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ESG rating and financial performance in the Nordic market

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Abstract

Stakeholders' interest in firms have increased in recent years and ESG rating have become more important. Previous literature has had difficulties concluding on the effect of ESG rating on financial performance. The ESG performance of firms in the Nordic countries are relatively high. This thesis will investigate the relationship between ESG performance and financial performance in the Nordics. Also, extending our investigation by deconstructing the ESG score. The updated ESG rating from Thomson Reuters is a measure for the independent variable and ROA is a measure for financial performance. Based on correlation analysis and results from a fixed effect regression we can conclude that the relationship is significant and negative for firms in the Nordics. Furthermore, the relationship is a one-directional causal relationship, where ESG rating affect financial performance in the subsequent period negatively.

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1.0 Introduction

The traditional objective of firms is that of maximising shareholder value. The shareholder is the residual claimant, and by maximising the equity belonging to the shareholders, the firm is profit maximising. This argument is supported by the fact that other stakeholders are protected by contractual agreements (Friedman, 1962). Environmental, social and governance factors affect stakeholders inside and outside the firm. Therefore, the counter-argument to solely focus on shareholder value is that stakeholders are not completely protected by their contracts, which implies that the firm should broaden its focus to include the stakeholders' perspective (Freeman, 1984). Shareholder theory does not support sustainable investment, while stakeholder theory argues that sustainable investments are value creating.

Sustainability is a vague term but can loosely be defined as meeting the present demand without compromising future demand (World Commission on Environment and Development, 1987). Corporate social responsibility (CSR) can be defined as "Corporate social actions whose purpose is to satisfy social needs" (Angelidis & Ibrahim, 1993, p. 6). A focus on social welfare has been a part of several firms' practices without them characterising their actions as CSR. In the nineteenth century, George Cadbury built a town around his factory. The families working for the company were provided with housing and facilities, in contrast to the many slums surrounding other industrial companies. This is one of the first documented CSR activities (Smith, 2003). In later years, there has been a shift from CSR to the more defined Environmental, Social and Governance (ESG) terminology, where the ESG criteria refer to firms' ethical impact and sustainable practices. Alternating between ESG and CSR is common, but the difference is often of no importance due to the fact that the two definitions are imprecise.

Interest in sustainability is growing; both investors and firms are looking at sustainability ratings. EY (2017) published a survey on the increasing demand for sustainable investments in the United States. They found that the Socially Responsible Investment (SRI) strategies had seen an annual growth of 107,4% since 2012. In the Nordic market, the interest for sustainability is especially high. Firms in the Nordic countries stand out as top performers in ESG ratings (Nordea Equity Research, 2017). The increasing interest for SRI leads us to believe that there is a positive relationship between sustainability and financial performance. This would

imply that firms have a financial incentive to invest in sustainable activities and thereby taking more social responsibility. Based on these observations, we arrive at the research question.

Does ESG score affect the financial performance of Nordic companies?

In order to answer the overall question, it is necessary to operationalise the variables in the research question. The independent variable is the sustainability score, and the ESG rating will act as a measure. Several institutions provide ESG rating based on factors related to sustainability, but there is a debate regarding how, what and the weighting of these different factors (Eccles, Serafeim, & Krzus, 2011). The ESG rating used will be collected from Thomson Reuters. The Thomson Reuters ESG score was updated from the ASSET4 scoring. The updated, more accurate score will enable us to perform a better analysis than previous studies in this field (Thomson Reuters, 2019). Financial performance is the dependent variable and will be measured by the accounting-based measure ROA.

The research question will be deconstructed into three segments, where we aim to gain a complete assessment of the financial value of sustainability rating. A large part of the previous literature has solely looked at the ESG score. Deconstructing the ESG score into Environmental, Social and Governance will provide a more extensive understanding of the different factors. The hypotheses will be constructed for each of the sub-segments. The first segment will investigate the relationship between the ESG score and ROA. In segment 2, the ESG score is deconstructed into the three pillars (Environmental, Social and Governance), and the relationship of each pillar score and ROA is investigated. Also, a fourth complementary score is added to assess the interrelationship with ROA. Segment 3 will contribute to the validity of the results by sampling out companies with complete data for the whole sample period and performing the same analysis as in segments 1 and 2.

The Nordic countries constitute the geographical delimitation in this study. Sweden, Norway, Finland and Denmark are similar in economic, social and CSR performance but still differ significantly in the size and composition of SRI (Scholtens & Sievänen, 2013). Economic openness, size, the composition of the financial industry and cultural values in the respective societies are the main driving

forces for the size and composition of SRI in the Nordic countries according to a case study by Scholtens and Sievänen. They argue that the ESG performance in the Nordics are highly correlated because of the similarities between the countries (Scholtens & Sievänen, 2013). It is supported by La porta, Lopez-De-Silanes and Shleifer (2008), who ascribe the similarities of the ESG performance to the homogeneity of institutions and cultural norms. The result from our thesis are therefore not directly applicable for other countries or regions due to the specific characteristics of the Nordic countries.

The Fixed Effect Model is chosen (see 5.1.2 and 7.1) as the most precise method for evaluating the effect of ESG rating on financial performance. Evaluating the data at our disposal and testing for possible distortions of the results is done in data description (6.2) and results (7.0). Analyses of the results in the three segments will enable us to answer the research question. The effect of ESG rating is found to be negative, which would suggest that the shareholder perspective of the firm holds true for listed firms in the Nordic market. Implications of these findings will contribute to the mixed results from earlier research.

2.0 Literature review

In the 1970s, the first research on the relationship between a firm's social responsibility and its financial performance was conducted by Moskowitz (1972). In the article, he listed 14 companies as being socially responsible and therefore to be seen as solid investment choices. He later showed that the stocks of these companies outperformed indexes such as the S&P 500 and Dow Jones and thus concluded a positive association existed between CSR and stock returns (Moskowitz, 1972). A contradictory view is that socially responsible firms are financing socially responsible activities with capital that could be put to better use elsewhere. Therefore, socially responsible firms will be at a competitive disadvantage to other firms. In a study by Vance (1975), a negative correlation between socially responsible rank and stock market performance was observed, which gave support to this contradictory view. These conflicting results were the starting point of an area of research that has grown over the subsequent years.

2.1 From social responsibility to ESG

Corporate Social Responsibility is the company's extended focus on outside stakeholders, as distinct from the narrower shareholder view. CSR activities have received more attention during the last century but have been a part of many firms' strategic plans now and before. Social Responsible Investment was originally characterised as an ethical investment with moral screening mostly based on religious views; the modern SRI is based more on the social convictions of individual investors (Renneboog, Ter Horst, & Zhang, 2008).

The more up-to-date characterisation of SRI is that these are investments that consider environmental, social and corporate governance criteria to generate long-term competitive financial returns and positive societal impact (US SIF, 2018). For the investor to act socially responsible, the CSR activities in a company must be expressed in measurable variables. The ESG score is supposed to be a better tool for reflecting CSR. The main issue using ESG ratings to assess the companies' sustainability, is the lack of available information. There is a difference in the disclosure of sustainability data given by the companies, which makes it difficult for the many ESG rating agencies to accurately reflect true sustainability. ESG rating agencies link the stakeholders to the companies, and the ESG rating makes socially responsible investing possible for investors (Schäfer, 2005). In a review of

corporate sustainability reporting tools (SRT's) (Siew, 2015), the author concludes that comparing different SRT's is hard due to deficiencies, lack of standardisation and the availability of information. Corporations exploit this difficulty to hide their actual practices and through green-washing manipulate stakeholders' perceptions of the firms.

The availability of information regarding the firms socially responsible activities has improved by voluntary and non-voluntary disclosure agreements. The United Nations Global Compact (UNGC) is a voluntary agreement to follow certain principles regarding human rights, labour, environment and anti-corruption. Currently, 9500 companies based in more than 160 countries have agreed to follow the principles and to provide the required reporting (United Nations, 2018). The United Nations Principles for Responsible Investing (UNPRI) encourage investors to incorporate ESG factors when making investment decisions (United Nations, 2018). UNGC increases the reporting on ESG data and therefore provides the foundation which investors need to make decisions based on ESG factors, to act in accordance with UNPRI.

2.2 Socially responsible investing and financial performance

The literature represents a subjectively selected sample of previous research relevant to our research question: *Does ESG score affect the financial performance of Nordic companies?* The literature has been evaluated by the relevance to our research question and how prominent the results have been for further research within the area.

The classic paper "The price of sin: The effect of social norms on markets" by Hong and Kacperczyk (2009) is one of the most acknowledged studies within the field. They define sin stocks as publicly traded companies involved with the production of alcohol, the production tobacco and gambling. Their results shows that these firms' cost of capital is negatively affected. They argue that SRI makes a difference for the investment decisions, not just the feeling of being a "do-gooder". That is, sin stocks have higher expected returns due to the risk of legal action they face, induced by societal norms. In "Vice versus virtue investing around the world" (2011), the authors investigate whether going long in a portfolio of sin stocks and short in a portfolio of socially responsible stocks outperforms market benchmarks. They find

no evidence that sin stocks, or socially responsible stocks, differ in returns after controlling for common factors (Lobe & Walkshäusl, 2011).

The article "The impact of corporate sustainability on organizational process and performance" (Eccles, Ioannou, & Serafeim, 2014) investigates the effect of corporate sustainability on organisational processes and performance. The paper argues that corporations that voluntarily adopted sustainability policies before it became “a trend” are truly sustainable. They investigate two groups of corporations, "High Sustainability" and "Low Sustainability", and find that "High Sustainability" companies significantly outperform "Low Sustainability" companies in both financial and accounting performance. This effect is particularly high for B2C companies. Alternative explanations to why "High Sustainability" companies significantly outperform "Low Sustainability" companies are also presented in the paper: price pressure from SRI funds, sustainability as a luxury good, omitted risk factor, survivorship bias, future default rates and corporate governance as a correlated omitted variable (Eccles et al., 2014). The interest of this article is in truly sustainable companies while our thesis focuses on sustainability rating. Their result is interesting because of their focus on true sustainability, and is, despite the difference from our research focus, relevant as it adds to an understanding of the depth in this research area. Still, their choice of instrument to measure true sustainability could be criticised because of the possibility that previous sustainability experience is not a true reflection of the firms sustainability performance today.

The report "Stockholder to stakeholder – How sustainability can drive financial performance" (2015) investigates more than 41 studies related to sustainability. The authors conclude that 80% of the studies reviewed show that companies with sustainability practices in place exhibit higher financial performances compared to the ones without. In the report, they look at studies related to any of the ESG factors. They conclude that it is of great importance for a company to care about their ESG metric (Clark, Feiner, Viehs, & Viehs, 2014).

Waddock & Graves (1997) discuss the causality of the linkage between corporate social performance and financial performance. They pose the alternatives where either slack resources or good management are theories that could explain the

relationship. According to slack resources theory, the direction of causality is that good financial performance leads to better corporate social performance because the firms have excess resources in good financial times to spend on corporate social activities. Good management theory upholds the opposite, where firms gain competitive advantages by investing in corporate social activities. The advantages are explained by the stakeholder theory (see section 3.1). Waddock and Graves find support for both directions and propose a "virtues cycle" between corporate social performance and financial performance. By today's standards, this report from 1997 applies an inadequate measurement for corporate social performance'.

Fischer and Sawczyn (2013) seek to continue the investigation of the relationship between corporate social performance and financial performance for firms in the German market. They argue that R&D causes omitted variable bias when it has been left out from previous studies. They include R&D and attempt to provide further support for the virtues cycle. They find a Granger-causal relationship between financial performance and the corporate social activities generated the subsequent year, thus providing support to the slack resources theory, but not for the virtues cycle explained by Waddock & Graves (1997). They also conclude that the firm is affected by R&D.

A more recent paper done in the German market, investigating the link between ESG factors and financial performance (Velte, 2017). Velte's research builds on evidence from Fischer and Sawczyn (2013). The financial performance is measured in two ways: Return on Assets and Tobin's Q. The sample period is 2010–2014 because of new regulations on CSR in listed companies after the financial crisis. ESG rating was collected from Thomson Reuters DataStream. The control variables used by Velte are R&D, beta, debt, size and a dummy variable for manufacturing or service industry. Velte finds that ESG as a factor and all the three factors alone have an impact on return on assets, but no significant impact on Tobin's Q. The paper is relevant since the German market has similarities with the Nordic markets. Still, it focuses on a time-span where all the German listed companies were forced to increase their focus on ESG.

The study "Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach" (Flammer, 2015)

investigates how CSR proposal affects corporate financial performance. Flammer finds evidence that support her hypothesis: CSR proposals lead to increased value for the shareholders. She also finds that companies with a low degree of CSR have a higher effect of increasing it than companies with a high CSR score, implying that there is a decreasing marginal effect. The paper mainly uses abnormal returns as the primary dependent variable. The results are interesting since they support the belief that ESG scores affect financial performance. Still, it does not use ESG metrics that can be compared to the other studies discussed. Her paper focuses mainly on CSR proposals that pass and fail in the companies.

The paper "The Economic Value of Corporate Eco-Efficiency" (Guenster, Bauer, Derwall, & Koedijk, 2011) focuses solely on the Environmental factor where they find evidence supporting a positive relationship between eco-efficiency and financial performance. Eco-efficiency is measured by another third-party provider (Innovest) and financial performance measured by ROA. The relationship is positive, and they conclude that a trade-off between strong corporate eco-policy and financial performance does not exist.

2.3 Connecting previous research to this thesis

We expect that ESG performance will have a significant positive effect on financial performance, based on the previous literature and due to the increased focus on sustainability in the Nordics. Although many of the papers use different methodologies and ways of measurements for evaluating sustainability, some inferences can be applied to the generality of sustainability criteria on financial performance. The largest concerns we will face is whether our results will reveal a true causality; will companies focusing on improving their ESG rating perform better financially, or will companies with better financial performance focus on improving their ESG rating? Waddock and Graves (1997) depict these alternatives as slack resources or good management. This thesis will evaluate if the good management hypothesis best explains the relationship between corporate social performance and financial performance. That is, does high ESG rating lead to better financial performance? The theory behind the construction of the hypotheses will be further discussed in the theory sections 3.1 and 3.2.

The lack of disclosure on ESG data is a problem, given that it will inflict restrictions on which companies we can include in our dataset. Disclosure being voluntary will probably produce a biased selection of companies, as the companies choosing to report on the factors underlying the ESG rating probably are companies performing well in regard to these factors. Whereas companies not performing well on these factors rather will tend not to report their numbers, generating an information skewness. Further discussion of the data will follow in the data description. Velte (2017) will be especially relevant to this thesis regarding methodology, and this will be discussed further in the methodology chapter.

3.0 Theory

Two theories that can explain the relationship between ESG rating and financial performance are the shareholder theory and the stakeholder theory. The shareholder theory states that the firm should act in the best interest of its shareholders, and that including other stakeholders when making decisions will lead to value destruction for the shareholders. The contrary view is the stakeholder theory, which argues that potential agency costs can be reduced when the interest of all stakeholders that are affected by the firm's decisions are included. Such stakeholders can be employees, debtholders, suppliers, the community or the public.

3.1 Shareholder theory

Milton Friedman introduced the shareholder theory in "Capitalism and Freedom" (1962). He states that the only group to which a corporation has obligations is its shareholders, and the goal of the firm is to maximise profits, and reward shareholders for the risk they have taken by investing in the firm. Therefore, a company should not have a social responsibility to outside stakeholders. Shareholders can then decide for themselves if and how they wish to contribute to society, rather than a firm committing to these activities on their behalf (Friedman, 1962). He argues that inclusion of several stakeholders' interests, especially competing interests, will lead to wasted time and funds and subsequently value destruction. Sternberg (1994, 1997, 1998) is a famous supporter of shareholder theory and has criticised the stakeholder theory in her papers. She argues that the stakeholder theory is dangerous and unethical because it disregards private property and the trust given to the firm by the shareholders.

Friedman (1962) states that the firms should focus purely on profit maximisation within the legal framework, engaging "…in open and free competition, without deception or fraud" (Friedman, 1962, p. 6). Smith (2003) argues that that critique of shareholder theory is often based on a misinterpretation of Friedman's (1962) statement because "… without deception or fraud" is often left out. Meaning that critics of shareholder theory often refer to shareholder advocates as encouraging illegal behaviour. Smith also states that the shareholder theory does not forbid allocation of funds to charitable or socially responsible activities. The shareholder theory supports these activities as long as they are the best investment opportunity

available (Smith, 2003). Hence, investing in activities that increase ESG rating should be done when it is profitable for shareholders.

To continue the discussion on activities that improve ESG rating, we must more closely define in what way the managers and shareholders interact. The separation of ownership and control is the key problem when regarding these activities. Large listed firms are owned by their shareholders and controlled by their managers (Berle & Means, 1932). There are several ways a manager can choose to act sub-optimal in regard to the shareholders' best interest, but one way he or she can violate the shareholders' trust is to let costs drift and engage in pet projects. The manager can prefer these projects because it entails private benefits to him or her (Jensen & Meckling, 1976). ESG improving activities could be a type of activity that would give the manager private benefits, such as being perceived as environmentally friendly. Therefore, a manager would not act in the best interest of the shareholders because of these potential private benefits.

3.2 Stakeholder Theory

Stakeholder theory was first presented by Freeman (1984) as a response to the shareholder theory. A definition of the theory is stated by Crainer as "The theory that a firm should be run in the interests of all its stakeholders rather than just the shareholders" (Crainer 1995, p. 1150). Stakeholder refers to everyone that has a stake in the company. The level of stake is not defined, so the number of stakeholders could be infinite. Critics argue that balancing infinitely many stakeholders' interests is not within the scope of managements duties. However, in most situations the firm's stakeholders are the employees, debtholders, suppliers, customers and the local community, and their level of stake should be considered from their level of being affected by the firm's actions.

The causal relationship between corporate social responsibility and financial performance is potentially a two-way relationship. Firms with high financial performance will have more resources available to spend on improving their ESG rating. Alternatively, the causal relationship is that having a high ESG rating leads to better financial performance through reduced agency costs, caused by better stakeholder relationships. Waddock and Graves (1997) refer to these two alternatives as the slack resources hypothesis and the good management hypothesis

(see 2.2). The focus in this thesis will be on the potential value creation generated from a high ESG rating. In the next section we will explain how we form the hypotheses accordingly (4.0), but first the sources of potential value creation from a high ESG rating will be discussed.

An argument for why stakeholder theory supports that increasing ESG rating will positively affect financial performance is presented by Shah and Bhaskar (2007). In their review (2015) they highlight the two papers Downing (1997) and Whysall (2000). Downing (1997) concludes that mismanagement of stakeholders'' interest can result in boycotts and brand smearing, which subsequently can lead to a loss in revenue and market shares for the company. Whysall (2000) investigated the consequences following a fallout with stakeholders of a firm and found that the effects are likely to be widespread, highly publicised and long-lasting. These consequences would reduce the firm's financial performance, hence increasing ESG activities will have a positive impact on financial performance.

Supporters of the stakeholder theories argues that firms can increase efficiency and earn competitive advantages by investing in their employees and good HR solutions, which will increase financial performance (Huselid, 1995; Pfeffer, 1994). Also investing in proactive environmental activities can reduce costs for companies if they are ahead of future or present regulations (Dechant, Altman, Downing, & Keeney, 1994; Hart, 1995; Shrivastava, 1995). Environmental investments can be used to create competitive advantages if products are presented as eco-friendly (Shrivastava, 1995), and can also improve the firm's reputation, which can strengthen loyalty from stakeholders such as customers, governments and employees.

Better stakeholder relationship with key stakeholders, such as employees, community and customers, will lead to better financial performance. A well-diversified group of employees will increase the productivity and satisfaction, hence increase financial performance. Having strong ties with the community will increase the likelihood of better taxation and reduced regulation, which in turn will lower the costs for the firms. Environmental awareness and better community ties can therefore come to be competitive advantages for firms (Waddock & Graves, 1997).

4.0 Main Hypotheses

Now that relevant previous literature and theoretical background has been provided, we return to the research question: *Does ESG score affect the financial performance of Nordic companies?* We will deconstruct the main research question into three segments. The first segment will investigate the overall relationship we want to examine. The second segment will deepen the understanding of the ESG rating. The third segment will provide validity to our results in segments 1 and 2. These three segments will contribute to the material that will make us able to answer the research question.

The relationship between ESG rating and financial performance is complicated because of the simultaneous causality (Fischer & Sawczyn, 2013; Waddock & Graves, 1997). By looking at the lagged ESG rating, we will be able to examine the relationship we investigate in this thesis.

$$ESG\ rating_{t-1} \rightarrow Financial\ performance_t$$

(+) A positive relationship would suggest that improving ESG rating is value creating (stakeholder theory).
(–) A negative relationship suggests that improving ESG rating destroys value (shareholder theory).

On the other hand, good financial performance could lead to better ESG rating because the firm will have excess resources to spend on ESG improving activities.

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

(+) If the relationship is positive, good financial performance lead to increasing ESG rating.
(–) Good financial performance does not lead to increasing ESG rating.

Therefore, we will form the hypothesis by using the lagged ESG rating to account for the causality problem. The investigation will be limited to whether the stakeholder view or the shareholder view is more prominent to explain our results in the Nordic market.

Segment 1 ESG score

Hypothesis H1A

Question: Are firms in the Nordic market with higher ESG score associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESG* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESG* $rating_{t-1}$ *and* ROA_t.

Segment 2 Pillar scores

This segment will provide insight to how the three components of the ESG score contribute to a firm's financial performance. In addition, the relationship between the controversies score and ROA will be investigated.

Hypothesis H2A

Question: Are firms in the Nordic market with higher Environmental score associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESGE* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESG* $rating_{t-1}$ *and* ROA_t.

Hypothesis H2B

Question: Are firms in the Nordic market with higher Social scoring associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESGS* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESGS* $rating_{t-1}$ *and* ROA_t.

Hypothesis H2C

Question: Are firms in the Nordic market with higher Governance scoring associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESGG* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESGG* $rating_{t-1}$ *and* ROA_t.

Hypothesis H2D:

Question: Are firms in the Nordic market with higher Controversies scoring associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESGC* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESGC* $rating_{t-1}$ *and* ROA_t.

Segment 3 Smaller sample with observations for the entire period

In this segment, we will reduce the number of firms with available ESG data for the complete sample period, and then carry out the same hypothesis tests described in segments 1 and 2. ESG data from 2005–2017 and the financial data from 2006–2018, results in a sample of 26 firms (appendix 4). In addition, a sample of companies with available ESG data from 2002–2017 results in a sample of 19 firms (appendix 5).

5.0 Methodology

To be able to answer the research question for this thesis *Does ESG score affect the financial performance of Nordic companies?* a suitable model must be chosen. In this chapter, we will start by explaining the data set and then go through the model selection process, before ultimately discussing some concerns about the validity of the results. The procedure for choosing the right model will be repeated for all three segments. The results from the tests are presented in the results (7.1, Table 4).

5.1.1 Panel Data

The data set at disposal contains observations for 14 years and 139 companies and is structured as a panel data set. The panel data set is unbalanced due to the lack of data. The advantage of using a panel data set is that we can control for unobservable variables across firms and years given that we model it accurately (Stock & Watson, 2015). In this thesis, such variables could be increased focus on ESG over time, the importance of ESG in different companies or in different industries. It accounts for individual heterogeneity. A panel data set is rich on information and therefore allows us to investigate more complex problems than with pure cross-sectional or pure time-series data. It would require a long time-series to investigate how the variables move dynamically in a pure time-series model, which would induce a problem since ESG rating is updated yearly and goes back to 2002. With panel data, the number of observations will be higher and thereby increase the power of the test (Brooks, 2014).

5.1.2 Model Building

Due to the fact that we have a panel data set and wish to take advantage of its features, a model for panel data will be chosen. There are different types of models to be applied on panel data, where Fixed Effect Model, Random Effect Model and Pooled OLS are the three most common. Velte (2017) and Shih-Fang Lo and Her-Jiun Sheu (2007) investigate the same topic as in this thesis and are both applying the Fixed Effect model. Still, our choice of model will be based on a Poolability Test, a Breusch-Pagan Multiplier Test and a Hausman Test, which will determine which of the three models is the most suitable for our panel data set.

Another approach that could be used instead of the panel data methods chosen in this thesis is a portfolio analysis. This methodology is applied by Guenster et al. (2011) who use the Fama & French (1993) methodology. A suggestion for further research is to use both the portfolio analysis and the panel data models to secure the robustness of the results.

5.1.2.1 Pooled model

A Pooled OLS would not take advantage of the benefits of the panel data set (Hill, Griffiths, & Lim, 2012). In a Pooled OLS the dependent variable is pooled together, both cross-sectional and time-series observations. The explanatory variables are stacked the same way. The Pooled OLS will be estimated using simple OLS. This method of handling a panel dataset is easy, and assumes that the average values of the variables and the relationship between them are constant across all entities (cross-sectionally) and over time (Brooks, 2014).

Put differently, the Pooled OLS use simple betas, meaning that they do not take into account the cross-sectional nor time-sectional characteristics. The Pooled OLS will be chosen if the data does not contain fixed effects or random effects. The regression equation for segment 1 with a Pooled OLS is:

$$ROA_{it} = \beta_1 + \beta_2 ESG_{it} + \beta_3 R\&D_{it} + \beta_4 Beta_{it} + \beta_5 DebtRatio_{it} + \beta_6 Size_{it} + u_{it}$$
$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

5.1.2.2 Fixed effects

The Fixed Effect Model controls for unobserved heterogeneity that is constant in the time dimension. It assumes that there are omitted variables in the panel data that varies across entities, but not across time (Stock & Watson, 2015). To control for the variation across firms, the model has one intercept for each firm (α_i). The intercepts absorb the omitted effect that is constant over time, but the variation across time is still not accounted for. There is a difference within each firm that is not accounted for by the control variables but is captured by the intercepts for each entity. For segment 1 the regression equation with fixed effects is:

$$ROA_{it} = \alpha_i + \beta_1 ESG_{it} + \beta_2 R\&D_{it} + \beta_3 Beta_{it} + \beta_4 DebtRatio_{it} + \beta_5 Size_{it} + u_{it}$$
$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

To test whether there are fixed effects in our panel data set, we use the F-Test for fixed effects, also referred to as the Poolability Test (Kunst, 2009). The null hypothesis states that individual effects do not exist, while the alternative states that there are individual effects. If the null hypothesis is rejected, a Pooled OLS cannot be used, and a Fixed Effect Model is preferred over Pooled model (Kunst, 2009). Kunst (2009) states that it is necessary to check for random effects before deciding if the Fixed Effect Model is the right choice.

5.1.2.3 Random Effects Model

The Random Effect Model takes the individual effects into account and uses one intercept per entity (W_{ij}). The difference between a fixed and random effect model is that the random effect model assumes that the entities are randomly selected and that the individual effect is not fixed, but random (Hill et al., 2012). The Random Effect Model assumes that the random effects arise from a common intercept that is the same for all units over time, plus a random effect that is constant over time and measures the random deviation from the global intercept for each entity (U_i) (Brooks, 2014). The regression equation for segment 1 with a random effect model is shown below.

$$ROA_{it} = \beta_1 ESG_{it} + \beta_2 R\&D_{it} + \beta_3 Beta_{it} + \beta_4 DebtRatio_{it} + \beta_5 Size_{it} + u_{it} + U_i + W_{ij}, \quad where\ i = 1, \dots, 139\ and\ t = 2006, \dots, 2018$$

Our sample of data is not selected randomly, but still, there is a need to check whether there are random effects in the data. The Breusch-Pagan Lagrange Multiplier Test will test for random effects in the data set, thereby determine the need to check if a Random Effect Model is the best course of action. The null hypothesis is that individual-specific or time-specific error variance is zero, meaning that a Pooled OLS is preferred over a Random Effect Model (Park, 2011).

If there are both random and mixed effects in the data a Hausmann Test is suitable to determine which effect is the strongest, hence which model to choose. The Hausman Test will make us able to determine which is the best choice between the Fixed Effect Model and the Random Effect Model. The test examines whether the individual effects are uncorrelated with other regressors in the model. If the

individual effects are correlated the random effect model will violate a Gauss-Markov assumption and is therefore no longer Best Linear Unbiased Estimate (BLUE), this is because the individual's effects are part of the error term in a Random Effect Model (Park, 2011). If the null hypothesis is rejected, the Fixed Effect Model is favoured.

5.2 Validity

The result from the model selection tests shows that a Fixed Effect Model is the most suitable to investigate the research question (table 4). This section will focus on how to secure validity for the Fixed Effect Model, and hence if the results are valid.

5.2.1 Omitted Variable Bias

For the omitted variable to lead to omitted variable bias, the omitted variable must be 1) correlated with the dependent variable and 2) correlated with at least one of the other independent variables. Omitted variables bias makes the estimator inconsistent. The independent and control variables included are based on economic arguments made by previous literature (Fischer & Sawczyn, 2013; Velte, 2017), further discussed in the data description (6.1.1 and 6.1.2). Several factors could be included, but it is crucial to find a balance between too few and too many variables since the variance of the estimator would increase with too many variables and the number of degrees of freedom would decrease. A parsimonious model would be better in this regard but would increase the probability of omitted variable bias. The first assumption for the Fixed Effect Model states that the error term has a conditional mean zero, which means that on average, the value of the dependent variable coincides with the regression line. Therefore, on average, the error term is zero. The first assumption implies that there is no omitted variable bias (Stock & Watson, 2015). As will be described in the descriptive data section (6.2.1.1) is the R&D variable excluded due to missing observations. This may cause an omitted variable bias problem. Fischer & Sawczyn (2013) criticize prior research for excluding this variable because empirical evidences show that there is high positive correlation between innovation, proxied by investment in R&D, and sustainability ranking.

5.2.2 Selection Bias

Missing data can be a threat to internal validity when it leads to sample selection bias. Stock and Watson (2015) define this as missing data due to a selection process that is related to the dependent variable. The second assumption in the Fixed Effect Model is that the variables are i.i.d. across entities. This assumption holds if the entities are selected by simple random sampling from the population (Stock & Watson, 2015). For our data set, selection bias might be a problem since the entities are not collected randomly but selected from the availability of ESG score. According to Heckman (1979) sample selection bias will occur when the data is picked based on the availability of data. Sample selection bias leads to biased and inconsistent estimators. The idea behind this is that companies that report ESG may report them for selfish reasons; they want to disclose data on variables where they perform better than their competitors (Fischer & Sawczyn, 2013). The sample can suffer from a lack of data from companies that perform poorly on sustainability criteria and therefore avoid reporting them. One impact a sampling bias may have on the result is that we cannot draw a general conclusion for all firms in the Nordic, just the firms that are included in this thesis.

5.2.3 Large Outliers

The third assumption for the Fixed Effect Model is that large outliers are unlikely. The assumption says that the dependent variable and the regressor have finite kurtosis (Stock & Watson, 2015). The definition of an outlier is vague, but practically, it is an influential observation that would change the estimates if it is dropped (Wooldridge, 2018). Possible explanations for large outliers could be data entry mistakes such as decimal point misplacement or wrong amounts of zeros. If it is not a data entry mistake, it might be an actual outlier, which has different characteristics than the majority of the sample (Wooldridge, 2018). The third assumption suggests that we must be aware of our data. The descriptive statistics table (appendix 2) will guide us. The table includes maximum, minimum, mean, median and standard deviation. An assessment of each observation that is "unusual" has been evaluated. Figure 5, 6, 7 and 9 show the distribution of the variables. We concluded that there was no need to exclude any variables. This is further discussed in Cross-sectional Descriptive Statistics (6.2.2).

5.2.4 Multicollinearity

The last assumption is no perfect multicollinearity, which occurs when there is an exact relationship between two or more variables (Brooks, 2014). Perfect multicollinearity does not appear often, and a software package will give a warning or drop one of the perfect correlated variables when trying to run a regression with perfect multicollinearity. A problem that more often arises is imperfect multicollinearity, also referred to as near perfect multicollinearity, which leads to high R-squared and high standard errors for the individual coefficients. Meaning that the explanatory power is high, but the variables will not be significant. Another problem that arises is that the regression becomes very sensitive, dropping a variable will have a significant impact on the regression. The last problem that occurs with near multicollinearity is that the confidence intervals will be wide, due to the high standard errors. Wide intervals give inaccurate conclusions (Brooks, 2014). To test for near multicollinearity is not straightforward, by looking at the correlation matrix easy forms of multicollinearity can be detected. Other forms of multicollinearity that cannot be detected in a correlation matrix can be a linear relationship between more than one explanatory variables: X1 + X2 = X3 (Brooks, 2014). It can be concluded from the correlation matrix (table 2) that none of the variables have a correlation high enough to suspect multicollinearity. The correlation matrix is thoroughly discussed in the data description section (6.2.3).

5.2.5 Serial correlation

Serial correlation or autocorrelation often occurs in time-series data. If there is autocorrelation and it is ignored, the coefficients estimates will still be unbiased but inefficient, therefore they are no longer BLUE. When the estimates are no longer BLUE, there is a chance the standard errors are wrong (Brooks, 2014). Wrong standard errors lead to wrong results and conclusions; therefore, it is necessary to check if the level of autocorrelation in the data will affect the results. There are several ways to test this as the Durbin-Watson or the Ljung-Box Q. The test chosen for this data set is the Wooldridge Serial Correlation Test since it is compatible with panel data. The results from the test is reported in the results (7.2).

5.2.6 Measurement error

Measurement error occurs if there are errors in the data collected or if it is wrongly reported. Measurement errors can lead to inconsistent estimators, and hence wrong

results. The data used in this thesis are collected from Eikon. Investigation of potential outliers adds further assurance that the reported data is accurate. To our best knowledge there is no mistreating of the data. One of the primary causes of concern relevant to this thesis is the potential measurement error in ESG. How to measure ESG is not standardised, and many rating firms do this differently (Waddock & Graves, 1997). Olmedo, Torres and Izquierdo (2010) address the problem with lack of transparency and differences in the methodology for ESG rating companies. The impact these problems have on our research is that we cannot conclude on how ESG scores impact financial performance on a general basis, the conclusion will only be valid for the ESG measures from Eikon. How the ESG rating from Thomson Reuter is measured is further discussed in the data description (6.1.1). However, the problem remains, how to measure ESG is still under discussion. Siew (2015) reviews corporate rating tools (SRT's) and concludes that the lack of standardisation of how to measure ESG is exploited by firms to hide their actual practices. They disclose information in their advantage and therefore manipulate the perceptions of the firm. Thus, measurement error is a problem when investigating how sustainability impact firm performance using ESG rating.

5.2.7 Simultaneous Causality

Another threat to internal validity is simultaneous causality, which occurs when Y causes X. We assume and want to test whether ESG rating affects financial performance, but there might be reasons to think that financial performance affects ESG scores. Companies with high financial returns have more funds to spend on activities improving ESG rating. If this is the case, the estimator will be biased and inconsistent because simultaneous causality leads to correlation between the regressor and the error term. Simultaneous causality is outside the scope of our thesis but is a very critical problem when investigating the relationship between financial performance and ESG rating. The ESG rating will be lagged one period to account for the causality problem. Other papers have focused on the causality problem (Eccles et al., 2014; Guenster et al., 2011; Waddock & Graves, 1997). Waddock and Graves (1997) conclude that the relationship is a virtues cycle and that the causality runs in both directions. This paper is more closely discussed in the literature review (2.2).

6.0 Data description

This section will focus on the choice of data, how it is collected and the relationship between the variables. The first section discusses the independent, the dependent and the control variables. Continuing with studies on the longitudinal and cross-sectional dimensions of the panel data set. The Pearson Correlation Matrix will be discussed in the last part.

6.1 Variable Description

The data used in this thesis is collected from Thomson Reuters Eikon. The Eikon database offers time-series data for the dependent and explanatory variables. To be able to investigate the research question, *Does ESG score affect the financial performance of Nordic companies?*, the choice of firms must be evaluated. The screening instrument from Eikon let us apply filters to narrow the sample of firms.

- *Country of Exchange:* Companies listed on the Swedish, Norwegian, Danish and Finnish stock exchanges. Iceland is excluded from our research since it is not comparable in regards to the size of its financial market and the importance of sustainable investment (Scholtens & Sievänen, 2013).
- *Excluding financial institutions:* In previous studies, financial institutions have been excluded with the supporting argument that financial institutions' business model is different and therefore ESG rating will affect them differently (Eccles et al., 2014). Another argument is that financial institutions are subjected to different regulations than firms in other sectors (Velte, 2017).
- *The availability of ESG Score in 2017:* To be able to analyse the relationship between ESG score and financial performance, the companies in our data must have an ESG score. Filtering the companies based on the availability of ESG scores in 2017, means that firms without ESG score in 2017 are excluded. This screening leads to selection bias and is discussed in the methodology (5.2.2).

The screening resulted in 139 firms (appendix 3) operating in 10 different industries (appendix 6). The time-span was initially 2002–2018 but had to be reduced to 2006–2018, due to missing observations (section 6.2.1.1).

6.1.1 Thomson Reuters ESG Scores - Independent Variable

Several rating agencies measure ESG performance of corporations, such as KLD, EIRIS, SAM, MSCI's and Asian Sustainability Reporting. Deciding which rating tool is the most accurate to use as the independent variable will be difficult because the main criticism is that all of the rating agencies' methodologies are different (Bauer, Guenster, & Otten, 2004; Guenster et al., 2011; Orlitzky, Schmidt, & Rynes, 2003). That is, there is no overall regularity in the way they measure the ESG score, and we cannot account for that when choosing which ESG-rating to use in this thesis.

The Thomson Reuters ESG rating was chosen because it is the most comprehensive of the ESG rating databases, worldwide and in the Nordics, and it is transparent regarding their methodology. Transparency has been discussed as one of the reasons for why ESG rating on financial performance has offered such mixed results (Bauer et al., 2004; Guenster et al., 2011; Orlitzky et al., 2003). Siew (2015) comments that one of the main concerns of the ESG rating is the lack of disclosure of the ESG relevant factors from companies. The Thomson Reuter ESG rating takes this into account, and companies that disclose more relevant information will be acknowledged for this (Thomson Reuters, 2019).

The Thomson Reuters ESG rating is collected form the database Eikon. Thomson Reuters changed their sustainability reporting tool from the ASSET4 rating to Thomson Reuter ESG score in 2016. The new rating goes back to 2002. The scores are updated yearly unless there is a special event affecting the ESG rating. The ESG score is calculated by 178 underlying measures that are based on relevance, comparability and availability. These are grouped into ten categories and give rise to the pillar scorings. The overall measure is the ESG score (ESG), which is comprised of the social pillar score (ESGS), environmental pillar score (ESGE) and the governance pillar score (ESGG). The ESG controversies score (ESGC), based on 23 controversies measures, aims to capture the negative media exposure a company has faced. Controversies within the last year are weighted more. The ESG combined (ESGCOM) score takes the controversies score into account, and if the firm has not been involved in any adverse event, it will be equal to the ESG score (Thomson Reuters, 2019).

Table 1: ESG Composition

Pillar	Category	Weights	Pillar weights
Environmental	Resource Use	11%	(11% + 12% + 11%)
	Emission	12%	
	Innovation	11%	
Social	Workforce	16%	(16% + 4,5% + 8% +7%)
	Human Rights	4,50%	
	Community	8%	
	Product Responsibility	7%	
Governance	Management	19%	(19% + 7% + 4,5%)
	Shareholders	7%	
	CSR Strategy	4,50%	

The scoring is based on algorithmic data selection and human process selection from 400 different measures. It is collected from annual reports, company websites, NGO websites, stock Exchange fillings, CSR reports, and news sources. Processed by the ESG research analysts and the built-in functions, then independently audited (Thomson Reuters, 2019).

Each score within each category lies between zero and a hundred. The score takes firms in the same category into account, the number of companies with scores and how well they performed. Thomson Reuter's industry grouping is used to benchmark the firms for environment, social and controversies score, which means that firms within one category are compared against each other. Governance score uses the country of headquarters as a benchmark. The formula below is gathered from Thomson Reuters and explains how the score is calculated (Thomson Reuters, 2019)

$$score = \frac{n.\ of\ companies\ with\ a\ worse\ value\ \frac{n.\ of\ companies\ with\ the\ same\ value\ included\ in\ the\ current\ one}{2}}{n.\ of\ companies\ with\ a\ value}$$

6.1.2 Financial Performance - Dependent Variable

The focus in this thesis is whether improving ESG activities will have value-increasing effects for the firm. Thus, our financial performance measurement must have attributes that measure the financial performance to all stakeholders, not only the shareholders. Market-based measures, perceptual measures and accounting-based measures are potential alternatives.

Market-based measures, such as price per share, are shareholder-focused and distorted by market activities. The shareholders' perception of the stock will affect their decisions of buying or selling, and therefore, the market value of the firm (Orlitzky et al., 2003). We want a financial measure that accounts for the firm's ability to generate financial performance, both from equity and debt. This makes us able to exclude the alternative of using market-based measures, which also relieves us from the external-market responses to non-market actions.

Perceptual measures, such as surveys about the financial performance of the firm, are subjective and associated with large measurement errors (Orlitzky et al., 2003). Perceptual measures would also give us a correct assessment of the firm's financial performance, but as mentioned above, it will suffer from being a subjective estimate.

Accounting based measures, such as Return on Assets (ROA), Return on Equity (ROE) and Earnings per Share (EPS) reflect the firm's allocation of funds and managerial capabilities, and thus the efficiency of the internal decision making (Orlitzky et al., 2003). An accounting-based measurement will account for the financial performance of the firm without the distractions of the bidding and selling environment of the market-based measurements or the measurement error of perceptual measures.

ROA would give us a measure for the entire financial performance of the firm as a whole. Therefore, ROA will be the dependent variable in this investigation. ROA is collected from the Thomson Reuters Eikon database and is calculated using this formula (Thomson Financial, 2007):

$$ROA(\%) = \frac{(Net\ Income\ before\ Preferred\ Dividends\ +\ ((Interest\ Expense\ on\ Debt - Interest\ Capitalized)\ *\ (1 - Tax\ Rate)))}{Average\ of\ Last\ Year's\ and\ Current\ Year's\ Total\ Assets} * 100$$

6.1.3 Control Variables

In line with previous studies, we will use control variables commonly used in this research area (Choi & Wang, 2009; Fischer & Sawczyn, 2013; Velte, 2017). Choi and Wang (2009) explain their choice of control variables as variables affecting the

persistence of profits. Investment in research and development will be a representation of the technological knowledge in the firm and should be included since R&D is a well-known source of persistent financial performance advantage. Due to the lack of observations, it is excluded (6.2.1.1), which could lead to potential omitted variable bias (discussed in 5.4.1).

Firm size is measured by the logarithm of total current assets collected from Thomson Reuters. According to Fama and French (1993), smaller firms tend to have higher earnings, suggesting that firm size is negatively related to ROA (Fama & French, 1993). At the same time, larger firms enjoy the benefits from economies of scale and have more power in the market (Penrose, 1959).

The risk of a firm can be quantified into two risk components, systematic and unsystematic. Unsystematic risk, or firm risk, can be measured by debt ratio (i.e. total debt/total assets). The debt ratio is extracted from Thomson Reuters and is reported as a percentage (Thomson Financial, 2007).

$$Debt\ ratio(\%) = \frac{(\text{Short Term Debt \& Current Portion of Long Term Debt } + \text{ Long Term Debt})}{Total\ Assets} * 100$$

The beta factor is used as a proxy for the systematic risk and is a measure for how much the stock moves for a given move in the market. That is, the beta is the covariance of the security's price movement in relation to the market price movement.

$$Beta = \frac{Cov(r_i, r_m)}{Var(r_m)}$$

The market price movement is the relevant local market index, i.e., r_m (Denmark: Copenhagen KFX Index, Finland: All Share Price Index, Norway: Oslo Bors Benchmark Index, Sweden: OMX Stock Index) (Thomson Financial, 2007). The intuition for both of the risk measures effect on financial performance is through the increased potential risk of default and therefore increased cost of debt (Choi & Wang, 2009).

Industry is a relevant control variable because of differences in regulation and exposure to societal norms – the latter argument referring to different industries expectations to behave socially responsible. Primary Global Industry Classification Standard (GICS) classifies companies with increasing granularity by sector, industry, group and sub-industry, and we obtain the industry groups from GICS. In our data set, we have ten different industries: Communication Services, Consumer Discretionary, Consumer Staples, Energy, Health Care, Industrial, Information Technology, Materials, Real Estate and Utilities. Velte (2017) and Fischer & Sawczyn (2013) argue that the industry effect is effectively controlled for by a dummy variable, Manufacturing or Services. Servaes and Tamayo (2013) have provided insights regarding the firm's ability to create value by engaging in and publicising CSR activities. They find evidence that CSR activities have a positive effect, but that it is conditional on the firm having a high customer awareness proxied by advertising expenditures. For firms with low customer awareness, the relationship is either negative or insignificant. The industry grouping is used for controlling the data, as can be seen 6.2.2.

6.2 Descriptive Statistics

6.2.1 Longitudinal Descriptive Statistics

6.2.1.1 Number of observations

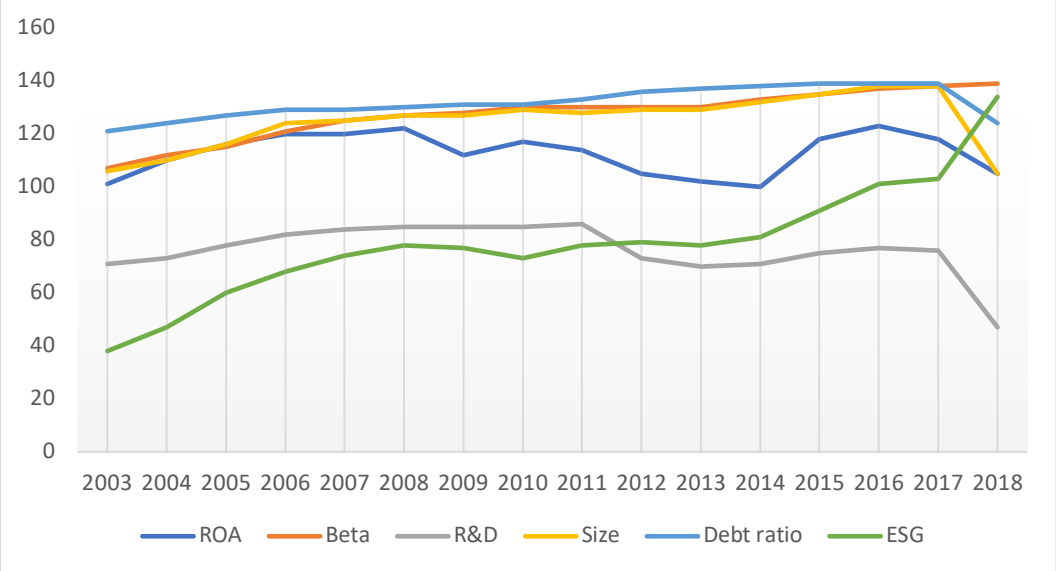

Figure 1: Number of observations

The number of observations is shown in figure 1. The maximal number of observations each year is 139. The numbers of observations for the control variables: beta, size and debt ratio, is increasing from between 100 and 120 observations in 2003 to 139 in 2017. The control variable, R&D, has fewer observations than the other control variables and introduces a cause for concern. The number of observations varies between 86 at its highest in 2011 and down to 47 observations in 2018. The low number of observations is an argument for excluding the variable, but this might cause an omitted variable problem. Referring to the correlation matrix (table 3), the correlation between R&D and ROA is 0,057, and the correlation with another of the explanatory variable is at most 0,512 (correlation with size). The concern for omitted variable bias is small, and R&D is therefore excluded as a control variable. This is a subjective judgement made by us and should still be considered as a threat to the validity of our results.

The number of observations of ROA varies between 123 and 100, the lowest number of observations was in 2014 with only 100 observations. The number of observations for ROA is relatively stable.

In 2003, only 38 firms reported ESG scores. The ESG score is comprised of each of the pillar scores; the number of pillar scores is equal to the number of ESG observations. Therefore, only the number of observations of the ESG score is reported in figure 1. ESG score is the variable of interest, and the small number of observations in 2003, 2004 and 2005 (respectively at 38, 47 and 60) is alarming. Therefore, the years 2003, 2004 and 2005 are excluded due to missing observations of ESG score.

The drastic drop of observations in 2018 can be ascribed to the fact that the data collection was made in February/March 2019, and a reasonable explanation could be that the data has yet to be reported.

6.2.1.2 ROA Mean

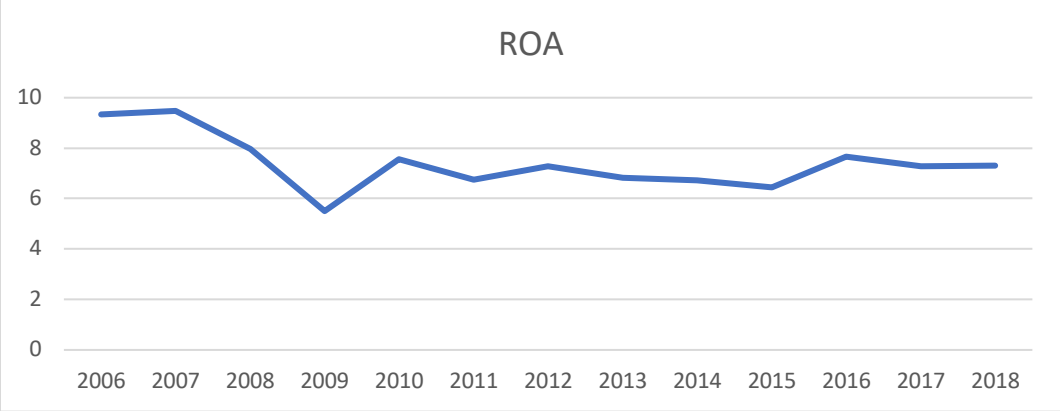

Figure 2: Average value of ROA

A simple univariate analysis of the dependent variable is to look at the average ROA throughout the sample period. The relevant time-span is 2006–2018 due to the missing observations of ESG described above. The average ROA follows a reasonable path. The financial crisis can be an explanation for the drastic plunge in 2008 and 2009.

6.2.1.3 ESG Mean

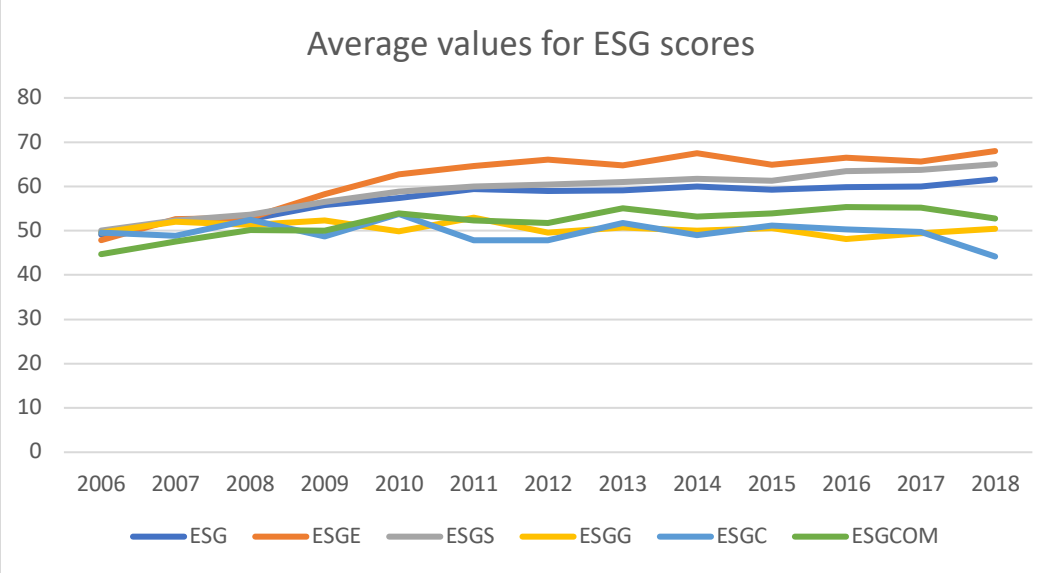

Figure 3: Average values of ESG scores

The average ESG score within all industries has improved steadily in the years from 2006 to 2018, which is in line with our previous belief that there has been an increasing focus on improving ESG during the last years. In 2006 the average ESG score was 49,15, compared to 61,61 in 2018. The combined ESG score, which takes into account the controversies score, has not increased the average value by as much

as the ESG score. That would imply that controversies would have become more common in the sample period from 2006 to 2018. This argument is strengthened by looking at the average controversies score, which has decreased slightly.

The average of the governance pillar score remains rather constant at about 50 throughout the sample period, while the average of the social and environmental pillars scores has increased in their yearly averages. This would be as expected; environmental and social considerations have gained momentum during these past years (EY, 2017).

6.2.2 Cross-sectional Descriptive Statistics

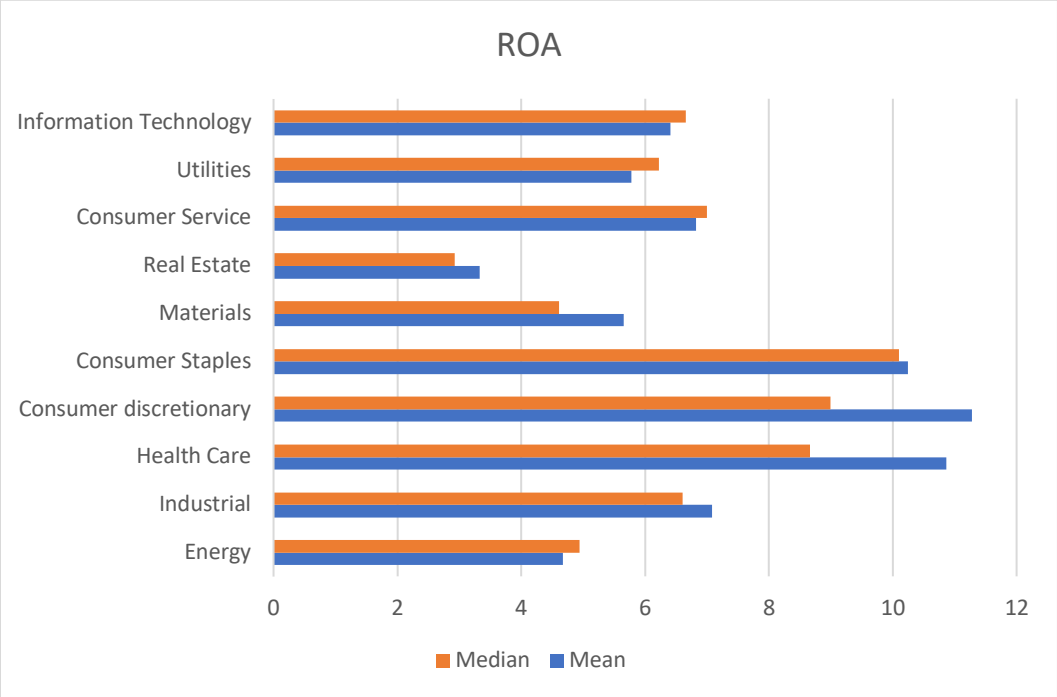

Figure 4: Average values of ROA, Industry

Comparing the mean and median of ROA between different industries will be helpful in order to evaluate the set of observations at our disposal. The reason for making the distributions conditional on the industry is that the ROA within an industry is more similar across peers than overall. Therefore, it will be easier to detect potential outliers. The variation across time is still relevant and a probable explanation in many cases for the deviations from the mean. If the mean and median is approximately equal, the distribution of ROA is symmetric, conditional on their respective industry, which is the case for the majority of the industries. For the industries Materials, Consumer Staples and Consumer Discretionary, the mean is

higher than the median, which is typical for positively skewed distribution. The point of this test is not that we require normality in the distributions, but whether we have large outliers distorting the regressions. Outliers are observations not fitting in with the pattern of the data (Brooks, 2014).

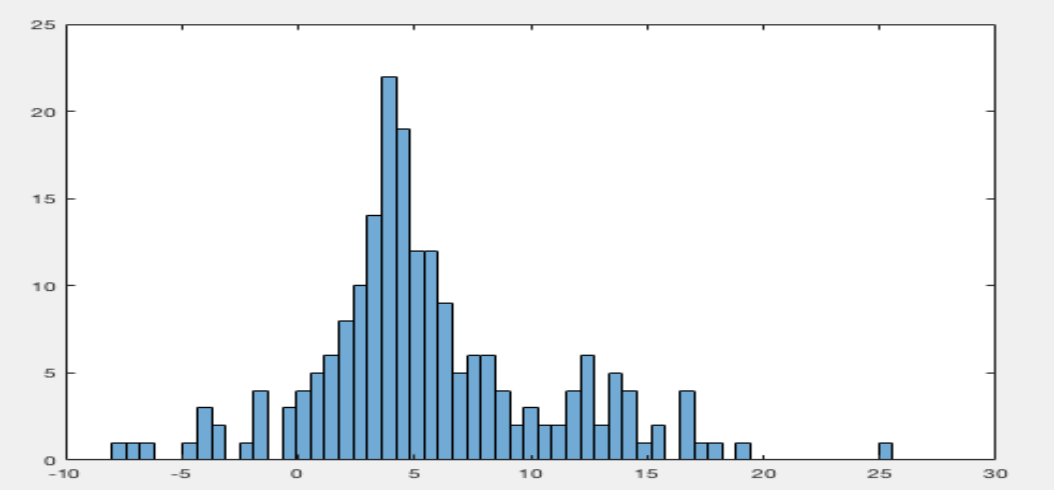

Figure 5: Distribution of ROA "Materials"

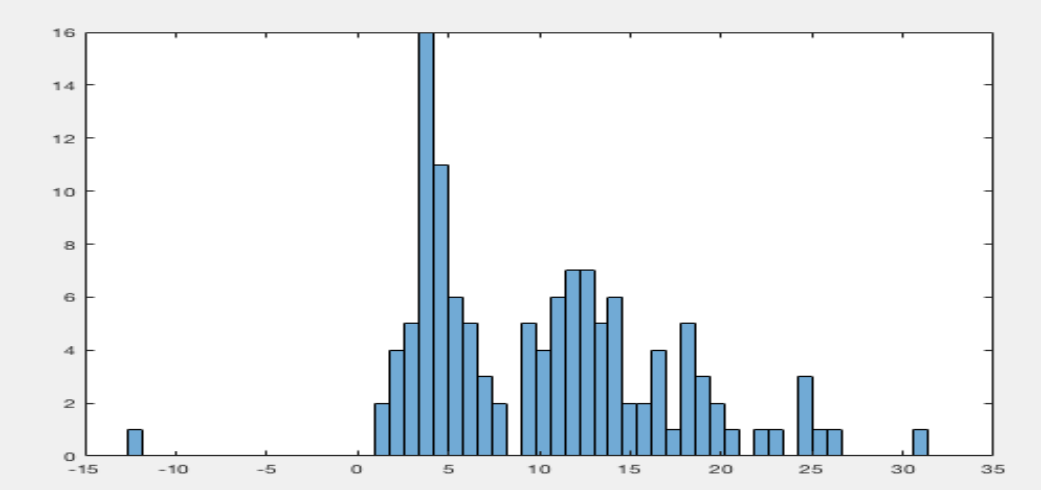

Figure 6: Distribution of ROA "Consumer Staples"

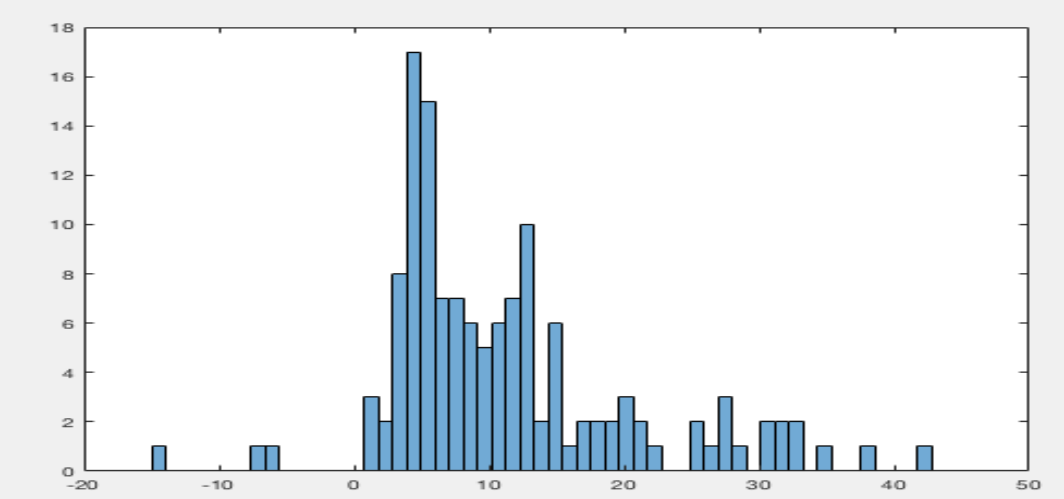

Figure 7: Distribution of ROA "Consumer Discretionary"

Let's take a closer look at the distribution of the observations on ROA, within the respective Industry Group. We see that a potential outlier for the distribution of Materials is Boliden AB 2006 at 25,15. For Consumer Staples, Mowi ASA 2008: –12,47 and Kindred Group PLC 2006: 31,01. For Consumer Discretionary, Bang & Olufsen 2009: –14,05 and Pandora A/S 2016: 42,44. Removing these observations would reduce standard errors, reduce the RSS and therefore increase the R-squared, and thus improving the fit of the model to the data. On the other hand, Brooks (2014) points out that this is basically fabricating the results. Deciding if this observation should be removed or not, is effectively a discussion of the correct way to handle data. We will not exclude any of the potential outliers due to there not being something specifically wrong with these inputs, even if they are different from the other observations.

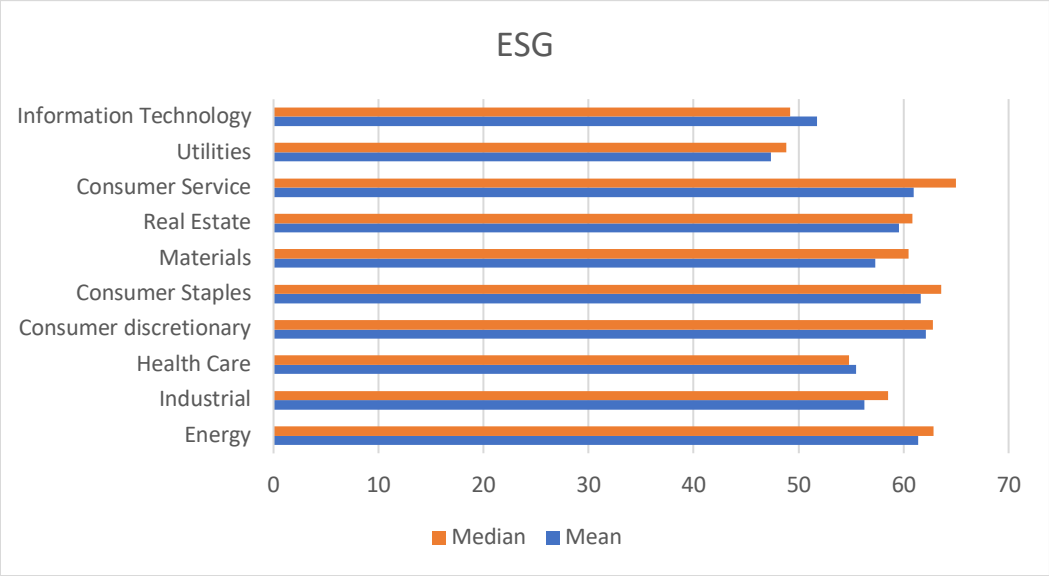

Figure 8: Average values of ESG, Industry

The same approach as for evaluating potential outliers is applied to the observations of ESG score. There are no major differences between the mean and median conditional on the industry. Consumer Service has a median that is five points higher than mean – implying a negatively skewed distribution. When taking a closer look at the distribution, there is no potential outlier that stands out as a reason for this. There are observations in the interval between 8 and 82, but the simple reason for this is that they have different ESG scores. It is not data-entry mistakes.

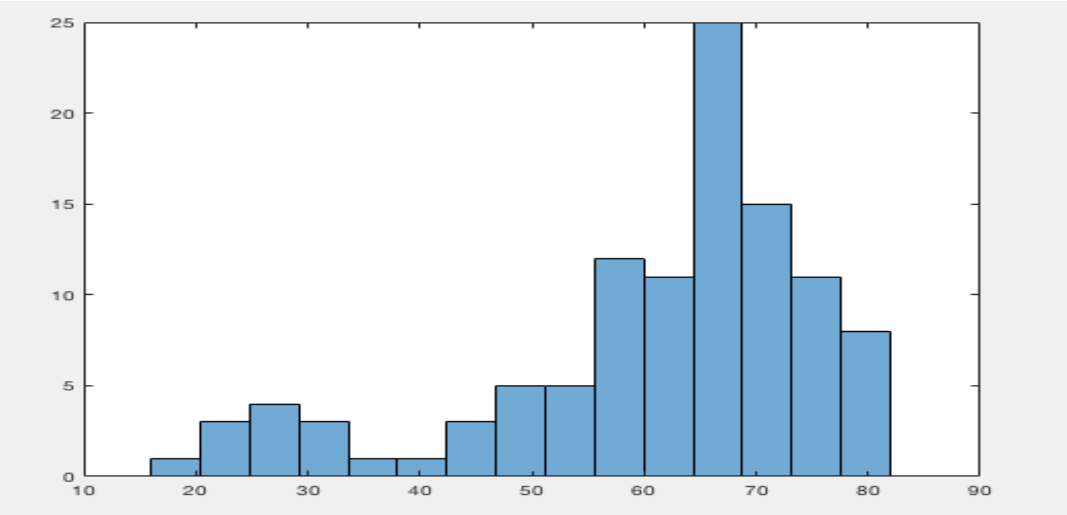

Figure 9: Distribution of ESG for "Consumer Services"

6.2.3 Correlations matrix

Table 2: Correlation Matrix

	Beta	*ROA*	*R&D*	*Size*	*Debt-%*	*ESGE*	*ESGS*	*ESGG*	*ESGC*	*ESG-COM*	*ESG*
Beta	1	-0,155	0,086	0,006	0,012	0,011	0,012	0,019	0,009	0,035	0,019
ROA	-0,155	1	0,057	0,222	-0,241	-0,005	0,028	-0,012	-0,014	-0,022	0,007
R&D	0,086	0,057	1	0,512	-0,107	-0,042	0,047	0,076	-0,018	0,008	0,038
Size	0,006	0,222	0,512	1	-0,075	0,090	0,188	0,078	-0,133	0,034	0,168
Debt-%	0,012	-0,241	-0,107	-0,075	1	-0,032	-0,007	0,049	0,006	0,020	0,003
ESGE	0,011	-0,005	-0,042	0,090	-0,032	1	0,613	0,108	-0,205	0,568	0,803
ESGS	0,012	0,028	0,047	0,188	-0,007	0,613	1	0,124	-0,244	0,549	0,819
ESGG	0,019	-0,012	0,076	0,078	0,049	0,108	0,124	1	-0,058	0,439	0,542
ESGC	0,009	-0,014	-0,018	-0,133	0,006	-0,205	-0,244	-0,058	1	0,469	-0,237
ESGCOM	0,035	-0,022	0,008	0,034	0,020	0,568	0,549	0,439	0,469	1	0,717
ESG	0,019	0,007	0,038	0,168	0,003	0,803	0,819	0,542	-0,237	0,717	1

Table 2 shows the result from a Pearson correlation matrix. The first thing to notice is the high correlation between the different pillars and the ESG score. The highest correlation is between the social pillar score and the ESG score. The correlation between ESG score and the environment pillar score is also high. The correlation to the governance pillar score is lower, meaning a high governance score does not impact the total ESG score as much as the two other pillars. There is a negative correlation between controversies score and ESG score, which is not in line with our expectations. The high correlations are not surprising since the total ESG score is based on the pillar scores.

For the ROA, the size variable is the most positively correlated, meaning that larger firms have higher ROA than smaller firms. Both debt ratio and beta have a negative correlation with ROA. According to CAPM-theory (Lintner, 1965; Markowitz, 1952; Sharpe, 1964) higher risk would lead to higher return, which is not the case in our sample. The negative correlation between the debt ratio and ROA is relatively high in this sample, implying that an increased level of debt has a negative effect on ROA. Among the ESG scores is the social pillar score the one with the highest correlation with ROA. The total ESG score has close to no correlation, while the other scores are negatively correlated to ROA, which is not supporting our expectations.

Another interesting observation is the correlation between the different ESG scores and size, where all are positive except the controversies score. The correlation between the social pillar score and size is especially high, implying that larger companies have a broader focus on social improving activities. The same conclusion can be drawn from the other ESG factors; larger firms have more focus on ESG.

The correlation matrix cannot be used to draw any conclusions about how different variables affect each other. Still, it can be used to detect simple forms for multicollinearity, as mentioned in the methodology part (5.4.4). The highest correlation detected above, if we exclude the correlation between the different ESG measures, is the correlation between R&D and size, which is 0,512. According to Brooks (2014), this correlation is not high enough to suspect multicollinearity problems of easy forms.

6.2.4 Descriptive Statistics – whole sample

Table 3: Descriptive statistics for the entire sample

	Mean	Median	Max	Min	Std. Dev.	Numb. Obs
ROA	7,43	6,24	75,19	-59,02	8,21	1703
Beta	0,99	0,94	5,55	-1,20	0,49	1476
RD*	116	16	3 762	0	398	996
Size*	4 487	1 387	101 918	1	8 953	1666
Debt-%	25,03	23,64	121,46	0,00	17,34	1735
ESGE	62,42	65,63	99,06	5,68	19,65	1115
ESGS	59,71	61,46	98,57	4,43	19,85	1115
ESGG	50,47	50,62	96,40	7,02	20,62	1115
ESGC	49,37	57,62	83,33	0,18	20,22	1115
ESGCOM	52,29	52,65	86,87	12,88	15,24	1115
ESG	57,81	59,79	90,74	12,88	14,53	1115

**Numbers in 10.000*

The descriptive statistics: mean, median, max, min, standard deviation and number of observations for the whole sample are reported in table 3. The years 2003, 2004 and 2005 have been excluded, due to too few observations. R&D is reported but will be excluded due to too few observations (see 6.2.1.1). The same statistics are reported yearly and cross-sectionally in appendix 1 and 2. Size shows considerable variation with deviating mean and median, and high standard deviation. This is not surprising, as size is measured by enterprise value (see. 6.1.3). The logarithm of size will be used in the regression.

7.0 Results

This section will start with a presentation and description of the model-building-tests described in the methodology chapter. These tests constitute the basis for choosing the right model. Following, the results from the validity tests will be described. These are mentioned previously, in 5.0 and 6.0. Subsequently, the results from the Fixed Effects model are presented. Penultimately, the regression results will be described and discussed, and lastly all these components are summarised upon.

7.1 Model Building – Methodology

The methodology describes the procedure for choosing the right model. Since this thesis operates with a panel data set there are three common models: Pooled OLS, Fixed Effects Model and Random Effects Model. The first test is the Poolability Test that determines whether a Pooled OLS model is to prefer over a Fixed Effects Model. The second test is the Bruech-Pagan Lagrange Multiplier Test, which tells if there are random effects in the model. If the null hypothesis is rejected, a Random Effects Model is more suitable than a Pooled OLS model. If the results from both the tests show that a Pooled OLS is not suitable, a Hausmann Test decides which effects are the most pronounced – the random effects or the fixed effects. We ran the three tests for each regression in segments 1, 2 and 3. The Fixed Effect Model is the most appropriate, as can be seen in table 4. The hypotheses for the three different tests are presented in appendix 7.

Table 4: Model Building Tests

Independent Variable	***Poolability Test***	***Bruech-Pagan Lagrange Multiplier Test***	***Hausmann Test***	***Model Choice***
ESG	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESGE	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESGS	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESGG	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESGC	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESG (2006–2018)	Reject H0	Reject H0	Reject H0	Fixed-Effect Model
ESG (2003–2018)	Reject H0	Reject H0	Reject H0	Fixed-Effect Model

7.2 Validity of the model

The relevant threats to the validity of the model are partly investigated in the univariate tests in the data description. The correlation between the variables does not seem to be a source of multicollinearity. Through an investigation of the data there was concluded that excluding outliers was unnecessary, hence the third assumption for the Fixed Effects Model holds. As described in section 5.2.5 we perform a Wooldridge test for serial correlation. The level of autocorrelation is not interfering with our results.

The control variable R&D is excluded due to missing data (see 6.2.1.1). As discussed in the methodology (5.2.1) this may lead to an omitted variable bias, hence decrease the validity of the model. As can be seen in table 2, the correlation between R&D and ROA is relatively low, therefore the problem with omitted variable bias is low. This is supported by the low correlation between R&D and for the different ESG scores.

Another threat to the validity discussed throughout the thesis is the simultaneous causality interfering with our results. The one period lag is supposed to make us isolate the effect of ESG rating on financial performance, but still, the concerns of interference from the opposite directional effect persists. That is, if a good financial situation increases ESG rating because of excess resources available to spend at ESG improving activities. By first looking at the results from a Fixed Effect Model on the relationship with no lag i.e., $ESG\ rating_t \rightarrow Financial\ performance_t$ we see a non-significant statistical relationship for ESG, ESGS and ESGC. ESGE has a negative significant impact on ROA on a 10% level, and the ESGG on a 5% level (appendix 9). Secondly, performing an analysis on the opposite direction, $ESG\ rating_{t+1} \rightarrow Financial\ performance_t$. The results are statistically insignificant for all ESG scores (appendix 10).

These two investigations are to establish whether we have true causation of the relationship between ESG rating and financial performance. Statistically the cause in our regression is ESG. Economically, there is still a potential distortion of our results, but the effect seems to be stronger in the direction where ESG rating affects the financial performance. Thus we conclude, that the cause in our regressions is ESG rating.

7.3 Regression results

The results from the regressions in segment 1, 2 and 3 are presented in this section. The general results are a statistically significant negative effect of ESG score on ROA. These findings support the shareholder theory, that improving ESG score is value destroying for firms listed in the Nordic market. ESG improving activities are expensive and the results implies that the potential value creation does not exceed the investment costs. This is the main economic argument supporting our results and applies to all of the subsequent discussions.

7.3.1 Segment 1: ESG score

The first segment investigates the relationship between ESG score and financial performance, measured by Thomson Reuters ESG rating and ROA. Table 5 shows the result of a Fixed Effects Model with the ESG score as the independent variable and ROA as the dependent variable.

Hypothesis H1A:

Question: Are firms in the Nordic market with higher ESG score associated with higher financial performance in the subsequent period?

H0: *There is no relationship between ESG* $rating_{t-1}$ *and* ROA_t.

HA: *There is a relationship between ESG* $rating_{t-1}$ *and* ROA_t.

Formalised by the Fixed Effect Model:

$$ROA_{it} = \alpha_i + \beta_1 ESG_{i,t-1} + \beta_2 Beta_{it} + \beta_3 DebtRatio_{it} + \beta_4 Size_{it} + u_{it}$$

$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

Table 5: Regression results for ESG

ROA	***COEFFICIENT***	***STD. ERROR***
BETA	–0,690464	0,501955
SIZE	3,833729***	0,401632
DEBT RATIO	–0,153277***	0,026206
ESG	–0,054214**	0,023843
ADJ. R^2	0,03099	
NUMB. OF FIRMS	108	

The expected result from the regression is a significant positive relationship between ROA and the ESG score. As can be seen in the regression results in table

5, the relationship between ROA and ESG is negative with a value of –0,0542, significant on a 5%-level, which means that the null hypothesis can be rejected in 95% of the cases — implying that higher ESG score is associated with lower ROA. The average ROA for the complete sample is 7,43% (table 3) which make a reduction of 0,0542 percentage points in ROA from an increase in ESG score with one point a rather large effect. The explanatory power is low with an adjusted R-square of 0,03099.

Statistically, the negative coefficient for ESG rating on ROA in the Fixed Effect Model implies that there is a negative link between higher ESG rating and financial performance in the next period. Economically, this would give support to the shareholder theory. ESG improving activities are sub-optimal from shareholders' point of view. As previously discussed, the argument for including stakeholders in the decision-making process of the firm is that it can reduce the agency costs tied to bad stakeholder relationships. A negative relationship gives no evidence supporting value creation from increasing ESG score and to the stakeholder theory. On the other hand, the arguments for stakeholder theory are that competitive advantages of caring for the stakeholders are increased sales from good customer relationships, reduced cost of capital from good debtholder relationships and goodwill from the community from good outside stakeholder relationships. These advantages are possibly more long term than the one-year lag we are investigating.

In the descriptive data section, both the average ESG rating and the number of observations are increasing, implying that there is a growing interest in improving and reporting the ESG rating for companies (figure 1 and figure 3). This observation would give support to the stakeholder theory – that more firms chose to include other stakeholders than only the shareholders in their decision-making process. If there is a negative relationship between ESG rating and financial performance and still more firms are focusing on improving their ESG rating, an explanation could be that we are not able to capture the long-term effects of a high ESG rating with a one-year lag. Another explanation is the theory presented by Jensen and Meckling (1976), that managers misbehave in regard to acting in the best interest of shareholders and make decisions that give them private benefits. An argument against this is that the governance pillar score is included in the ESG score. The governance pillar score will be further discussed in segment 2.

The negative coefficient of the ESG contradicts the main findings of previous literature (Friede, Busch, & Bassen, 2015). Servaes & Tamayo (2013) investigate the relationship between CSR activities and firm value. They find a positive link between them, conditional on that the company has a high customer awareness. That is, CSR activities has a positive impact but only if the company is considered to be highly dependent on their reputation. When they include fixed effects, the link is negative. The individual heterogeneity accounted for by the Fixed Effects Model could be a reason for the negative results, if the relationship between ROA and ESG rating is conditional on which type of firm it is.

The choice of ROA as a measure for financial performance is discussed in the data section (6.1.2). The main argument for using an accounting-based measure was to avoid the fluctuations in marked-based measures, caused by buying and selling. It is argued in the literature that accounting-based measures covers past and short-term performance, while the market-based measures covers future and more long-term financial performance (Hoskisson, Johnson, & Moesel, 1994; Keats & Hitt, 1988). The negative results could be explained by the idea that ESG improving activities are profitable in a longer perspective, not the short-term. A market-based measure such as Tobin's Q could therefore be a better choice as dependent variable. This argument is not supported by the research from Velte (2017). He finds no significant relationship between Tobin's Q and ESG performance.

The control variables are also presented in the regression. The beta is negatively related to ROA, but not significant. No significant relationship between systematic risk and financial performance is not in line with basic CAPM-theory (Lintner, 1965; Markowitz, 1952; Sharpe, 1964). The size variable is significant at all levels with a relatively large positive value, indicating that larger firms have higher ROA in this sample. The debt-ratio is also significant on all levels, but the relationship is negative, implying that substantial debt reduces the ROA.

7.3.2 Segment 2: Pillar score

7.3.2.1 ESGE

The first pillar score is the environmental factor. Velte (2017) finds a significant positive relationship between the environmental pillar and ROA in the German market. There is also an increased focus on environmental initiatives through forced and voluntary regulations globally (United Nations, 2018). Previous literature and current market settings have formed our expectations, and we expected to find a positive relationship between the ESG environmental score and ROA. The expectations set the hypothesis and have been formalised in the regression below. The regression results are presented in table 6.

Fixed Effect Model:

$$ROA_{it} = \alpha_i + \beta_1 ESGE_{i,t-1} + \beta_2 Beta_{it} + \beta_3 DebtRatio_{it} + \beta_4 Size_{it} + u_{it}$$
$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

Table 6: Regression result for Environmental Pillar Score

ROA	***COEFFICIENT***	***STD. ERROR***
BETA	–0,643475	0,502903
SIZE	3,840567***	0,400284
DEBT RATIO	–0,153753***	0,025182
ESGE	–0,042492**	0,017783
ADJ. R^2	0,03169	
NUMB. OF FIRMS	108	

The value of the environment score is negative and significant at a 5% level, –0,042492. The control variables are similar as for the regression in segment 1. The low adjusted R-squared can be ascribed to the use of the Fixed Effect Model.

A possible explanation for the negative coefficient for the environmental pillar Score can be that the activities generating a higher environmental pillar score is generated from activities improving Resource Use Score, Emission Score and Innovation Score (appendix 8). Improving these factors demands costly investments and the benefits are shared with the public. Therefore, the negative coefficient is economically intuitive.

On the other hand, these activities could create value by improved reputation. Not engaging in environmental pillar score improvements, would incur costs due to the potential fallout with the stakeholders (Whysall, 2000). Another cost of not improving the environmental pillar score is the cost on society. The public or the community are therefore a stakeholder who carries the cost of the firm's actions. Taxation, regulation and voluntary agreements are the actions available to allocate these costs accordingly (United Nations, 2018). ROA is a measurement of financial performance that accounts for tax. If the taxation accurately reflects the cost of the externalities put on society, the ROA would be better for companies choosing to improve their environmental pillar score rating. The coefficient of the environmental pillar scores effect on ROA is negative, which implies this is not the case. The observation in the data description, where the mean environmental pillar score rating is increasing (figure 3) in combination with the negative effect on ROA, further supports the notion that companies increasingly broaden their focus to include stakeholders. Still, the results from the regression suggest that the costs for a firm improving their ESG environmental scores are more prominent than the potential costs of not improving it.

Lastly, it is essential to note that the result differs from previous literature, such as "The Economic Value of Corporate Eco-Efficiency" (Guenster et al., 2011) that is discussed in the literature review. The authors of this paper find a positive relationship between eco-efficiency and financial performance and argue that there is no trade-off between the two because they are aligned.

7.3.2.2 ESGS

The expectation is formed from previous literature that has used the ESG rating social score to investigate financial performance (Eccles et al., 2014; Velte, 2017). Despite their use of different ESG rating, the aim of the social pillar is still to capture the social actions of the firm. Positive and significant is the general finding, which leads us to believe we will see the same results for the Nordic companies in our sample.

Fixed Effect Model:

$$ROA_{it} = \alpha_i + \beta_1 ESGS_{i,t-1} + \beta_2 Beta_{it} + \beta_3 DebtRatio_{it} + \beta_4 Size_{it} + u_{it}$$

$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

Table 7: Regression result for Social Pillar Score

ROA	***COEFFICIENT***	***STD. ERROR***
BETA	–0,74586	0,503474
SIZE	3,583093***	0,399814
DEBT RATIO	0,0156116***	0,025281
ESGS	0,007186	0,016087
ADJ. R^2	0,02445	
NUMB. OF FIRMS	108	

The result differs from the other pillar scores, the social pillar score is not significant, and the effect is close to zero. Meaning, there is no significant relationship between this pillar score and the ROA; the null hypothesis that there is no relationship between $ESGS_{t-1}$ and ROA_t cannot be rejected. The control variables are similar to the other regressions, and the adjusted R-squared is low.

The social pillar score consists of the Workforce Score, the Human Rights Score and the Community Score (appendix 8). The result is not in line with our expectations that a high social pillar score would lead to high financial performance. One would expect that firms with better working conditions and with a better reputation for engaging in the society would attract better staff and be able to keep them longer, and hence increase efficiency and return (Becker, Huselid, Pickus, & Spratt, 1997; Faleye & Trahan, 2011). Downing (1997) provides evidence that the consequences from a fallout with stakeholders are costly for firms. Activities with a negative effect on Human Rights Score are typically activities that is upsetting to stakeholders. Therefore, the positive coefficient would provide further support to this line of thought. Still, the non-significance makes us unable to conclude with statistical certainty.

An economic argument for the non-significant results might be the Nordic market. The social pillar score is based on peers, as for all the ESG scores from Thomson Reuters. The Nordic market is known for having a higher quality when it comes to work (Oinas, Anttila, Mustosmäki, & Nätti, 2012). Because of this, the impact of increasing the social pillar score may have less effect in the Nordics than in other countries where the average level is lower.

7.3.2.3 ESGG

Good governance implicitly meaning that good managers with proper incentives run the firm. Therefore, the theory of well-governed firms relates to the field of agency issues where the general corporate finance literature suggests that well-governed firms have better financial performance than firms with high potential costs from agency conflicts. The expectation is to find a positive relationship between the governance pillar score and ROA.

Formalised by the Fixed Effect Model:

$$ROA_{it} = \alpha_i + \beta_1 ESGG_{it} + \beta_2 Beta_{it} + \beta_3 DebtRatio_{it} + \beta_4 Size_{it} + u_{it}$$
$$where \ \ i = 1, \dots, 139 \ and \ t = 2006, \dots, 2018$$

Table 8: Regression result for the Governance Pillar Score

ROA	***COEFFICIENT***	***STD. ERROR***
BETA	–0,689296	0,50252
SIZE	3,564757***	0,379075
DEBT RATIO	–0,155703***	0,025186
ESGG	–0,030548**	0,015315
ADJ. R^2	0,02943	
NUMB. OF FIRMS	108	

The governance pillar score has a significant impact on ROA at a 5%-level with a value of –0,03. The regression result is not in line with our expectations that the governance score would have a positive impact on financial performance. The adjusted R-square is low for this regression, similar to the other pillars effect on ROA.

The governance pillar score is constructed of the Management Score, Shareholders Score and Strategy Score. The Management Score is supposed to measure a "company's commitment and effectiveness towards following best practice corporate governance principles" (appendix 8). That is, the cost of non-productive activities from the management can be reduced by better control over the management. Better governance often leads to better protection of the investors' funds, so they are willing to accept a lower return. Hence the cost of capital for the firm is lower, which in turn will increase the operating result for the firm (Love, 2011). The regression result in table 8 is not supporting this argument from Love,

but she also points out that a firm chose its optimal level of governance, where the effect of increasing the degree of governance will not increase the financial performance. The negative coefficient from the governance pillar score on ROA could suggest that firms in the Nordic are not at their optimal level of governance. Love further states in her paper that literature points both ways when it comes to financial performance and governance in firms and exemplifies with evidence from other geographical settings, Japan (Aman & Nguyen, 2008) and Australia (Pham, Suchard, & Zein, 2012).

We now return to the discussion of the ESG scores impact on ROA (7.3.2.1). It was pointed out that the ESG score is comprised of the management score which would contradict the argument supporting the theory of misbehaving managers presented by Jensen and Meckling (1976). However, this argument is built on a positive relationship between governance and financial performance. The relationship between governance and ROA is negative. Therefore, a potential explanation could be that managers do not act in the best interest of the shareholders' but instead making decisions where they receive private benefits.

7.3.2.4 ESG Controversies

Controversies score aims to measure the negative publicity a company has faced. It is reasonable to assume that adverse publicity would affect financial performance negatively. This expectation is supported by Whysall (2000), that investigated the magnitude of controversies, and found that controversies have a significant negative impact on firm performance.

Formalised by the Fixed Effect Model:

$$ROA_{it} = \alpha_i + \beta_1 ESGC_{it} + \beta_2 Beta_{it} + \beta_3 DebtRatio_{it} + \beta_4 Size_{it} + u_{it}$$
$$where \;\; i = 1, \dots, 139 \; and \; t = 2006, \dots, 2018$$

Table 9: Regression result for Controversies score

ROA	***ROA (ESG)***	***STD. ERROR***
BETA	–0,738238	0,503246
SIZE	3,514788***	0,382370
DEBT RATIO	–0,156597***	0,025251
CONTROVERSIES	–0,002943	0,011070
ADJ. R^2	0,02427	
NUMB. OF FIRMS	108	

The coefficient for the controversies score is negative, which is not in line with our expectations. The not significant coefficient means that we cannot reject the null hypothesis that there is no relationship between the controversies score and ROA. Therefore, we cannot conclude that there is a relationship between the controversies score and ROA.

A reason why the controversies score is insignificant could be that the controversies score is lagged one period. An explanation could be that the effect of adverse publicity is more immediate than the relationship we seek out to investigate in this thesis. When we perform an investigation without a lag the result is a not significant positive relationship (appendix 9). The positive relationship would support our argument, but it is not statistically significant on any level.

7.3.3 Segment 3: Smaller sample of observations

This segment will discuss the result from the smaller sample of firms where each firm has ESG-observations for the entire period. The model choice for analysing this sample is the same as for segment one and two, the Fixed Effects Model. The tests leading up to the choice of the model are described table 4.

Table 10: Regression result time-span: 2006–2018

ROA	***ROA (ESG)***	***ROA (ESGE)***	***ROA (ESGS)***	***ROA (ESGG)***
Beta	0,432500	0,508877	0,230984	0,383705
Size	3,953676***	3,985257***	3,575148***	3,410492***
Debt Ratio	–0,201938***	–0,213482***	–0,218026***	–0,204606***
ESG/E/S/G	–0,077907**	–0,054415***	–0,016438	–0,043593***
Adj. R^2	0,33597	0,33376	0,30562	0,32592
Numb. of firms	26	26	26	26

Table 10 presents the result for the sample period 2006–2018. The restriction of available ESG data for each year between 2006–2018 resulted in 26 firms. The ESG score is significant at a 5% level, the same as for segment 1, but the estimated impact is –0,022 larger for the smaller sample than for segment 1. For the ESGE pillar score is the impact –0,012 larger compared to segment 2. It is also significant at all levels, while in segment 2 it was significant at a 5% level. The social pillar score is not significant for this sample, the same as for segment 2. The governance

pillar score is significant at all levels, and the impact is 0,013 higher for this sample compared to segment 2. Where this sample differs most from the segment 1 and 2 is the adjusted R-squared, that is approximately 0,33 for all the regressions, while it was between 0,02 and 0,03 for segment one and two. The effect of the control variables is similar to segments 1 and 2.

Table 11: Regression result for time-span: 2003–2018

ROA	***ROA (ESG)***	***ROA (ESGE)***	***ROA (ESGS)***	***ROA (ESGG)***
Beta	0,541276	0,472838	0,057897	0,253139
Size	5,183246***	5,000724***	4,704710***	4,272283***
Debt Ratio	–0,159207***	–0,170471***	–0,175622***	–0,150797***
ESG/E/S/G	–0,115298***	–0,064461***	–0,040000**	–0,069348***
Adj. R^2	0,41392	0,38900	0,36616	0,40204
Numb. of firms	19	19	19	19

There are 19 firms with available ESG data each year in the time-span 2003–2018. All three pillar scores and the ESG score have a negative impact on ROA. ESG, ESGE and ESGG are significant on all levels, while the social pillar score is significant on a 5% level. The level of impact from ESG on ROA is the largest measured in this study and is considerably higher compared to segments 1 and 2. The adjusted R-squared is also the highest measured in this study with a value of 0,41392 for the ESG. The social score is significant, which is different from the coefficient on the social score in section 2.

The point of doing an additional study of the firms with available ESG data is to give additional support to our result. The original sample of 139 firms in segments 1 and 2 is largely affected by the missing data in the data set. By narrowing down the selection of firms to those that have disclosed data since 2006, respectively 2003, we can strengthen the accuracy of the result that ESG-rating has a negative effect on ROA — implying that the effect on financial performance is negative which is not in accordance with our expectations but contributes to the validity of our results.

8.0 Conclusion

The purpose of this thesis was to investigate the relationship between ESG score and financial performance in the Nordic market. The thesis poses the research question:

Does ESG score affect the financial performance of Nordic companies?

We conclude that there is a relationship between sustainability ESG rating and financial performance in the Nordic market. The relationship between ESG score and ROA is negative. By deconstructing the ESG score in three pillar scores were we able to prove that the environmental pillar score and the governance score had a negative effect on ROA, while the social pillar score had no significant effect.

Previous research on this topic have found mixed results, but few have found negative results. ESG improving activities are expensive and the value creation suggested by stakeholder theory are not enough to cover these costs. Our findings support the shareholder theory, including stakeholders' interest can be value destroying for firms. Possibly the value creation from improving ESG rating is more long-term than the one-year lag captures. The dissonance between our results and previous research can be explained by attributes in the Nordic market, strong regulations and high focus on ESG factors. The marginal improvement of doing better will be less for firms already doing well. It is possible that there is an optimal level of ESG rating that is profit maximising, deviating will have negative consequences for firms.

The negative relationship means that firms in general will reduce their return on assets by investing in activities increasing their ESG score. This gives the firm a financial incentive to refrain from increasing their environment score, social score and governance score. This implication would make it more difficult to achieve a more sustainable society. In the univariate analysis of the average ESG score we saw an increase from 2002 to 2018, implying that there are other incentives for investing in ESG improving activities than purely financial. We previously took on the role as the advocate of shareholders' and argued that investing in socially responsible investments was a waste of resources by mangers acting in their own best interest. Their private benefit as being seen as socially responsible made them

violate the trust given by the shareholders, but the value of reputation is important for firms as well.

The measurement problem is one of the main issues discussed throughout previous literature. Our contribution to the literature in this research area is the improved understanding of the relationship between ESG rating and financial performance by using the updated ESG rating tool from Thomson Reuters. The independency and objectivity of Thomson Reuters rating is an argument that speaks for the validity of the instrument. The main issue regarding ESG rating is that many of the factor variables used as input is voluntary to disclose and there is no standardised way to measure ESG performance. Hence, the measurement problem remains. Therefore, we cannot conclude on a general basis how ESG rating affect financial performance, only how the Thomson Reuters ESG rating affect financial performance. A recommendation for future research is to investigate several sustainability measures to get a more comprehensive result that can be generalised.

Another contribution to the existing literature is the geographical delimitation to the Nordic countries. The availability of ESG data for firms in the Nordic countries was limiting for our investigation. Before screening for available ESG data in 2017 the sample of firms were much larger, but without an independent variable these observations are pointless. Therefore, our sample of firms with available ESG data in 2017 is potentially distorted by sample selection bias caused by lack of disclosure on ESG data. Another problem is that the missing observations of R&D make us disregard this potentially important control variable in our investigation. This introduces a cause for concern regarding omitted variable bias. Future research should be attentive to the problems we faced. The lack of data might be an indication that investigations of small samples are premature.

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Appendix 1: Descriptive statistic. Sorted after years.

Year		Beta	ROA	R&D	Size	Debt ratio	ESGE	ESGS	ESGG	ESGC	ESGCOM	ESG
2003	Mean	0,753664486	4,53316832	751414,408	23545251,04	25,8468595	51,0802212	49,2029668	47,40095043	54,96208775	46,50879713	49,29161829
	Median	0,64	4,9	115000	7274575	24,47	50,2171483	52,2983907	46,30574344	60,22727273	46,42272727	47,63156769
	Max	2,87	34,21	21031000	197436726	84,75	85,2606952	95,7989315	86,48782911	75	69,23635236	77,06112853
	Min	-0,21	-55,39	1300	79427	0	26,6176471	18,5446009	13,49726776	15	29,90340909	29,90340909
	Std. Dev.	0,575754643	11,3372475	2650510,44	41844646,96	18,45641122	16,2683151	17,440013	17,43311374	17,09407752	11,15613018	10,85891312
	Numb. of obs.	107	101	71	106	121	38	38	38	38	38	38
2004	Mean	0,822161607	7,30967273	739691,096	26289633,77	23,22887097	52,2551781	49,6884763	50,87373852	55,41400106	47,76446341	50,92265989
	Median	0,65	5,835	145000	8976125	20,465	43,1372549	44,668008	50,62096374	61,53846154	47,75444096	49,40340909
	Max	3,79	58,93	19321000	283708923	73,62	89,0756303	82,7005511	83,43091335	73,4375	78,43939394	80,45714286
	Min	-0,2	-59,63	564	53382	0	16,6176471	15,5300222	9,344262295	8,695652174	21,39734848	21,39734848
	Std. Dev.	0,659658353	12,1792023	2451383,05	49044939,55	17,14993556	19,2830421	17,2503071	21,22074721	17,9278025	13,46841666	13,86629918
	Numb. of obs.	112	110	73	110	124	47	47	47	47	47	47
2005	Mean	0,823148696	8,06447414	752645,628	34268318,52	23,82062992	52,3529502	53,9066112	51,60205502	49,58373683	48,07761237	52,67547684
	Median	0,74	7,265	144300	12664101	21,06	46,9691106	54,8812325	51,58656234	56,63924794	47,08408663	53,08309827
	Max	2,98	50,022	21350000	377406481	70,4	93,0795848	94,1264609	87,8870674	67,64705882	83,03388747	83,4379085
	Min	-0,5	-29,832	515	72221	0	19,9624531	23,206682	7,581967213	3,333333333	20,79842172	25,50721744
	Std. Dev.	0,584178511	8,77861448	2612919,7	66547450,46	17,17027192	17,6683249	18,6148881	21,10461058	18,44292738	14,20816767	14,58595315
	Numb. of obs.	115	116	78	116	127	60	60	60	60	60	60
2006	Mean	0,828840496	9,33836667	817927,366	38983794,61	23,05170543	47,8715491	50,0429534	49,52660763	49,62284587	44,71434322	49,14719048
	Median	0,72	8,3845	115897	14400678,5	19,38	42,6948529	49,5395229	50,73297604	57	42,40739087	48,62714744
	Max	3,12	31,415	25402000	392202418	80,49	91,2980068	84,1381623	91,72446406	83,33333333	73,65224359	75,27006516
	Min	-0,36	-27,605	1703	109034	0	5,91911765	14,0397943	9,052031361	0,625	19,9125	19,9125
	Std. Dev.	0,535087879	7,8828487	3008641,15	71758896,98	17,29974011	18,3836951	17,8824594	19,95081646	19,53897385	12,67974948	13,37715091
	Numb. of obs.	121	120	82	124	129	68	68	68	68	68	68
2007	Mean	0,9513936	9,47618333	895741,012	41820966,39	25,58868217	52,6196406	52,2896944	51,99127785	48,83329554	47,50024517	52,31085904
	Median	0,89	8,327	124500	12841885	21,68	53,8718386	53,2175539	56,51311754	59,16666667	47,32539562	54,39957298
	Max	2,4903	54,726	26455000	548125369	81,82	93,2932264	90,92723	88,42422215	72,22222222	84,87202381	84,87202381
	Min	-0,12	-37,5	3070	126620	0	14,9754902	16,1971831	10,86065574	4,761904762	18,68482143	21,67777778
	Std. Dev.	0,441181354	9,12589022	3201552,25	79551906,3	18,41948019	19,7921623	19,4595156	21,10424104	20,40316435	15,23549864	14,80151877
	Numb. of obs.	125	120	84	125	129	74	74	74	74	74	74
2008	Mean	0,999154331	7,95858197	995989,4	26718815,83	28,39915385	52,9262896	53,6011457	51,26685324	52,44405296	50,19989727	52,65973543
	Median	0,93	7,1275	144400	7539499	28,305	54,1636777	53,5651408	51,83450976	58,33333333	50,08389058	52,67795792
	Max	2,316	38,774	28648000	384143225	77,78	97,0375107	95,9758551	92,55319149	72,22222222	80,11793313	80,11793313
	Min	-0,08	-26,742	4100	8698	0	5,67743491	13,035355	16,28880363	2,777777778	18,25646697	24,76574213
	Std. Dev.	0,446453801	7,85881685	3542003,33	55043232,53	19,00028503	19,968612	21,7176393	19,78658714	17,22849202	16,43939096	14,7188523
	Numb. of obs.	127	122	85	127	130	78	78	78	78	78	78
2009	Mean	1,026679688	5,50170536	942526,165	34680450,6	26,1521374	58,2960945	56,5005511	52,27754551	48,66312974	50,0645758	55,82301915
	Median	1,0145	4,979	144100	9441678	24,66	61,3861386	57,1002486	53,20741269	58,41584158	49,72856696	57,2712766
	Max	2,39	31,029	26206000	529640158	77,29	98,699095	94,7382408	86,9898849	68,75	75,21927711	81,96952128
	Min	-0,49	-45,498	1000	80797	0	18,0481283	9,39386318	13,3442623	1,136363636	22,43081761	22,43081761
	Std. Dev.	0,474283689	7,92276422	3267926,13	71915641,04	17,53914751	20,4958767	20,6939719	18,60821882	21,72956238	14,94260081	14,45243092
	Numb. of obs.	128	112	85	127	131	77	77	77	77	77	77
2010	Mean	1,009435385	7,56220513	994819,824	40876169,62	23,67931298	62,7735169	58,8559572	49,90265159	53,79376706	53,93566848	57,4571693
	Median	0,98	6,006	162200	11233906	21,64	65,7352941	62,7666992	49,80816184	58,38509317	54,57064495	60,76086957
	Max	2,35	32,905	29163000	511420507	78,45	99,0641711	90,3912363	85,80942623	72,72727273	79,61356383	79,61356383
	Min	-0,43	-6,455	900	324197	0	16,8449198	10,0821596	11,00252207	4,347826087	20,80163043	20,80163043
	Std. Dev.	0,464284785	6,49579151	3577754,38	81597582,34	16,57840524	20,1728494	21,2114435	18,7512575	16,29973169	14,77525179	14,70183228
	Numb. of obs.	130	117	85	129	131	73	73	73	73	73	73
2011	Mean	1,065433846	6,74669298	1039898,92	37077410,75	24,38022556	64,5671503	59,9971168	52,96172561	47,81369169	52,28347722	59,40513389
	Median	1,0077	6,027	175399,5	9727372	22,55	67,5030624	61,0861467	57,30783242	58,52003845	54,27915275	61,13999806
	Max	5,55	27,48	31075000	559452869	84,67	98,5294118	95,3306797	89,07103825	80,76923077	85,52269821	85,52269821
	Min	0,12	-35,777	800	279197	0	19,9134948	21,0485133	7,018442623	1,470588235	23,94618056	23,94618056
	Std. Dev.	0,607728433	7,54514032	3739700,86	78746747,24	16,96596301	17,9217273	18,9855126	19,87851872	22,79836927	14,84193295	13,55668593
	Numb. of obs.	130	114	86	128	133	78	78	78	78	78	78
2012	Mean	1,048508462	7,2712381	1229901,59	40291825,11	25,25169118	66,022925	60,3963324	49,60649312	47,80267826	51,81696848	59,01847287
	Median	1,0151	5,69	191914	12853581	25,595	68,7706543	61,971831	47,57513661	59,54773869	50,29296875	59,91868805
	Max	3,79	32,88	30923000	480789616	97,19	92,6692285	98,5740685	89,01980874	80,76923077	86,86969431	86,86969431
	Min	0,16	-4,269	2300	290290	0	18,258427	17,990757	11,7704918	1,315789474	23,06265625	23,06265625
	Std. Dev.	0,514129066	6,47994703	4140222,49	81987685,83	17,43200877	17,3921917	20,146146	20,08782291	22,20331168	15,30706716	14,38755756
	Numb. of obs.	130	105	73	129	136	79	79	79	79	79	79
2013	Mean	1,034296923	6,82435294	1250775,99	46084378,91	26,34343066	64,7093289	60,9990673	50,79893257	51,80503741	55,02956478	59,14951515
	Median	0,9871	5,35	205850	16326225	25,41	65,5325531	62,687344	51,75644028	57,38636364	55,99192247	60,51728173
	Max	3,42	37,03	31364000	523000118	106,3	96,69443	93,4419014	88,17330211	80,76923077	86,21715561	86,21715561
	Min	0,06	-7,63	2200	416461	0	16,5942513	19,8943662	10,52459016	5,263157895	23,27077846	25,59722222
	Std. Dev.	0,528652628	6,42101626	4296825,14	91482816,92	18,68688056	17,7644934	19,1232173	20,93441057	17,88500531	13,90917195	13,09609317
	Numb. of obs.	130	102	70	129	137	78	78	78	78	78	78
2014	Mean	1,025830827	6,70977	1373614,18	50536756,8	26,40021739	67,4399822	61,6974358	49,95295574	48,93922582	53,23147449	60,06783516
	Median	1,02	5,56	154000	17585369	24,46	68,4152766	64,084507	50,17679203	59,21052632	53,45342105	61,7591951
	Max	4,16	35,93	36004000	659793098	121,46	96,1490528	96,2014511	86,93346191	76,92307692	86,20047763	86,20047763
	Min	-1,2	-9,98	2000	392929	0	17,6470588	20,7011299	7,87470726	2	21,86074094	21,86074094
	Std. Dev.	0,576077345	7,03661791	4863957,32	100128265,1	19,29733484	18,4841606	20,2491704	20,1474204	21,48240527	14,15020027	13,36837795
	Numb. of obs.	133	100	71	132	138	81	81	81	81	81	81
2015	Mean	0,98684963	6,44490678	1303389,15	55565704,42	24,72057554	64,8450671	61,3034842	50,66314549	51,17651441	53,99192259	59,26231908
	Median	0,96	5,47	187800	18117991	23,77	66,5966387	62,5782473	52,73224044	58,08823529	53,49203704	60,875
	Max	2,54	41,288	32823000	1019176736	80,36	93,249054	96,2331033	96,40255009	73,07692308	85,01203704	85,01203704
	Min	-0,17	-43,82	1600	653411	0	17,9256966	23,1653076	10,592686	3,431372549	27,5370578	27,5370578
	Std. Dev.	0,435372744	9,51504847	4373714,6	117669694,7	15,77816317	17,2610861	17,6338751	21,58425463	19,24520438	13,3459793	12,83655743
	Numb. of obs.	135	118	75	135	139	91	91	91	91	91	91
2016	Mean	0,934839416	7,66870732	1286749,42	55689494,55	23,94251799	66,508538	63,4283534	48,13936374	50,25455975	55,3593509	59,8124743
	Median	0,91	5,61	182000	19357493	22,31	70,4656863	65,9536659	47,57025761	56,79012346	57,66137595	62,12197462
	Max	1,98	75,19	28896000	666555687	78,02	96,7999171	97,3597284	93,47189696	66,66666667	86,74107143	86,74107143
	Min	0,04	-9,25	1600	671049	0	14,3818544	20,4111308	9,077109897	2,777777778	18,63157895	18,63157895
	Std. Dev.	0,405074729	9,99729414	3963628,64	101461496,6	15,76990613	19,6604823	19,4962657	21,28395741	18,13687128	16,00869303	15,01317275
	Numb. of obs.	137	123	77	138	139	101	101	101	101	101	101
2017	Mean	0,93337971	7,28509322	1393538,59	60270996,1	23,47985612	65,5902224	63,7944737	49,42555014	49,76794665	55,23482392	60,02250659
	Median	0,92	5,9265	180200	20668101	22,53	70,6681586	64,9893299	48,06704184	56,66666667	58,06404026	62,28873188
	Max	2,48	38,15	33085000	798056000	88,17	93,8410017	97,1342909	92,96807593	67,64705882	85,90558963	85,90558963
	Min	-0,6542	-29,44	1800	602784	0	13,9815628	4,42957746	9,86433013	0,18115942	12,88175373	12,88175373
	Std. Dev.	0,461836284	8,33059034	4437010,55	113150924	15,69290789	19,1947739	19,7948471	22,77807226	18,96559845	16,93912135	15,67011884
	Numb. of obs.	138	118	76	138	139	103	103	103	103	103	103
2018	Mean	0,985685612	7,30145714	2077073,19	52904889,19	23,97282258	68,0040614	65,0223839	50,51086484	44,18368888	52,72710043	61,61014093
	Median	0,94	6,71	243600	25279300	22,78	72,4640631	66,6909652	50,45312861	57,14285714	53,6361515	63,20966106
	Max	3,46	36,25	37616000	697845600	96,6	97,7394958	97,6842245	94,56245671	70,65217391	83,52633779	90,73662207
	Min	0,1	-59,02	11100	245431	0	20,4166667	17,3179925	8,473793581	1,923076923	22,49535424	22,49535424
	Std. Dev.	0,47682578	9,98719507	6002700,26	89890518,62	16,44316625	17,9814792	17,3982272	21,72502508	23,23349007	15,30498071	13,78620617
	Numb. of obs.	139	105	47	105	124	134	134	134	134	134	134

Appendix 2: Descriptive statistics

Sorted by industry, time span: 2006–2018

		Beta	ROA	R&D	Size	Debt-%	ESGE	ESGS	ESGG	ESGC	ESGCOM	ESG
Energy	Mean	1,20386478	4,66767133	377579,4	56455976,82	32,1509375	66,5438011	64,5118695	51,8180056	46,39556957	53,9850553	61,3310978
	Median	1,16	4,941	106666	12275105	27,675	73,3933808	67,0884555	50	57,60407149	53,5151659	62,812158
	Max	4,16	31,319	2800000	705873157	103,95	92,1958556	98,5740685	92,4590164	65,6626506	85,5226982	85,5226982
	Min	-0,08	-43,82	2471	403632	0	16,5942513	17,0839854	9,19293821	2,037617555	23,0012177	25,6486928
	Std. Dev.	0,559153724	9,29778986	719083,056	139854514,4	23,73800739	21,1680861	21,5659257	20,8773197	21,38688733	15,5246787	14,4584334
	Num. Of ob	159	143	50	155	160	118	118	118	118	118	118
Industrial	Mean	1,033124109	7,08036264	927621,723	37833767,25	24,05924875	64,1405652	58,1937966	45,1623892	48,04757908	50,7822974	56,2411187
	Median	1,03	6,6	156526	8742714	23,5	67,1209432	58,0945903	43,5813367	57,25806452	51,2623077	58,5206401
	Max	2,4903	54,726	16656000	430146519	121,46	94,7753014	94,337097	92,5531915	71,11111111	84,4444726	84,4444726
	Min	-1,2	-16,845	1000	126438	0	13,9815628	9,39386318	7,01844262	0,18115942	18,256467	20,8016304
	Std. Dev.	0,422794305	5,07490471	2616245,63	71598547,87	15,29976172	17,9091438	19,7160281	21,1111373	20,37859005	15,3423029	14,2234134
	Num. Of ob	589	455	361	579	599	369	369	369	369	369	369
Health Care	Mean	0,68064497	10,8651126	1521076,34	58335835,06	16,7739881	58,6828166	56,7221728	50,2685999	56,08880165	52,5887949	55,420452
	Median	0,6	8,658	498906	19855580	13,715	60,0413603	56,7236754	50,9904372	61,78343949	52,7066257	54,7554004
	Max	1,98	41,288	13643000	1019176736	60,22	89,756245	94,9150787	88,9974779	71,11111111	76,3677083	79,8570652
	Min	-0,36	-45,498	9300	247138	0	18,4954751	18,9004998	16,2648666	3,767123288	22,1404095	27,3889272
	Std. Dev.	0,413439156	12,6254304	2986796,03	144522408,7	14,4039654	16,7972832	19,0283427	18,0732905	16,9967839	12,6418291	11,8182089
	Num. Of ob	169	151	142	166	168	107	107	107	107	107	107
Consumer (	Mean	1,087562329	11,2749398	619338,079	47815226,04	17,98993421	66,8818939	63,9947599	54,4942004	43,04414892	51,9462284	62,0787148
	Median	0,935	8,986	170500	9210726,5	16,035	66,503268	65,694165	55,0819672	57,30337079	52,4591175	62,7311066
	Max	5,55	42,44	3566000	522465792	70,36	99,0641711	94,5645705	96,4025501	69,04761905	86,7410714	90,7366221
	Min	-0,43	-14,051	6054	1007897	0	16,3709285	23,3751345	15,2868852	1,041666667	25,2198347	25,2198347
	Std. Dev.	0,689699404	9,24781952	927573,977	103176232,6	13,7765205	21,7351466	18,4166957	22,1083278	25,54485431	15,1022884	14,1950441
	Num. Of ob	146	133	63	146	152	83	83	83	83	83	83
Consumer S	Mean	0,675431008	10,2396098	103127,356	38527777,5	24,63252033	70,0331056	54,290429	60,7848391	56,25452586	60,2215668	61,6237341
	Median	0,62	10,095	96000	27212695	20,93	76,3909314	52,8403756	68,3612172	58,793208	63,1812596	63,580427
	Max	2,06	31,012	468000	136852896	96,6	93,1608788	94,4925966	94,5624567	67,6056338	86,8696943	86,8696943
	Min	-0,14	-12,479	1703	272186	0	17,3823529	4,42957746	17,3518285	7,360406091	12,8817537	12,8817537
	Std. Dev.	0,372729613	6,80419024	118632,11	36584001,41	20,05417007	19,4384809	20,8407602	20,5424209	12,23612711	16,1450367	15,0325233
	Num. Of ob	129	123	59	117	123	64	64	64	64	64	64
Materials	Mean	1,102844554	5,64866	283968,065	37072736,8	25,92396135	59,138413	59,2380969	52,9573849	52,3541046	52,8371611	57,2885872
	Median	1,11	4,612	97000	25091424	26,62	60,5584931	61,8281115	53,2074127	58,49056604	51,4624126	60,4636872
	Max	2,18	25,149	1729000	239466034	81,82	96,2253305	86,0328638	87,2191864	83,33333333	83,5263378	83,5263378
	Min	0,174	-7,63	4900	1109628	0,3	5,91911765	15,4289373	21,2355798	4,388714734	19,9125	19,9125
	Std. Dev.	0,451475936	5,11082558	398991,216	43008465,59	13,43983648	21,101633	18,6930609	16,7796856	18,7804214	15,3324439	14,490792
	Num. Of ob	202	200	168	199	207	127	127	127	127	127	127
Real Estate	Mean	0,904216867	3,32593333		30570453,62	47,72643678	61,2354573	63,8920374	52,5658185	44,37921551	52,6243546	59,5343034
	Median	0,84	2,92		26249462,5	53,38	63,3165829	58,2263187	53,6885246	53,57142857	52,8213475	60,7846378
	Max	1,65	12,521		118499000	78,86	93,1731229	94,5039804	88,8083228	61,06557377	83,7127828	83,7127828
	Min	0,44	0,83		6211825	0	5,67743491	21,8096458	10,5864696	1,811594203	19,139824	29,277535
	Std. Dev.	0,273598961	2,13873652		20968969,54	16,63511864	22,4328144	17,5348507	17,7581265	20,12178474	15,9381567	15,388676
	Num. Of ob	83	75	0	82	87	63	63	63	63	63	63
Consumer S	Mean	0,907397479	6,81999083	301281,818	66861563,29	30,07568	62,2762243	65,3524822	54,3442001	45,35969169	52,5965051	60,9490285
	Median	0,82	6,992	167000	18066022,5	31,42	66,7385707	70,2221022	55,0451695	57,46268657	53,787225	64,9363754
	Max	1,93	19,35	2564000	319074467	60,15	88,5854342	95,9758551	92,9680759	67,46031746	80,1179331	81,9695213
	Min	-0,6542	-2,907	800	1209642	2,89	20,2905454	14,0397943	12,1656601	1,572327044	18,6315789	18,6315789
	Std. Dev.	0,430006393	3,88354004	439904,5	96620394,62	11,92077526	17,2770409	20,8458617	19,4742771	22,47991181	15,7607394	14,8502981
	Num. Of ob	119	109	55	116	125	108	108	108	108	108	108
Utilities	Mean	0,74456875	5,77253333	83642,8571	46535610,19	31,75173913	45,4006779	48,069202	48,7536296	58,33900331	45,5679056	47,3706542
	Median	0,75155	6,219	41000	22474984	33,02	38,2565739	52,587133	50,0170765	61,00847458	42,5965304	48,799666
	Max	1,63	8,89	669000	192452683	40,81	76,9349845	72,3573017	93,471897	67,22222222	71,7747368	71,7747368
	Min	0,0804	2,28	17000	9885069	22,53	22,4100088	21,6046278	7,87470726	16,56626506	21,8607409	21,8607409
	Std. Dev.	0,343039082	2,07710891	168919,465	56820594,42	5,237574605	18,510583	15,1861449	26,4899351	12,81063049	16,4576102	17,089615
	Num. Of ob	16	15	14	16	23	22	22	22	22	22	22
Informatio	Mean	1,131679121	6,40990278	5666808,45	50409487,23	14,04230769	49,4773538	55,0023529	50,406732	56,24146471	49,7806242	51,7221888
	Median	1,03	6,656	408717	14597996	12,94	51,6435036	55,4182196	51,8132581	57,94736842	48,1673708	49,1926181
	Max	3,12	75,19	37616000	392202418	40,9	73,8810742	94,8312517	84,7540984	68,9516129	83,0695523	83,0695523
	Min	-0,42	-59,02	8828	8698	0	17,2413793	16,7169685	12,343298	8,064516129	25,8306349	25,8306349
	Std. Dev.	0,575203337	16,5668225	10920799,3	76985409,93	11,57085218	16,3228219	17,6993659	21,9966081	11,54297701	12,0061217	12,8631645
	Num. Of ob	91	72	84	90	91	54	54	54	54	54	54

Appendix 3: List of companies

Akastor ASA	Hexagon AB	Prosafe SE
Aker BP ASA	Hexpol AB	REC Silicon ASA
Aker Solutions ASA	Holmen AB	Rockwool International A/S
Alfa Laval AB	Hufvudstaden AB	Saab AB
Ambu A/S	Huhtamaki Oyj	SalMar ASA
Amer Sports Oyj	Husqvarna AB	Sandvik AB
AP Moeller - Maersk A/S	ICA Gruppen AB	Sanoma Oyj
Assa Abloy AB	Intrum AB	Santa Fe Group A/S
Atlas Copco AB	Iss A/S	SAS AB
Axfood AB	JM AB	Schibsted ASA
Bang & Olufsen A/S	Kemira Oyj	SECTRA AB
Beijer Ref AB (publ)	Kesko Oyj	Securitas AB
Bergman & Beving AB	Kindred Group PLC	Simcorp A/S
BillerudKorsnas AB (publ)	Kone Oyj	Skanska AB
Boliden AB	Konecranes Abp	SKF AB
Cargotec Oyj	Kungsleden AB	Solar A/S
Carlsberg A/S	Lindab International AB	SSAB AB
Castellum AB	Loomis AB	Stolt-Nielsen Ltd
Chr Hansen Holding A/S	Lundin Petroleum AB	Stora Enso Oyj
Clas Ohlson AB	Mekonomen AB	Subsea 7 SA
Coloplast A/S	Metsa Board Oyj	Svedbergs i Dalstorp AB
CTT Systems AB	Metso Oyj	Svenska Cellulosa SCA AB
Dampskibsselskabet Norden A/S	Millicom International Cellular SA	Swedish Match AB
DNA Oyj	Modern Times Group MTG AB	Swedish Orphan Biovitrum AB (publ)
DNO ASA	Mowi ASA	Team Tankers International Ltd
Dometic Group AB (publ)	NCC AB	Tele2 AB
DSV A/S	Nederman Holding AB	Telefonaktiebolaget LM Ericsson
Dustin Group AB	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	Tieto Oyj
Eniro AB	Nobina AB (publ)	Tomra Systems ASA
Epiroc AB	Nokia Oyj	Torm PLC
Equinor ASA	Nokian Tyres plc	Trelleborg AB
Fabege AB	Nolato AB	UPM-Kymmene Oyj
Fastighets AB Balder	Norsk Hydro ASA	Uponor Oyj
Fingerprint Cards AB	Novo Nordisk A/S	VBG Group AB (publ)
Flsmidth & Co A/S	Novozymes A/S	Veidekke ASA
Fortum Oyj	Oriflame Holding AG	Vestas Wind Systems A/S
Frontline Ltd	Oriola Oyj	Volvo AB
Genmab A/S	Orion Oyj	Wartsila Oyj Abp
Getinge AB	Orkla ASA	Wihlborgs Fastigheter AB
GN Store Nord A/S	Orsted A/S	William Demant Holding A/S
Gunnebo AB	Outokumpu Oyj	Yara International ASA
H & M Hennes & Mauritz AB	Outotec Oyj	Yit Oyj
H Lundbeck A/S	Pandora A/S	
Hembla AB	Petroleum Geo Services ASA	

Appendix 4: List of companies with ESG Data 2006–2018

These companies have ESG-scores every year between 2006–2018.

AP Moeller-Maersk A/S	Millicom International Cellular SA
Akastor ASA	Modern Times Group MTG AB
Alfa Laval AB	Mowi ASA
BillerudKorsnas AB	NKT A/S
Cargotec Oyj	Norsk Hydro ASA
Coloplast A/S	Oriflame Holding AG
Electrolux AB	Sanoma Oyj
Flsmidth & Co A/S	Securitas AB
Frontline Ltd	Simcorp A/S
GN StoreNord A/S	Svenska Cellulosa SCA AB
Hembla AB	Tomra Systems ASA
Konecranes Abp	Trelleborg AB
Mekonomen AB	Yit Oyj

Appendix 5: List of companies with ESG Data 2003–2018

Companies with ESG-scores every year in the time span: 2003–2018

AP Moeller-Maersk A/S	Mowi ASA
Alfa Laval AB	NKT A/S
Cargotec Oyj	Norsk Hydro ASA
Coloplast A/S	Sanoma Oyj
Electrolux AB	Securitas AB
Frontline Ltd	Simcorp A/S
GN StoreNord A/S	Tomra Systems ASA
Konecranes Abp	Trelleborg AB
MekonomenAB	Yit Oyj
Millicom International Cellular SA	

Appendix 6: List of industries

Energy	Consumer Service	Real Estate
Consumer Staples	Health Care	Utilities
Consumer Discretionary	Industrial	
Materials	Information Technology	

Appendix 7: Hypotheses for the econometrics tests

Poolability test – Pooled OLS Model vs. Fixed Effect Model

H0: Individual effects do not exist.

HA: Individual effects do exist.

The Bruech-Pagan Lagrange Multiplier test - Pooled OLS Model vs. Random Effect model

H0: Individual-specific or time-specific error variance are zero.

HA: Individual-specific or time-specific error variance are not zero.

Hausmann test – Fixed Effect Model vs. The Random Effect Model

H0: Both Fixed effects and Random effects model can be used

HA: Only Fixed effects model is suitable

Appendix 8: Definition of pillar score factors

Score	Definition
TR ESG Resource Use Score	The Resource Use Score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
TR ESG Emissions Score	The Emission Reduction Score measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.
TR ESG Innovation Score	The Innovation Score reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.
TR ESG Workforce Score	The Workforce Score measures a company's effectiveness towards job satisfaction, a healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.
TR ESG Human Rights Score	The Human Rights score measures a company's effectiveness towards respecting the fundamental human rights conventions.
TR ESG Community Score	The Community Score measures the company's commitment towards being a good citizen, protecting public health and respecting business ethics.
TR ESG Product Responsibility Score	The Product Responsibility Score reflects a company's capacity to produce quality goods and services integrating the customer's health and safety, integrity and data privacy.
TR ESG Management Score	The Management Score measures a company's commitment and effectiveness towards following best practice corporate governance principles.
TR ESG Shareholders Score	The Shareholders Score measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices.
TR ESG CSR Strategy Score	The CSR Strategy Score reflects a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

Appendix 9: Simultaneous Causality

Segments 1 and 2: Whole sample, time-span 2006–2018.

$$ESG\ rating_t \rightarrow Financial\ performance_t$$

	ESG	ESGE	ESGS	ESGG	ESGC
BETA	–0,817363*	–0,770782	–0,878832*	–0.828021*	–0,89534*
SIZE	3,555502***	3,650554***	3,349265***	3,46652***	3,475856***
DEBT-%	–0,16378***	–0,16469***	–0,16670***	–0,1611***	–0,16680***
ESG/E/S/G/C	–0,021209	–0,030905*	0,014144	–0,04200**	0,012644
ADJUSTED R^2	0,05784	0,06126	0,05777	0,05837	0,05888
NUMB. OF OBS.	132	132	132	132	132

Appendix 10: One-directional Causality

Segments 1 and 2: Whole sample, time-span 2006–2018.

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

	ESG	ESGE	ESGS	ESGG	ESGC
BETA	–0,3654048	–0,363644	–0,383195	–0,3115277	–0,381709
SIZE	2,485295***	2,488043***	2,340105***	2,497369***	2,493793***
DEBT RATIO	0,108339***	–0,108371***	–0,110048***	–0,10570***	–0,10892***
ESG/E/S/G/C	–0,00054	–0,000814	0,019968	–0,016603	0,004575
ADJ. R2	–0,0579	–0,0579	–0,05551	–0,05558	–0,05759

Appendix 10: One-directional Causality

Segments 1 and 2: Whole sample, time-span 2006–2018.

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

	ESG	ESGE	ESGS	ESGG	ESGC
BETA	–0,3654048	–0,363644	–0,383195	–0,3115277	–0,381709
SIZE	2,485295***	2,488043***	2,340105***	2,497369***	2,493793***
DEBT RATIO	0,108339***	–0,108371***	–0,110048***	–0,10570***	–0,10892***
ESG/E/S/G/C	–0,00054	–0,000814	0,019968	–0,016603	0,004575
ADJ. R2	–0,0579	–0,0579	–0,05551	–0,05558	–0,05759