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IMPACT OF ESG SCORE ON THE COST OF CAPITAL: A CASE STUDY OF NORDIC COMPANIES

Bachelor's thesis

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.
The document length is 8109 words from the introduction to the end of conclusion.

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ABSTRACT

This study analyzes the impact Environment, Social, and Governance (ESG) scores on Nordic firms. The company's ESG score is an evaluation of a firms's sustainability level. The number of firms with the ESG score has increased rapidly in the Nordic countries and according to the data from Thomson Reuters Eikon, the countries with the ESG score rose from 116 to 572 in only 6 years. This thesis reviews the stakeholder, legitimacy, and agency theories to find the relationship between ESG score and the weighted cost of capital. These theories were used to draw the hypothesis which later was tested by the panel regression data with fixed and random effects models with the explanatory variables such as size, leverage, return on asset (ROA) and beta. The data set consist of 25 Danish, 24 Finnish, 15 Norwegian, and 45 Swedish firms that were extracted from the Thomson Reuters Eikon database and examined from 2015 to 2021 for the regression model.

The key finding from the investigation is the is a positve relationship between ESG score and WACC in Nordic companies. The association between these variables is statistically significant. It was also found that ROA has a significant positive relationship with the WACC. The association between ESG score and WACC was tested in earlier studies in different countries. These findings are in line with some of previous studies confirming that there is a positive relationship between these two variables.

Keywords: ESG, Cost of capital, ROA, CSR, regression.

INTRODUCTION

The topic of the thesis is about the role of Environment, Social, and Governance (ESG) disclosure on the cost of capital of the organizations. There is a growing body of knowledge around the world on the impact of ESG on organizations performance which underlines the importance of this emerging field. In addition to the significance of the topic in the literature, the personal interest in the impact of ESG disclosure has been the main incentive for conducting the research.

Disclosure of the financial information of enterprises about their soundness has become increasingly crucial to decision-makers for international trade and investment. However, only financial disclosure is no longer enough to meet all the company's information needs. For that reason, companies tend to disclose additional information, specifically environmental, social and sustainability reports with the aim to help investors to better understand the activities of companies, (Barako et al. 2006). In addition, the today's reality for the traders about the uncertainty due to the COVID-19 pandemic, increasing the demand for the quality, quantity and the transparency of disclosures, and any sufficient information that reduces the problem of asymmetric information between the company and its stakeholders are considered critical factors that help to increase the confidence of stakeholder and shareholder (Ellili 2020).

Since the Global Reporting Initiative (GRI) publication in 2001, the disclosure of Corporate Social Responsibility (CSR) became popular and responsible managers are aware of the benefits that they can gain from disclosing CSR reporting. The growing awareness of the need to address social and environmental aspects of the company led to the CSR disclosure being treated as an investment rather than an extra cost. Companies are expected to involve in and contribute to the development of society by engaging in education, healthcare, training, women empowerment, and rural development (Poddar et al. 2019). In addition to societal development, it is also considered that CSR also contributes to sustainable development (Kolk 2016). Therefore, it is becoming increasingly vital to disclose non-financial information about a company's actions, primarily through environmental, social, and sustainability reports. (Raimo et al. 2021). Also, in some literature, CSR disclosure is identified with Environment, Social, and Governance (ESG) reporting (Gillan et al. 2021). Disclosure of such non-financial information improves the image and the confidence of the corporate, attracting investment, job satisfaction and better employee loyalty. In

addition, consideration of the environment and social aspect motivates the companies to develop new products and processes with reduced resource consumption resulting in lowering the cost (Bassen et al. 2011; Burke, Logsdon 1996; Knox, Maklan 2004).

The aim of the research is to determine, in as much detail as possible, whether or not there is a connection between ESG scores and costs of capital. A sizable representation of a wide range of businesses will participate in the research project. There has previously been studies conducted on comparable issues in a number of countries; however, the primary objective of this subject is to concentrate primarily on companies located in Nordic countries. The focus of the study will be on Nordic countries, namely: Denmark, Finland, Norway, and Sweden. Although Iceland and autonomous territories-the Faroe Islands and Greenland (Denmark) and Aland (Finland) are also part of the Nordic region in Europe, they were excluded from this research because of insufficient data regarding the ESG score. The reason for studying the Nordics is that European countries are considered the leading countries in sustainable development (Buallay 2019) and Nordic countries have outstanding performance and close interconnection as well as shared institutions and policies (Aggarwal 2013).

Moreover, the knowledge in the literature from Nordic countries on the role of ESG is limited and since the start of this thesis, there are no research on the ESG impact on the weighted average cost of capital (WACC). Also, the Nordic countries are known for their strong sympathy for sustainability. WACC represents a company's total cost of capital, which includes both debt and equity. When assessing the current value of a project or firm, financial analysts often use the weighted average cost of capital (WACC) as the discount rate. WACC is determined by the external market rather than by the company’s management. Previous studies conducted in other countries and regions found that there is a relationship between ESG score and WACC (Lopatka et al. 2021; Atan et al. 2018; Lee et al. 2013, Wong et al. 2021). So, this thesis will attempt to answer the below research question:

Does ESG score affect the cost of capital in the Nordic companies?

To explore the impact of ESG on WACC, a panel data regression analysis will be performed with fixed and random effects on the data extracted from the Thomson Reuters Eikon database which is a suite of software tools for financial professionals to monitor and analyse financial data provided by Refinitiv. Market data, news, fundamental data, analytics, trading, and communications tools are all available in this database. The selection of the Thomson Reuters system can be explained by the fact that, Thomson Reuters with a use of public sources, ESG data

is meticulously gathered and standardized (e.g. annual reports, NGO websites and CSR reports). About 150 content researchers have been taught to gather ESG data using their sector knowledge to reliably analyse and collect meaningful, relevant (businesses report in a variety of units, scopes, and styles), and up-to-date data ("Refinitiv Eikon" 2021). To conduct the regression analysis following data will be taken directly from Thomson Reuters Eikon database: ESG score combined, environmental, social and pillar scores separately, WACC, total debt, total assets, ROA, and beta. The data will cover the period of 2015 and 2021.

The thesis is divided into 3 major parts. The first part of the thesis a review of the literature on ESG disclosure and the cost of capital. Also, discussion of relevant theories for the study such as stakeholder theory, agency theory, and legitimacy theory. Disclosure of data and methodology is the second part of the thesis. This part will be focusing on the explanation of variables and the method to conduct the study. This part also includes the descriptive statistics of the extracted data. Results are the last part of the thesis where the findings from the regression model and discussion will be presented drawing the conclusion.

1. LITERATURE REVIEW

This part of the thesis is focusing on fundamental theories and empirical studies. Stakeholders theory, legitimacy theory, and agency theory were discussed in the fundamental theories section. In addition, previously conducted research with similar findings was discussed in the empirical studies review.

1.1. Fundamental theories

Since much of the attention that has been paid in previous research has been to the stakeholder, legitimacy, and agency theories, we will concentrate on these concepts here. According to the stakeholder theory, CSR and ESG disclosure assists businesses in improving their reputation, which ultimately results in a reduction of certain indirect costs. However, according to the legitimacy theory, businesses should demonstrate that they are conforming to the standards that have been established by society. Moreover, the agency theory proposes that in order to diminish the imbalance of information, businesses should make their financial data public.

1.1.1. Stakeholder theory

Stakeholder theory is frequently mentioned when one talks about a responsible company. Stakeholder theory suggests that CSR/ESG disclosure or sustainable practices may increase the firm's long-term worth by helping the company fulfil its social duties, satisfy its environmental commitments, and improve its reputation. Nevertheless, these sustainability initiatives can call for the deployment of a significant number of resources, which might be in direct opposition to the goal of increasing the wealth of shareholders. According to the stakeholder theory, the firm's purpose is to maximize shareholder (customers, debtors, employees, and regulatory authorities) earnings while also preserving stakeholder interests (Freeman, Mcvea 1984; Jensen 2005). Stakeholder theory does not give data on a company's relative success when using ESG principles in comparison to its competitors. This is why a number of studies try to find the effects of CSR activities on firms. El Ghoul et al (2011) conducted a study to find if CSR activates lower the cost

of capital. Jones (1995) found that stakeholder management strategies result in more effective contracting.

Currently, there are an increasing number of socially conscientious investors who buy shares in more sustainable firms (Aras, Crowther 2007). Therefore, companies tend to disclose company's information on socially oriented activities. These firms usually have less intrinsic risk and cost of equity (Li, Foo 2015). In this regard, most of the studies found that there is a negative relationship between CSR and the cost of equity (Ghoul et al. 2011). However, there are also some studies that prove there is a positive correlation between the cost of equity and social disclosure. One of the studies which were done in Canada, states that some social projects can enlarge a firm's risk which results in a positive relationship between CSR and cost of equity (Richardson, Welker 2001). Another study conducted in Germany indicates that the companies who publish the CSR report have more capital sources which end up having less cost of equity (Michaels, Gruning 2017).

1.1.2. Legitimacy theory

The legitimacy theory, which states that businesses endure societal and political pressure to maintain their legitimacy by fulfilling their social contract by engaging in non-financial ESG activities is pertinent to corporate sustainability (Guthriea, Parker 1989). Separate reports including ESG data are becoming more prevalent these days. Companies give CSRs to gain legitimacy in their communities so that they may continue to operate, expand, and profit. According to legitimacy theory, firms always strive to ensure that they are viewed as working within the constraints and norms of their society (Deegan, Unerman 2011). Therefore, companies always try to show their stakeholders that their actions are legitimate.

Managers use it to explain or forecast certain sustainability reporting methods (Dyduch, Krasodomska, 2017; Gray et al. 2001; Hooghiemstra, 2000; Rahman, Alsayegh 2021). Legitimacy theory, according to Suchman (1995), is "a broad view or assumption that an entity's acts are desirable, legitimate, or acceptable within some socially formed system of norms, values, beliefs, and definitions." This implies that the organization must demonstrate that its actions are transparent and that the public views it to be working within established standards and bounds on a regular basis. Financial stakeholders are the most important stakeholder to the company, and therefore firms tend to tailor toward them in order to meet their needs (Neu, Warsame, Pedwell 1998). Firms that perform poorly in terms of environmental, social, and governance (ESG) may find it difficult to obtain the required support and resources to continue functioning in a society

that values ESG practices. From this assumption, it can be expected that an ESG score will help firms to improve their relationship with stakeholders which will help to have less cost of capital.

1.1.3. Agency theory

The agency theory states that disclosing financial and non-financial information reduces knowledge asymmetry, hence removing the "stewardship problem" between managers and capital suppliers (Healy, Palepu 2001). In the case of debt capital issuance, the agency theory emphasizes the presence of agency difficulties and knowledge asymmetry among creditors and managers (Jensen, Meckling 1976). Agency theory states that lenders commit their money to a corporation (agent) in the hopes of obtaining it back with an interest rate that compensates them for the risk of giving capital (Jensen, Meckling 1976). As stated in this agency theory, the agent has an information power over the principal resulting in asymmetric information (Gerwanski 2020). If companies have a greater disclosure of information, this will reduce the information asymmetry and it might end in a lower cost of debt (Aman, Nguyen 2013; Armstrong et al., 2010; Bryl, Fijalkowska 2020). CSR provides information that helps stakeholders make better decisions (Du, Bhattacharya 2010) and it also increases market returns (Malik 2014). In addition, a CSR report can help new investors to evaluate corporate value by informing how the company is dealing with environmental expenditures and climate changes (Dhaliwal et al., 2014). However, CSR reports usually are time-consuming and expensive to prepare, which is why management might be uncertain if the report meets their goal of sharing the information (O' Dwyer, 2002). Although there are many types of research that prove that CSR rating decreases a company's cost of equity (Gupta et al. 2018), one research found that CSR disclosure has no impact on the cost of equity in Asian firms (Feng et al. 2017). Moreover, research that was conducted in Japan didn't find any noteworthy relationship between cost of equity and CSR (Suto, Takehara 2017)

From the given theories following hypothesis was conducted:
H1: ESG score is negatively associated with the cost of capital in the Nordic companies

1.2. Empirical studies

Several research studies have already been conducted on the relationship between ESG and WACC as well as the relationship between CSR and WACC in other countries and regions. In this

part, I will first write about previously conducted studies that found the negative relationship between these variables and then studies that found a positive relationship.

Wong et al. (2021) studied the effect of the (ESG) certification on Malaysian companies. They used a fixed panel regression model to find the impact of ESG inclusion on the cost of capital. In this regression model, the dependent variable is the cost of capital, ESG inclusion is a dummy variable and firm size, asset growth, cash holdings, debt ratio, asset tangibility, ROA are the firm characteristics. This study found that, in Malaysia, an ESG certificate decreases a company's cost of capital and increases Tobin's Q (Wong et al. 2021). In this study, ESG inclusion, log (assets) and debt ratio for the regression model are statistically significant. The results of the study show that the cost of capital of the company decreased by 1.2 %, although Tobin's Q increased by 31.9 % after introducing the ESG certification (Wong et al. 2021). Moreover, it was found that corporate lending decisions are not firstly prioritised in the ESG disclosure (Wong et al. 2021).

Eliwa, Aboud and Saleh (2021) conducted a study where they inspect if lending institutions recompense companies in 15 European countries for their ESG performance in terms of lowering their cost of capital by using legitimacy and institutional theories. The research differentiates between ESG performance, which is used to demonstrate a successful engagement with ESG initiatives, and ESG disclosure, which is used to create a favourable image of engagement to impact stakeholders' attitudes. Standard errors pooled regression was used to find the connection between ESG practices and the cost of debt. The control variables for the regression analysis included the firm size, leverage, return on assets and interest coverage rate. The study found that companies usually can benefit from the growing level of ESG performance and disclosure which ends up in having a smaller cost of capital (Eliwa et al. 2021). In addition, they discovered that the impacts of ESG practices on the cost of debt are shaped by stakeholder orientation at the national level (Eliwa et al. 2021). This study suggests that the market is a powerful motivator for companies to adopt ESG practices (Eliwa et al. 2021).

Ok and Kim (2019) studied the effect of CSR activities on the cost of equity in Korea. They have used Cross-Sectional regression analyses to find the relationship between the ESG grades and the cost of equity. They analysed how corporate social responsibility affects the cost of equity by 3 dimensions of activities: environmental management, socially responsible management, and corporate governance. Research shows that the companies that have socially responsible management have less cost of equity. These socially responsible firms are paying 1.13% to 1.37%

lower cost of equity compared to other companies. The research found that although environmental management has no influence on the cost of equity in Korea, socially responsible management and corporate governance affect the cost of equity (Ok, Kim 2019). In addition, it was found that investors are willing to accept lesser returns from companies that are more heavily involved in CSR efforts since they may anticipate long-term profits (Ok, Kim 2019).

Tluczak, Piechocka-Kaluzna, and Lopatka (2021) examined the association between ESG score and WACC in US companies. To find the relationship between WACC and ESG score, they have estimated a regression analysis. The research found that there is a significant and negative relationship between these variables (Tluczak et al 2021). Moreover, this research states that there is no significant relationship between ESG and its elements and cost of debt financing however, the relationship between them is negative (Tluczak et al. 2021).

Jyoti and Khanna (2021) conducted a study in India, examining the influence of the company's sustainable performance on the financial performance of service sector companies. Researchers used the fixed effects panel data regression to find the correlation between ROA and ESG score, ROE and ESG score. In this study, the dependent variable is the financial performance indicator, and the control variables are firm size and firm leverage. The outcome of the study is that environmental score has a significant negative relationship with ROA and the social score has a significant negative association with ROE (Jyoti, Khanna 2021). It was found that environmental, social and governance scores combined have a negative relationship with the return on assets and return on capital employed (Jyoti, Khanna 2021). This study, however, was only limited to service sectors.

Raimo et al. (2021) have conducted a study analyzing the effect of ESG disclosure on the cost debt dept. Fixed effects panel regression analysis was conducted in this study with size, ROA, leverage, and interest coverage rate being control variables. The findings of the research show that ESG disclosure helps companies to have less cost of debt financing (Raimo et al. 2021). Moreover, it was also found that there is a negative relationship between information disclosure and cost of debt capital financing (Raimo et al. 2021).

Yeh et al. (2020) studied the effect of cost of capital on CSR in China. The research looks at how CSR influences a company's cost of equity and debt capital in China. The findings suggest that higher CSR performance may effectively cut cost of debt capital. Companies may use CSR to

minimize their debt costs by communicating to creditors their dedication to sustainable development and social responsibility (Yeh et al. 2020). Creditors may determine whether to help sustainable businesses cut their cost of capital by looking at their CSR performance (Yeh et al. 2020). However, the results state that in China there is no negative relationship between CSR performance and cost of equity (Yeh et al. 2020).

Atan et al. (2018) studied the impact of ESG factors on firm performance in Malaysian companies. The study aims to find the influence of ESG elements on the profitability, company value, and cost of capital of Malaysian public limited businesses. In this study, panel data with fixed and random effects model has been used to find relationship between WACC and ESG score, ROE and ESG score, and Tobin's Q and ESG. The study finds that ESG is positively and significantly affect the WACC and company with a strong ESG score will have a higher cost of capital (Atan et al. 2018). Moreover, they also found that ESG score does not increase value of a firm or profitability (Atan et al. 2018).

Similarly, Lee et al. (2013) examined the relationship between CSR and financial performance. To find the relationship between financial performance and CSR, the cross-sectional regression model has been estimated where size and leverage are control variables. The result of the study is showing that CSR is positively correlated with ROA and Tobin's Q (Lee et al. 2013). It is also found that CSR has a positive effect to the cost of capital which was opposing to their hypothesis (Lee et al. 2013). These findings show that CSR is not an expense, and it might increase value of a firm (Lee et al. 2013).

In general, previous studies found both positive and negative relationships between ESG score/CSR and cost of capital, cost of equity and cost of debt financing. However, most of the studies used the panel data regression analysis with fixed and random effects to find this relationships. In next section, the data and methods for the regression models will be discussed.

2. METHODS AND DATA

2.1.Sample and data collection

The data used in this study is secondary and is obtained from the Thomson Reuters Eikon database. The database is comprehensive enough to use for data collection from the Nordic countries (Velte, 2017; Kling et al. 2021). For the study, 2015-2021 years have been selected to capture the recent updates and such a time perspective is usual in other studies (Jyoti, Khana 2020). Some of the listed companies have been excluded due to missing data for the duration under investigation. Also, in order to eradicate the effect of outliers from influencing, 1 % of extreme data from both tails of the sample are excluded (1st and 99th percentile). A total of 1750 companies in the Nordic countries were identified in the Thomson Reuters Eikon database. But after eliminating companies with insufficient data and outliers, 109 companies were included in the data sample for 2015–2021.

The ESG data as well as financial information, such as WACC, total assets, total debt, ROA, and beta were extracted from the database. Refinitiv ESG scores reflect the underlying ESG data framework and consist of 10 categories which are:

- Environmental (3): resource use, emissions and innovation
- Social (4): workforce, human rights, community, product responsibility
- Governance (3): management, shareholders, CSR strategy

WACC data from Refinitiv calculates the average rate a company is expected to pay to its debt, equity, and preferred stockholders to finance its assets, where each component of capital is proportionately weighted in the same fraction as the capital structure.

To control the relationship between ESG and WACC, firm leverage, ROA, beta and firm size were also extracted from the database. The summary statistic is presented in Table 1, the Correlation coefficient matrix is in table 2 and the variables used in the regression analysis are defined in the table 3.

In total, 109 firms were included in the analysis of which 25 were Danish, 24 Finnish, 15 Norwegian and 45 Swedish firms.

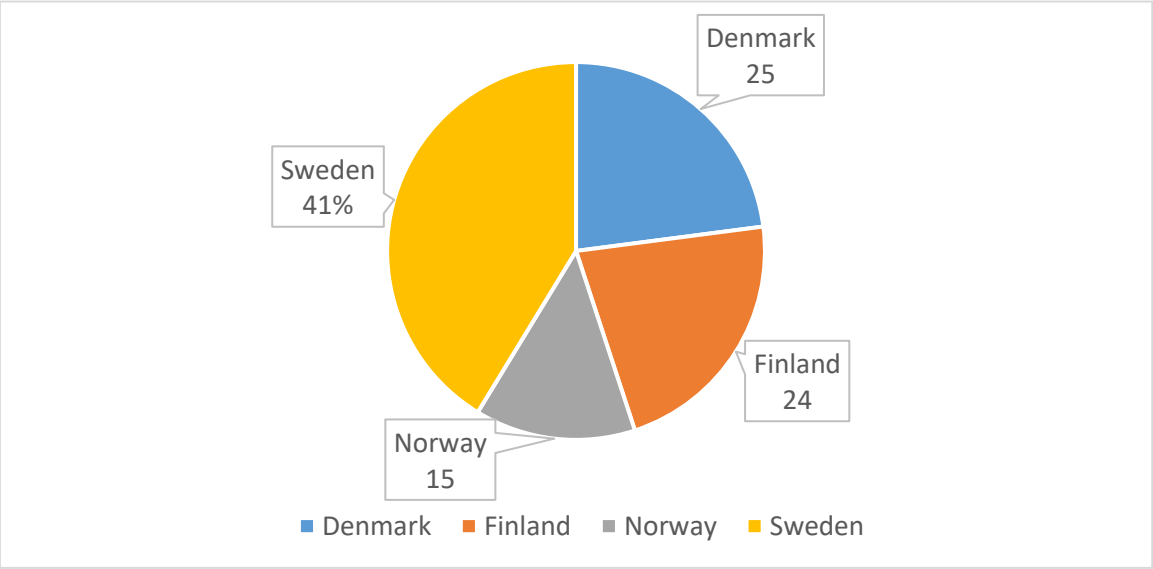

Figure 1. Country distribution of the data
Source: Created by the author based on data from the Thomson Reuters Eikon database

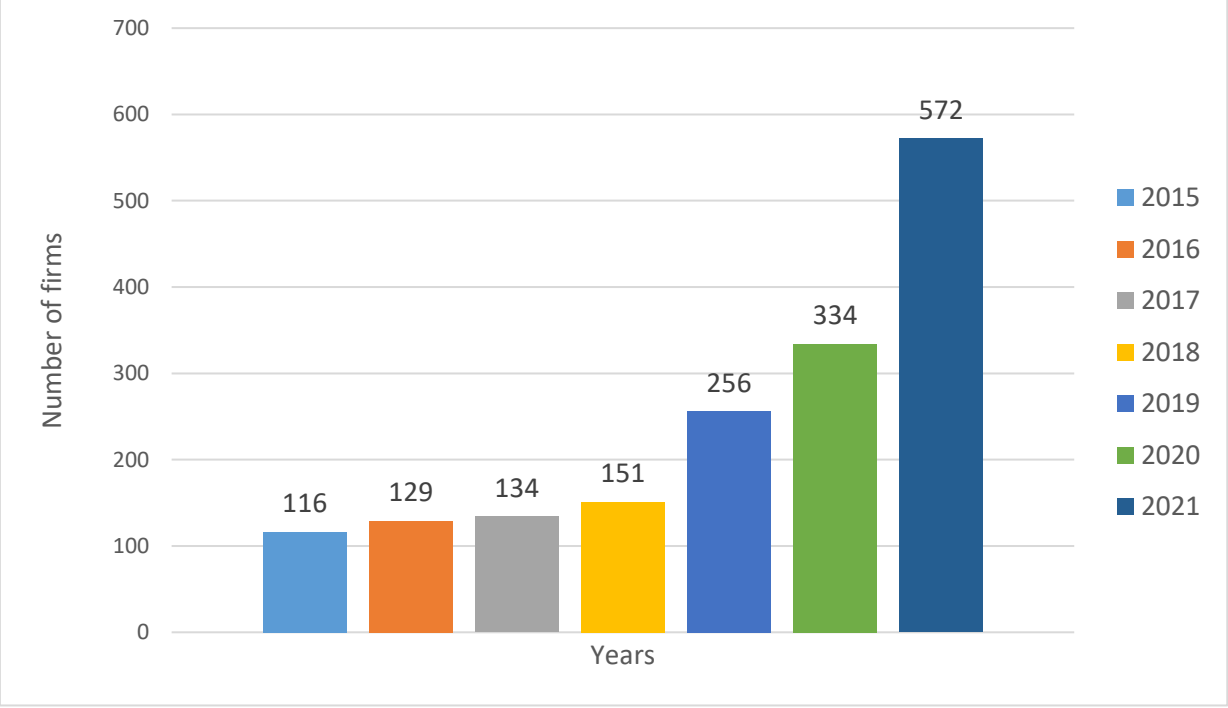

Figure 2. Number of firms with an ESG score in Nordic countries
Source: Created by the author based on data from the Thomson Reuters Eikon database

Figure 1 illustrates the distribution of the countries that were used for the regression models. It is visible from the table that the countries with the most companies are Sweden and Denmark while Norway has the least amount of companies in the given data.

Figure 2 shows the number of Nordic countries with ESG scores over the 7 years from 2015 to 2021. The figure exhibits that between 2015 to 2018 there was a steady increase in number of new companies having ESG scores. However, after 2019, companies started adding ESG scores more rapidly. We can see that only 166 companies had an ESG scores in 2015, while in 2021 the number of companies with ESG score was 5 times more, reaching its maximum with 572 companies. The massive increase of new 238 firms with ESG scores between 2020 and 2021 is also noticeable. This shows that companies in Denmark, Finland, Norway and Sweden have started giving more attention to their Environmental, Social and Governance pillar scores in recent years.

2.2. Descriptive statistics

This paragraph mainly focuses on the descriptive part of the data, describing the variables as well as showing the correlation coefficient matrix.

Table 1 displays the summary statistics of the data that was used for the regression models. The minimum ESG score combined is from 2018 by Norwegian company Dno ASA with a score of 13.4. The company had an increasing ESG score over the years and had a maximum ESG score in 2021. On the other hand, the well-known Swedish company Volvo AB has the maximum ESG score among all the selected data with an ESG score of 94.64. A case study conducted by Falkenhard (2021) found that Volvo had the highest company ESG score in 2020 which proves the correctness of the given data. The mean of enivoronmental pillar score is 0.633, thesocial pillar score 0.683, and the governance pillar score 0.578

The mean of the WACC is 6.4 % with minimum and maximum amounts of 0.2 % and 19.5 % respectively. The company with the minimum WACC is the Norwegian company Orkla ASA with 0.2% in 2019. Normally, companies with a low WACC have a higher market value which also could mean they have a higher ESG score. If we take a look at the data, we can see that Orkla ASA has the 9th highest ESG score for the same year among all companies. Meanwhile, REC Silicon

ASA has the maximum amount of WACC with 19.5 % in 2020 which can indicate that the company has low market value. Also, if we look at the ESG score of the company in the same year, we can see that it is much less than the average score.

Table 1. Descriptive statistics

	Mean	Median	St. Dev.	Min	Max
ESG score	0.638	0.658	0.152	0.134	0.947
Environmental score	0.633	0.673	0.218	0.001	0.974
Social score	0.683	0.722	0.170	0.115	0.955
Governance score	0.578	0.590	0.217	0.065	0.979
WACC	0.064	0.063	0.025	0.002	0.195
SIZE	22.49	22.35	1.511	15.78	27.20
LEV	0.256	0.218	0.360	0.003	5.6
ROA	0.064	0.053	0.077	-0.438	0.534
BETA	1.094	1.086	0,634	-0.175	4.612

Source*:* Created by the author based on data from the Thomson Reuters Eikon database

Table 2. Correlation coefficient matrix

	ESG Score	Environmental score	Social score	Governance score	WACC	LEV	ROA	SIZE	Beta
ESG score	1	0.745	0.826	0.678	-0.035	-0.1	0.12	0.32	-0.172
Environmental score	0.745	1	0.509	0.251	-0.057	-0.139	0.033	0.353	-0.1
Social score	0.826	0.509	1	0.332	0.016	-0.112	0.247	0.212	-0.222
Governance score	0.678	0.251	0.332	1	-0.06	0.011	-0.051	0.281	-0.055
WACC	-0.035	0.057	0.016	-0.06	1	-0.108	0.111	-0.331	0.453
LEV	0.162	0.139	-0.112	0.011	-0.108	1	-0.092	-0.208	0.001
ROA	-0.1	0.033	0.247	-0.051	0.111	-0.092	1	-0.163	-0.208
SIZE	0.12	0.353	0.212	0.281	-0.331	-0.208	-0.163	1	-0.138
Beta	-0.172	-0.1	-0.222	-0.055	0.453	0.001	-0.208	-0.138	1

Source: Created by the author based on data from the Thomson Reuters Eikon database

Moreover, data shows that the average leverage ratio is 0.256, minimum 0.00003 and maximum 5.597 which is dividing total debt by total assets. Generally, a ratio of 0.5 or less is ideal because if a company has a leverage ratio of more than 1.0 it means the company has more liabilities than the assets. According to the data, mean of the ROA and beta for given data are 0.064 and 1.094 respectively.

Table 2 is a correlation coefficient matrix. This table to shows what is the correlation coefficient between the given variables; ESG score, WACC, size, leverage, ROA, and beta.

Table 3. Description of variables

Variable	*Description*
ESG score	ESG score is calculated as the weighted average of the ESG scores for the given fiscal year.
Environmental score	The environmental dimension of ESG score
Social score	The social dimension of ESG score
Governance score	The governance dimension of ESG score
WACC	The weighted average cost of capital (WACC) is a method of calculating a company's cost of capital in which each capital type is weighted equally.
Size	Firm size calculated as dividing number of employees to the number of total firms
LEV	The leverage ratio is computed by dividing a company's total debt by its total assets.
ROA	ROA is a return on asset which is calculated as net income divided by total assets.
Beta	The volatility of a stock is measured using market beta.

Source: Created by the author based on data from the Thomson Reuters Eikon database

To give a better understanding of the variables that will be used, the above table was created. Table 3 is describing the variables that have been used for the regression analysis. It includes the dependent variable WACC, as well as explanatory variables such as ESG score environmental, social, and governance score, size, leverage, ROA, and beta.

2.3. Methodology

The focus of this thesis is to find whether ESG is related to WACC (cost of capital) or not. As mentioned above, the data is extracted from the Thomson Reuters Eikon database and contains 109 companies examined from 2015 to 2021. The data which is used for regression models is panel data which containa 763 observations in total. Panel data has been frequently used to find the relationship between cost of capital and ESG score/CSR or similar relationships in earlier studies (Wong et al. 2021; Eliwa et al. 2021; Jyoti, Khana 2021; Atan et al. 2018) There are number of benefits of panel data which is why it is commonly used in studies. Panel data provides researchers with a vast number of observations, allowing them to make more precise forecasts for individual outcomes (Hsiao 2006).

The Fixed effects and random effects panel data regression analysis will be used to find the impact of ESG score on Nordic companies' WACC (cost of capital). Wong et al. (2021) used the fixed effects panel regression model to find the relationship between ESG certification on a firm's cost of capital and using the dependent variable of the regression model as the cost of capital. Atan et al. (2018) conducted a study using the fixed and random effects regression model to find a relationship between ESG factors and WACC. Similarly, the research conducted in the 15 EU countries to find the effect of ESG practices on the cost of debt also used panel regressions with fixed and random effects (Eliwa et al. 2021). In addition, some authors used the fixed effects panel data regression analysis to find an association between ROA, ROE, ROCE and ESG scores combined (Jyoti, Khana 2021).

Similarly, this thesis will employ a quantitative research method to test the nature of relationships between a dependent variable and independent variables and it will be based on panel data regression with fixed effects and random effects model where ESG score will be an independent variable and cost of capital (WACC) will be a dependent variable. Both models have their own pros and cons.

On one hand, the fixed effects model has the benefit of allowing time specific effects to be associated with explanatory factors; nevertheless, the number of missing variables grows as the number of sample data grows. On the other hand, in the random effects model when the size of the sample grows, the number of variables remains constant (Hsiao 2006).

The study is based on panel data with fixed and random effects. (Bollen, Brand 2010) shows panel regression with random effects and fixed effects model as follows:

Random effects model (1)

$$y_{it} = B_{yx}x_{it} + B_{yz}z_i + \eta_i + \varepsilon_{it}$$

where
y – dependent variable,
B_{yx} – row vector of coefficient
x_{it} – vector of time-varying covariate
B_{yz} – a row vector of coefficient
z_i – vector of observed time-invariant covariates
η_i – latent time-invariant variable
ε_{it} – random disturbance

Fixed effects model (2)

$$y_{it} = B_{yx}x_{it} + \eta_i + \varepsilon_{it}$$

where
y – dependent variable,
B_{yx} – row vector of coefficient
x_{it} – vector of time-varying covariate
η_i – latent time-invariant variable
ε_{it} – random disturbance

The weighted sum of the cost of equity and cost of debt is the cost of capital WACC is the weighted average cost of capital which is calculated by a company's cost of capital in which each capital type is weighted equally. Usually, higher risk of a company, the higher cost of equity or cost of debt. If a return on capital is higher than cost of capital, the investment is considered as valuable (Fernandez, 2011). Farber, Gillet and Szafarz (2005) give the standard formula of WACC formula is defined as:

$$WACC = Re(1-L) + Rd(1-Tc)L \quad (3)$$

where
WACC – weighted average cost of capital
Re – cost of equity
L – leverage
Rd – cost of capital
Tc – corporate tax rate

WACC data is taken from Thomson Reuters which calculates the average rate a company is expected to pay in debt and equity. Refinit Eikon is using the StarMine model to calculate the WACC. According to Refinit Eikon, StarMine WACC is the more accurate way to calculate the cost of capital of the company because when standard WACC calculations fail, it uses straightforward and clever approaches to tackle the problem.

The thesis mainly investigates the impact of the ESG score on the cost of capital. Apart from ESG scores combined, the panel data with fixed effects model will also be conducted to find relationships between the environmental, social and governance pillar scores separately with WACC. ESG scores combined as well as environmental, social and governance scores separately will be collected from Thomson Reuters which are collected from *DataStream* (ESG-ASSET4). The Thomson Reuters ESG score is used to assess a firm's relative ESG performance in three areas: environmental, social, and governance (Eliwa et al. 2021). Investors with over €2.5 trillion in assets under management are projected to use the ASSET4 data to develop their portfolios by including ESG data in their standard investing research (Ioannou, Serafeim 2012).

The control variables include firm size, leverage, ROA, and beta. In the previous studies, the cost of debt and the cost of capital were regularly found to be highly associated with these variables (Wong et al. 2021; Jyoti, Khana 2021). The company size will be measured as the natural logarithm of total assets. Prior studies found that there is a negative relationship between size and cost of capital (Wong et al. 2021; Yeh 2020). On the other hand, it was found in the previous studies that companies with the lower Leverage have smaller interest rates, and which is expected to have a positive relationship between Leverage and cost of capital (Erragragui, 2017). Leverage will be calculated by finding the ratio of total debt to total assets at the given year *t*. Return on asset (ROA) is the NI (net income) divided by total asset at the year t. Logically, if the company has a higher return on assets, it should have more earnings. This means a higher ROA will end in a higher cost

of capital (Wong et al. 2021). The last but not least control variable is beta which shows the volatility of a stock.

The robustness check has been made to know how good estimates are from the secondary data. Panel data regression analysis with fixed and random effects has been conducted where the independent variable is cost of debt financing instead of cost of capital. The dependent variables stayed the same; ESG score, size, leverage, ROA, and beta. The data for regression analysis contains same companies from 2015 to 2021. A detailed view of the results can be seen in appendices 2.

To conduct the regression models, the Gretl software was used which is open-source software for econometric analysis and it is written in the C programming language. The results of regression models from Gretl software and discussion of major results are presented next.

3. FINDINGS AND DISCUSSION

This chapter will be focusing on the findings and results from the regression model. These findings are used to evaluate hypotheses derived from fundamental theories. Then, the findings will be compared with the previous research.

3.1 Results of the Regression models

The impact of the ESG score on the firm's cost of capital has been examined from 2015 to 2021. The pooled OLS regression model was conducted as a starting point. The Fixed effects models and Random effects regression models analysis has been used to find the relationships between ESG score and cost of capital of Nordic companies. Then, the Fixed effects regression models were estimated to find relationship between Environment, Governance and Social pillar scores with the WACC separately. The results of the regression models showing the association between ESG score and WACC, between environmental pillar and WAAC, between social pillar and WAAC, and between governance pillar and WAAC can be seen in Table 4.

According to the regression model, for ESG score, the fixed effects model has 63 % R^2 and it is higher than the random effects model which is why is 40 %. Although R^2 doesn't indicate whether the model is good or not, it does provide an estimation of the link between the changes of the dependent variable and the independent variable. The coefficient for ESG score is positive in all regression models. In panel data with fixed effects, the coefficient value of the ESG score is 0.8 % while in random effects model it is as high as 1.6 %. ESG score, ROA, and beta have a positive association with WACC in all 3 regression models presented. Size and leverage on the other hand, have a positive relationship with WACC. ESG score and ROA are statistically significant in all 3 models while size is significant only in random effects model. In the fixed effects model, there are in total 3 significant variables such as ESG score, ROA, and beta. On the other hand, in the random effects model all variables are significant but beta.

Table 4. Result of the regression models with WACC being dependent variable.

Explanatory variables	Pooling (1)	Fixed effects (2)	Random effects (3)	Fixed effects (4)	Fixed effects (5)	Fixed effects (6)
ESG score	0.018***	0.008**	0.016**			
	(3.57)	(0.97)	(2.48)			
Environmental score				0.022***		
				(3.05)		
Social score					0.004	
					(0.65)	
Governance score						-0.041
						(-0.84)
SIZE	-0.005	-0.002	-0.004***	-0.003**	-0.001	-0.01
	(-9.5)	(-1.46)	(-5.1)	(-2.72)	(-1.3)	(-0.87)
LEV	-0.01***	-0.003	-0.006***	-0.003	-0.003	-0.002
	(-4.91)	(-1.13)	(-2.73)	(-1.35)	(-1.06)	(-0.87)
ROA	0.041***	0.049***	0.045***	0.048***	0.049***	0.05***
	(4.03)	(3.5)	(3.79)	(3.49)	(3.53)	(3.59)
Beta	0.018***	0.029***	0.019	0.024***	0.027***	0.028***
	(6.2)	(5.9)	(9.9)	(5.12)	(6.05)	(6.09)
Constant	0.149**		0.108***			
	(10.15)		(6.93)			
Observations	763	763	763	763	763	763
R^2	0.337	0.63	0.4	0.64	0.63	0.63

Notes: ***p-value < 0.01, **p-value < 0.05 and*p-value < 0.1.

t-statistics are given in parentheses, and they are italic text.

Source*:* created by the author.

The panel regression with fixed effects was used for the environmental, social, and governance pillar scores. According to the Hausman test, the fixed effects model is more accurate to use for this dataset. Based on the fixed effects model, the environment and social scores have positive coefficients while the governance score has a negative. The R^2 values for all 3 models (4), (5) and (6) are higher than 63 % and have p-values less than 0.01 which makes them statistically significant. For the environment score in the fixed effects model, all variables except leverage

are significant. The social score has only 2 significant variables which are ROA and beta. Similarly, governance score in regression mode also has 2 same significant variables: ROA and beta.

3.2 Discussion

In this part, the results of the regression model will be discussed, and hypotheses will be evaluated. Moreover, the results of the regression model will be compared with the previous literature as well as the theories that were given in the 1st section.

H1: ESG score is negatively associated with the weighted average cost of capital in the Nordic companies.

Hypothesis 1 claims that the companies with a high ESG score are having a lower cost of capital in Nordic companies. Table 4 shows that for all regression models (1), (2) and (3) the ESG score is statistically significant. The results from model (2) and model (3) indicate that the association between ESG score combined and WACC is positive. The results are similar to the result of Atan et al. (2018), a study that was conducted in Malaysian companies, which also found a positive association between ESG combined score and weighted average cost of capital. Moreover, another study that was conducted by Wang, Feng and Huang (2013) found similar results in Asian companies claiming that CSR practices do not decrease cost of capital. Similarly, Lee et al. (2013), conducted research to find if CSR activities increase the value of a firm in Korea. One of the regression analyses that were estimated was aimed to find the impact of CSR activities on WACC. Similar to this research, he found that CSR activities are positively related to the WACC.

A possible explanation for the above result is presented by Jang et al. (2013) claiming that cost of capital measurement can be vulnerable to inaccuracies. Another possible reason might be that most of the research conducted previously has used 10 years of data (Wong et al. 2021; Raimo et al. 2021; Eliwa et al. 2021), while the dataset has been used for this research covered only 7 years of data. Also, it is possible that WACC, as an estimate for thecost of capital, has measurement errors. Consequently, H1 is rejected.

To calculate the size of the company, the natural logarithm of total assets is calculated. Regression models (2) and (3) show that size has a negative relationship with the WACC and in the random

effects model the size is statistically significant. However even though size is negatively associated with WACC in fixed effects model, it is not statistically significant. This means that larger firms in Norway, Sweden, Denmark, and Finland benefit from lower cost of capital. Also, this means that larger companies might have lower default probability. Previously conducted studies have also found a negative relationship between size and WACC (Ghoul et al. 2011; Atan et al. 2018).

In this research, the leverage ratio is computed by dividing a company's total debt by its total assets. Similar to size, leverage also has a negative relationship with WACC for the fixed effects and random effects models. The leverage is not statistically significant in fixed effects model as it can be seen from the model (2). Wong et al. (2021) also included the leverage to the fixed effects model and found that they are negatively associated with WACC. Atan et al. (2018), on the other hand, finds a positive link between WACC and leverage in fixed effects models. This finding is in contrast to Modigliani and Miller (1958) findings which state that as the company's debt grows, the cost of equity should rise.

Beta and ROA both have a positive link with the weighted average cost of capital. ROA is statistically significant in all models. The correlation coefficient is as high as 4.9 percent in fixed effects model (2) which indicates that companies with a higher cost of capital in Nordic also tend to have higher rate return on assets. Companies with high ROA also have higher profitability and they are more asset efficient. Wong et al. (2021) find that the ROA has a positive relationship with the cost of capital in Malaysia. The results contrast with the trade-off theory's assumption that, if all other factors are equal, successful firms will have lower bankruptcy risks and debt costs. Similar to Ghoul et al. (2011), the beta is also statistically significant in this research (2).

In addition, panel data with fixed effects models (4), (5), and (6) have been estimated to find the association between environmental pillar score with WACC, social pillar score with WACC and governance pillar score with WACC separately.

In the regression model (4), the environmental score has 4 statistically significant variables: environmental score, size, ROA, and beta. The coefficient value of the environmental pillar score with WACC has the highest positive value among all scores with a coefficient of 0.022. This means that companies with the high environmental pillar score tend to have a high weighted average cost of capital. Atan et al. (2018) state that Malaysian companies also have a positive association between WACC and environmental pillar score.

Moving to the social pillar score, model (5) shows that it has 2 statistically significant variables: ROA and beta. It has a positive link with WACC with a coefficient value of 0.004 which is relatively low compared to other scores. On the other hand, the governance score is the only variable with a negative relationship with the WACC. The governance score also has 2 statistically significant variables which are beta and ROA. It has a negative coefficient value of 0.041, but it is not statistically significant in the panel regression with the fixed effects. The results suggest that companies in Nordic countries can focus on increasing the governance score to have a lower cost of capital. They can achieve this by having a better management style and with a higher CSR score.

CONCLUSION

The main purpose of the research is to acquire a better understanding of the impacts of ESG scores in Nordic countries. With the three main theories, stakeholder, legitimacy, and agency theory, the study hypothesis was conducted and aimed to find the relationship between ESG score and WACC.

The dataset for panel data analysis was extracted from the Thomson Reuters Eikon database. In total 109 companies from 4 Nordic countries; Norway, Finland, Denmark, and Sweden were in the given sample. Although the 10-year data was taken from the Thomson Reuters Eikon database, the data that was used for the model covered years from 2015 to 2021 which is mainly because of the missing ESG scores in the previous years.

The aim of the thesis was to find the relationship between WACC and ESG scores and to see if this relationship is significant enough to affect each other. While some studies previously found that the relationship between them is positive, other researchers found that the association between these variables is negative (Wong et al. 2021; Atan et al. 2018).

While the model had one dependent variable-WACC, the explanatory variables included the size, leverage, ROA, and beta. Primarily, 5 regression models were in total estimated to the association between given variables. Panel data with random and fixed effects model was conducted to find the relationship between the ESG score combined and the cost of capital (WACC). Moreover, the pooled OLS regression model was also estimated in the initial stage for the ESG score combined. Then, 3 separate fixed effects models were used for finding the relationship between environmental pillar and the cost of capital (WACC), social pillar score, and WACC, governance pillar score and WACC. To conduct the regression models, the Gretl software was used which is open-source software for econometric analysis.

To state again the main results from the regression models, the ESG score combined is positively and significantly associated with the WACC. In fixed effects model for ESG combined score, ROA and beta are also among the significant variables while in the random effects model, size, leverage, and ROA are statistically significant. While ROA and beta have a positive relationship with WACC in both fixed and random effects, the relationship between size and leverage with WACC is negative. Fixed effects models for environmental, social and governance scores separately had the similar significant variables, ROA and beta. Also, the models show that environmental and social scores are positively related to WACC while governance is negative.

The findings of the regression models didn't support the given hypothesis, which claimed that there is a negative relationship between ESG score and weighted cost of capital in Nordic countries. Even though the relationship between these two variables is significant, it is not negative as it was predicted in hypotheses. These findings in line with studies by Atan et al. (2018) and Lee et al. (2013) who also had similar research aims. Also, findings show that ROA is positively and significantly associated with WACC which suggest that companies with high WACC tend to be more profitable than other companies. Wong et al. (2021), had similar results from the regression analysis that was estimated. Although the governance score was not statistically significant, it was the only negatively related score to WACC which can encourage the business owners to focus more on management structures and company policies in order to lower the cost of capital of a firm.

Though this study helps to have a better understanding of the relationship between ESG score and the cost of capital, few limitations indicate possible research areas. To start with, data that was used for the regression analysis was secondary data taken from the Thomson Reuters Eikon database. To find a more accurate answer, it would be better if the data will be taken from primary sources such as annual reports of companies. In addition, the study is mainly focused on a relationship between ESG score and cost of capital but in future studies, the relationship between ESG score and cost of debt financing or cost of equity also can be examined. Furthermore, the study is focused only on Nordic companies. It might be interesting for future studies to focus on companies from other countries such as countries from Estonia, Latvia, and Lithuania.

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APPENDICES

Appendix 1. All variables with definitions and the data sources

Variable	Definition	Source
WACC	The weighted average cost of capital (WACC) is a method of calculating a company's cost of capital in which each capital type is weighted equally.	Thomson Reuters Eikon DataStream database
ESG score	ESG score is calculated as the weighted average of the ESG scores for the given fiscal year.	Thomson Reuters Eikon Asset4 database
Environmental pillar score	The environmental measurement of ESG performance	Thomson Reuters Eikon Asset4 database
Governance pillar score	The governance measurement of ESG performance	Thomson Reuters Eikon Asset4 database
Social pillar score	The social measurement of ESG performance	Thomson Reuters Eikon Asset4 database
Size	Firm size calculated as dividing number of employees to the number of total firms	The Thomson Reuters DataStream database
LEV	The leverage ratio is computed by dividing a company's total debt by its total assets.	The Thomson Reuters DataStream database
ROA	ROA is a return on asset which is calculated as net income divided by total assets.	The Thomson Reuters DataStream database
Beta	The volatility of a stock is measured using market beta.	The Thomson Reuters DataStream database

Appendix 2. Robustness check

Table 5. Result of the regression models with cost of debt financing being dependent variable.

Explanatory variables	Pooling (1)	Fixed effects (2)	Random effects (3)	Fixed effects (4)	Fixed effects (5)	Fixed effects (6)
ESG score	-0.001	0.042***	0.021***			
	(-0.23)	(-1.49)	(0.02)			
Environmental score				0.02***		
				(0.01)		
Social score					0.026***	
					(4.68)	
Governance score						0.017***
						(0.001)
SIZE	-0.007	0.001	-0.004***	0.002*	0.002**	0.002
	(-1.52)	(0.95)	(-0.122)	(0.1)	(2.3)	(1.60)
LEV	-0.01	-0.005**	-0.003*	-0.004*	-0.004**	-0.004**
	(-0.54)	(-2.42)	(-1.78)	(0.07)	(-1.98)	(-1.98)
ROA	0.033***	0.03***	0.004	0.032***	0.032***	0.03***
	(-3.77)	(2.68)	(0.39)	(2.8)	(2.84)	(2.60)
Beta	0.003***	0.024	0.005***	0.002	0.006	0.004
	(3.32)	(0.663)	(2.92)	(0.55)	(1.62)	(1)
Constant	0.034**		0.015			
	(3.2)		(0.17)			
Observations	758	758	758	758	758	758
R^2	0.04	0.092		0.05	0.67	0.63

Notes: ***p-value < 0.01, **p-value < 0.05 and*p-value < 0.1.

t-statistics are given in parentheses, and they are italic text

Source: created by the author

Appendix 3. Dataset for the regression analysis

Dropbox link for the dataset that has been used to create regression analysis models: https://www.dropbox.com/s/v4etekzkk27qdmx/Dataset%20for%20regression%20analysis.xls?dl=0

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