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Financial Economics

ESG and Bond Performance:

Evidence from the Nordic

Bachelor Thesis 15hp

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Abstract

This study examines whether corporate ESG performance has an effect on bond performance in the Nordic countries. There are two main theoretical views regarding ESG investments which are risk mitigation and resource depletion. ESG spendings are either seen as a way to lower the overall risk of the company and thus leading to lower spreads, or seen as a waste of resources which increase firm risk. We use two OLS regressions to test both the combined ESG scores' and the individual pillar scores' relationship with z-spreads.

We find no significant results for the individual pillars of the score, whereas some weak evidence is found for the risk mitigation view for the combined ESG score. However, this evidence is insufficient, meaning that a negative relationship cannot be proven.

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1. Introduction

In the first chapter, the general research topic and question is introduced. The chapter starts by discussing the subject in the context of general background information and the purpose of the text, which is used to further motivate the chosen topic and research question.

1.1 Background

In today's society, a widely discussed subject in news and public debates considers how companies and society as a whole have to evolve to solve the important question: How can a sustainable future be accomplished? The most common perception is that we are moving towards this goal, and thus companies must also adapt to these changes in order to have a chance of survival in a business climate where customers more or less require that they improve upon sustainability. This has led to the development of concepts such as *corporate social responsibility (CSR)* and *environmental, social and corporate governance (ESG)* which connects companies' actions with sustainability aspects.

When the sustainability development of today's society is combined with financial markets and financial theory it is expected to find observable relationships. Firstly, from a theoretical point of view, investors are thought to be rational and to only care about two things, risk and return. With this in mind, it could be argued that companies that act more sustainably should be rewarded with at least the following two things. Companies with environmental and social focus should be subject to higher return as they adapt to the demand for sustainable solutions from customers. They should also generate higher future profit as they are more suitable to navigate the expected future world set up by documents such as the United Nations sustainability goals and the Paris climate agreement.

Secondly, it could also be argued that firms with higher ESG ratings are subject to less risk. It has been shown throughout modern history that actions taken by firms in contradiction to what could be viewed as ESG beneficial operations can lead to clear setbacks. Lack of corporate responsibility in environmental or social aspects can, for example, lead to both big fines and boycotting by customers. Lack of suitable governance structures can also lead to drastic falls in market value, as in the case of Volkswagen and the emission scandal where the stock value dropped 40% within two weeks (Jung and Sharon, 2019). Therefore, from the

above explained benefits from environmental, social, and governance responsibility, one could expect that higher rated firms on the ESG scale perform better financially.

Moreover, even if the assumptions about investors were to be loosen up and they were to take more into account than risk and return when making investment decisions, one could still argue that the same result would be observed. Investors might value other important matters besides risk and return when considering investment opportunities such as contributing to a sustainable future. In that case, investors would be willing to pay more or equally to require a smaller return from companies with better ESG ratings. Thus, leading to a lower cost of capital for those companies.

1.2 Problem Description and Problem Analysis

There is numerous research that investigates the relationship between sustainability work in companies and financial performance, particularly concerning equity. A summarizing report by Friede, Busch, and Bassen (2015) suggests that the majority of these reports find a positive relationship between ESG performance and financial performance. However, research investigating the relationship between bond performance and ESG performance of firms is not conducted anywhere near to the same extent. In addition, to our knowledge, there are no published articles at the moment investigating the relationship in Nordic countries which also strengthens the reasons to perform this study.

It is interesting to investigate the relationship between bond performance and ESG performance in Nordic countries, instead of the more researched areas such as America or Asia, not only because it is fairly unexplored, but also because the Nordic area has some special characteristics. Nordic countries are exclusively ranked at the top of the ESG ranking list (Robeco, 2020) and it is therefore interesting to investigate the relationship between ESG performance and bond performance in this area since countries with higher ESG ratings are more likely to show such a relationship compared to countries with a lower ranking (Stellner, Klien, and Zwergel, 2015).

Furthermore, the Nordic countries, except Finland, are not part of the European Monetary Union (EMU) but they are part of the European Economic Area which thus makes Nordic countries affected by expansionary measures performed in the Eurozone. During recent years

the euro has continuously been developed and thus bond markets have been positively affected and an increasing number of new corporate bonds have been added to the market. This expansion of the European bond market has certainly been of great importance to the European countries since the bond market has become a further integrated market with lower transaction costs and greater liquidity (Stellner, Klien, and Zwergel, 2015). It is therefore interesting to examine the Eurozone instead of the more common areas for studies such as the U.S. bond market. The Nordic countries are not part of the EMU but they are still rewarded with the benefits mentioned as part of the European Economic Area. Therefore, since research has already been done on the European bond market, the Nordic area is of increased interest as well in order to research this expanded bond market.

In addition, there are differences between the performance of equity and that of bonds due to the fact that the securities differ in many ways. As when equity holders would be more concerned with the development of the company, bondholders are instead often more concerned with the company's ability to pay coupons and the face value when these payments are due. Both of these stakeholders are concerned with the risk of the investment and, as discussed previously, there is expected to be a negative relationship between risk and ESG performance. However, as the bond and share investment horizons differ it might be that ESG affects share price more drastically if the ESG enhancements today are expected to provide payoff after the investment horizon of a bond.

1.3 Aim of the Study

This study aims to investigate if there is an observable relationship between firm ESG performance, both as a whole and through the individual pillars, and bond performance. By running a regression from gathered up-to-date data and important control variables, one can argue with great certainty that the found (non-)relationship is valid and use this information to strengthen decision making within the company and for stakeholders.

As mentioned, a possible relationship between ESG rating and bond performance is valuable information for the company which gives this study an important assignment. This study thus seeks to provide additional information for companies regarding ESG performance. If the relationship is positive between the two components, meaning that firms are rewarded with lower credit spreads, the company could be further motivated to improve the different parts

included in the ESG score. It would be an additional driving force for companies to continue to increase time and money spent on environmental, social, and governance questions. However, if a relationship cannot be proven, this paper does not encourage companies to ignore ESG implementation in the corporation since there are many other powerful reasons to invest in such projects.

Furthermore, this study also intends to contribute to the already existing literature on this subject by taking a different approach in two aspects. First, by researching a different area, such as the Nordic area. Secondly, by investigating not only ESG performance and bond performance relationships but also by studying individual parts of the ESG measurement, such as environmental, social, and governance, and their possible effect on bond performance. By making well argued adjustments based on information and results from previous studies, this essay intends to further deepen the knowledge within this research area and complement the existing literature.

This study therefore aims to analyze and answer the following research question:

How is firm ESG performance related to bond performance within the Nordic countries?

1.4 Limitations

This study is limited to the data available in the databases, especially in regards to the proxy for ESG performance. The proxy used is the available ESG scores in the Refinitiv Eikon database that are produced using self-reported information by firms (Refinitiv.com). The scores are therefore not an exact measurement of ESG performance but rather a proxy indicating the relative performance of the firm. Moreover, the ESG score database of Refinitiv Eikon is also far from complete, resulting in a skewed sampling around large firms which have a higher likelihood of being included in the database. The above described factors do, for example, also lead to the exclusion of icelandic firms due to that their bond issuing firms do not have available ESG scores for the relevant time period.

1.5 Structure

The following chapter introduces the general theoretical framework used to discuss and understand the research question and results. It also contains references to previous studies

conducted in closely related research fields which are used, together with the theoretical framework, to develop the hypotheses this paper aims to test. The third chapter describes how these hypotheses are tested and further explain the regression model and how its usage leads to trustworthy results. Chapter four provides information about the data and the data gathering process while chapter five contains the empirical results both from the main regression model and the performed robustness checks. The last chapter concludes and summarizes the research performed within this paper.

2. Literature Review and Hypotheses Development

The second chapter discusses the theory that the research idea and approach are built upon. Results of previously conducted studies closely related to the research topic are also brought up within this section. Lastly, the chapter ends with a description of what this paper seeks to contribute with, both related to the theoretical framework and previous studies.

2.1 Stakeholder Theory

According to the stakeholder theory, a company should not solely create value for their shareholders, but for all stakeholders. Meaning that customers, employees, creditors, and other actors interested and involved in the firm should also be taken into account during the company's decision-making. If the management does not consider the stakeholders mentioned, the company risks receiving mistrust from associated actors, according to Jones in the paper *Instrumental Stakeholder Theory: A Synthesis of Ethics and Economics* (1995) and would thus also incur losses for the company. Instead, accounting for and satisfying stakeholders should provide additional value and increased profits for the corporation, as stated by Freeman in the text *Stakeholder Theory: The State of the Art* (2010)

Menz (2010) also describes numerous benefits for companies that satisfy their stakeholders. Firstly, companies could avoid large fines and costs when managing an increased socially responsible entity since ecological contamination and legal disputes would be mitigated. Secondly, the work morale in the company would most certainly increase when focusing on fair and caring treatment from the company towards their employees. Thirdly, it has also been shown that focus on fairness from the companies enhances positive relationships with authorities and other organisations resulting in a variation of insurance for the company. All the benefits mentioned would additionally also increase the trustworthiness and position of the company, as well as the company value and customer satisfaction, which in turn lowers the risk of the company.

In addition, higher corporate social responsibility indicates a lower risk of the company as described by Boyslah, Kryzanowski, and M'Zali in the text *The impact of the dimensions of social performance on firm risk* (2013). When investors care for social responsibility, they obtain a greater profit from their assets beyond the traditional monetary payoffs. When the

focus on sustainability increases, demand for socially responsible assets also increases. Thus, firms providing investment possibilities for socially responsible investors will benefit in terms of decreased risk of their assets, which is in accordance with the stakeholder theory.

As described, socially responsible companies will benefit in terms of lower risk, increased company value, and various additional advantages in a world where stakeholders value sustainability. The stakeholder theory is thus an important theory when investigating firm ESG performance, especially when studying a possible relationship with bond performance since bond investors are stakeholders that value firms with low risk.

2.2 ESG- and Financial Performance

According to the working paper *Firms and Social Responsibility: A Review of ESG and CSR Research in Corporate Finance* by Gillan, Koch, and Starks (2020) there are two prominent standpoints regarding how ESG related performance affects firm value and performance. One side, arguing that financial performance is enhanced with ESG performance, points to that customers are often more willing to buy from firms with better sustainability reputations. In other words, it is argued that companies spend resources on improving their ESG performance in order to get a competitive advantage that will be greater than the cost. The other side, however, emphasizes that resources spent on better ESG performance represent a principal-agency relationship problem where scarce resources are depleted in order for agents to enhance their reputation instead of increasing the performance or value of the firm.

As it is a debated question, it is also a well-studied subject. The summarizing study by Friede, Busch, and Bassen (2015) has looked at over 2000 published studies conducted within this field and concluded that almost all of them find a relationship between ESG- and financial performance. Furthermore, the vast majority of these findings indicate that this relationship is positive, meaning that better ESG performance enhances the financial performance.

2.3 Risk and Bond Spreads

Credit spreads indicate the difference in the return of corporate bonds and the return of risk-free bonds (government bonds). The difference between the returns, the spread, is a risk premium that investors require to hold a riskier bond (corporate bond). Empirically shown, investors seek compensation in the form of a risk premium due to credit risk, liquidity risk,

and systematic risk (Menz, 2010), but further research shows that these factors are not enough to explain actual credit spreads in the market (Amato and Remolona, 2003). That begs the question of what other factors affect risk premiums. Menz (2010) refers to a previous text of his written together with Nelles where they were able to prove that one factor driving the risk premium is governance quality within a firm, even if the evidence were weak. It is therefore interesting to further research what factors drive risk premiums of corporate bonds in order to determine if any other relationships can be detected.

Moreover, there are different ways to measure credit spreads and therefore also risk premiums. The conventional yield spread measures the difference between the interest rates at one point and therefore ignores the shape of the yield curve. Another commonly occurring measurement is the z-spread, which in short is a measurement of how much a certain spot rate curve must be shifted in order for a bond's discounted coupons and face value to equal its current price. That is, the z-spread takes the whole yield curve of government bonds into consideration while the conventional yield spread, through its application, implicitly assumes a flat yield curve. Therefore, by using z-spread instead of conventional yield spread, problems such as term structure effects are eliminated because the whole curvature is taken into account (Stellner, Klien, and Zwergel, 2015).

2.4 ESG, Risk, and Bond Performance

There are, as previously mentioned, two prevailing sides regarding how ESG related investments by firms should affect firm performance and therefore the risk profile of the company. Better ESG performance might for instance lead to more motivated employees as it is often regarded as important to work for a sustainable employer. This is potentially extra important since payoff structures for employees often are time-based and not performance-based. Working morale is therefore an important factor as it determines how effectively employees use their time. It could also be argued that better ESG performance could lead to the reduction of other costs such as environmental damages, litigation costs, and reputational and brand value associated costs. In contrast, it is possible that ESG investments actually have higher costs than gains as most direct costs, such as environmental damages, are seldom fully borne by the polluter (Menz, 2010).

However, better ESG performing firms should, ceteris paribus, be associated with lower risk since better ESG performance should decrease the probability of litigation and reputational costs associated with performing badly within ESG related matters. Better ESG performance should, in theory, also lead to better long-term relationships with stakeholders such as with employees, as discussed above, and with customers, both in terms of loyalty but also the willingness to pay a premium for products. In contrast, ESG related investments could also be viewed as value-destroying for shareholders if it is argued to be a depletion of resources available for the company. In this theoretical framework, ESG investments are associated with higher fixed costs which in turn increase volatility of earnings and worsens the risk profile of the company (Stellner, Klien, and Zwergel, 2015).

The two different views on ESG performance and investments can best be categorised as either seeing ESG investments as risk-mitigating or, instead believing that it depletes resources and that trying to better the firm´s ESG performance can be seen as overinvestment within the ESG field.

2.5 Results from Previous Studies

2.5.1 Results Regarding Combined ESG Performance

There have been some previous studies conducted within this field, one of them is the study by Menz (2010) and it focuses on investigating this relationship for euro corporate bonds and mainly for European companies. Menz is not able to find any significant results and therefore draws the conclusion that ESG has not been incorporated into the pricing of bonds yet.

The article by Stellner, Klien, and Zwergel (2015) focuses on corporate bonds from non-financial firms within some specific EMU countries. The geographical location is therefore quite similar to that of Menz (2010), but in contrast, this research finds significant results which stem from including country ESG performance in the model. The argument from the authors is that the price of a bond is determined by investors and that the investors ultimately decide what level of ESG investments by a company is optimal. They claim that bond markets are relatively national and they therefore develop a model to test the prediction that matching the ESG performance of the country in which the company is located is to be seen as optimal and should therefore be rewarded with lower spreads. If a company is

performing worse than the overall ESG performance of the country, it would be seen as risk-mitigating by the investors to increase ESG investments, and if the company is performing to par or better than the country of incorporation, further ESG investments are to be seen as resource depletion. Stellner et al. finds that better ESG performance is rewarded with lower spreads only if it is recognised by the environment, as predicted by their hypothesis.

2.5.2 Results Regarding Pillar Performance

The three pillars of the ESG score, environmental, social, and governance, have been proven in previous studies to have similar effects on firm risk, bond spreads and credit ratings which will be presented in this section.

The environmental pillar involves lowering factors such as pollution and other externalities as well as contributing to factors such as clean water and air. Stellner, Klein, and Zwergel (2015) have gathered previous studies within this area and the results of these reports are contradictory. One study provides evidence that an increase in a firm's environmental risk leads to higher cost of debt, whereas, in another study, an increase in management controlling for environmental risk also leads to higher cost of debt. However, most of the studies did find that a poor environmental performance leads to higher spreads, which also is in accordance with the gathered studies in Gillian, Koch, and Starks´s (2020) paper. Gillian et al. (2020) provide studies that have concluded that firms with poor environmental performance are punished with higher spreads and lower credit ratings, especially if the country the firm is operating in has restrictive environmental rules, which is the case in the Nordic area.

Social performance on the other hand has not been shown to the same extent to have the same influences as environmental performance. Bouslah, Kryzanowski, and M'Zali (2013) conclude in their paper that individual factors of a firm's social performance affect the firm risk differently. For example, human rights and employee relations were shown to have a negative relationship with firm risks whereas other factors such as diversity and community did not show a similar relationship. Stellner et al. (2015) discuss the effect of stronger employee relations and provide evidence that such relations lower the cost of debt and improve credit grading, which is in accordance with the results of Bouslah et al. (2013).

The third pillar of the ESG score, governance performance, includes policies and standards for the company as well as structure, responsibilities, and rights. Multiple studies conclude that better governance performance is related to lower credit risks which is accompanied by lower spreads and higher ratings. (Gillian, Koch, and Starks, 2020)

To conclude, governance and environmental performance have strongly been proved to have a negative relationship with credit risk and spreads. Social performance has been shown to have the same relationship as well, but studies have also proven the opposite. Therefore, based on previous studies, one could expect that at least the governance and environmental pillars will show an effect on z-spreads while the social pillar will probably not appear to have an impact on spreads.

2.6 Contribution Related to Theory and Previous Studies

Related to the theory and previous studies gone through in this chapter, this paper will investigate the relationship between ESG, as a whole and dissected, and bond performance. The results will be discussed in relation to if ESG investments are incorporated into the pricing of bonds. The outcomes will in addition be analysed in terms of if ESG performance is seen as risk-mitigating or if investors view it as overinvestments by firms.

The previous study by Menz (2010) failed to find a significant relationship between ESG and bond performance, however, the study by Stellner, Klien, and Zwergel (2015) did find a relationship when taking country ESG performance into consideration. Bearing that in mind, it is interesting to investigate if a negative relationship can be established between the credit spread of corporate bonds and the ESG performance of firms within the Nordic countries as they are the top-ranked countries related to ESG performance (Robeco, 2020). With the Stellner, Klien, and Zwergel (2015) study in consideration, if a negative relationship could be found anywhere it would with the greatest probability be within the Nordic countries. Then, if such a relationship were to be established through this paper, it could be argued that investors think of greater ESG performance as risk mitigating, and that better ESG performing companies are rewarded with lower spreads and cost of debt within the most sustainable countries.

Lastly, this paper will not solely contribute with a study of ESG´s effect on bond performance, but also the individual effect from the three pillars of the score. If one or more of the pillars are proven to have a significant effect of the total ESG´s effect on bond spreads, one can argue that companies should increase their focus particularly on that specific pillar. This would contribute to simplifications for corporations in what sustainable factor to invest more time and money in since ESG involves various matters.

2.7 Hypotheses

Based on the results from Menz´s (2010) study, it is not expected to find significant relationships between the ESG measure and the performance of corporate bonds. However, his study was performed on historical data before 2007 and in the geographical area of Europe, which in general doesn't place as high on sustainability rankings, both which could lead to different results and in particular less of a relationship between ESG- and bond performance.

In contrast, studies done on ESG´s effect on financial performance have in most cases resulted in an established positive relationship between the two variables (Friede, Busch, and Bassen, 2015) which instead strengthens the beliefs that a relationship between ESG and bond performance also should be found. Moreover, the research by Stellner, Klien, and Zwergel (2015) found that matching the ESG performance of the country where the company is located with the company's spending on ESG contributes to better bond performance. As mentioned earlier, Nordic countries are ranked high on ESG lists, thus, we expect that a positive relationship between ESG performance and bond performance could be established within the Nordic countries.

Lastly, with all mentioned above in consideration, at least one of the components of ESG should affect bond performance positively, although Menz (2010) refutes that statement. It is certainly possible that Menz´s study was accurate, however, that does not imply that the non-relationship is true in the present times as well, more than ten years after publication. ESG has significantly gained relevance during recent years which increases the possibility of ESG performance to have an effect on bond performance. In addition, as discussed in chapter two, previous studies have provided evidence for the pillars of ESG to have an impact on firm risk, bond spreads and credit ratings, in particular the environmental and government

pillars, which thus gives the expectations that such a relationship is to be found in this study as well.

The following two hypotheses is therefore developed and tested:

1. Improved total firm ESG performance is seen as risk mitigating and lowers corporate bond z-spreads.
2. Improved ESG pillar performance is seen as risk mitigating, for all factors, and lowers corporate bond z-spreads.

3. Method

This chapter provides a description of the regression model used in the study as well as how the chosen variables help create a representative estimate on how company ESG performance affects credit spreads.

3.1 The Dependent Variable

This paper will investigate the relationship between ESG score, used as a proxy for ESG performance, and z-spreads of corporate bonds as a measurement of bond performance. Most commonly occurring throughout previous studies conducted is to either look at credit ratings or credit spreads when investigating the relationship between ESG performance and the risk level of firms. As this paper focuses on instrument performance, a bond spread is used since it is a measurement on instrument level, whereas a firm credit rating is at firm level. Bond ratings could be used as it is also a measurement on instrument level, however, the one thing that can be concluded from significant results using ratings in general is if rating agencies consider ESG performance when determining a firm or bond rating. If instead credit spreads are used, conclusions drawn are directly related to the cost of debt of firms which probably are of higher value to the management of companies when deciding whether to take on an ESG related investment or not.

When considering credit spreads, different measurements of spreads have been used throughout previous research. One of the spreads, the z-spread, incorporates the whole yield curve, as well as eliminates problems such as term structure effects, as discussed in section 2.3. Because of these reasons, the z-spread is used in this paper. Furthermore, the natural logarithm of the z-spread is used in the research by Stellner, Klien, and Zwergel (2015) and in accordance with their research the natural logarithm is used in this paper as well. It could be argued that it is most appropriate to use the natural logarithm since ESG is expected to have a negative effect that follows the economic law of diminishing effect. Lastly, the z-spread used in this study is calculated over a benchmark curve for sovereign debt of EMU countries (Refinitiv.com).

3.2 The Variable of Interest

ESG performance is the variable of interest in this study and is measured through the proxy ESG score. ESG stands for environmental, social, and governance and this study investigates both the firm´s combined ESG score and the three individual parts of the score and their respective effects on z-spread. ESG score is a measurement for the relative ESG performance of a firm as well as the firm's efficiency and dedication to ESG-related factors.

In this study, the combined ESG score and the three pillar scores are retrieved from the well-known site Refinitiv Eikon. The score is based on data collected from the companies' publicly issued information which is summarized into 450 measurements and then thoroughly scaled down to the 186 most suitable data points for comparison (Refinitiv.com). The data points are fitted into one of ten different categories within the ESG score. In the environmental pillar the categories are resource use, emissions, and innovation, whereas the social pillar includes workforce, human rights, product responsibility, and community. Lastly, the governance score includes the categories CSR strategy, stakeholders, and management. Refinitiv Eikon is also considered one of the most reliable and accurate ESG-score producers (Stellner, Klien, and Zwergel 2015). Their ESG scores are a commonly used proxy in published articles for ESG performance and are used by both Velte (2017) and Stellner, Klien, and Zwergel (2015).

3.3 Control Variables

In order to obtain a reliable and unbiased estimate, the regression model contains control variables due to the fact that there are other factors beyond ESG performance that could have an effect on bond spreads. The chosen control variables used in this model, to avoid misleading results, are the ones expected to have an effect on z-spreads. The control variables are theoretically or empirically shown to affect the dependent variable and are divided into company specific variables and other control variables to distinguish between the different types and to simplify the reading. In addition, the chosen variables are commonly used in this research field.

3.3.1 Company Specific Variables

The first company characteristic that is expected to affect the creditworthiness of the company is company size. This is because larger firms are expected to cope better in economic downturns and with fluctuating cash flows (Stellner, Klien, and Zwergel 2015) (Menz 2010). The model in this paper therefore contains the control variable total revenue as a proxy for firm size. The variable will be lagged one year to reflect the available information for investors and will be denoted in euro to control for the different currencies across borders. Total revenue is also the proxy variable for company size used by Stellner, Klien, and Zwergel (2015) and in accordance with the previous research conducted by Bannier, Bofinger, and Rock (2021) the natural logarithm of this variable will be used.

Secondly, highly leveraged companies are expected to have a worse risk profile than those who are not, ceteris paribus. This is because higher debt to asset ratios should increase default risk and therefore the credit spread. Furthermore, both papers by Stellner, Klien, and Zwergel (2015) and by Menz (2010) include a leverage control variable. This model therefore includes the ratio of total debt to total assets, where higher ratios are expected to increase the credit spread.

Thirdly, the profitability of the company is also expected to affect the spread as it should reduce the risk of default. When companies increase their ability to generate profits from their assets, their capacity to pay should increase as well (Stellner, Klien, and Zwergel 2015). Therefore, return on assets is also used as a control variable since it is a common profitability measurement, and more importantly, does not take leverage into account. This is important since leverage already is accounted for in the variable controlling for the debt to asset ratio.

The last company variables used are dummy variables indicating sector and country of incorporation. These are included due to the fundamental differences between sectors, which imply different risk profiles, and also to account for differences across borders.

3.3.2 Other Control Variables

There are also two risks at instrument level that have to be taken into account as these risks affect the spread. First, term risk, which is the risk of something unforeseen happening, is increasing with time to maturity and is therefore included in the model through a variable that

contains years until maturity. Second, liquidity risk, the risk of not being able to sell the instrument when in need of cash as an investor, is incorporated through a proxy variable that contains the bid-ask spread of the bond. While keeping everything else constant, high liquidity risk should imply a high bid-ask spread and in turn the credit spread should be higher. (Stellner, Klien, and Zwergel, 2015)

The final control variables included in the model are year dummy variables, a commonly used proxy for the economic situation of the different years. The systematic risk is expected to affect the dependent variable by causing variation in the spread which will be captured by this variable (Stellner, Klien, and Zwergel, 2015). In addition, when accounting for years, the autocorrelation problem could possibly be decreased (Wooldridge, 2009) as well as the effect of omitted variables that are changing over time (Studenmund, 2017).

Table 1: Variables of the Regression Models

Variable	**Description**	**Unit**	**Source**
ESG-scores	Refinitiv Eikon ESG scores	0-100	Refinitiv Eikon
Z-spread	Corporate bond z-spread over EMU benchmark curve	Basis points	Refinitiv Eikon
Revenue	Total revenue to control for company size, lagged	MEUR	S&P
Debt/assets	Ratio of total debt over total assets of the company, leverage		S&P
ROA	Return on assets EBIT/total assets		S&P
Sector dummy variable	Indicating sector which firm operates within		Refinitiv Eikon
Country dummy variable	Indiciating country of incorporation		Refinitiv Eikon

Year dummy variable	Indicating the time period of the observation		Refinitiv Eikon
Time to maturity	Years to maturity	Years	Refinitiv Eikon
Bid-ask spread	Difference between closing ask and bid price divided by the midpoint between them.		Refinitiv Eikon

The table provides brief information about each variable used in the OLS-regression models.

3.4 Standard Errors

Robust clustered standard errors should be used when observations cannot be assumed to be statistically independent (Thompson, 2011) which could be argued is applicable for the regressions in this study. The standard errors will be clustered on firm and year. That is because the expected effect of ESG performance should be similar for all bonds issued by a corporation given that it is measured in the same time period. As mentioned earlier, ESG performance, if proven to be risk mitigating, should affect risk at firm level. However, the ESG performance of a firm will vary over time and Refinitiv Eikon ESG scores are published annually. It is therefore most reasonable not to cluster on company over the whole observed time period but rather cluster on company for each year. It is also an approach used by Bouslah, Kryzanowski, and M'Zali (2013) in their research paper investigating a similar relationship.

3.5 The Regression Models

The following two equations are the ones run through an OLS-estimator. Both regressions are run with clustered standard errors on firm-year.

$$(1)\ ln(Z)_{i,t} = \beta_0 + \beta_1 ESG_{c,t} + \beta_2 ln(Rev_{c,t-1}) + \beta_3 D/A_{c,t-1} + \beta_4 ROA_{c,t-1} + \beta_5 TTM_{i,t} +$$

$$\beta_6 BA_{i,t} + \beta_7 Count_c^* + \beta_8 Sect_c^* + \beta_9 Year_t^* + \varepsilon_{i,t}$$

$$(2)\ ln(Z)_{i,t} = \beta_0 + \beta_1 E_{c,t} + \beta_2 S_{c,t} + \beta_3 G_{c,t} + \beta_4 ln(Rev_{c,t-1}) + \beta_5 D/A_{c,t-1} +$$

$$\beta_6 ROA_{c,t-1} + \beta_7 TTM_{i,t} + \beta_8 BA_{i,t} + \beta_9 Count_c^* + \beta_{10} Sect_c^* + \beta_{11} Year_t^* + \varepsilon_{i,t}$$

ESG, E, S, and G represent the combined ESG score and the ESG pillar scores, respectively. Rev, D/A, and ROA are the company specific variables for revenue, debt to asset ratio and return on assets while TTM and BA are the instrument specific variables for time to maturity and bid-ask spread. Count and Sect are abbreviations for country and sector, while the * indicates that these are dummy variables. C represents an individual company, t a specific year, and i an individual bond. The error term is represented by ε.

4. Data

The content of this chapter explains how the data used in this paper was collected and processed. A description of the total sample as well as the reasons for removing particular data points is presented as well. Lastly, summarizing statistics of the variables is provided and discussed in relation to other researchers' findings for the same variables.

4.1 Data Collection

The sample used in this study was collected through Refinitiv Eikon by including all active bonds during the years 2011-2020 in the Nordic countries that had both an ESG score and a z-spread, which resulted in a total of 788 observations. There are no bonds from Iceland in the final set of observations due to that Iceland does not yet have ESG scores for companies with registered bonds. The sample is also restricted to non-financial companies and bonds without data on a certain year's ask price has been removed. The reasons for removing financial institutions are first, that they follow different regulations, and second, to be in accordance with other researchers in order to provide a study comparable to the previously written papers.

There are also multiple reasons why Nordic bonds active during the years 2011-2020 were chosen for the investigation in our study. As mentioned before, the European bond market has gained attractiveness and size during recent years making it an excellent area for studies, instead of the U.S. bond market which otherwise is a common area of interest. With the expansion of the European bond market a number of benefits for the area follows, such as increasing liquidity and decreasing transaction costs (Stellner, Klien, and Zwergel, 2015). However, studies focusing on European companies have already been conducted, whereas the Nordic bond market, on the other hand, has not been examined in any published article in relation to ESG performance, to our knowledge. In addition, the Nordic countries are ranked alone at the top of the ESG ranking list (Robeco, 2020) which, according to Stellner, Klien, and Zwergel (2015), should imply that a negative relationship between ESG score and z-spread could most certainly be observed.

By using the ten most recent years when collecting the data the results are as up to date as possible while still providing a large enough sample to provide trustworthy results. There is

an important trade-off to bear in mind when gathering a sample between having only the most recent data that best reflect the present and avoiding a too small of a sample in order for the results to be accurate. The importance of sustainability is also growing each year (Boyslah, Kryzanowski, and M'Zali, 2013) making it important to not include bonds from earlier years when ESG was apprehended less relevant.

Therefore, if going back too many years in time when gathering data, the Nordic countries used in this study would have a lower ESG score and thus a relationship would most likely not exist. In contrast, one could not only investigate 2020 arguing that it is the best approach based on that the most recent data have been used and then state that a relationship exists. This is because cross-sectional data is not sufficient to establish such a causality. In addition, the sample of such a study would be exceedingly small and thus unreliable to provide accurate conclusions. Moreover, a ten-year time period is a commonly accepted period for panel data studies as well as it considers the above described trade-off.

4.2 Outliers

Outliers are data points which drastically differ from the majority of observations (Durivage, 2015). The presence of outliers within datasets can thus damage the credibility of conclusions drawn based on this data if they are not taken into consideration (Bouslah, et. al., 2013). Existing outliers in datasets are commonly managed within the academic research field through winsorization. In accordance, it is also the method used in the closely related research paper by Bannier, Bofinger, and Rock (2021) and will therefore be implemented in this study as well.

Within the collected dataset used in this paper, outliers were identified in three variables, z-spread, time to maturity, and bid-ask spread. Therefore, winsorization has been performed for these variables, meaning that values above or below some percentile have been replaced by the value of the corresponding percentile. For the z-spread and the time to maturity, the most commonly used percentile for winsorization, one percent, were used. However, regarding the variable bid-ask spread, the outliers were congregated around the highest percentiles. This is because the measurement bid-ask spread is the difference between the closing ask and bid price, divided by the midpoint between the two, meaning that all outliers will be in the high percentile marks. Therefore, the two percentages replaced are instead the

ones above the 98th percentile. This is also an important change of the winsorization since the maximum value of the bid-ask spread of 200 percent indicates the absence of a registered bid price, which is an unrepresentative value of the liquidity.

Table 2: Winsorized vs Non-winsorized Variables

Variable	Mean	Median	Std. Dev.	Min	Max
Z-spread	193.173	83.965	2272.408	-3.2	63805.4
Z-spread (w)	108.733	83.965	98.018	1.32	499.17
TTM	15.749	6.579	86.135	0.164	998.148
TTM (w)	8.601	6.579	7.772	0.452	57.219
Bid-ask spread	0.024	0.004	0.190	0.0003	2
Bid-ask spread (w)	0.006	0.004	0.005	0.0003	0.030

The table provides summarizing statistics about the three variables that have been winsorized in the OLS-regressions. The winsorized variables, indicated by "w", are compared with the non-winsorized variables to express the importance of eliminating outliers. Z-spread and TTM have been winsorized at 1 percent, whereas, the bid-ask spread has been winsorized for the highest two percentages. TTM is an abbreviation of time to maturity and is measured in years.

4.3 Descriptive Statistics

Table three and four, as well as figures one to three, visible below, contains and displays some summarizing characteristics of the collected data. Table three provides various information about most of the variables in the model which will be compared to previous literature to uncover possible fallacies in the sample. When comparing the dependent variable and the variable of interest with the data used in the research by Stellner, Klien, and Zwergel (2015) it is apparent that the data collected are quite similar. Firstly, the z-spreads collected by Stellner et. al. have a mean of 125.5, a median of 80.9, and a standard deviation of 179.5. When compared to our sample we find that their mean is somewhat above ours, while their

median is lower, and their standard deviation is above ours. The difference in standard deviation could be a result of winsorization as their data is not winsorized. Secondly, when comparing ESG scores we find that both their mean and median is above the data used in this report. They have reported a mean, median and standard deviation of 78.3, 82.4, and 14.5, respectively. This is somewhat surprising as one would expect that companies within better performing countries, in ESG related matters, should perform better in this aspect.

Table 3: Summarizing Statistics on the Variables

Variable	Mean	Median	Std. Dev.	Min	Max
Z-spread (w)	108.733	83.965	98.018	1.32	499.17
ESG score	70.540	74.965	12.653	25.254	91.260
E score	68.433	72.970	18.875	3.370	94.172
S score	71.953	75.743	14.031	28.325	95.006
G score	68.032	71.998	17.607	6.526	94.873
Revenue	18053.06	9380.058	23516.4	166.388	95429.51
D/A	0.320	0.290	0.162	0.042	0.968
ROA	0.094	0.079	0.072	-0.046	0.393
TTM (w)	8.601	6.579	7.772	0.452	57.220
Bid-ask spread (w)	0.006	0.004	0.005	0.0003	0.030

The table displays some summarizing statistics about the variables later used in the OLS-regression. E, S, and G scores are short for the three individual pillar scores environmental, social, and governance. D/A is an abbreviation for the debt to asset ratio and time to maturity is shortened to TTM and is expressed in years. The winsorized variables are indicated by "w". Z-spread and TTM have been winsorized at one percent, whereas, the bid-ask spread has been winsorized for the highest two percentages.

The figures provided below display the distribution of the observations between countries, sectors and years. The majority of the collected bonds have been issued in Sweden, and as previously mentioned, Iceland have been removed from the final dataset due to the fact that none of the bond issuing companies in Iceland had an ESG-score. The sample is also skewed almost entirely towards the most recent years. The reason for a collection of more bonds in later years could be that the ESG database is growing each year due to the increasing importance of ESG. Thus, more companies provide information about their actions within this field each year. Telecommunication and oil and gas are the two sectors with the largest amount of data.

Figure 1: Distribution of Observations Based on Sector

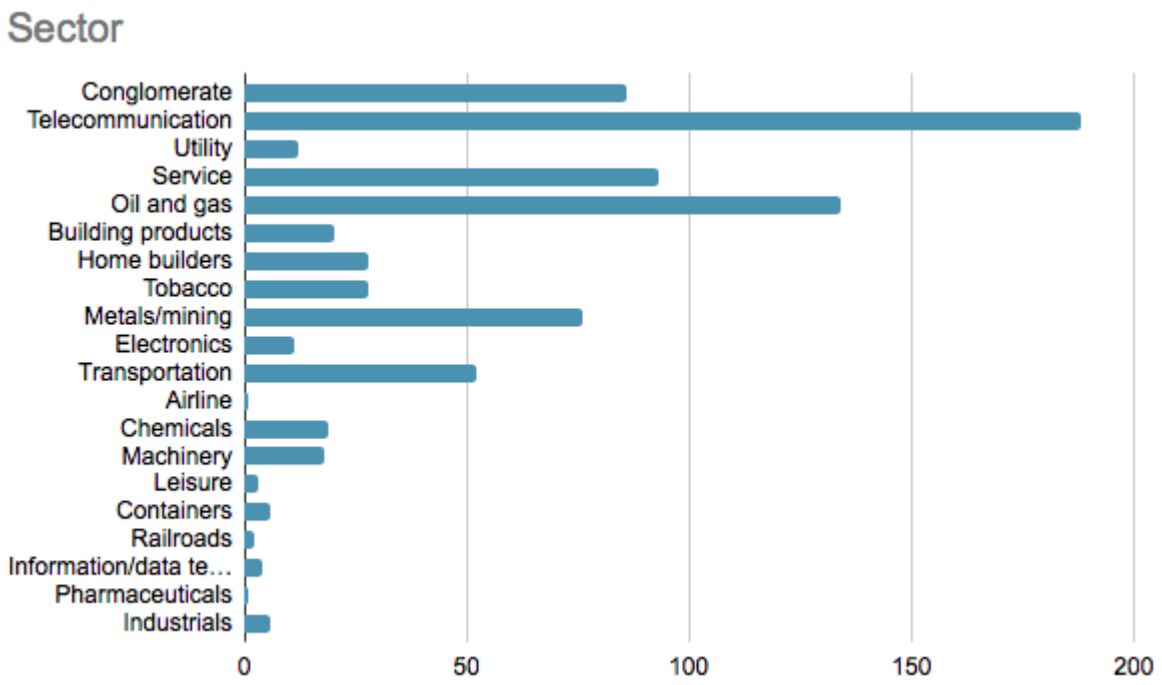


Figure 2: Distribution of Observations Based on Country

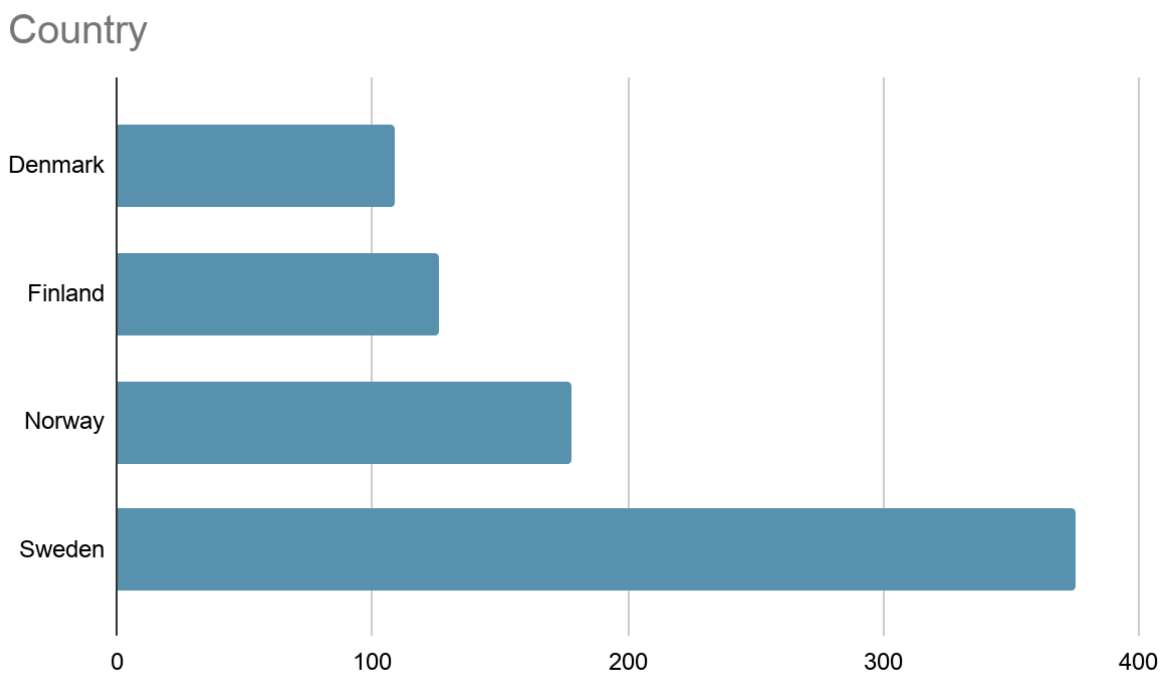
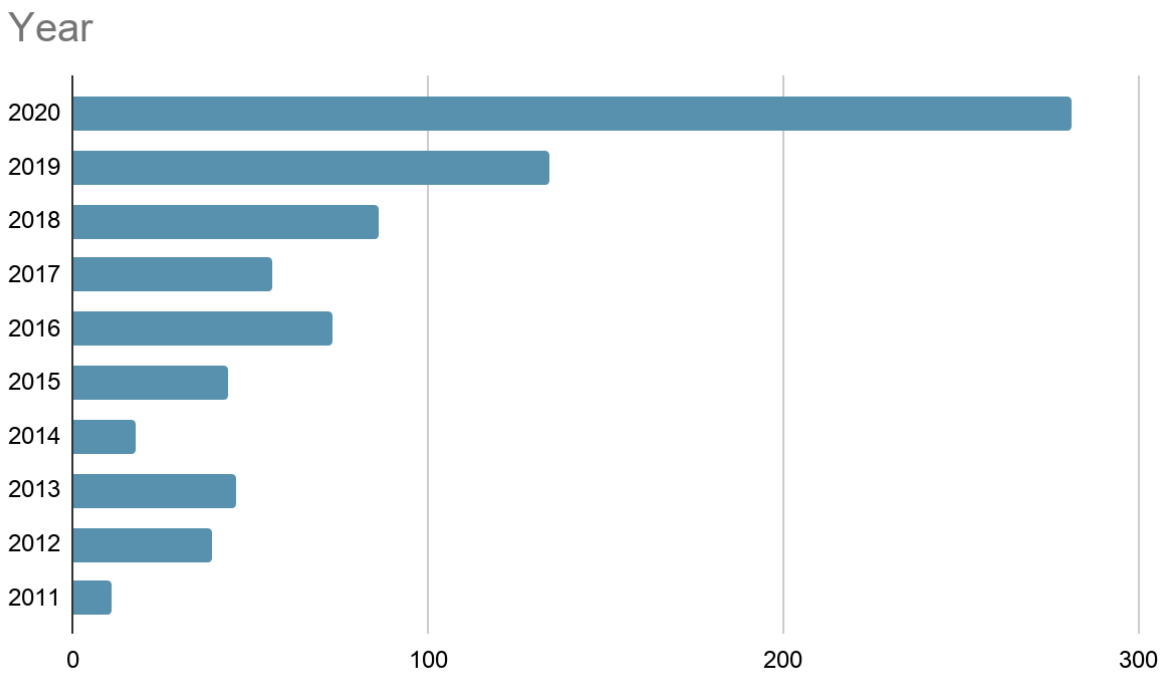


Figure 3: Distribution of Observations Based on Year



Lastly, table four displays the results of the tests of differences in means of the z-spreads between groups that have been divided by the score median. The group of companies with a higher combined score as well as higher social and governance scores have a lower mean of z-spread compared with those who have lower scores. For the environmental score the opposite is observable where the companies with higher scores have a higher mean of z-spread. The difference is however insignificant.

Table 4: Tests of Differences in Means

Score	Mean (L)	Mean (H)	Diff	P-value
ESG score	121.166	96.174	24.992	0.000
E score	107.541	109.975	-2.434	0.727
S score	124.808	91.992	32.816	0.000
G score	127.292	89.985	37.307	0.000

The table displays the results from the tests of differences in means of z-spread. E, S, and G scores are short for the three individual pillar scores environmental, social, and governance. (L) and (H) represent the low and high division of the score median. The difference is indicated by diff and is calculated by subtracting the mean of the high score group from the low. The p-values are calculated allowing for differences in standard deviations between the groups and the z-spread is winsorized at 1 percent.

5. Empirical Results

This chapter provides the empirical outcome from the above described regressions and the results of the hypotheses testing as well as the significance of the tests. Both the ESG-score as a whole and the three pillars individually is presented in this chapter in relation to their significance and their relationship with the z-spread. The results are also provided in comparison to the hypotheses in chapter two. Furthermore, the chapter also contains the empirical results from the robustness checks that have been performed.

5.1 Result from the Regressions

As previously presented, the OLS-regressions have been conducted to examine if a relationship between ESG performance and bond performance exists, as well as the individual pillars of the score´s relationship with bond performance. Multiple control variables together with standard errors clustered on firm-year have been included to form the results from the two regressions that is visible in table five below.

Table 5: Results of the Regressions

Dependent variable	**ln(z-spread)**		**ln(z-spread)**	
	ESG Score Regression		**Pillar Score Regression**	
Variable	**Coefficient**	**|T-stat| (p-value)**	**Coefficient**	**|T-stat| (p-value)**
ESG score	-0.00967*	1.89 (0.06)	-	-
E score	-	-	-0.00538	1.16 (0.248)
S score	-	-	0.00156	0.27 (0.787)
G score	-	-	-0.00432	1.06

				(0.291)
ln(Revenue)	-0.10229	1.35	-0.10536	1.41
		(0.179)		(0.160)
D/A	-0.02460	0.04	-0.02464	0.04
		(0.969)		(0.969)
ROA	-2.82189***	2.88	-2.79571***	2.89
		(0.004)		(0.004)
TTM (w)	0.03092***	6.27	0.03112***	6.39
		(0.000)		(0.000)
Bid-ask spread (w)	60.02493***	4.07	59.68498***	4.07
		(0.000)		(0.000)
Dummy Variables and Clustering				
Country dummies	yes		yes	
Sector dummies	yes		yes	
Year dummies	yes		yes	
Cluster (firm x year)	yes		yes	

The table provides the results from the OLS regressions, with 788 number of observations, controlled for fixed effect for country, year and sector. The dependent variable is the natural logarithm of z-spread. The winsorized variables are indicated by "w". Z-spread and TTM have been winsorized at one percent, whereas, the bid-ask spread has been winsorized for the highest two percentages. The estimations are obtained with clustered standard errors on firm x year and the table is divided into two parts, one part for each regression. The variables for country, year and sector are not included in the table due to reasons of clarity and readability. E, S, and G scores are short for the three individual pillars environmental, social, and governance. D/A is an abbreviation for the debt to asset ratio and time to maturity is shortened to TTM. *, **, and *** indicates significance at 10%, 5%, and 1%, respectively.

The ESG score regression tests if the combined ESG score has an effect on z-spread. Higher ESG score is expected to lower the z-spread for a company due to overall lower firm risk, as described in chapter two. Therefore, a negative sign for the ESG coefficient is expected. This is in accordance with the obtained results, visible in table five, where the ESG coefficient is measured to -0.00967 at a significance level of 10%. However, since the results are weakly statistically significant, the first null hypothesis: *there is no relationship between corporate ESG score and z-spread* cannot be rejected with confidence. Thus, the results from our first regression provides evidence that ESG scores do have an effect on z-spreads, although, only weak evidence.

For the pillar scores regression, where the individual pillars of the ESG score is examined in relation to z-spread, matching signs for the environmental and governance coefficients are found. Similar to the first regression, the coefficients for these pillars are negative, -0.00538, and -0.00432, respectively. The coefficient for the social score is however positive, 0.00156, but also the furthest away from being significant. In addition, as expressed in chapter two, social performance has not been shown as strongly in previous studies to affect spreads compared to the other pillars, which is also reflected in table five where the coefficient for the social pillar, in absolute terms, is lower than the other pillar´s coefficients. Nonetheless, none of the three pillars results are statistically significant and no conclusions can therefore be drawn about the effect the pillars have on z-spread. The reason for non-significant results for the pillars might be that they are not individually sufficient to affect the z-spread, but together they are.

Lastly, the control variables with highly significant estimated effect are return on assets, years to maturity, and bid-ask spread with the estimates -2.82189, 0.03092, and 60.02493, respectively. The signs of the estimates are of the expected sign where more profitable companies are rewarded with lower spreads while bonds with more years until maturity and higher bid-ask spreads receive higher spreads. Years until maturity and bid-ask spread are also two control variables included in the regression model of Stellner, Klien, and Zwergel (2015) where they find similar results for these variables. Close to the findings of this model, the authors find strongly significant effects of years until maturity, with a coefficient of 0.0624, and bid ask spread, with a coefficient of 97.0245. Even though the estimated effects differ in relation to the estimated effects by the model used in this paper, the differences are relatively small. Our model predicts that a one year increase in time to maturity leads to a

3.092 percent increase in z-spread while a one hundred percentage point increase in bid-ask spread leads to a 6002.493 percent increase in z-spread.

5.2 Robustness Checks

5.2.1 Replacing Proxy and Measurement Control Variables

In order to investigate the robustness of the results, the regressions have been changed and run again. The changes that have been made are replacements of some proxy or measurement control variables.

In table six below, parts of the regression results from the robustness checks using the combined ESG score can be found. The first change, replacing the natural logarithm of revenue with solely revenue, is based on the fact that Stellner, Klien, and Zwergel (2015) do not use the logarithm. This change increases the significance of the ESG score from weakly significant to significant. However, Stellner, Klien, and Zwergel (2015) found a significant effect of size, which is not a result found in this paper. Their outcome of significant results for size, are in fact closer to the results in our regression where the natural logarithm of revenue is replaced with the natural logarithm of market capitalization, even though Stellner et. al. (2015) use revenue as their proxy for size. This might indicate that market capitalization is a better proxy for size as, when used, a significant negative effect of size is found, as one would expect. However, the effect from the ESG score becomes insignificant when using this proxy for size.

Furthermore, the measurement variable for profitability, return on assets, were also replaced as a robustness check where two different measures were tested, return on invested capital and return on equity. As can be seen in the table, both of these replacements lead to the effect of the ESG score becoming insignificant. The return on invested capital was also used by Stellner et. al. (2015) who also found significant results for this control variable, with a coefficient of -1.9373, which is relatively close to the coefficient measured through our robustness check.

Table 6: Results when Replacing Measurement and Proxy Variables for Combined ESG Score

Dependent variable: ln(z-spread)			
New Variable	**ESG** Coefficient (p-value)	**New Variable** Coefficient (p-value)	**Number of Observations**
Revenue *replacing ln(Revenue)*	-0.01196** (0.025)	-0.0030 (0.548)	788
ln(Market cap) (w) *replacing ln(Revenue)*	-0.00304 (0.502)	-0.33439*** (0.000)	677
ROIC (w) *replacing ROA*	-0.00819 (0.102)	-2.40209*** (0.008)	788
ROE (w) *replacing ROA*	-0.00722 (0.143)	-2.28763*** (0.001)	685

Dummy variables and clustering

Country dummies	yes
Sector dummies	yes
Year dummies	yes
Cluster (firm x year)	yes

An OLS-regression, with standard errors clustered on firm x year and controlled for fixed effect for country, year and sector, was run changing one control variable at a time, ceteris paribus. The dependent variable is the natural logarithm of z-spread. The winsorized variables at one percent are indicated by "w". TTM, bid-ask

spread and z-spread were also wonsorized. All winsorized variables have been winsorized at one percent, except for the bid-ask spread that was winsorized for the highest two percentages. Number of observations are provided since the total data was subject to changes when replacing variables. *, **, and *** indicates significance at 10%, 5% and 1% respectively. The variable revenue, replacing ln(revenue), is expressed in billions of euros while the natural logarithm is based on millions of euros. This transformation has been performed for reasons of rescaling. Market cap is short for market capitalization, ROIC is an abbreviation for return on invested capital, ROE and ROA are short for return on equity and return on assets, respectively.

In all of the OLS-regressions that are run, no model found significant results for any of the individual pillars of the ESG score, as can be seen below. Thus, the pillar´s might not affect z-spreads sufficiently individually, though together they do, as previously described.

The discussion above regarding revenue or market capitalization as a proxy for size is also applicable in the pillar regressions, since the only significant result for size is obtained when using market capitalization as the proxy. As mentioned earlier, this might indicate that market capitalization is a better proxy for size than revenue as it captures the expected effect of size.

Table 7: Results when Replacing Measurement and Proxy Variables for Pillar Scores

Dependent variable: ln(z-spread)					
New Variable	**E score** Coefficient (p-value)	**S score** Coefficient (p-value)	**G score** Coefficient (p-value)	**New Variable** Coefficient (p-value)	**Number of Observations**
Revenue *replacing ln(Revenue)*	-0.00595 (0.216)	0.00028 (0.961)	-0.00498 (0.234)	-0.00261 (0.607)	788
ln(Market cap) (w) *replacing ln(Revenue)*	-0.00077 (0.860)	-0.00143 (0.797)	-0.00063 (0.866)	-0.33775*** (0.000)	677
ROIC (w) *replacing ROA*	-0.00584 (0.223)	0.00206 (0.731)	-0.00298 (0.475)	-2.43309*** (0.007)	788

ROE (w) *replacing ROA*	-0.00503 (0.297)	0.00218 (0.712)	-0.00245 (0.511)	-2.27923*** (0.001)	685

Dummy Variables and Clustering

Country dummies	yes
Sector dummies	yes
Year dummies	yes
Cluster (firm x year)	yes

An OLS-regression, with standard errors clustered on firm x year and controlled for fixed effect for country, year and sector, was run changing one control variable at a time, ceteris paribus. The dependent variable is the natural logarithm of z-spread. The winsorized variables at one percent are indicated by "w". TTM, bid-ask spread and z-spread were also wonsorized. All winsorized variables have been winsorized at one percent, except for the bid-ask spread that was winsorized for the highest two percentages. Number of observations are provided since the total data was subject to changes when replacing variables. *, **, and *** indicates significance at 10%, 5% and 1% respectively. The variable revenue, replacing ln(revenue), is expressed in billions of euros while the natural logarithm is based on millions of euros. This transformation has been performed for reasons of rescaling the coefficient. Market cap is short for market capitalization, ROIC is an abbreviation for return on invested capital, ROE and ROA are short for return on equity and return on assets, respectively. E, S, and G score is short for the three individual pillars environmental, social, and governance.

5.2.2 Panel Regression with Bond Fixed Effect

The regression was also run as a panel regression controlling for bond fixed effect. When this regression was run, country and sector fixed effects were omitted for reasons of multicollinearity. The reason for this robustness check is that bond fixed effect could capture bond or company specific effects that are constant over time that otherwise are missed by the control variables. The problem of using this fixed effect, however, is that effects from relatively constant variables can be captured by the fixed effect and therefore not be estimated in the relevant coefficient.

The results from this regression are similar to that of the main OLS model, with weakly significant results for the combined ESG score and a similar coefficient. However, there are also some differences, for example, a significant effect is found for the governance score. Furthermore, the coefficient sign for years until maturity is of opposite sign compared to the main model, previous studies, and theory. Time to maturity is also strongly significant, indicating that the z-spread is decreasing with maturity. Our main model did find strongly significant results as well, however of the opposite sign, which is the same finding as Stellner et. al. (2015). The implication of this is that the trustworthiness of the results regarding time to maturity is reduced in the panel regression. The reason for a negative sign of TTM could be that years to maturity remains relatively constant between years (only changes one unit), and for some of the winsorized data the time to maturity is constant. Thus, bonds with a long time to maturity will have this across observations, meaning that a lot of the maturity effect could be captured by the bond fixed effect. Consequently, leading to misrepresentative results, which could be the case for other variables as well, which would help explain why some coefficients differ from our main model and the findings of Stellner et. al. (2015).

Table 8: Results from the Panel Regression with Bond Fixed Effect

Dependent variable	**ln(z-spread)**		**ln(z-spread)**	
	ESG Score Regression		**Pillar Score Regression**	
Variable	**Coefficient**	**|T-stat| (p-value)**	**Coefficient**	**|T-stat| (p-value)**
ESG score	-0.00827*	1.69 (0.093)	-	-
E score	-	-	-0.00331	1.03 (0.303)
S score	-	-	0.00094	0.30 (0.765)
G score	-	-	-0.00506**	2.02 (0.040)

ln(Revenue)	0.08477	1.11	0.07579	0.92
		(0.268)		(0.358)
D/A	0.61600**	2.16	0.56016**	2.03
		(0.031)		(0.043)
ROA	-0.86969	1.49	-0.90546	1.54
		(0.137)		(0.124)
TTM (w)	-0.12650***	4.04	-0.12543***	3.83
		(0.000)		(0.000)
Bid-ask spread (w)	24.23492***	2.68	24.18834***	2.61
		(0.008)		(0.010)

Dummy variables and clustering

Year dummies	yes	yes
Cluster (Bond)	yes	yes

The table provides the results from the panel regressions, with 788 number of observations, controlled for bond fixed effect. The dependent variable is the natural logarithm of z-spread. The winsorized variables are indicated by "w". Z-spread and TTM have been winsorized at one percent, whereas, the bid-ask spread has been winsorized for the highest two percentages. The table is divided into two parts, one part for each regression. The variables for country, year and sector are not included in the table due to reasons of clarity and readability. E, S, and G score is short for the three individual pillars environmental, social, and governance. D/A is an abbreviation for the debt to asset ratio and time to maturity is shortened to TTM. *, **, and *** indicates significance at 10%, 5% and 1% respectively.

5.3 Discussion

Based on the results described above we concluded that we do not have sufficient evidence to reject that ESG scores are irrelevant for credit spreads . The estimated coefficients for both the combined score and two of the pillars are negative and support the risk mitigation theory and stakeholder theory, where taking the interest of other stakeholders, beside shareholders, into consideration results in benefits for the company. In this case, the negative signs

strengthen the argument that ESG related matters help reduce firm risk and overall lowers the cost of debt. Nonetheless, the results for the individual pillar scores are almost exclusively insignificant while the significant results found for the combined ESG scores are weakly significant in the majority of cases. Moreover, the robustness checks resulted in mostly insignificant findings. When considering the above described outcomes we conclude that we cannot reject that ESG is not accounted for by investors, or that both the risk mitigation view and resource depletion view are considered, which results in the irrelevance of ESG scores when determining the appropriate spread levels for a corporate bond.

6. Summary and Conclusions

This study examines if corporate ESG performance has an effect on bond performance in the Nordic countries, which is investigated through an OLS regression testing the relationship between ESG scores and z-spreads. The individual pillars of the score have also been run in a regression with z-spread in order to investigate the sole relationship between the variables.

There are two main theoretical views regarding how this relationship between firm ESG performance and bond performance should relate. The first one, best described as the view of risk mitigation, emphasises that there are risks associated with performing poorly in ESG related matters such as possible litigations and reputational costs. Therefore, it is argued that investments within the ESG area are to be seen as risk mitigating as it lowers the overall risk of the company. This should mean that companies that perform better in ESG related matters are rewarded with lower credit spreads. However, the contrasting view emphasises the scarceness of resources and that ESG investments therefore should be viewed as resource depletion. Within this view, companies that perform better in the ESG area should be penalized with higher credit spreads as they are wasting scarce resources which should increase firm risk.

The results from this study are partly in consensus with the view of risk mitigation. In the main empirical results it is shown that higher ESG-scores does in fact lower the z-spreads, though the results are weak. According to the main model, a one unit increase in ESG score should result in a 0.97 percent decrease of the bond z-spread. Thus, investing in ESG enhancing matters should provide more benefits than contributing to a sustainable future, such investments could therefore be seen as economically rational. This is of interest for both the management and the equity holders within the discussion of how to optimize firm value. The coefficients for the individual pillars of the score, except the social pillar, did have a negative sign as well, however, these results were not statistically significant. Therefore, one cannot conclude that environmental, social and/or governance pillar scores alone affect z-spreads, which previous studies partially are in contrast to. The pillars combined into the ESG score, one the other hand, do provide weakly significant results, as mentioned.

The data used for this study could possibly inherently be ambiguous due to the fact that the data was sampled around relatively few companies. The biggest limitation for the size of the

sample is the availability of ESG scores which have resulted in a sample gathered around the companies with such a score. This might be problematic as the risk mitigating ESG effect is expected to be the same for all bonds issued by the same company in a specific time period. However, this problem has been partially accounted for through clustering of standard errors on firm-year.

Furthermore, even if the main results are significant, the robustness checks show that the results may not be as clear as first thought. When using different proxies and measurement for size and profitability the results provide the same negative sign, nonetheless, the effect becomes insignificant. These results thus make it difficult to draw any conclusions on how firm ESG scores affect bond performance in Nordic countries, and we cannot reject that ESG scores are irrelevant when determining credit risks and spreads.

We believe that studies regarding corporate ESG performance´s effect on bond performance should continue to be developed. The subject is still underexplored and many market actors could benefit from the conclusions drawn from these studies. In addition, the increasing importance of ESG´s role in society further strengthens the value of the studies within this subject. Further studies of interest could, more specifically, be to see whether the effect of ESG performance on credit spreads vary in different market conditions. One could argue that ESG investments are more likely to be seen as depletion of scarce resources in economic downturns. This is because resources are generally more scarce in these periods. It would therefore be interesting to see if different effects could be found if data were sampled in different economic conditions.

7. References

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