based on behavioral-claim greenwashing (an organization telling the truth vs. its telling lies or half-lies) and motive greenwashing (an organization acting on its own initiative vs. taking credit for

following legal obligations). They conclude that only honest and transparent communication about environmentally friendly behavior pays off, and only a true green position can be beneficial (de Jong et al., 2019).

Greenwashing could potentially harm the credibility of the ESG scoring system if it turns out that greenwashing is a widespread problem among companies. We have few ways to specifically control for greenwashing in our thesis as we only extract the scores from the Thomson Reuters Eikon database. In an attempt to control for this, we have chosen to include the ESG controversies score in our analysis, which aims to capture if a company has had some negative media exposure related to ESG. This score is made up of controversies related to ESG and negative events reflected in the global media, which makes it independent from what the companies reports themselves.

2.2 Economic theory

In this section, the theories used to explain the research questions will be presented. Four theories have been selected to cover the whole spectra of outcomes in order to have a theory for each possible outcome. The theories selected are stakeholder theory, shareholder theory, slack resources theory, and managerial opportunism hypothesis. The shareholder and stakeholder theories are of opposite opinions regarding the effect of CSR on the company's financial performance.

2.2.1 Shareholder theory

First introduced by Friedman (1962) in "Capitalism and Freedom", stating that the only obligation of the corporation is to maximize the shareholder value. Friedman was famously quoted for his statement "the business of business is business," and warned at the same time against CSR in the earlier mentioned book Capitalism and Freedom: "Few trends could so thoroughly undermine the very foundations of our free society as the acceptance by corporate officials of a social responsibility other than to make as much money for their stockholders as possible." (Friedman, 1962, p. 133). It should be up to shareholders themselves to decide whether to contribute to society, and the firm cannot make this decision for them. From this point of view, CSR-investments that exceed the legally binding minimum is viewed as destruction of capital since it cannot be directly tied to value creation in the company. This view is supported by Jensen (1986), who states that excess cash in the hands of management might lead them to

invest in a way that doesn't maximize firm value. The risk of wasteful behavior from management spending on CSR will put the firm at a financial disadvantage in comparison to competitors that invest less in CSR, according to Aupperle, Carroll, and Hatfield (1985).

Retaining profits in the company to develop the CSR policy gives rise to potential agency problems between owners and managers. There are several different ways a manager can act differently from the shareholder's best interest, with different projects or investments that, for example, could benefit the manager on a personal level. An example could be different ESG improving activities or investments that could give the manager private benefits such that he or she is being perceived as environmentally friendly, where the manager would not behave in the shareholders' best interest.

2.2.2 Stakeholder theory

The stakeholder theory argues that the company has responsibilities beyond its own shareholders and maximizing profits. Taking these responsibilities seriously and improving the social, governance, and environmental situation, both internally and externally to stakeholders, the company will have a better financial performance than the companies that ignore their stakeholders. This view was first introduced by Freeman (1984) in his book "Strategic Management," and is an answer to Friedman's shareholder theory. Freeman defines a stakeholder as anyone that has a stake in the company, for example, employees, customers, suppliers, shareholders, or individuals affected by a corporation. In other words, anyone with a stake in the company, as suggested by Elkington's triple bottom line that sprung out of the idea introduced by Freeman. Elkington (1994) developed a framework that recommends companies to focus on social and environmental concerns just as they do on profits. Critics of the theory argue that the level of stake is not defined, so it could, in principle, be infinite. In most situations, the firm's stakeholders are defined as the employees, debtholders, suppliers, customers, and the local society, and their level of stake is considered on behalf of how they are affected by the firm's actions. The expectation is that investing in CSR-activities will lead to an advantage to competitors that have a more shareholder-based view. By investing in CSR, the expected effect is that risks tied to CSR, such as government regulations, environmental changes, or gender inequality, will be mitigated (Cornell & Shapiro, 1987). This leads to the risk premium of the company being lower than that of competitors not investing in CSR. A lower risk premium then lowers the cost of capital, and investments will come cheaper to the company.

2.2.3 Slack resources theory

The majority of former research on this subject assume and explore the causal effect of CSR investment on the financial performance of firms. Waddock and Graves (1997) inversed this thought and claimed it might be the other way around. That is, profitable firms will have excess funds needed to invest in CSR. The cornerstone of this theory is what its name implies, slack resources. As discussed by Waddock & Graves (1997), with good financial performance of companies comes slack resources, excess cash, that management can invest as they seem fit. The excess cash gives management the possibility to invest in social relations, governance, or environmental activities. This theory argues the opposite causality of the stakeholder theory. According to slack resources theory, the good financial performance precedes the ESG spending and therefore a correlation between the two can be observed. This is supported in a study by McGuire, Scheeweis and Branch (1990), where it is suggested that better corporate financial performance (CFP) leads to higher investment in CSR and a better ESG score. In the tests, McGuire et al. (1990) tried to lag the leading variable, say social performance, and tested it on CFP the current year. Then they tried it vice versa. Their analysis showed support for a stronger positive relationship when CFP was the lagged variable, which is in line with the slack resource theory.

2.2.4 Managerial opportunism hypothesis

The managerial opportunism hypothesis is a type of agency problem between management and shareholders. Preston and O'bannon (1997) suggest that this happens as a result of the compensation schemes connected to short term financial performance and stock price in listed companies. Their hypothesis is that when a company is financially profitable, it leads to less spending on CSR-activities for management to realize a larger bonus. Inversely, when the company is delivering weak financial results, the managers might increase spending on CSR to create confusing surrounding reasons to mask for the poor financial returns. The majority of former research on the subject assumes and explores the causal effect of CSR investment on the financial performance of firms (Friede et al., 2015; Margolis et al., 2011), whereas Waddock et al. (1997) inversed this thought and claimed it might be the other way around.

2.3 Value relevance

The research around value relevance investigates how useful the accounting information of a company is for stock investors. The accounting information is denoted as value relevant if there is a statistical association between the accounting numbers and the market value of equity (Beisland, 2009, p. 7). In Beisland's review of the value relevance literature from 2009, he covers mainly high-quality value relevance research generally selected from top accounting journals over the last two decades. The article concludes that the accounting summary, which is the book value of equity and earnings, undoubtedly is associated with the market value of stocks and stock returns (Beisland, 2009, p. 23). Based on this, Ohlson's model will be used to control for both the financial information (book value per share and earnings per share) and non-financial information (ESG scores).

2.3.1 Ohlson price model

James Ohlson developed a price model for companies including both financial and non-financial factors, where the market value of a firm is measured through a function of its book value and abnormal earnings (Ohlson, 1995). The model is based on three different assumptions. The first assumption is that the present value of expected dividends determines the market value. Second, accounting data and dividends satisfy the clean surplus relation, and dividends reduce book value without affecting current earnings. The last assumption is that a linear model frames the stochastic time-series behavior of abnormal earnings. The clean surplus relation requires that a change in book value equals earnings minus dividends (Ohlson, 1995, p. 661). The Ohlson's model is widely used in studies to examine the valuation effect of the non-financial information (De Klerk et al., 2015; Qureshi et al., 2020; Semenova et al., 2010), which the ESG score is on a company's stock price.

2.4 Previous research

We will in this section present some of the studies that have explored similar themes and patterns. Most of the studies often test the relationship between CSR and financial performance across large areas (Europe, USA, etc.), and several studies use older datasets. This study will test the effect of CSR against the stock price for companies listed in the Nordic countries in recent times, as the theme of sustainability has gained a lot of attention lately. The findings from previous studies are nevertheless interesting as they provide knowledge on how the relationship has developed over time and areas.

2.4.1 Value relevance

As mentioned earlier, this theme has been debated and researched over an extended period, and the results vary a lot depending on the period, industry, and geographic focus area. A study done by Friede, Busch & Bassen (2015) combines the findings of about 2200 individual studies from the beginning of the 1970s, where they try to generalize the results of different studies done on the relationship between a company's ESG score and their financial performance. Only academic studies were considered in the study, and all relevant scholar databases and publisher sites were searched. All studies were required to be available in electronic format, and the cut-off date for inclusion was December 2014. They summarize that roughly around 90% of the studies concluded with a non-negative relationship between the ESG score and the financial performance. Of the 90%, a large majority of studies report a positive relationship between ESG and financial performance (Friede et al., 2015). These positive results were found across various approaches, regions, and asset classes. The financial performance measures used in the research were defined as accounting-based performance, market-based performance, operational performance, perceptual performance, growth metrics, risk measures, and the performance of ESG portfolios. We find the study highly relevant as it generalizes the results for 2200 individual studies. It also makes us able to see if the results in the Nordic countries differ from the general findings.

A similar article by Margolis, Elfenbein, & Walsh (2011) made a meta-analysis of 167 studies on the effect of corporate social performance (CSP) on financial performance between 1972 and 2007. On the basis of keywords, the data was collected from scientific databases and manually searched scientific journals. The financial performance data were categorized into two types: accounting-based measures and market-based measures. Their results are similar to the ones of Friede et al. (2015), with an overall positive relationship between CSP and financial performance. Only 2% of the studies analyzed conclude with a negative relation. Even though it supports a positive relationship, the overall effect is not very strong. They also investigate the causal effect of CSP on financial performance, or if the effect goes the opposite way. The evidence that the effect of financial performance on CSP is as strong, if not even stronger, is quite consistent, according to the writers.

The value relevance of ESG performance was tested on the Swedish market by Semenova, Hassel, and Nilsson (2010). Their research was performed on companies listed on OMX Stockholm. By gathering ESG data from an independent rating company called GES Investment

Services, now owned by Sustainalytics, they tested the scores on both accounting-based and market-based value. The sample consisted of 224 companies from 2005 to 2008. The writers identified extreme values in both the accounting-based and market-based data. To limit the effect from these outliers, they removed observations using the 1,5 interquartile rule. This is calculated by subtracting the value of the first quartile from the value of the third quartile and multiplying the difference by 1,5. The product from the multiplication is then added to the third quartile and subtracted from the first. The data points above and below these numbers are defined as outliers and were removed. They used Ohlson price model to formulate the regression function to be tested. Data from the sub-dimensions to ESG score was also gathered. Their findings support a positive relationship between good ESG scores and positive returns on the company stocks. They find the environmental effect to be the strongest indicator of company performance. This study is relevant for our thesis as it is tested on the Swedish market. The study sample is 12 years old, which makes it interesting to see if similar results are found with a newer sample.

De Klerk, de Villiers, and van Staden (2015) examined the same relationship as Semenova et al. (2010) among 89 of the largest UK companies in the years 2007 and 2008 using a modified Ohlson price model. They measured CSR through three different measures. The first measure is an indicator variable of whether the GRI framework is used for CSR disclosure or not. The second measure is also based on the GRI guidelines but takes into account the level of compliance with the guidelines. The last measure is a composite measure of CSR disclosure practices based on data collected by KPMG during international research on CSR reporting practices in 2008. The results of their study are in line with Semenova et al. (2010), where they find support for higher levels of CSR disclosure to be associated with a higher stock price. Also, they find evidence that CSR disclosure by companies which operates in environmentally sensitive industries (mining and quarrying, manufacturing, electricity, gas, steam and air conditioning supply and constructing) show a stronger association with stock prices than companies operating in other industries (De Klerk et al., 2015, p. 208).

A larger study was done on 812 listed European firms by Qureshi, Kirkerud, Theresa, and Ashan (2020), which investigated whether sustainability disclosure and female representation on boards affect firm value. Data from 2011 to 2017 was gathered using Thomson Reuters Eikon. They use, in line with both De Klerk et al. (2015) and Semenova et al. (2010), a benchmark price model of Ohlson (1995) to measure the firm value. Their results support the findings

of both De Klerk et al. (2015) and Semenova et al. (2010), with a positive relationship between ESG and stock price. In addition, they find the environmental and social scores to be more relevant than governance score. This is partly in line with Semenova et al. (2010), which finds the environmental score to be the strongest indicator of the categories. This study is pretty similar to what we will examine, except that we will focus further on the environmental disclosure and the Nordic countries. It will be interesting to see if these results will differ from what is found in general for the European countries.

A study was done on the German markets DAX30, MDAX, and TacDAX from 2008 to 2017 by Claudio Nuber, Patrick Velte, and Jacob Hörisch (2020). They examined the time-lagging impact on sustainability performance on financial performance through a panel data regression approach. The financial performance was measured through a company's return on assets and Tobin's Q. The ESG ratings were collected from Thomson Reuters Eikon. They performed an analysis with both firm and time-fixed effects, and added lagged variables to evaluate the long-term impact of ESG on financial performance. The study finds support for ESG scores to have a significant impact on ROA but a non-significant impact on Tobin's Q. Further, they couldn't find a consistent indication for a time-lagging impact on the company's financial performance. A similar study was done in the Nordic countries by Dahlberg & Wiklund (2018), which also examined the potential effect of ESG scores on both Tobin's Q and ROA. This study was performed on companies in the Nordic countries from the years 2007 to 2017 and had a total of 995 firm-year observations. In opposite to the findings of Nuber et al. (2020), they found that both the environmental and social scores had a positive correlation with Tobin's Q and no significant correlation at all with ROA. When testing the effect from the governance, their findings match Nuber et al. (2020) with no significant correlation for either Tobin's Q or ROA. Based on the datasets used in these two studies, the assumption can be made that investors in the Nordic markets value ESG scores. In contrast, in the German dataset, it is unclear whether it adds additional value or not.

The level of ESG disclosure is a problem debated in several articles. The effect of ESG disclosure is tested on firm value by Fatemi, Glaum, and Kaiser (2018). They aim to test whether disclosing the activities and state of the company's ESG performance has an additional effect on the firm value of the company. They test their hypothesis using ESG scores from KLD Research & Analytics alongside with Bloomberg's disclosure score. A sample of 403 US-listed companies was selected after screening. They use Tobin's Q-ratio to define the firm value.

Hence, a higher score will indicate that investors value it higher than the physical assets of the firm. The study finds that when only testing ESG strengths and concerns, they get a positive correlation for strengths and negative for concerns compared to firm value. The interesting part when disclosure is added into the test is that firms with strong ESG get a weaker effect on firm value if they have high ESG disclosure. However, the effect is opposite when it comes to firms with ESG concerns, a high disclosure helps to weaken the effect of the bad ESG score. In other words, disclosure helps to mitigate the effect of a bad ESG score. This provides firms with insight on how to relate to and manage their disclosure levels.

Eccles, Iannou, and Serafeim (2014) investigate the effect of corporate sustainability on organizational processes and performance. They compare a sample of 180 companies, half of them classified as high sustainable and half of them as low sustainable companies. They define high sustainability as company's which voluntarily adopted sustainability policies by 1993 and low sustainability as company's which adopted almost none of these policies. Over the 18-year study period, the high sustainability companies outperform the low sustainability ones in terms of both stock market and accounting measure (Eccles et al., 2014). Porter and Kramer (2002) published an article on how corporate philanthropy can lead to competitive advantages and economic benefits. They argue that philanthropy often can be the most cost-effective way for a company to improve its competitive context, enabling companies to leverage the efforts and infrastructure of non-profits and other institutions (Porter & Kramer, 2002).

2.4.2 Causality between social responsibility and financial performance

Tiago Melo (2012) tested the slack resources hypothesis on corporate social performance (CSP) on an unbalanced panel data set of 624 US-listed companies in the period from 2001 to 2007 with 3085 observations in total. The CSP data was provided by KLD, which he describes as a trustworthy source for CSP indicators. The main findings from the study indicate that prior financial performance, measured as market value, positively affects CSP. The study further confirms that slack resources are assigned to specific areas of CSP rather than to all aspects of CSP. The specific areas are product issues, community relations, environmental issues, employee relations, and diversity of the work force.

On the other hand, a study done by Farag, Meng, and Mallin (2015) on Chinese listed companies in the Shanghai Stock Exchange investigated the social performance of companies. They found support for the managerial opportunism hypothesis, where better financial performance

was consistent with worse CSP. The study used a cross-sectional analysis of the relationship between CSP and CFP. It used data from annual reports, social responsibility reports, financial statements, and websites of the respective companies. CSP was measured using the CSPDI disclosure index, and the CFP was measured through Tobin's Q, annualized daily stock return and return on assets.

Lin, Law, Ho, and Sambasivan (2019) conducted a study where they attempted to model the bidirectional linkages between CSR and CFP using the prospective and retrospective approaches. They used a panel data set of 100 companies with a sample period from 2007 to 2016. Financial performance was measured through different accounting variables such as ROE, ROA, and ROIC. Their main findings show that better financial performance of firms leads to better CSR engagement, and better CSR need not necessarily lead to superior CFP. It is also underlined that the relationship between CSR and CFP is complex, where they refer to different studies over time with inconsistent outcomes (Margolis et al., 2011; Waddock & Graves, 1997). Fischer and Sawczyn (2013) also tested the relationship between a corporate social performance (CSP) and their CFP on a study performed on large German listed firms. They based a company's CSP on environmental and social core performance indicators based on guidelines of the GRI and measured CFP on a company's ROA. This study finds a positive and significant relationship between corporate social performance and their CFP but also supports Lin et al. (2019) statement that the relationship between a company's CSR and CFP is complex to measure.

2.4.3 Effects of ESG score

It's debated whether ESG investing is motivated by the reduction of risk and prevention of occurrences where the company is exposed negatively. Cornell and Shapiro (1987) claim that through ESG spending, a company reduces potential situations that could be bad for the company. According to them, a lower risk will lead to a lower risk premium. This problem was investigated by Aouadi & Marsat (2018) using a dataset consisting of observations from 4000 firms in the period from 2002 to 2011. To deal with outliers, the dataset was winsorized at the 1% level. They examine the effect of negative news stories tied to behavior not in compliance with ESG expectations of society on the stock price of the company. The results surprisingly show that an ESG controversy for high attention companies is value-enhancing. They argue that this might be happening since investors see a potential for improvement and that the company most likely will become more scrutinized; therefore, the risk will be reduced. Cornell and

Shapiro (1987) argue the opposite of these results claiming that leaks like this is could damage the company's reputation and the publics' perception of them, leading to a greater cost of capital and larger risks. This shows that even though the reduced risk aspect as a result of a good CSR policy can be argued, there is no simple answer to how this effect plays out in real life.

A study of the risk aspect connected to CSR is done by Sassen, Hinze, and Hardeck (2016). Their dataset consisted of an unbalanced panel of 8752 firm-year observations from 928 firms in a time period from 2002 to 2014. Their goal was to investigate whether ESG performance had a reducing effect on the financial risk of a company. They used Thomson Reuters Eikon to provide them with their data and used total firm risk, systematic risk, and unsystematic risk as their dependent variables. Their independent variables were ESG scores and its subcategories. The results support that a higher ESG score is associated with lower overall risk and unsystematic risk. When breaking the score into subcategories, they find that environmental performance decreases the unsystematic risk, and social performance lowers the overall firm risk. However, corporate governance performance does not provide the researchers with any significant results. A reason for this connection might be the increased transparency that comes with CSR reporting and therefore gives better insight for the investors.

The positive effects of a lower risk profile can give a financial advantage in many situations. One aspect of this is the cost of financing that Cheng, Iannou, and Serafeim (2014) investigated. Securing financing is a costly operation for most companies, whether it is through loans or raising equity in the financial markets. Cheng et al. (2014) hypothesize that the increased transparency that comes with CSR reporting will improve access to financing and, through this, decrease costs of the company. The dataset in the study consists of an unbalanced panel of 10 078 firm-year observations from 2191 firms in the time period 2002 to 2009. To represent the "access to financing"-variable, they calculated index scores based on accounting ratios such as cash flow to total capital, market to book, debt ratio, dividends to total capital, and cash holdings to total capital. This is then analyzed using panel data with the ESG scores gathered from ASSET4, which specializes in providing objective, relevant, auditable, and systematic ESG information (Cheng et al., 2014). They find support for their hypothesis that companies with better ESG scores are less capital constrained, which in other words means that a better ESG score leads to better access to financing.

Amel-Zadeh and Serafeim (2018) researched the use of ESG reporting by institutional investors that aren't associated with SRI-funds. By sending out a survey to a large sample of investors, they based their findings on the response of 652 subjects, 14,4% of the sample that received the study. Their findings show that institutional investors mainly invest in ESG because of financial incentives rather than the ethical consideration. The way investors use ESG data is not simple to understand since it's stated that the use of ESG varies with the country, industry, and company strategy. In some countries with major environmental problems tied to water use, a good environmental score might have a positive impact on the stock price. In contrast, in a developing country where corruption is a problem, governance might be the deciding factor. These results might partly explain why former research can't seem to find common ground on the significance or the causal direction of ESG score on CFP (Clark & Viehs, 2014; Margolis et al., 2011). The study also shows that a major problem of ESG reporting is the lack of standards and a large number of screening companies reporting on different grounds.

2.5 Summary of previous research

A summary of the earlier research included in our thesis is found in Table 1 below. As observed, all studies either find a positive or non-correlation between the ESG relation and financial performance. In the meta-studies of Friede et al. (2015) and Margolis et al. (2011), the overall effect is positive. However, it is important to mention that some of the studies they use find negative and no correlation. It is also interesting to observe that even when the studies use different kinds of CSR-score providers, the results are still consistent between them.

Looking at the financial performance related to the ESG score; in other words, the opposite causality as presented above, the studies are not consistent with both evidence for positive and negative relationships. We find this relationship to be interesting to examine, as the results of previous studies are conflicting. One explanation could be that they all used different services to provide them with data on the CSP scores.

Table 1

Summary of previous research

Authors	Sample	Time frame	Firms-year observations	Independent variable: CSP-score	Dependent variable:	ESG relation to financial performance
Friede et al. (2015)	Global	1970-2014	Meta-analysis of several studies	N/A	N/A	+
De Klerk et al.	UK	2007-2008	178	GRI	Stock price	+
Margolis et al. (2011)	Global	1972-2007	Meta-analysis of several studies	N/A	N/A	+
Nuber et al. (2017)	Germany	2010-2014	385	T. R. Eikon	ROA & Tobin's Q	+, 0
Semenova et al. (2010)	Sweden	2005-2008	896	GES Investment Services	Stock price	+
Fatemi et al. (2018)	USA	2006-2011	1640	KLD & Bloomberg	Tobin's Q	+
Fischer & Sawczyn (2013)	Germany	2007-2008	128	Based on Global reporting initia-tive	ROA	+
Cheng et al. (2014)	Global	2002-2009	10 078	ASSET4	Index-score based on ac-counting ra-tios	+
Dahlberg & Wiklund (2018)	Nordic countries	2007-2017	995	T. R. Eikon	ROA & Tobin's Q	0, +
Eccles et al. (2014)	USA	1993-2010	N/A	T. R. Eikon & Bloomberg	Stock price	+
Qureshi et al. (2020)	Europe	2011-2017	5684	T. R. Eikon	Stock price	+

Authors	Sample	Time frame	Firms-year observations	Independent variable:	Dependent variable: CSP-score	Financial per-formance rela-tion to ESG
Melo (2012)	USA	2001-2007	3085	ROA & MVA	KLD	+
Farag et al. (2015)	China	2009-2011	141	Tobin's Q	Annual reports & sustainability reports	-
Lin et al. (2019)	Global	2007-2016	1000	ROA, ROE & ROIC	T. R. Eikon	+, -

2.6 Main hypotheses

Our review of literature helps us to develop different hypotheses to investigate our research question about the correlation between ESG ratings and the financial performance of companies listed in the Nordic countries in the light of different theories on the subject. Earlier studies on the relationship have shown a mostly positive connection. Despite this, both Lin et al. (2019) and Fischer and Sawczyn (2013) describe the relationship between CSR and CFP as complicated to measure.

To test the relationship between ESG ratings and CFP for companies, lagged variables are used to examine the relationship and to account for the causality problem. With a lagged ESG rating, the long-term impact of ESG on CFP can also be tested, in line with Nuber et al. (2020). By lagging either the ESG rating or the CFP, we get the following two relationships to examine the direction of the causality:

$$ESG\ rating_{t-1} \rightarrow Stock\ price_t$$

If a positive relationship is found, it suggests that an improvement in the ESG rating is connected to a higher market value in the following period and is value-creating, which supports the stakeholder theory. Alternatively, a negative relationship would suggest that an improvement in the ESG rating is connected to a decrease in the market value and its value-destroying, which supports the shareholder theory.

$$Financial\ performance_{t-1} \rightarrow ESG\ rating_t$$

If a positive relationship is found, it suggests that good financial performance in a company leads to a higher ESG rating, which supports the slack resources theory. Alternatively, a negative relationship would suggest that good financial performance is connected to a negative change in a company's ESG rating, which supports the managerial opportunism hypothesis.

Based on these relationships and the lagged variables for ESG ratings and financial performance, we have developed the following hypotheses to test.

2.6.1 Overall ESG score

Our first research question will be used as a starting point for our analysis to examine the relationship between a company's ESG score and stock price. Earlier studies have found support for a positive relationship between the company's ESG score and the stock price in several different countries (De Klerk et al., 2015; Qureshi et al., 2020; Semenova et al., 2010). We expect to find a positive relationship and support the stakeholder theory in line with former studies mentioned in Table 1.

Research question 1.1

Is a higher ESG score among listed companies in the Nordic countries associated with a higher stock price?

H0: There is no relationship between a company's *ESG rating*$_t$ and *stock price*$_t$

HA: There is a (positive/negative) relationship between a company's *ESG rating*$_t$ and *stock price*$_t$

In addition, we want to include the relationship between a company's ESG controversies score and the stock price. The ESG controversies score is calculated based on 23 ESG controversy topics (Refinitiv, 2020). The controversy score is then combined with the basic ESG score to form the ESG combined score from Thomson Reuters Eikon. If the company was involved in controversies, this would reduce their overall combined score. Therefore, if a company was not involved in any ESG controversies, the combined score will equal the ESG score. This score will be tested in the same model as the hypothesis above and will let us compare if investors take into account the scoring penalty that comes with bad press. We have included the controversies score in our analysis to take into account potential greenwashing and whether there is a plausible effect.

Research question 1.2

Is a higher ESG combined score among listed companies in the Nordic countries associated with a higher stock price?

H0: There is no relationship between a company's *ESG Combined rating*$_t$ and *stock price*$_t$

HA: There is a (positive/negative) relationship between a company's *ESG Combined rating*$_t$ and *stock price*$_t$

2.6.2 Pillar scores

To investigate the effect of the ESG score further, each pillar is individually controlled to see their effects. One of our assumptions is that in well-developed countries like the Nordics, both the social- and governance pillar are relatively restricted by law. This gives businesses little room to maneuver on their own. We will investigate if the environmental score has a higher effect on a company's stock price than the other two pillars.

Research question 2.1

Is a higher environmental score associated with a higher stock price among listed Nordic companies?

H0: There is no relationship between a company's *Environment rating*$_t$ and *stock price*$_t$

HA: There is a (positive/negative) relationship between a company's *Environment rating*$_t$ and *stock price*$_t$

Research question 2.2

Is a higher social score associated with a higher stock price among listed Nordic companies?

H0: There is no relationship between a company's *Social rating*$_t$ and *stock price*$_t$

HA: There is a (positive/negative) relationship between a company's *Social rating*$_t$ and *stock price*$_t$

Research question 2.3

Is a higher governance score associated with a higher stock price among listed Nordic companies?

H0: There is no relationship between a company's *Governance rating*$_t$ and *stock price*$_t$

HA: There is a (positive/negative) relationship between a company's *Governance rating*$_t$ and *stock price*$_t$

2.6.3 Subcategories to environmental score

To examine the environmental pillar further, the three subcategories that make up the environmental score will be tested on the stock price individually. As we haven't found similar studies on this before, it is interesting to see which effect each category has on the stock price.

Research question 3.1

Is a higher resource use score associated with a higher stock price?

H0: There is no relationship between a company's *resource use score*$_t$ and *stock price*$_t$
HA: There is a (positive/negative) relationship between a company's *resource use score*$_t$ and *stock price*$_t$

Research question 3.2

Is a higher emissions score associated with a higher stock price?

H0: There is no relationship between a company's *emissions score*$_t$ and *stock price*$_t$
HA: There is a (positive/negative) relationship between a company's *emissions score*$_t$ and *stock price*$_t$

Research question 3.3

Is a higher innovation score associated with a higher stock price?

H0: There is no relationship between a company's *innovation score*$_t$ and *stock price*$_t$
HA: There is a (positive/negative) relationship between a company's *innovation score*$_t$ and *stock price*$_t$

2.6.4 Causality between financial performance and ESG score

As Lin et al. (2019) suggests, there has for a long time been a discussion surrounding the causality of these types of studies. The main question is whether it's the ESG score which affects ROA or if the causality is the opposite way. ROA is introduced as a financial variable since it is not affected by the market factors, and is also used in similar studies on the subject (Lin et al., 2019; Melo, 2012).

Research question 4.1

Is a higher ESG score associated with a higher ROA?

H0: There is no relationship between a company's *ESG score*$_t$ and *ROA*$_t$
HA: There is a (positive/negative) relationship between a company's *ESG score*$_t$ and *ROA*$_t$

Research question 4.2

Is a higher ROA associated with a higher ESG score?

H0: There is no relationship between a company's ROA_t and $ESG\ score_t$

HA: There is a (positive/negative) relationship between a company's ROA_t and $ESG\ score_t$

3 Method and models

This section introduces the different price models in our thesis, then presents the methodology and a description of our data set and variables.

The Ohlson model has been chosen to form the basis from which the following price models have been developed. This model was further modified according to a study done by De Klerk et al. (2015) for the influence of corporate social responsibility disclosure on stock prices in the United Kingdom. Ohlson price model is based on the assumption that the market value of equity is a function of the company's book value, net income, and other non-accounting information, in our case, the ESG score. We use stock price as the dependent variable in our model in line with Ohlson's model.

3.1 The price models

3.1.1 Price model I

As the starting point for our model, we have selected the valuation model developed by Ohlson (1995). To be able to test the value relevance of non-financial data as the ESG score and sub-categories, we first establish whether there is an effect and how strong it might be from our financial control variables. The first model tested is:

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \varepsilon_{i,t} \qquad \text{(I)}$$

Stock price ($P_{i,t}$) is the dependent variable in all our models as it is the effect of the independent variables on investor behavior we want to test by registering changes in stock price. The independent variables in model (I) are book value per share ($BVPS_{i,t}$) and earnings per share ($EPS_{i,t}$). The sub-letters i & t define the BVPS & EPS of company (i) at year end (t). All unobserved factors are defined in $\varepsilon_{i,t}$.

3.1.2 Price model 1 & 2

In model (1.1) and (1.2), we aim to test hypothesis 1 and examine if the ESG variable provides additional information to the change in stock price over time.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESG_{i,t} + \varepsilon_{i,t} \qquad (1.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESG_{i,t-1} + \varepsilon_{i,t} \qquad (1.2)$$

We extend model (I) by adding ESG scores for company *i* at year end *t*. This model aims to test if there is a correlation between ESG & stock price in year t by regressing ESG on stock price and controlling for the financial information contained in BVPS and EPS. By introducing the ESG score to the model, we can test whether non-financial information could be a determining factor of the company's stock price. This relation will also be tested with a lagged version of ESG to see whether a potential delay in information might delay the effect from the score and see the long-term effects from the ESG score. We expect that the effect will be positive and significant in agreement with the stakeholder theory and in line with earlier studies (Fatemi et al., 2018; Friede et al., 2015; Margolis et al., 2011).

In addition to testing the ESG score, we will also test the ESG combined score in the same way as described above. This will tell us if investors penalize companies for not living up to the CSR expectations that could are assumed based on the given ESG score. We want to control for the ESG combined score as this connection has been investigated earlier by Aouadi and Marsat (2018). They concluded that an ESG controversy can be value-enhancing for high attention companies. Based on this, we have included price model 2 in our analysis.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESGC_{i,t} + \varepsilon_{i,t} \quad (2.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 ESGC_{i,t-1} + \varepsilon_{i,t} \quad (2.2)$$

3.1.3 Price model 3, 4 & 5 – Subcategories to the ESG score

In the three following models, the subcategories that ESG consists of will be separated and regressed individually. This is done to test if one or more of the subcategories of ESG has a larger determining on the stock price of the companies. This is earlier done by Semenova et al. (2010) and Qureshi et al. (2020), which both found support for the environmental factor having the strongest effect. Qureshi et al. (2020) also found the social disclosure to have a significant effect on the stock price. First, we will run the regressions as stated below, and then the variable representing the subcategory will be replaced with the lagged version of itself in line with our previous price model. This way, we test the score of the category in the last two years and can examine any delay in the market response and see the long-term effects. This is done to test hypotheses 2.1, 2.2, and 2.3.

3.1.3.1 Price model 4, environment

In model (3.1) and (3.2), the environment subcategory, representing the E, from ESG has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 E_{i,t} + \varepsilon_{i,t} \quad (3.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 E_{i,t-1} + \varepsilon_{i,t} \quad (3.2)$$

3.1.3.2 Price model 4, social

In model (4.1) and (4.2), the social subcategory, representing the S, from ESG has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 S_{i,t} + \varepsilon_{i,t} \quad (4.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 S_{i,t-1} + \varepsilon_{i,t} \quad (4.2)$$

3.1.3.3 Price model 5, governance

In model (5.1) and (5.2), the governance subcategory, representing the G, from ESG has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 G_{i,t} + \varepsilon_{i,t} \quad (5.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 G_{i,t-1} + \varepsilon_{i,t} \quad (5.2)$$

3.1.4 Price model 6, 7 & 8 – Subcategories to environmental score

Our focus lies on the specific effect from environmental focus in the companies. We will investigate the environmental effect further by testing the subcategories that make up the total environmental score individually. The score to the variable E is made up of a weighted average of the company's resource use, emissions, and environmental innovation. First, we will run the regressions as stated below, and then the variable representing the subcategory will be replaced with the lagged version of itself in line with our previous price models. These price models will be testing hypotheses 3.1, 3.2, and 3.3.

3.1.4.1 Price model 6, resource use

In model (6.1) and (6.2), the subcategory resource use from the environmental score has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 Re_{i,t} + \varepsilon_{i,t} \quad (6.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 Re_{i,t-1} + \varepsilon_{i,t} \quad (6.2)$$

3.1.4.2 Price model 7, emissions

In model (7.1) and (7.2), the subcategory emissions from the environmental score has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 Em_{i,t} + \varepsilon_{i,t} \quad (7.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 Em_{i,t-1} + \varepsilon_{i,t} \quad (7.2)$$

3.1.4.3 Price model 8, innovation

In model (8.1) and (8.2), the subcategory innovation from the environmental score has been separated.

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 In_{i,t} + \varepsilon_{i,t} \quad (8.1)$$

$$P_{i,t} = \beta_0 + \beta_1 BVPS_{i,t} + \beta_2 EPS_{i,t} + \beta_3 In_{i,t-1} + \varepsilon_{i,t} \quad (8.2)$$

3.1.5 Price model 9 & 10

In model (9) & (10) we aim to test hypotheses 4.1 and 4.2. As expressed by Lin et al. (2019), the causality is a relevant piece of the puzzle to understand whether the ESG actually influence financial performance. We aim to test the causality, and therefore lag both ESG score and the return on assets variable. This will be tested in the following models:

3.1.5.1 Price model 9, ESG scores effect on ROA

In model (9.1) and (9.2), we test if the ESG score has any effect on the company's ROA.

$$ROA_{i,t} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 ESG_{i,t} + \varepsilon_{i,t} \quad (9.1)$$

$$ROA_{i,t} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 ESG_{i,t-1} + \varepsilon_{i,t} \quad (9.2)$$

3.1.5.2 Price model 10, ROA's effect on the ESG score

In model (10.1) and (10.2) we test if the ROA has any effect on the company's ESG score.

$$ESG_{i,t} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ROA_{i,t} + \varepsilon_{i,t} \quad (10.1)$$

$$ESG_{i,t} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ROA_{i,t-1} + \varepsilon_{i,t} \quad (10.2)$$

By changing the dependent variable and lagging ESG & return on assets as independent variables, the goal is to test the causality of the variables. Both models will also be tested with a lagged version of the independent variables' effect we aim to examine. Tying back to the different economic theories, these two models will give us an indicator of which ones are more likely to be observed in reality. We test whether financial performance has an impact on ESG by using a lagged variable of return on assets. This way, we can uncover if good return on assets in one period leads to the company having slack resources to invest in ESG and therefore obtaining a higher score.

3.1.6 Overview of models

Table 2 presents the 20 models that will be used in our analysis. All ESG and control variables will be tested against the stock price in the model (1.1) – (8.2). Each variable is tested with the same year score in model X.1, and a lagged version of the same variable in model X.2. When testing the causality of ESG in (9.1) to (10.2), we introduce ROA as the financial variable. Since we test both ways, ESG is the dependent variable in (9.1) and (9.2), while ROA is the dependent variable in (10.1) and (10.2).

Table 2

Overview of the 20 models included in the analysis

		Independent	*Model*
P	BVPS + EPS	ESG_t	(1.1)
		ESG_{t-1}	(1.2)
		$ESGC_t$	(2.1)
		$ESGC_{t-1}$	(2.2)
		$Environmental_t$	(3.1)
		$Environmental_{t-1}$	(3.2)
		$Social_t$	(4.1)
		$Social_{t-1}$	(4.2)
(Dependent)	*(Control)*	$Governance_t$	(5.1)
		$Governance_{t-1}$	(5.1)
		$Resource\ use_t$	(6.1)
		$Resource\ use_{t-1}$	(6.2)
		$Emissions_t$	(7.1)
		$Emissions_{t-1}$	(7.2)
		$Innovation_t$	(8.1)
		$Innovation_{t-1}$	(8.2)
ESG	ESG_{t-1}	ROA_t	(9.1)
(Dependent)	*(Control)*	ROA_{t-1}	(9.2)
ROA_t	ROA_{t-1}	ESG_t	(10.1)
(Dependent)	*(Control)*	ESG_{t-1}	(10.2)

3.2 Statistical Method

According to Brooks, there are broadly two classes of panel estimator approaches that can be employed in financial research; fixed-effect models and random-effects models (Brooks, 2019, p. 492). Based on this, we choose to examine the pooled OLS model, the fixed-effect model, and the random-effect model to control which one will fit our data set best. The choice of model in our thesis will be based on a Poolability test, a Breusch-Pagan Multiplier test, and a Hausman test, see appendix 1. The result of these three tests concludes that a fixed-effect model is the preferred model for our data and will be the model we will use in our thesis. This is in line with the studies of both Nuber et al. (2020) and Semenova et al. (2010), which examine the same relationship between CFP and ESG as in our thesis. Brooks further supports this, where he writes that the random-effect model is more appropriate when the entities in the sample can be

thought of as having been randomly selected from the population, but a fixed-effect model is more relevant when the entities in the sample effectively constitute the entire population (Brooks, 2019, p. 502). Since our data consist of all companies in the Nordic markets with reported ESG scores, we can say that it effectively constitutes the entire population available. We will be using Stata/SE 16.1 as the statistical program to run all tests needed for our research. Interpreting the output from the regressions in Stata will mainly be done through the regressions' coefficients and the adjusted R^2 of the regression.

R^2, or R-squared, is the output Stata provides from a regression that explains how well the independent variables describe the changes in the dependent. Woolridge describes R^2 as the fragment of the sample variation in *y* that is explained by *x* (Wooldridge, 2016, p. 35). We will focus on the adjusted R^2 as our indicator of how well the model works. We do this since adjusted R^2 imposes a potential penalty for adding additional independent variables to a model in addition to the regular R^2, which never fall when a new independent variable is added (Wooldridge, 2016, p. 182).

The regression coefficients of the model will provide us with information on the relationship between the dependent and independent variables. What we are looking to find out in order to prove or reject our hypothesis is mainly whether the connection is positive, negative, or not existing/zero. These results can then be used to say something about the economic theories and which ones that apply to our population and data.

4 Data description

Our sample selection is limited to companies with both headquarters in one of the Nordic countries and listed on one of the Nordic stock exchanges. By limiting ourselves to these two demands, we make sure that our data can be used to say something about the behavior of investors active in the Nordic markets and whether they expect value to be created from performing well within ESG. Our decision to focus on the Nordic countries stem from an interest to test whether investors in Nordic markets share the same environmental awareness that the countries are associated with based on the high rankings on environmental indices (Comble et al., 2019; Yale Center for Environmental, 2018). The general development of all countries is leaning towards more sustainable practices, and they all score high on international environmental performance indices. The countries we have chosen for our study are Sweden, Norway, Denmark, Finland, and Iceland. A full list of companies, sectors, and countries included is found in appendix 3.

4.1 Panel Data

Our data set consists of observations with a time-series dimension from 2010 to 2019 and a cross-section dimension of 153 different companies, and is structured as a panel data set. Since not every company have ESG observations over the entire period, we have a lack of data and an unbalanced panel data set. Even though the data set is unbalanced, we can use the same technique as a balanced dataset since Stata automatically will account for missing values. We find a panel data set to be a sufficient way to examine how our variables and the relationship between them change dynamically. By combining cross-sectional and time-series data, one can increase both the number of degrees of freedom and the power of the test by employing information on the dynamic behavior of a large number of entities at the same time (Brooks, 2014, p. 527).

4.2 Stock price & return on assets – Dependent variable

The goal of the study is to examine investors' views and expectations of a company's ESG performance and its stock price. Therefore, the variable we measure ESG scores against will naturally be the stock price since we want to focus on how investors valuate ESG investments. As a result of the ESG data being updated annually, we will use the closing price at 31.12.XX each year as our price variable.

4.3 ESG scores – Independent variable

Deciding which rating company to use for our data-gathering isn't straight forward, as one of the main criticism to the use of ESG data is that all companies use different methodology and framework to score companies (Bauer, Guenster, & Otten, 2004; Guenster, Bauer, Derwall, & Koedijk, 2011; Orlitzky, Schmidt, & Rynes, 2003). There is no generalized way of giving an ESG score, and we cannot account for the scores of other rating agencies. The database we use to gather the dataset is Thomson Reuters Eikon since it is one of the most comprehensive databases and provides all the data points needed for our research in one place. Thomson Reuters Eikon is also widely used in similar studies on the subject (Dahlberg & Wiklund, 2018; Eccles et al., 2014; Nuber et al., 2020; Qureshi et al., 2020). In addition to being used by researchers, it is also widely recognized and used by both institutional investors and analysts. The data collected are ESG scores and the subcategories to the three main pillars, the stock prices of the companies, and financial performance data. This database gives us access to comprehensive financial data of companies all over the world. The ESG dataset consists of more than 7000 companies worldwide, and in the Nordics have we registered 266 of firms with enough data to be included.

The ESG score is a weighted average of separate scores for environmental-, social- and governance performance. The overall score aims to sum up the companies' performance, commitment, and effectiveness in their ESG related work (Refinitiv, 2020). The three main pillars scores are, in turn, averages of 400 measures gathered to form subcategories. There are ten subcategories, three on the environment, three on governance, and four on social, see table 3 below.

As our goal is to focus on the impact of the environmental score, we will also test the subcategories on the environment. Therefore, we have collected the scores on resource use, emissions, and environmental innovation of the companies in our data set. See Table 3 below for a description of the scoring system and weighting of variables in the ESG score.

Table 3

Illustration of the categories and their weighting in the overall ESG score (Refinitiv, 2020)

Pillar	Category	Weights	Indicators
Environmental	Resource use	11%	19
	Emission	12%	22
	Innovation	11%	20
Social	Workforce	16%	29
	Human rights	4,5%	8
	Community	8%	14
	Product responsibility	7%	12
Governance	Management	19%	34
	Shareholders	7%	12
	CSR Strategy	4,5%	8

In addition to the ESG score, a variable that quantifies the controversies tied to ESG performance that are associated with the company is also used. This variable, The ESG Combined score, gives a discounted score compared to the ESG score if news stories regarding the company have a material impact. The goal of the score is, in Thomson Reuters words, to differentiate between companies that have limited reporting or aren't transparent and the companies that actually "walk the talk" (Refinitiv, 2020).

4.4 Return on assets – Independent variable

As presented in the hypothesis section, the causality and direction of the effect will also be investigated in this study. The stock price is the preferred variable when we are testing the effect of ESG on the market price of the company. To test the managerial opportunism- and slack resources theory, we must use a variable to represent the financial performance of the company and not the market performance. Return on assets (ROA) has been chosen to represent the financial performance of the company, and a lagged version of ROA will be used to test the effect of financial performance in period *t-1* on ESG scores in period *t*.

4.5 Control variables

By controlling for performance-specific variables that have a high likeliness of impacting stock price changes, we isolate the impact from ESG score better. Since both book value per share (BVPS from here on) and earnings per share (EPS from here on) most likely correlate strongly with stock price, we control for these factors in our model in line with the Ohlson price model.

Controlling for these financial variables is also in line with other studies done on the subject (De Klerk et al., 2015; Qureshi et al., 2020; Semenova et al., 2010).

4.6 Dataset & data-dropping

When extracting the data on the companies listed and with headquarters in one of the Nordic countries, we end up with a dataset consisting of 1421 different companies from Thomson Reuters Eikon. The data set is further limited by the fact that ESG reporting is voluntary and, despite a rising trend where there is a demand for it, many companies still do not report the relevant numbers needed. We have registered a large increase in ESG reporting from 2018 to 2019. Since we are monitoring the change in stock price tied to a change in ESG, we need at least two-yearly observations. Because of this, we have removed all companies who only reported ESG data in 2019. After screening the data set and filtering out companies without any or only 2019 ESG data reported, we ended up with a selection of 153 different companies among the countries. When screening the data set further, Iceland falls out since none of the listed companies on Iceland have ESG data available in Thomson Reuters Eikon. The Swedish companies make up almost half of the dataset, and the remaining half is spread relatively even between Norway, Finland, and Denmark. Naturally, Swedish companies make up almost half the dataset since our total dataset consists of 861 Swedish listed companies, compared to 238 Norwegian listed companies, 145 Danish listed companies, 153 Finnish listed companies, and 24 Icelandic listed companies. After the reduction of companies without any ESG data or only ESG data from 2019, we end up with 71 Swedish companies, 31 Danish companies, 28 Finish companies, and 23 Norwegian companies. There is a risk of the dataset being biased as companies not doing well in the ESG area are more likely to decide not to release their ESG data, and we end up with only analyzing companies doing well on the subject.

4.7 Preliminary analysis

In this section, the validity of the tests will be examined and how various issues that could damage validity have been taken into account and mitigated. The section starts with descriptive statistics and a correlation matrix.

4.7.1 Descriptive statistics and correlation matrix

Table 4

Descriptive statistics

Variable	N	Mean	Median	Std, Deviation	Min	Max	Skewness	Kurtosis
Priceclose	1183	21.85	17.18	17.24	1.68	112.36	1.89	7.86
Bookvalue	1181	10.50	7.28	9.37	0.61	53.62	1.88	6.47
EPS	1113	1.32	1.07	1.10	-0.74	6.11	1.41	5.76
ESG	1350	60.03	61.69	14.96	11.44	92.29	-0.50	2.90
ESGE	1350	66.76	68.64	18.07	12.75	97.74	-0.56	2.69
ESGS	1350	61.02	62.75	19.28	7.70	98.72	-0.39	2.41
ESGG	1350	51.36	51.75	20.93	3.51	97.76	-0.04	2.12
ESGC	1350	54.08	53.47	15.55	11.44	92.29	-0.02	2.26
Resource Use	1350	69.60	74.31	21.89	0.94	99.82	-0.78	2.90
Emissions	1350	67.06	71.41	22.57	0.89	99.53	-0.75	2.91
Environmental Innovation	1350	63.62	70.23	24.00	0.23	99.39	-0.34	1.91
ROA	1191	0.06	0.06	0.08	-0.59	0.75	0.50	17.59

Table 5

Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1.Priceclose	1.000											
2.Bookvalue	0.412***	1.000										
3.EPS	0.697***	0.607***	1.000									
4.ESG	-0.048*	-0.107***	-0.029	1.000								
5.ESGE	-0.094***	-0.129***	-0.058*	0.804***	1.000							
6.ESGS	-0.006	-0.156***	-0.028	0.840***	0.621***	1.000						
7.ESGG	-0.014	0.041	0.017	0.669***	0.256***	0.299***	1.000					
8.ESGC	-0.029	-0.065**	-0.028	0.690***	0.571***	0.559***	0.468***	1.000				
9.Resource Use	0.030	-0.121***	0.024	0.719***	0.819***	0.617***	0.234***	0.509***	1.000			
10.Emissions	-0.092***	-0.089***	-0.002	0.673***	0.813***	0.546***	0.209***	0.483***	0.567***	1.000		
11.Env. Innovation	-0.152***	-0.01***	-0.154***	0.525***	0.746***	0.325***	0.168***	0.369***	0.413***	0.351***	1.000	
12.ROA	0.361***	-0.210***	0.296***	0.02	-0.02	0.139***	-0.080***	-0.001	0.101***	0.025	-0.157***	1.000

The skewness value in Table 4 provides an indication of the symmetry of the distribution for each variable, where if the distribution is perfectly normal, you will obtain a skewness value of 0 (Pallant, 2016, p. 57). All our financial variables have a positive skewness value, which means the scores are clustered to the left at low values. It is the opposite with all our ESG variables, which all have a negative skewness value. The ESG skewness values are remarkably

lower compared to the financial variables. The kurtosis value, on the other hand, provides information about the steepness of the distribution, where also a value of 0 is connected to a perfectly normal distribution (Pallant, 2016, p. 57). We have a positive kurtosis value for all of our variables, which indicates the distribution is rather peaked and clustered in the center, with long thin tails. The financial variables have higher kurtosis values than the ESG variables, and where ROA stands out with a particularly high value. High kurtosis values implies a leptokurtic distribution, which commonly appear in an economic time series (Brooks, 2019, p. 57). A leptokurtic distribution raises the potential of possible outliers in our study.

Table 5 shows the correlation matrix between the variables used in our regressions. We generally have a high correlation between the ESG score variable and each of the pillars. These correlations are expected as the pillar scores together make up the ESG score. Only ESG and ESGE are significant of the ESG variables. This is in line with our expectations, as we suspect that the environmental effect has the strongest effect on share price. Another issue could be the correlation between our financial variables and our dependent variable. Especially the correlation between EPS and Price close is high, but also the correlation between EPS and Book value. These are correlations we must consider and keep in mind when interpreting the regression results. We will investigate further if there are any problems with multicollinearity in our data set through a VIF-test. Otherwise, it is interesting to observe that all the different ESG variables are negatively correlated with the dependent variable price close except the resource use, which is not in line with our expectations. Almost all the ESG variables are also negatively correlated with all the financial variables, expect a few exceptions.

4.7.2 Omitted Variable Bias

Two conditions must be satisfied if the omitted variable is leading to omitted variable bias: the omitted variable must correlate with both the dependent variable and at least one of the other independent variables we are testing. If these two assumptions are satisfied, the least square assumptions are violated, and we end up with biased estimates. Another expression for the omitted variable bias is that we exclude a relevant variable or underspecify the model. We have worked to find a balance between not including too many variables in the regression, as this leads to a high variance, while also include enough variables to provide a satisfying explanatory power for the model. We have chosen to drop some relevant variables we initially wanted to include in the regression, but that has too many missing values. These variables are R&D (Research and Development) and beta measured through CAPM. McWilliams and Siegel (2000)

argue in their article “Corporate social responsibility and financial performance: correlation or misspecification?” that there is a positive link between a company’s R&D expenditures and both CSR through reputation and differentiated products, and the long-time financial performance. A firm’s beta-value captures the market risk and shows the relationship between a firm’s stock volatility and market volatility. These two variables may cause an omitted variable bias to our regression.

4.7.3 Missing data

A missing data problem arises in our data set because of the lack of reporting from companies and their ESG scores. If the data are missing completely at random, then missing data causes no statistical problems (Wooldridge, 2016, p. 293). This assumption implies that the reason for the missing data is independent of both observed and unobserved factors, which affects the dependent variable. We can assume that companies with a higher share of ESG investments are more willing to report their ESG numbers rather than companies with a low share. Based on this, we can assume that our data isn’t missing completely at random and that our data will potentially suffer from this. We have observed a large increase in the number of companies disclosing their CSR policies in the past year, but which we, unfortunately, cannot use in our data set as we need data from two or more years. As mentioned earlier, we had to drop R&D and Beta as variables in our regression due to missing observations. These missing observations were primarily from the earliest years of our dataset, where we observed that the observations were increasing over the past years.

4.7.4 Heteroskedasticity & autocorrelation

Heteroscedasticity states that the variance of the unobservable, *u*, conditional on x, is constant (Wooldridge, 2016, p. 45). When this assumption is broken, the error term is said to exhibit heteroskedasticity (or non-constant variance). If the error term is heteroskedastic and not handled accordingly, the standard errors could be wrong. We use both a Whites test and a Breusch-Pagan test to control for heteroskedasticity in our data, see appendix 2. Both tests indicate that our data suffers from heteroskedasticity.

We also tested our data set for autocorrelation through a Wooldridge Serial Correlation test, see appendix 2. The test indicates that our data suffer from autocorrelation, which means that the regular heteroskedastic-robust standard errors neither are valid as they are obtained under the assumption of no serial correlation.

To deal with both the heteroskedasticity and autocorrelation in our data set, we use heteroskedastic-robust and auto-correlation consistent standard errors in our regressions. Heteroskedasticity and autocorrelation do not cause bias or inconsistency in the OLS estimators, but the usual standard errors and test statistics are no longer valid (Wooldridge, 2016, p. 267). By using the heteroskedasticity and autocorrelation consistent standard errors, we will still be able to use the OLS-estimation as before and have valid standard errors and test statistics even when the data suffers from both heteroskedasticity and autocorrelation.

4.7.5 Multicollinearity

Multicollinearity arises when you have a high correlation between two or more independent variables and is a violation of the least square assumptions. We focus on imperfect multicollinearity, which more often arises than perfect multicollinearity. Imperfect multicollinearity can lead our coefficients to be imprecise, a high R-squared, and high standard errors for individual coefficients. We use a variance-inflation factor (VIF) test, see appendix 2, as a measure of whether we have multicollinearity among our explanatory variables. In addition, we look at the correlation matrix. Even though the correlation matrix expresses some high correlations between some of the variables, our VIF test indicates that we do not have any problems with multicollinearity among the variables in the data set.

4.7.6 Measurement error

A measurement error is defined as the difference between the observed value and the actual value (Wooldridge, 2016, p. 288). The measurement error in the dependent variable causes biases in the OLS estimator only if it is systematically related to one or more of the explanatory variables in the regression. All the data we use in this thesis is collected from Thomson Reuters Eikon, which is a widely used tool for retrieving financial information. Most of the financial variables like EPS and BVPS are data from the individual company's financial reporting and stock prices collected from the exchanges, while the measurement of ESG is more dependent on what the company itself has reported. Exactly how the ESG score is measured through Thomson Reuters Eikon is explained under section 4.2. We have explained in section 2 about potential greenwashing, as well as problems surrounding the unstandardized method of measuring ESG among companies (Deloitte et al., 2020; Nelson, 2018). Based on this, it could be a potential measurement error in the ESG score in our thesis.

4.7.7 Large outliers

When having a small data set, the OLS estimates are sensitive to the inclusion of one or several observations (Wooldridge, 2016, p. 296). Wooldridge defines an outlier loosely as an observation which, if dropped, changes the key OLS estimations by a "large" amount. As it is a requirement for the fixed effects model that large outliers are unlikely, we must investigate this further. When running a scatter plot, we register a few extreme data points that could affect the result that isn't necessarily representative of the dataset. We have chosen to winsorize the upper and lower 2,5% (together 5%) of the observations. A total of 219 observations were removed, 74, 75, and 70 from respectively stock price, book value per share and earnings per share. After dropping these data points, a total of 1350 firm-year observations remain in the dataset used in the regressions.

5 Results and discussion

In this section, all results from the regressions will be presented and explained. The section ends with different robustness tests and a discussion where the hypotheses are connected to the results from the regressions.

5.1 Results

Below we will present the results of our regressions analysis. The regressions are structured to sum up the models in section 3.1. The results of the regressions will then be used to connect our research to the economic theories presented in section 2.2.

5.1.1 Price model I

Table 6

Regression table, baseline model

	Price close
Variables	**M (I)**
Bookvalue	0.396*
	(0.213)
EPS	5.037***
	(1.034)
Constant	10.48***
	(1.933)
Observations	1060
Adj. R	0.194

Standard errors in parantheses
* p<.10, ** p<.05, *** p<0.01

In price model I, found in Table 6 above, we start by testing the accounting-based variables influence and connection to the market value of the companies. This model is interpreted by Barth and Clinch (2009) and has its root in the Ohlson price model. We use book value per share and earnings per share to define our basic model. These two variables are used to account for the effect on the stock price that comes from the financial performance of the company. In Table 6 above, the results of the first regression are presented. In price model I, both β_1 & β_2 are positively significant at the 10% and 1% level, respectively. Book value per share has a

0.396 positive effect on the stock price controlled for earnings per share. In comparison, earnings per share present a lot stronger effect of 5.037 controlled for book value per share. This means that a $1 increase in book value per share is associated with a $0.396 increase in the stock price on average. An increase in earnings per share will have a stronger effect, where a change of $1 is associated with a $5.037 change in the stock price. The positive correlation of the variables indicates that a positive change in the independent variables will lead to a positive change in the dependent variable. This price model has an adjusted R^2 of 0.194, which tells us that these two financial variables just explain right under 1/5 of the total variance in the stock price.

5.1.2 Price model 1 & 2

We run Model (1.1) - (2.2) to investigate our research question 1: Is a higher ESG score among listed companies in the Nordic countries associated with a higher stock price? We present the results in the following Table 7.

Table 7

Regression table, ESG and ESG Combined

	Price close			
Variables	**M (1.1)**	**M (1.2)**	**M (2.1)**	**M (2.2)**
Bookvalue	0.361*	0.370*	0.387*	0.392*
	(0.207)	(0.208)	(0.213)	(0.210)
EPS	4.923***	4.758***	4.997***	4.768***
	(1.020)	(1.016)	(1.025)	(1.002)
ESG	0.139*			
	(0.0727)			
ESG_{t-1}		0.154**		
		(0.0752)		
ESGC			0.0421	
			(0.0316)	
$ESGC_{t-1}$				0.0534
				(0.0326)
Constant	2.490	1.781	8.309***	7.904***
	(4.796)	(4.949)	(2.633)	(2.681)
Observations	1060	1016	1060	1016
Adj. R	0.207	0.203	0.197	0.192

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

Price model 1 is where the first non-financial variable is introduced and regressed. Before testing out models that deal with the causality questions and the effect of the underlying categories, we test ESG score in model (1.1) and the ESG combined score in model (2.1). We compare these two models against model (I) to see if the ESG score of a company affects their stock price when controlling for the financial variables book value per share and earnings per share.

While model (I) has an explanatory factor of 0.194, this factor increases in model 1.1 and 1.2 as *ESG* or ESG_{t-1} is introduced to 0.207 and 0.203. Book value is significant at the 10% level in both (1.1) and (1.2) with coefficients on 0.361 and 0.37, while earnings per share is significant at the 1% in both (1.1) and (1.2) with coefficients on 4.923 and 4.758. ESG is significant at the 10% level with a coefficient at 0.139, while ESG lag is significant at the 5% level with a coefficient of 0.154. The constant turns insignificant for both the models when ESG or ESG lag is included with coefficients of 2.490 and 1.781, respectively.

We also test whether the ESG combined score can be used to deduct anything about whether investors penalize companies that get bad press and potentially greenwashing as a result of ESG related controversies. When we regress model 2.1 and 2.2 with the ESGC score, *BVPS* and *EPS* remain significant at the 10% and 1% level in both models. However, the coefficients for *ESGC* and $ESGC_{t-1}$ give positive results meaning a lower controversy leads to a higher stock price. The coefficients do not show significant results, and they are much smaller than in models 1.1 and 1.2, where we only used ESG without weighing in controversies. These findings are not directly in line with Aouadi and Marsat (2018), that found an increase in controversies, in our case, meaning a lower *ESGC* score, would lead to a higher stock price in certain industries. The adjusted R^2 has also decreased in comparison to models 1.1 and 1.2, meaning that this model is less reliable when it comes to predicting a potential stock price change as a result of an improved ESG controversies score. This suggests that investors do not pay attention to controversies surrounding the actual CSR-performance of the companies to the same extent as the ESG score.

These price models were used to test the hypothesis that a higher ESG score is associated with a higher stock price for a company. We find that both the ESG score of the current year and the lagged ESG score from last year has a positive effect on the stock price according to our regression results in (1.1) and (1.2). An increase of 1 point in the ESG score is associated with an increase in the stock price of $0.139, and we see a stronger effect of $0.154 from the lagged version of ESG. This indicates support for the hypothesis, in line with other studies done on

the subject (Friede et al., 2015; Margolis et al., 2011; Semenova et al., 2010). As a positive change in the ESG score indicates a positive change in the stock price of a company, we can assume investors expect a good ESG performance to be value enhancing. This indicates a support of the stakeholder theory, as suggested by Freeman (1984) which states that taking the stakeholders of a company into account is value enhancing. We can also observe that the explanatory factor increases when both the ESG and the lagged ESG is added to the regression, but not when the controversies version of ESG is included.

5.1.3 Price model 3, 4 & 5

We run Model (3.1) to (5.2) to investigate our research question 2.1, 2.2, 2.3: Is a higher environmental- / social- / governance score associated with a higher stock price among listed Nordic companies? We present the results in the following Table 8.

Table 8

Regression table, ESG subcategories

	Price close					
Variables	**M (3.1)**	**M (3.2)**	**M (4.1)**	**M (4.2)**	**M (5.1)**	**M (5.2)**
Bookvalue	0.379*	0.385*	0.387*	0.380*	0.392*	0.409*
	(0.210)	(0.209)	(0.206)	(0.203)	(0.214)	(0.213)
EPS	4.901***	4.620***	4.885***	4.725***	5.041***	4.760***
	(1.015)	(0.990)	(1.006)	(0.996)	(1.037)	(1.006)
ESGE	0.114*					
	(0.0596)					
$ESGE_{t-1}$		0.134**				
		(0.0630)				
ESGS			0.0985**			
			(0.0482)			
$ESGS_{t-1}$				0.113**		
				(0.0450)		
ESGG					0.00965	
					(0.0337)	
$ESGG_{t-1}$						-0.00625
						(0.0403)
Constant	3.152	2.013	4.605	4.038	10.02***	10.98***
	(4.479)	(4.665)	(3.675)	(3.526)	(2.497)	(2.765)
Observations	1060	1016	1060	1016	1060	1016
Adj. R	0.207	0.208	0.207	0.205	0.193	0.186

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

After testing the correlation between the overall ESG score and the stock price in the previous section, we are interested in testing each subcategory that ESG consists of on the stock price to examine which are valued highest of the three. In regression (3) to (5) above, we have tested the environmental-, social- and governance score on the stock price individually. The lagged variable of each category is used to see if last year's score affects next year's stock price. The financial variables book value per share and earnings per share are controlled for in all the regressions.

Looking at the explanatory factor of the regressions of the subcategories, we can observe that the environmental and social categories have a similar explanatory power of around 0.207, while the governance category has a lower explanatory power of around 0.193. When controlling for the lagged versions of the variables, environmental increases to 0.208, while both social and governance decreases to 0.205 and 0.186, respectively. We assume that the decrease in explanatory power comes from the reduction in observations when using the lagged version of the variables. The social factor is significant at the 5% level in both cases, while the governance factor is not significant in any of the cases. Environment is significant at the 10% level in the same year score, while it's significant at the 5% level when we use the lagged version. When observing the financial variables, we can see that book value per share is significant at the 10% level, and earnings per share are significant at the 1% level, through all the regressions. Environment expresses the highest coefficient of the three subcategories with 0.114 and 0.134, followed by the social category.

Our findings suggest that last year's score for each pillar has a greater effect on the stock price than the same year's score, and that the environmental score constitutes the greatest effect of the three on a company's stock price. The results suggest that investors expect value creation from good performance in the social and environmental areas as it leads to higher stock price of the companies that perform well. This is in line with studies done on both the Swedish market by Semenova et al. (2010) and a study on among the European markets by Qureshi et al. (2020). A stronger effect from the lagged variables makes sense as the ESG scores tied to a specific year are not published by the time the stock price of fiscal year end is known. Therefore, we can expect the score from year t to have an effect on the stock price in year t_{+1}. This is not in line with Nuber et al. (2020), who could not find a consistent indication of the time-lagging impact of ESG on a company's market value. The findings for the environmental pillar are in line with our assumption that both the social and the governance part of ESG are more

regulated by law in the Nordic countries; therefore, companies can easiest differentiate themselves in the environmental area. While both the environmental- and the social score has a positive contribution to stock price, the coefficient for governance is negative for the lagged variable and positive for the same years score (but never significant). As we cannot find any significant results from the governance variable, we fail to reject H0 in research question 2.3.

5.1.4 Price model 6, 7 & 8

We run Model (6.1) to (8.2) to investigate our research question 3.1, 3.2, 3.3: Is a higher resource use- / emissions- / innovation score associated with a higher stock price among listed Nordic companies? We present the results in the following Table 9.

Table 9

Regression table, environmental subcategories

	Price close					
Variables	**M (6.1)**	**M (6.2)**	**M (7.1)**	**M (7.2)**	**M (8.1)**	**M (8.2)**
Bookvalue	0.392*	0.383*	0.384*	0.409*	0.383*	0.396*
	(0.207)	(0.208)	(0.212)	(0.212)	(0.212)	(0.210)
EPS	4.964***	4.663***	4.875***	4.592***	5.030***	4.772***
	(1.021)	(0.980)	(1.028)	(0.995)	(1.031)	(1.008)
Resource use	0.0850**					
	(0.0374					
Resource use$_{t-1}$		0.0965***				
		(0.0335)				
Emissions			0.0686			
			(0.0424)			
Emissions$_{t-1}$				0.0809*		
				(0.0456)		
Env. Innovation					0.0278	
					(0.0283)	
Env. Innovation$_{t-1}$						0.0356
						(0.0285)
Constant	4.568	4.268	6.097*	5.382	8.812***	8.474***
	(3.401)	(3.026)	(3.369)	(3.606)	(2.704)	(2.781)
Observations	1060	1016	1060	1016	1060	1016
Adj. R	0.206	0.205	0.203	0.202	0.195	0.189

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

In table 9, we have further extended regression (I) from the previous section to examine the environmental pillar in the ESG score closer. The environmental pillar has been separated into

the three subcategories, which together make up the environmental score in Thomson Reuters Eikon. The environmental pillar is a weighted average of the score given on the company's resource use, emissions, and environmental innovation. In addition to using the same year's score, a lagged version of each of the three categories is included to examine if last year's score could have a stronger effect on the stock price rather than the same year's score.

The company's resource use gave us both the strongest and most significant results, as it is positively significant on the 5% level and significant on the 1% level when we used the lagged variable. Emissions are only significant at the 10% level when we use the lagged variable, while environmental innovation is not significant in any of the regressions. Resource use also appears as the dominant factor of the three when we look at the explanatory factors of the models, followed by emissions, and finally innovation. All the variables have positive coefficients in all the regressions. The financial variables are stable over the regressions, where book value per share is significant at the 10% level, and earnings per share are significant at the 1% level over all the regressions.

Environmental innovation is quite an abstract way of scoring companies, and no matter how hard Thomson Reuters Eikon tries to standardize it, there will always be a lot of insecurity tied to the score. It does make sense that this variable explains less variation and has a weaker, insignificant coefficient than the other variables. Whereas both emissions and resource use are quantifiable variables that can be measured and give a more hands-on explanation to the environmental performance of companies. The output from the model lets us accept research question 3.1 as resource use gives us a significant and positive connection to the stock price and partly accepts research question 3.2 as emissions show a significant connection when lagged.

5.1.5 Price model 9 & 10

We run Model (9.1) to (10.2) to investigate our research question 4.1 and 4.2: Is a higher ESG score associated with a higher ROA or is a higher ROA score associated with a higher ESG? We present the results in the following Table 10.

Table 10

Regression table, causal effect

	ESG		ROA	
Variables	**M (9.1)**	**M (9.2)**	**M (10.1)**	**M (10.2)**
ESG			-0.000332*	
			(0.000177)	
ESG_{t-1}	0.655***	0.650***		-0.00054**
	(0.0320)	(0.0323)		(0.000209)
ROA	5.237*			
	(3.3153			
ROA_{t-1}		7.177***	0.391***	0.389***
		(2.678)	(0.0579)	(0.0598)
Constant	22.04***	22.16***	0.0606***	0.073***
	(1.962)	(1.971)	(0.0127)	(0.0143)
Observations	1055	1058	1018	1018
Adj. R	0.438	0.439	0.175	0.179

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

The goal for price model 9 and 10 is to test the causal direction as suggested by Lin et al. (2019) between CSR and the financial performance of a company. The outcomes of earlier studies have been inconsistent, which makes the relationship very much unclear (Lin et al., 2019). We introduce ROA as the financial performance variable, as ROA better reflects how a company is doing financially and allows the market effect, which is included in the stock price, to be taken out. We want to test if we find support for either slack resources theory or managerial opportunism hypothesis by using ESG as the dependent variable. Since the market effect has been removed by using ROA as the financial performance variable, we can also test the stake-holder and shareholder theories on the companies' financial performance, instead of the market performance that has been the focus earlier.

Regression (9.1) and (9.2) show that the lagged ESG is significant at the 1% level with both ROA and with the lagged ROA, and with positive coefficients at 0.655 and 0.65, respectively. While ROA only is significant at the 10% level with a coefficient of 5.237, the lagged variable is significant at the 1% level with a coefficient of 7.177. This indicates that the lagged version of ROA could be a better indicator for the ESG score than the ROA the same year, which could be explained by the long-term effect to be stronger than the short-term. This happens most likely as a good result from a specific year gives more slack in the budget the upcoming year. This may be why the increase in the ESG score is experienced with a delay of one year. When

we look at the explanatory factor in the models, it increases from 0.438 to 0.439 when the lagged ROA is introduced instead of the same years ROA. The difference is so minimal that we do not emphasize this very much, and the two models give approximately the same explanatory power on the ESG score.

The direction tested has been changed in regression (10.1) and (10.2), so that ROA is the dependent variable instead of ESG. The lagged version of ROA is as expected significant at the 1% level. The lagged ESG is significant at the 5% level and the same years ESG significant on the 10% level, both have negative coefficients of -0.000332 and -0.000540, respectively. In regression (10.2), the coefficient of ROA lag is reduced, and more of the effect on ROA is absorbed by ESG lag than by ESG. Model 10.2 also shows a stronger explanatory power with an adjusted R^2 of 0.179; we find stronger support that increased ESG scores in the former year lead to lower ROA the following year.

In short, we observe from model 9 that ROA has a positive effect on a company's ESG score which supports slack resource theory in line with Waddock et al. (1997) and McGuire et al. (1990). Alternatively, it is interesting to observe that the ESG score has a negative effect on ROA in model (10.1) and (10.2); this negative relationship supports shareholder theory. The connection can look complex but could be explained by the fact that it will cost money to invest in ESG to receive a high score, which decreases a company's ROA. Even though it decreases ROA to invest in ESG, it could, on the other hand, be expected that a company with a high ROA should invest and get a high ESG score, and therefore we find the positive relationship in model (9.1) and (9.2).

5.2 Robustness tests

In addition to our price models, we perform different robustness test to examine and increase both the validity and the reliability of our study. The models we tried were excluding the financial sector, distributing the ESG scores into top-, bottom-, mid- and outer 50% to see if a change in the ESG score behaves differently based on how high it is and to include all extreme values that were winsorized in the data dropping.

5.2.1 Exclusion of the financial sector

In line with Eccles et al. (2014), we examined how an exclusion of the financial sector affects our regressions as one can argue that companies in the sector have a generally different business

model, which differentiates how the ESG rating will affect them. Nuber et al. (2020) also excludes financial service firms due to their specific regulation and capital structure. The exclusion of the sector leaves us with a total of 832 firm-year ESG observations, down from 1060 observations earlier.

Table 11

Regression table with exclusion of the finance sector

	Price close					
Variables						
Bookvalue	0.420*	0.448*	0.434*	0.429*	0.481*	0.505**
	(0.249)	(0.252)	(0.248)	(0.252)	(0.244)	(0.237)
EPS	4.501***	4.205***	4.523***	4.374***	4.720***	4.318***
	(1.181)	(1.123)	(1.192)	(1.159)	(1.233)	(1.139)
ESGE	0.173**					
	(0.0773)					
$ESGE_{t-1}$		0.173**				
		(0.0803)				
ESGS			0.115*			
			(0.0645)			
$ESGS_{t-1}$				0.113*		
				(0.0549)		
ESGG					-0.00808	
					(0.0426)	
$ESGG_{t-1}$						-0.0356
						(0.0505)
Constant	-0.218	-0.0813	4.244	4.641	11.32***	13.00***
	(5.831)	(5.921)	(4.566)	(3.955)	(2.813)	(3.100)
Observations	832	794	832	794	832	794
Adj. R	0.177	0.171	0.163	0.154	0.146	0.139

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

The results from table 11 are relatively consistent with our findings from table 8 (price model 3, 4, and 5), where both the environmental and the social pillars are positive, and the governance pillar is negative. Adjusted R-squared decreases for the lagged versions, which could be explained by the loss of observations. Both the financial variables are consistent with the results from before.

The results from the regression also support our findings from earlier, where the environmental pillar seems to be the dominant factor in the ESG score. This effect is amplified when the

financial sector is excluded, as the coefficients both express higher values and are more significant than earlier. This is also in line with the assumption by Eccles et al. (2014) that the ESG score affects the financial sector differently than other sectors. As this regression is quite similar to our main regressions, we find support for keeping the financial sector in our main dataset.

5.2.2 Different levels of the ESG score

By separating the ESG scores into quartiles, we can monitor whether the effects are stronger or weaker in the different groups. The quartiles were combined to control different combinations; *top50* includes the 50% companies with top ESG scores, and the *bottom50* is the opposite. This is done to control whether ESG has a higher or lower effect depending on if the company has a high or low score. The quartiles were also combined to form *mid50*, the middle 50%, and *outer50* being 25% from the top and 25% from the bottom. The results will allow us to say something about how investors look at ESG scores and for which companies the ESG scores matter the most.

Table 12

Regression table, segmented by ESG score

	Price close			
Variables				
Bookvalue	0.476*	0.411*	0.660**	0.127
	(0.275)	(0.220)	(0.270)	(0.175)
EPS	5.067***	4.662***	4.667***	5.169***
	(1.217)	(1.253)	(1.436)	(1.374)
Top50	0.146			
	(0.104)			
Bottom50		0.152*		
		(0.0836)		
Mid50			0.200*	
			(0.120)	
Outer50				0.0905
				(0.126)
Constant	-1.532	4.233	-3.137	6.671
	(7.818)	(5.101)	(8.108)	(7.756)
Observations	567	493	528	532
Adj. R	0.252	0.196	0.204	0.189

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

Looking at the results from table 12, we conclude with the analysis being consistent with former findings that the ESG score has a positive coefficient and a positive effect on the stock

price. This coefficient stays positive for all the four segments tested but varies somewhat in strength and significance. Both the top 50% and the outer 50% show insignificant results, and no correlation can be claimed. However, the variables that include the bottom 50% and the mid 50% show significant coefficients at 0.152 and 0.200, respectively. This means that investors see more value being made from an increase of the ESG score in companies with a low or average ESG score.

Higher coefficients and stronger significance in the bottom and mid 50% are in line with our expectations. It can be argued that it happens as a result of the ESG score being more important in companies that score low. Once a company reaches a "high" score, it doesn't seem to be as important whether it increases or decreases a little as the investor either way bought into a company with a good CSR-policy. Whereas a company with a low score could have more risk tied to itself and this results in investors see value in increased ESG score and the reduction of risk that comes with improved CSR-policies as suggested by Sassen, Hinze, and Hardeck (2016).

5.2.3 Inclusion of extreme values

We have included all the extreme values which are removed in the dataset in our last robustness test to observe how strong the effect they have on the regression. The results can be observed in the table below.

Table 13

Regression table without any winsorizing

Variables	Price close					
Bookvalue	0.263	0.260	0.266	0.264	0.267	0.270
	(0.207)	(0.209)	(0.210)	(0.207)	(0.208)	(0.206)
EPS	2.031***	2.042***	2.029***	2.031***	2.015***	2.010***
	(0.491)	(0.489)	(0.492)	(0.493)	(0.489)	(0.489)
ESGE	0.356**					
	(0.138)					
$ESGE_{t-1}$		0.277**				
		(0.134)				
ESGS			0.219			
			(0.197)			
$ESGS_{t-1}$				0.334*		
				(0.196)		
ESGG					-0.0877	
					(0.100)	
$ESGG_{t-1}$						-0.138*
						(0.0810)
Constant	1.188	7.167	11.65	5.204	29.77***	32.55***
	(10.76	(9.812)	(13.97)	(13.01)	(7.385)	(7.338)
Observations	1173	1129	1173	1129	1173	1129
Adj. R	0.339	0.337	0.335	0.341	0.333	0.335

Standard errors in parantheses
*p < .10, **p <.05, ***p <0.01

The number of observations increases from 1060 and 1016 to 1173 and 1129, respectively. While earnings per share are significant at the 1% level through all regressions, book value per share isn't significant for any of the regressions. The current year's environmental score goes from being significant at the 10% level to become significant at the 5% level, while the social pillar goes from being significant at the 5% level to be insignificant at the same years score and only significant at the 10% level for the lagged variable. The lagged governance variable turns significant at the 10% level when adding extreme values. All ESG variables show the same sign and approximately the equal value on the coefficients, except the current year's governance score, which turns from being positive to being negative.

The biggest effect we get from the removal of extreme values is on the book value variable, which turns significant on the 10% level for all regressions when extreme values are removed. When observing the original observations, we can see that book value also expresses the most extreme values of our variables. It is worth to mention that the adjusted R squared increases up

to around 0.34. A factor that influences this is the increase in the number of observations, which makes it difficult to directly compare it with the other regressions.

5.3 Discussion of results

We will discuss our results in this section. To answer our first research question: *Is a higher ESG score among listed companies in the Nordic countries associated with a higher stock price?* we used Model 1 & 2 and provided the results in Table 7. We found support for a positive correlation between a company's ESG score and their stock price among listed companies in the Nordic countries. We got the most significant results when using a lagged version of the ESG score, which indicates that ESG investments have long-term positive effects on a company's stock price rather than a short-term effect the same year. We reject H0 about no relationship between a company's ESG score and its stock price. The correlation between ESG and stock price are in line with previous studies on the subject from our literature review, and in line with our expectations. It is interesting to observe that we got more significant results from our lagged variables, which indicates that the long-term effect of ESG investing have a stronger effect than the short term. This basic model finds support for the stakeholder theory since non-financial information has an effect on the stock price of companies, hence investors see value created from focus on the surroundings of a company.

To answer research question two: *Is a higher environmental- / social- / governance score associated with a higher stock price among listed Nordic companies?* we used Model 3, 4 and 5 and provided the results in Table 8. We find support for both the environmental- and the social score to be positively associated with a higher stock price among companies listed in the Nordic countries. We cannot find any significant results between the governance score and the stock price. The environmental pillar expresses the strongest effect based on the size of the coefficients, but the social pillar is slightly more significant. Both lagged variables for the environmental- and the social pillar have higher and more significant coefficients than the same year variables for the two. Based on this, we fail to reject H0 about no relationship between a company's governance score and its stock price. Our findings surrounding significant results on the positive correlation between the environmental pillar and stock price is in line with both Semenova et al. (2010) and Qureshi et al. (2020). Quereshi et al. (2020) also found the social disclosure to have a significant relationship to stock price, which also is in line with our findings. These results suggest that developing and investing in a CSR policy increases the market value of a company, but the focus should be on the environmental and social factors. As CSR

has a broad span of focus areas, it will potentially help companies to know where to pinpoint their resources in order to maximize the wanted effect. The governance factor is most likely less relevant due to it being strongly legislated in the Nordic countries. For the governance factor to stay relevant, it will have to remain legislated or policy makers could for example incentivize investments in order to keep focus within this area. It could be interesting to compare our results to a study in countries where governance is less regulated to see whether investors valuates it differently there.

To answer research question three: *Is a higher resource use- / emissions- / innovation-score associated with a higher stock price among listed Nordic companies?* we used Model 6, 7 and 8 and provided the results in Table 9. We find support for the hypothesis that the resource use score has a positive association with the company's stock price. This applies to both the same-year variable and the lagged variable. We can otherwise find a weak significant support for a positive connection between the emission last year and this year's stock price. The same-year emission and both the variables for environmental innovation express no significant connection with the stock price. We fail to reject H0 for a non-relationship between a company's environmental innovation and its stock price. These findings indicate that investors valuate resource use and emissions higher than environmental innovation. A possible explanation of these results could be that innovation consist of things like research and development, which could be more difficult to valuate for an investor compared to a quantified number like a company's emissions or resource use. Also, the experienced effect from environmental innovation could be more long term than our study investigates. This subcategory has not to our knowledge been tested on the Nordic markets before and can actively be used by companies to improve their ESG score and also market value. In the short term, we can advise companies to focus on cutting mainly resource use but also emissions to improve market value as our data suggest a positive connection.

To answer research question four: *Is a higher ESG score associated with a higher ROA or is a higher ROA score associated with a higher ESG?* we used Model 9 and 10 and provided the results in Table 10. We observe that both the same year ESG score and the lagged ESG score express a negative impact on a company's ROA. The ESG score is significant at the 10% level and the lagged version at 5%. On the other hand, when switching the dependent variable to ESG we observe that both the same-year ROA and the prior-year ROA have a positive effect. While the same-year ROA is significant at the 10% level, prior-year ROA is significant at the

1% level. This supports the hypothesis that a higher ROA is associated with a higher ESG score. A better ROA leading to a better ESG score is in line with the slack resources theory and can be explained that good financial performance provides resources to develop a company's CSR policy. When we mirror this regression, we find a better ESG score in the former year leading to worse ROA in the following year. This might happen as a result of management being too focused with improving the CSR policy and the actual business of the company loses focus. Or if large investments are tied to the CSR development then the assets of a company will increase leading to a relatively worse return in comparison to the assets of the company when the actual return in fact might be the same as the former year.

6 Conclusion and further research

The present study investigated the relationship between ESG scores and the market performance of companies in the Nordic markets. In addition, the environmental aspect would be investigated further to see whether investors valued certain components of the ESG factor more than others. The study also examined the causal direction between corporate social performance (ESG scores) and corporate financial performance. This led us to formulate the research question:

Is there a correlation between the ESG performance score and the stock price of companies listed in the Nordic markets, and if so, how strong is the effect of E, compared to the S and G?

Our first analysis of the overall effect of ESG on the market performance of companies supports a positive relationship between the two. Based on this, we find plausible support for our theory that investors in the Nordic markets see ESG performance as value-creating. The results also support a stronger effect from the lagged version of the ESG score, hence we can conclude with a delay in the market response and that the long-term effects are higher than the short-term. As the significant effect is only observed when controlling the ESG score and not when adding the controversies factor, which reduces the score if negative press surrounding CSR is connected to the company, it can be suggested that investors mainly value a good CSR-policy but do not necessarily monitor actual negative events surrounding the companies. In section 2, stakeholder and shareholder theory are introduced. Our results find support for the stakeholder theory and show that investors receive additional value from increased ESG score when controlling for financial performance variables.

By breaking down the ESG score and isolating the subcategories, we also tried to find which one that is the most influential among the three. Both the environmental and social subcategories were found to have a value increasing effect on the market value. When comparing the two categories, we conclude with environment having the greater effect, though it is only marginal. The lagged version of both variables shows a stronger and more significant effect, supporting the results from the overall ESG variable. The governance effect doesn't give any significant results on stock price. As governance and social rules are stricter than the environmental in the Nordic countries, we expected these two categories to have a lower explanatory power than the environmental effect. The social pillar proved to have a greater effect than we expected.

The environmental subcategory was examined further on the basis that this was the most influential out of the three factors that make up the ESG score. The three categories making up the environmental score are resource use, emissions, and environmental innovation. The last category gives no significant results and lower explanatory power than the other two. Resource use is by far the strongest one out of the three, and, in line with our other results, it is the lagged version that provides the strongest significance. The emission-variable is only significant when lagged. Despite this, there is an explanatory effect from the variable, though somewhat weak.

The causal effect between company financial performance and ESG score was examined with the goal to see if we could find support for either the slack resources theory or the managerial opportunism theory. Our tests clearly suggest that we find support for the slack resource theory, which states that good financial performance leads to a better ESG score in the future, most likely through excess funds provided by good financial performance. What is interesting is that when we test the opposite effect with ROA as the dependent variable, our results show support for the shareholder theory. This means that despite the evidence that better ESG scores lead to worse ROA, investors still expect value to be created as the market value rises with better ESG scores. We suggest this relationship means that investors see value in non-financial information, and therefore ESG has an impact on the market value of the companies in our dataset. Investors do not mind that ESG investing is costly and decrease; in this case, the return on assets. A potential explanation to this is what Sassen, Hinze, and Hardeck (2016) suggested; that reduced risk of scandals tied to environmental, social, or governance could increase firm value.

It is hard to make a definite assumption from this research, but the dataset provides enough certainty to assume a positive relationship between a company's CSR policy and market value in the Nordic markets. It's likely that it is a result of the growing environmental issues that the world is facing, alongside a higher expectation on companies' CSR-engagement, that the positive association with market value of companies can be made. The results of this study can be used by different agents in different roles to create value. Management in corporations can use the integration or improvements of CSR-policies to increase future market value and make the company more attractive to investors. The results, specifically from the subcategories of the environment pillar, can be useful as it isolates which areas that have the most effect. Earlier studies haven't to our knowledge tested the subcategories at the level we did, seeing a significant effect from reducing or improving the resource use, and the emissions lets managers know

which specific areas to improve in. Testing the specific subcategories allows managers to assign resources to the areas where it will have the most effect.

Better CSR-policies can also help to improve the public perception of the company, which will most likely lead to reduced risk tied to a potential investment in the specific company. A lower risk allows companies to get easier and cheaper access to capital both in equity and debt markets. Investors can, in turn, focus on companies that are improving their CSR-score to increase their yield in the financial markets.

6.1 Limitations

CSR-reporting is not legislated, which causes a gap in the population for companies not choosing to report it. Our dataset only allowed us to test 11% of the whole population due the lack of companies that make their CSR data public. The trend of reporting on the CSR-policies is on the rise, and number of companies that report the numbers went from 153 in 2018 to 266 in 2019. The size of our sample also limits us from going in-depth and testing variables such as industry/sector or if there are any differences between the countries. In our case, Sweden has 71 companies, while Norway only has 23 companies that report ESG. This issue provides us with too few observations to compare the effect between the countries. We decided to use year-end stock price to quantify market value, but the ESG score isn't released at the same time. This might be why our lagged variables show a stronger significance.

6.2 Future research

As our dataset is quite limited by the lack of companies reporting on ESG, we suggest this test could be done a few years into the future. If the trend mentioned in section 6.1 continues and more companies start reporting, a more complete study could be done on a larger population. This would allow for industries and country-effects to be tested more closely as well. Our data-sample has few observations from 5 years and back which prevents us from testing whether the effect from ESG is stronger or not in the last few years as the environmental attention has risen, the time effect would also be interesting to test. An alternative to using Thomson Reuters Eikon ESG scoring system would be to attempt a similar study but with the scoring-standardization that the big four accounting firms suggested at the World Economic Forum once/if they get implemented (Deloitte et al., 2020).

It would also be interesting to look into whether the response in the financial markets happens in the short or long term and, if so, how fast the market reacts to a change in the ESG score of a company. This could be tested by an event study during the time window where the ESG scores are updated.

Our main focus was to investigate the effect from the environmental pillar and uncovered that the resource use and, with limited effect, the emissions of a company that has explanatory power. We suggest an in-depth study of these subcategories to understand why this effect appears and how companies receive a higher score. The implication of a study like this would be that companies could better know where to target their investments into CSR.

References

Amel-Zadeh, A., & Serafeim, G. (2018). Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financial Analysts Journal, 74*(3), 87-103. doi:10.2469/faj.v74.n3.2

Aouadi, A., & Marsat, S. (2018). Do ESG Controversies Matter for Firm Value? Evidence from International Data. *Journal of Business Ethics, 151*(4), 1027-1047. doi:10.1007/s10551-016-3213-8

Auer, B. R., & Schuhmacher, F. (2016). Do socially (ir)responsible investments pay? New evidence from international ESG data. *Quarterly Review of Economics and Finance, 59*, 51-62. doi:10.1016/j.qref.2015.07.002

Aupperle, K., Carroll, A., & Hatfield, J. (1985). An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal (pre-1986), 28*(2), 446. doi:10.2307/256210

Barth, M. E., & Clinch, G. (2009). Scale effects in capital markets-based accounting research. *Journal of business finance & accounting*, 253-288.

Bauer, R., Guenster, N., & Otten, R. (2004). Empirical evidence on corporate governance in Europe: The effect on stock returns, firm value and performance. *Journal of Asset Management, 5*(2), 91. doi:10.1057/palgrave.jam.2240131

Beisland, L. (2009). A Review of the Value Relevance Literature. *The Open Business Journal - Open Bus J, 2*. doi:10.2174/1874915100902010007

Blasco, J. L., & King, A. (2017). *The KPMG Survey of Corporate Responsibility Reporting 2017*. Retrieved from https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/10/kpmg-survey-of-corporate-responsibility-reporting-2017.pdf

Bowen, H. R. (1953). *Social responsibilities of the businessman*. New York: Harper.

Brooks, C. (2014). *Introductory econometrics for finance* (3rd ed. ed.). Cambridge: Cambridge University Press.

Brooks, C. (2019). *Introductory Econometrics for Finance*.

Carter, C. R., Kale, R., & Grimm, C. M. (2000). Environmental purchasing and firm performance: an empirical investigation. *Transportation Research Part E, 36*(3), 219-228. doi:10.1016/S1366-5545(99)00034-4

Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal, 35*(1), 1-23. doi:10.1002/smj.2131

Clark, G. L., & Viehs, M. (2014). The Implications of Corporate Social Responsibility for Investors: An Overview and Evaluation of the Existing CSR Literature. *Social Science Research Network*.

Comble, M., Jenks, M., Leue, H., Lutz, V., Singh, H., & Schmidt, J. (2019). *ISS ESG Country Report 2019: The State of Play in Country ESG Performance, Sanctions, and Climate*. Retrieved from https://www.issgovernance.com/library/esg-country-report-2019/

Cornell, B., & Shapiro, A. (1987). Corporate Stakeholders and Corporate Finance. *Financial Management, 16*(1), 5. doi:10.2307/3665543

Dahlberg, L., & Wiklund, F. (2018). ESG Investing In Nordic Countries: An analysis of the Shareholder view of creating value. In.

de Jong, M. D. T., Huluba, G., & Beldad, A. D. (2019). Different Shades of Greenwashing: Consumers' Reactions to Environmental Lies, Half-Lies, and Organizations Taking Credit for Following Legal Obligations. *Journal of business and technical communication*, urn:issn:1050-6519.

De Klerk, M., de Villiers, C., & van Staden, C. (2015). The influence of corporate social responsibility disclosure on share prices. *Pacific Accounting Review, 27*(2), 208-228. doi:10.1108/PAR-05-2013-0047

Delmas, M. A., & Burbano, V. C. (2011). The Drivers of Greenwashing. *California Management Review, 54*(1), 64-87. doi:10.1525/cmr.2011.54.1.64

Deloitte, EY, KPMG, & PwC. (2020). *Toward Common Metrics and Consistent Reporting of Sustainable Value Creation*. Retrieved from http://www3.weforum.org/docs/WEF_IBC_ESG_Metrics_Discussion_Paper.pdf

Eccles, R., Ioannou, I., & Serafeim, G. (2014). The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science, 60*(11), 2835-2857. doi:10.1287/mnsc.2014.1984

Elkington, J. (1994). Towards the Sustainable Corporation: Win-Win-Win Business Strategies for Sustainable Development. *California Management Review, 36*(2), 90-100. doi:10.2307/41165746

Farag, H., Meng, Q., & Mallin, C. (2015). The social, environmental and ethical performance of Chinese companies: Evidence from the Shanghai Stock Exchange. *International Review of Financial Analysis, 42*, 53-63. doi:10.1016/j.irfa.2014.12.002

Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal, 38*, 45-64. doi:10.1016/j.gfj.2017.03.001

Fischer, T., & Sawczyn, A. (2013). The relationship between corporate social performance and corporate financial performance and the role of innovation: evidence from German listed firms. *Zeitschrift für Planung und Unternehmenssteuerung, 24*(1), 27-52. doi:10.1007/s00187-013-0171-5

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment, 5*(4), 210-233. doi:10.1080/20430795.2015.1118917

Friedman, M. (1962). *Capitalism and Freedom*: University of Chicago Press.

Goergen, M. (2012). *International corporate governance*. Harlow: Pearson.

GRI. (n.d.). About GRI. Retrieved from https://www.globalreporting.org/Information/about-gri/Pages/default.aspx

Guenster, N., Bauer, R., Derwall, J., & Koedijk, K. (2011). The Economic Value of Corporate Eco-Efficiency. *European Financial Management, 17*(4), 679-704. doi:10.1111/j.1468-036X.2009.00532.x

Hammond, K. (1997). Leaked Audit: Nike Factory Violated Worker Laws. Retrieved from https://www.motherjones.com/politics/1997/11/leaked-audit-nike-factory-violated-worker-laws/

Jensen, M. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review, 76*(2), 323. doi:10.2307/1818789

Langeland, J. A., & Ugland, L. K. (2019). ESG rating and financial performance in the Nordic market. In: Handelshøyskolen BI.

Lin, W. L., Law, S. H., Ho, J. A., & Sambasivan, M. (2019). The causality direction of the corporate social responsibility – Corporate financial performance Nexus: Application of Panel Vector Autoregression approach. *North American Journal of Economics and Finance, 48*, 401-418. doi:10.1016/j.najef.2019.03.004

Lobe, S., & Walkshäusl, C. (2016). Vice versus virtue investing around the world. *Review of Managerial Science, 10*(2), 303-344. doi:10.1007/s11846-014-0147-3

Margolis, J. D., Elfenbein, H. A., & Walsh, J. P. (2011). Does it Pay to Be Good...And Does it Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance. *Social Science Research Network*.

McGuire, J. B., Schneeweis, T., & Branch, B. (1990). Perceptions of Firm Quality: A Cause or Result of Firm Performance. *Journal of Management, 16*(1), 167-180. doi:10.1177/014920639001600112

McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: correlation or misspecification? *Strategic Management Journal, 21*(5), 603-609. doi:10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO

Melo, T. (2012). Slack-resources hypothesis: a critical analysis under a multidimensional approach to corporate social performance. *Social Responsibility Journal, 8*(2), 257-269. doi:10.1108/17471111211234879

Nelson, M. (2018). *Does your nonfinancial reporting tell your value creation story?* Retrieved from https://www.ey.com/Publication/vwLUAssets/ey-ccass-survey-2018-report/$FILE/ey-ccass-survey-2018-report.pdf

Nuber, C., Velte, P., & Hörisch, J. (2020). The curvilinear and time-lagging impact of sustainability performance on financial performance: Evidence from Germany. *Corporate Social Responsibility and Environmental Management, 27*(1), 232-243. doi:10.1002/csr.1795

Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research*, 661-687.

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies, 24*(3), 403-441. doi:10.1177/0170840603024003910

Pallant, J. (2016). *SPSS survival manual : a step by step guide to data analysis using IBM SPSS* (6th ed. ed.). Maidenhead: McGraw Hill Education.

Porter, M., & Kramer, M. (2002). The competitive advantage of corporate philanthropy. *Harvard Business Review, 80*(12), 56-68.

Preston, L. E., & O'Bannon, D. P. (1997). The corporate social-financial performance relationship: A typology and analysis. *Business and Society, 36*(4), 419-429. doi:10.1177/000765039703600406

PRI. (n.d.). About the PRI. Retrieved from https://www.unpri.org/pri/about-the-pri

Qureshi, M. A., Kirkerud, S., Theresa, K., & Ahsan, T. (2020). The impact of sustainability (environmental, social, and governance) disclosure and board diversity on firm value: The moderating role of industry sensitivity. *Business Strategy and the Environment, 29*(3), 1199-1214. doi:10.1002/bse.2427

Refinitiv. (2020). *Environmental, Social and Governance (ESG) scores from Refinitiv*. Retrieved from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking and Finance, 32*(9), 1723-1742. doi:10.1016/j.jbankfin.2007.12.039

Sassen, R., Hinze, A.-K., & Hardeck, I. (2016). Impact of ESG factors on firm risk in Europe. *Zeitschrift für Betriebswirtschaft, 86*(8), 867-904. doi:10.1007/s11573-016-0819-3

Semenova, N., Hassel, L., & Nilsson, H. (2010). The value relevance of environmental and social performance: evidence from Swedish SIX 300 companies. In (pp. 265-292).

UN Environment. (2019). *Global Environment Outlook 6*. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/27539/GEO6_2019.pdf?sequence=1&isAllowed=y

US SIF Foundation. (2018). *Report on US Sustainable, Responsible and Impact Investing Trends*. Retrieved from https://www.ussif.org/files/Trends/Trends%202018%20executive%20summary%20FINAL.pdf

Vide, T. (2016). Does it pay to be good? An analysis of vice and virtue stock performance in the Eurozone. *Journal of Banking and Financial Economics, 6*(2), 113-125.

Waddock, S. A., & Graves, S. B. (1997). The Corporate Social Performance - Financial Performance Link. *Strategic Management Journal, 18*(4), 303-319. doi:10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO2-G

Wooldridge, J. M. (2016). *Introductory econometrics : a modern approach* (6th ed. ed.). Australia: Cengage Learning.

World Bank. (2004). *Who cares wins : connecting financial markets to a changing world*. Retrieved from Washington, D.C: http://documents.worldbank.org/curated/en/280911488968799581/Who-cares-wins-connecting-financial-markets-to-a-changing-world

World Commission on Environment and Development. (1987). *Our common future*. Retrieved from Oxford: http://www.un-documents.net/wced-ocf.htm

Yale Center for Environmental, L. P. (2018). *2018 Environmental Performance Index; Environmental Performance Index, 2018 Release (1950–2018)*. Retrieved from https://epi.envirocenter.yale.edu/downloads/epi2018policymakerssummaryv01.pdf

Appendix

Appendix 1

Model building

Pooled OLS or fixed effects:

```
. xtreg Priceclose Bookvalue EPS ESG, fe

Fixed-effects (within) regression               Number of obs      =       1,060
Group variable: company1                        Number of groups   =         144

R-sq:                                           Obs per group:
     within  = 0.2092                                         min =           1
     between = 0.4751                                         avg =         7.4
     overall = 0.3860                                         max =          10

                                                F(3,913)           =       80.49
corr(u_i, Xb)  = 0.2224                         Prob > F           =      0.0000

------------------------------------------------------------------------------
  Priceclose |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   Bookvalue |   .3614057   .0987662     3.66   0.000     .1675706    .5552408
         EPS |   4.923407   .4109208    11.98   0.000     4.116948    5.729866
         ESG |     .13862   .0346944     4.00   0.000       .07053    .2067101
       _cons |   2.489624   2.233576     1.11   0.265    -1.893915    6.873164
-------------+----------------------------------------------------------------
     sigma_u |  12.180905
     sigma_e |  7.1961263
         rho |  .74128409   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(143, 913) = 12.87                     Prob > F = 0.0000

. reg Priceclose Bookvalue EPS ESG i.company1

      Source |       SS           df       MS      Number of obs   =     1,060
-------------+----------------------------------   F(146, 913)     =     29.64
       Model |  224097.08        146  1534.91151   Prob > F        =    0.0000
    Residual |  47279.005        913  51.7842333   R-squared       =    0.8258
-------------+----------------------------------   Adj R-squared   =    0.7979
       Total |  271376.085      1,059  256.256927   Root MSE        =    7.1961


       F(143,   913) =   12.87
            Prob > F =    0.0000
```

Pooled OLS or random effects:

```
Breusch and Pagan Lagrangian multiplier test for random effects

        Priceclose[company1,t] = Xb + u[company1] + e[company1,t]

        Estimated results:
                             |       Var     sd = sqrt(Var)
                    ---------+-----------------------------
                    Pricecl~e|    256.2569       16.00803
                           e |    51.78423       7.196126
                           u |    80.75518       8.986389

        Test:   Var(u) = 0
                                 chibar2(01) =   891.05
                              Prob > chibar2 =   0.0000
```

Hausmann, fixed of random effects:

```
                 ---- Coefficients ----
                |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                |    fixed        random       Difference          S.E.
----------------+----------------------------------------------------------------
      Bookvalue |    .3614057     .365987      -.0045813        .0685128
            EPS |    4.923407     6.02006      -1.096653        .0896332
            ESG |      .13862     .075521        .063099        .0168868
----------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      160.60
                Prob>chi2 =      0.0000
```

Appendix 2

Validity

Heteroskedasticity:

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (144)  =   5.6e+34
Prob>chi2 =      0.0000


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of Priceclose

         chi2(1)      =   572.95
         Prob > chi2  =   0.0000
```

Multicollinearity:

Price model 1-8

Variable	VIF	1/VIF
ESG	1.86	0.536499
ESGC	1.84	0.543620
Bookvalue	1.56	0.639054
EPS	1.54	0.648827
Mean VIF	1.70	

Variable	VIF	1/VIF
ESGS	1.69	0.592047
ESGE	1.65	0.607578
Bookvalue	1.60	0.623134
EPS	1.55	0.645718
ESGG	1.11	0.903335
Mean VIF	1.52	

Variable	VIF	1/VIF
ResourceUs~e	1.63	0.611985
EPS	1.61	0.621769
Bookvalue	1.60	0.624257
EmissionsS~e	1.51	0.661616
Environmen~e	1.35	0.741281
Mean VIF	1.54	

Price model 9-10

Variable	VIF	1/VIF
ESG	1.00	1.000000
Mean VIF	1.00	

Variable	VIF	1/VIF
ROA	1.00	1.000000
Mean VIF	1.00	

Autocorrelation

```
Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,     126) =     26.185
           Prob > F =      0.0000
```

Appendix 3

Summary of data set

List of companies:

AB SKF	Hexagon AB	PGS ASA
Akastor ASA	Hexpol AB	Prosafe SE
Aker ASA	Holmen AB	Ratos AB
Aker BP ASA	Hufvudstaden AB	REC Silicon ASA
Aker Solutions ASA	Huhtamaki Oyj	Rockwool International A/S
Alfa Laval AB	Husqvarna AB	Royal Unibrew A/S
Ambu A/S	ICA Gruppen AB	Saab AB
AP Moeller - Maersk A/S	Industrivarden AB	SalMar ASA
Assa Abloy AB	Indutrade AB	Sampo plc
Atlas Copco AB	Intrum AB	Sandvik AB
Axfood AB	Investor AB	Sanoma Oyj
Bang & Olufsen A/S	Iss A/S	SAS AB
Beijer Ref AB (publ)	JM AB	Schibsted ASA
Bergman & Beving AB	Jyske Bank A/S	Sectra AB
BillerudKorsnas AB (publ)	Kemira Oyj	Securitas AB
Boliden AB	Kesko Oyj	Simcorp A/S
Cargotec Corp	Kinnevik AB	Skandinaviska Enskilda Banken AB
Carlsberg A/S	Kone Oyj	Skanska AB
Castellum AB	Konecranes Abp	Solar A/S
Chr Hansen Holding A/S	Kungsleden AB	SSAB AB
Clas Ohlson AB	L E Lundbergforetagen AB (publ)	Stora Enso Oyj
Coloplast A/S	Leroy Seafood Group ASA	Storebrand ASA
CTT Systems AB	Lindab International AB	Svedbergs i Dalstorp AB
Dampskibsselskabet Norden A/S	Loomis AB	Svenska Cellulosa SCA AB
Danske Bank A/S	Lundin Petroleum AB	Svenska Handelsbanken AB
Demant A/S	Mekonomen AB	Swedbank AB
DNA Oyj	Metsa Board Oyj	Swedish Match AB
DNB ASA	Metso Oyj	Swedish Orphan Biovitrum AB (publ)
DNO ASA	Modern Times Group MTG AB	Sydbank A/S
Dometic Group AB (publ)	Mowi ASA	TDC A/S
DSV Panalpina A/S	NCC AB	Tele2 AB
Dustin Group AB	Nederman Holding AB	Telefonaktiebolaget LM Ericsson
EAC Invest AS	Neste Oyj	Telenor ASA
Electrolux AB	Nibe Industrier AB	Telia Company AB
Elekta AB (publ)	NKT A/S	TGS NOPEC Geophysical Company ASA
Elisa Oyj	Nobia AB	TietoEVRY Corp
Eniro AB	Nobina AB (publ)	Tomra Systems ASA
Epiroc AB	Nokia Oyj	Topdanmark A/S
Equinor ASA	Nokian Tyres plc	Trelleborg AB
Fabege AB	Nolato AB	Tryg A/S
Fastighets AB Balder	Nordea Bank Abp	UPM-Kymmene Oyj
Fingerprint Cards AB	Norsk Hydro ASA	Uponor Oyj
Flsmidth & Co A/S	Novo Nordisk A/S	Valmet Oyj
Fortum Oyj	Novozymes A/S	VBG Group AB (publ)
Genmab A/S	Oriola Oyj	Veidekke ASA
Getinge AB	Orion Corp (finland)	Vestas Wind Systems A/S
Gjensidige Forsikring ASA	Orkla ASA	Volvo AB
GN Store Nord A/S	Orsted A/S	Wartsila Oyj Abp
Gunnebo AB	Outokumpu Oyj	Wihlborgs Fastigheter AB
H & M Hennes & Mauritz AB	Outotec Oyj	Yara International ASA
H Lundbeck A/S	Pandora A/S	Yit Oyj

Sectors:

Sectors	Number of companies
Basic Materials	16
Consumer Cyclicals	19
Consumer Non-Cyclicals	9
Energy	6
Financials	32
Healthcare	15
Industrials	33
Technology	16
Telecommunications Services	6
Utilities	1
Total	**153**

Countries:

Countries	Number of companies
Denmark	31
Finland	28
Norway	23
Sweden	71
Total	**153**