GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN

Impact of ESG Score on Cost of Capital

Evidence From the Swedish Market

Bachelor Thesis 15hp
Authors: Nicolas Khosravi
Alexander Wadman
Supervisor: Jian Hua Zhang
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Abstract

This paper aims to examine if there is a significant relationship between Swedish firms ESG scores and their financing costs. By constructing three regression models with WACC, cost of equity and cost of debt as the dependent variables and ESG score as an independent variable, this paper tests three different hypotheses. Using a sample of 468 observations from 157 companies between the years 2015 to 2020, we find a significant negative relationship between ESG scores and both WACC and cost of debt. However, we do not find any significant results for the model with cost of equity. Our results show that Swedish firms are rewarded with lower WACC and cost of debt for their work with sustainability. These results have important practical implications for asset managers, corporations and policymakers. Firstly, asset managers gain valuable information of how a more sustainable firm receives a higher valuation. Secondly, corporations have a rationale to pursue investments in ESG activities as it lowers the cost of debt. Thirdly, the results support how policy makers can strengthen the direction to a sustainable future with effective incentives for stakeholders.

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Glossary

CAPM - Capital asset pricing model

COC - Cost of capital

COE - Cost of equity

COD - Cost of debt

CSP - Corporate social performance

CSR - Corporate social responsibility

ESG - Environmental social governance

FY - Fiscal year

NGO - Non-governmental organizations

OLS - Ordinary least squares

WACC - Weighted average cost of capital

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1 Introduction

1.1 Background

The explosive growth in the global financial market and increased sustainability focus means that companies, in parallel with maximizing shareholder value, also need good environmental, social and corporate governance (ESG) to satisfy stakeholders. As a consequence of the global transformation to a more sustainable future, a specific framework has been developed with the aim of helping companies increase the transparency of how they work with sustainability. This is known as ESG-score, which helps stakeholders evaluate companies performance. Moreover, the framework also aims to enhance the comparability between companies in order to provide more data and analytics for the financial industry (Refinitiv, 2021). It is also in a business interest to be able to obtain as cheap financing as possible through both equity and debt. Because of that, there is a link between companies wanting to contribute to a sustainable future while at the same time satisfying shareholders through a low cost of capital. Furthermore, sustainable entrepreneurship can create significant competitive advantages, for example through a good corporate reputation (Waddock and Graves, 1997).

The topic of this study has been subject to similar research before such as the US stock market by El Ghoul, Guedhami, Kwok and Mishra (2011) and Yeh, Lin, Wang and Wu (2019) research on the Chinese stock market. Much of the previous research has focused on examining the cost of equity (COE) (El Ghoul et al., 2011; Chouaibi, Matteo and Zouari, 2021) or cost of debt (COD) (Oikonomou, Brooks and Paveli, 2014; Magnanelli & Izzo, 2017) while some focus on both the COE and COD (Yeh et al. 2019; Bhuiyan and Nguyen, 2019). Suto and Takehara (2017) studies both COE and COD among firms in Japan but also their weighted average cost of capital (WACC). Furthermore, all of the aforementioned research has focused on different geographical locations and time periods, however, neither of the previous research has investigated the relationship between firms ESG score and financing costs in Sweden more specifically.

1.2 Purpose

The purpose of this thesis is to study whether companies with higher ESG scores enjoy a lower cost of raising capital both on the basis of cost of debt and cost of equity. The thesis uses the Swedish stock market and Swedish publicly traded companies. Previous research has focused on COE or COD in different markets around the world. However, studies on the Swedish stock market and more specifically studies on the relationship between companies ESG score and WACC have not been conducted. Since WACC is used for calculating the value of individual firms, the authors of this paper find it highly interesting and relevant to study whether it is possible to increase firm value through being more sustainable. Consequently, the purpose is to further contribute with new insights and broaden the level of knowledge within the subject.

1.3 Hypotheses

This paper will be based on three hypotheses where the first hypothesis tests if a higher ESG score generates a lower weighted average cost of capital. The second hypothesis tests if a higher ESG score generates lower cost of equity and finally the third hypothesis tests if a higher ESG score generates a lower cost of debt.

While most of the previous studies within the area agree upon the negative relationship between corporate social performance (CSP) and either cost of equity or debt there are still studies with contradictory results as described later in this paper. The expected results are therefore not totally obvious.

The study also emphasizes that the most recent time periods, in contrast to previous research with outdated time series, are more relevant since sustainability focus has substantially accelerated around the world during the last couple of years (WWF, 2021). Based on all the arguments above, the first hypothesis is:

Hypothesis 1

There is a significant negative relationship between a company's ESG score and its WACC

Previous literature, such as Chouaibi et al. (2021) reports that a higher degree of corporate social responsibility (CSR) decreases a company's idiosyncratic risk which helps lower the cost of equity. Furthermore, a high standard of CSR reporting attracts institutional capital. As a consequence analysts start to cover the company which also reduces the cost of equity according to Chouaibi et al. (2021). This is also confirmed by Suto and Takehara (2017) in their report where they find that institutional ownership increases the negative relationship between the level of CSR and cost of equity.

El Ghoul et al. (2011) argue that firms with a high degree of social irresponsibility are associated with a greater risk. For example, if a company is potentially liable in various parts of the value chain, such as lack of personal protection or uncertain products, the risk of future lawsuits increases which will have a negative impact on the firm's future cash flow. This implies that the negative relationship between ESG scores and cost of equity is further reinforced. Based on these arguments, the second hypothesis is:

Hypothesis 2

There is a significant negative relationship between a company's ESG score and its cost of equity

Suto and Takehara (2017) did not find any negative relationship between CSP and cost of debt, instead their results indicated a positive relationship. This is discussed further in their paper where they argue that debtors on the Japanese market view CSR activities as costly instead of providers of important information. In contrast, Yeh et al. (2019) found a significant negative relationship between Chinese firms and COD. Hence, there is contradictory evidence which strongly motivates the following third hypothesis.

Hypothesis 3

There is a significant negative relationship between a company's ESG score and its cost of debt

1.4 Layout of thesis

The remaining part of the research has the following structure: Section 2 addresses previous research within the subject and researchers' conclusions. Section 3 includes the theories that are used in the report as well as an explanation of stakeholder theory, WACC and CAPM in order to increase the understanding. Section 4 shows the methodology which thoroughly explains how the research will be done. Section 5 contains the type of data used in this paper and where it has been collected from. Section 6 presents the empirical results of the report. Section 7 includes the authors' discussion and implications. Lastly, section 8 contains the conclusions of this paper.

2 Literature review

Sustainable investments and actions within companies and the effects it has on their cost of capital is an area that has experienced a lot of research. While there are similarities among much of the literature there are still also differences. Researchers have focused on different parts of capital costs and examined data using many different methods. Furthermore, previous research has been conducted with samples taken from different industries or geographical areas. Most of the previous research concludes that cost of capital is reduced among companies with higher CSR performances, but whether this is due to lower cost of equity or debt is ambiguous.

El Ghoul, Guedhami, Kwok and Mishra (2011) studies the effect of companies with different CSR scores on a large sample of US firms between 1992 and 2007. Using data from different databases, among them Thompson Institutional Brokers Earnings Services, four different models were used to run regression analysis using several control variables. The paper concludes that firms with higher CSR scores had substantially lower cost of equity.

In contrast, Yeh, Lin, Wang and Wu (2019) study if CSR performance can affect Chinese firms' cost of capital. They begin by explaining that firms in developed markets such as the US prefer to raise funds through equity while Chinese firms tend to prefer external debt financing. Yeh et al. (2019) uses data from 662 firms between 2008 and 2011 in their study where they test two hypotheses, namely if firms with higher CSR performance have lower cost of equity and cost of debt. Using Heckman's two-stage model for their regression model,

where they test for both one and two year ahead cost of capital and the current CSR performance, the results indicate that higher CSR performance significantly decreases cost of debt. However, it also indicates that higher CSR performance significantly increases the cost of equity but continues by explaining how this is due to Chinese politics.

Bhuiyan and Nguyen (2019) uses similar methods and control variables as both El Ghoul et al. (2011) and Yeh et al. (2019) in their study of how CSR score affects cost of capital among 230 Australian companies between 2004 and 2016. Similar to Yeh et al. (2019), Bhuiyan and Nguyen (2019) examine the effects on both COE and COD but also refer to the control variables used by El Ghoul et al. (2011) in their own regression model. Bhuiyan and Nguyen (2019) conclude that CSR had a significantly negative relationship with both COE and COD. Suto and Takehara (2017) examine the relation between CSP and COC of Japanese firms between 2008 and 2013. They found that higher CSP lowers the COE and WACC but increases the COD.

Oikonomou, Brooks and Pavelin (2014) studies how different dimensions of CSP impacted corporations' cost of debt and credit quality of firms issued bonds. The analysis used data from over 3000 US bonds issued by 742 firms between 1991 and 2008. Their findings conclude that firms with good CSP are rewarded with lower cost of debt but also that firms with bad CSP are penalized with higher cost of debt. Furthermore, the study also finds strong evidence that firms with higher CSP received higher credit qualities. In other words, firms with higher CSP are perceived with lower credit risk.

Chouaibi, Matteo and Zouari (2021) demonstrates that the CSR performance has an impact on the cost of equity. Consequently, increased transparency of non-financial information lowers the idiosyncratic risk for the firm because of better diversification. Chouaibi et al. (2021) also show that increasing the commitment of CSR-reporting attracts more analysis and institutional investors which lower the cost of raising equity. In addition, the report shows that if a firm has a relatively high cost of equity, the incentive of disclosing non financial information increases. The analysis uses data from 924 observations and 154 French companies between 2015 and 2020.

While much of the previous research seems to prove a negative relation between CSR and COC there are still some examples that find the opposite. One example is Magnanelli and

Izzo (2017) who find a positive relation between CSP and COD. Another example is Chava (2014) who finds no significant relation among companies environmental performances and COE or COD.

3 Theory

The theories used in this thesis are the definition and framework of stakeholder theory, weighted average cost of capital (WACC) and capital asset pricing model (CAPM). The theories will be explained in order to give a deeper understanding of how the metrics move and why.

3.1 Stakeholder theory

According to the stakeholder theory a firm's management should create value for all stakeholders. When it comes to decision making, firms should also consider how it affects its relation with customers, suppliers, employees, creditors and more. The theory argues that no value can be created individually as all the stakes are dependent on each other. If consideration is not taken from management, the firm can suffer from deep mistrust which consequently could hurt the profits. Therefore management should act in the interest of all stakeholders through maintaining and shaping the aforementioned relationships (Freeman, Harrison, Wicks, Parmar, Purnell and De Colle; 2010).

The benefits of satisfying all stakeholders are several. According to Oikonomou et al. (2014) firms are either rewarded with lower or penalized with higher cost of debt based on their CSP. This is aligned with the theory since stakeholders, in particular shareholders and managers, can be affected both positively or negatively depending on a firm's actions. Moreover, El Ghoul et al. (2011) argue that firms with a lack of social responsibility are associated with a higher risk, such as lack of personal protection. Therefore, it is important to ensure that employees have proper work conditions, for example correct equipment, as it otherwise could lead to streiks, voluntary redundancies and bad repetition which would hurt the firm's profits. Furthermore, firms' reputation could be severely damaged if social norms are violated such as discriminations among employees or high pollution of the air (Menz, 2010). Consequently, firms are subject to increased risk as customers might boycott their products or services. Based on the above, firms focusing on all their stakeholders are predicted to be less risky and

have higher ESG scores. The stakeholder theory therefore supports the hypothesis of a negative relationship between firms' cost of capital and ESG scores.

3.2 Weighted Average Cost of Capital (WACC)

WACC is a measure that highlights a company's weighted average cost of capital both from the equity and debt perspective. The formula also takes into account loan financing and its tax shield, which is deductible. If the company has only financed itself with equity then this corresponds to cost of equity whereas the opposite would be cost of debt. The formula is, according to Berk and DeMarzo (2020):

$$WACC = \frac{E}{D+E} * (r_e) + \frac{D}{D+E} * (r_d) * (1 - t) \quad (1)$$

where more specifically cost of equity is:

$\frac{E}{D+E} * (r_e)$

and cost of debt is:

$\frac{D}{D+E} * (r_d) * (1 - t)$

E= market value of equity

D= market value of debt

r_e= cost of equity

r_d= cost of debt

t= tax rate

3.3 Capital Asset Pricing Model (CAPM)

CAPM determines the relationship between the expected return and the systematic risk (undiversifiable risk) for assets. This model is based on critical assumptions such as investors being able to borrow and lend at the risk free rate, no transactions cost, homogeneous expectations among investors and that they hold efficient portfolios (Watson, D. and Head, A., 2016). The formula is, according to Berk and DeMarzo (2020):

$$E(R) = R_f + \beta * (E(R_m) - R_f) \quad (2)$$

$E(R)$= expected return

R_f= risk free return

β= The beta of the security

$E(R_m) - R_f$= Market premium

4 Method

This study consists of both descriptive and inferential statistics in order to draw any conclusions regarding hypotheses presented above. It begins with descriptive statistics in the form of panel summary and Pearson correlation test of all the variables and data used. The panel summary includes the number of observations, mean, standard deviation, minimum and maximum values while the correlation matrix presents the correlation between all of the used variables. The descriptive statistics are helpful tools to further understand the extorted data and highlight the relationships between the variables.

The inferential statistics consists of three regression analyses where companies WACC, COE and COD are dependent variables and ESG-score the independent variable. Furthermore, this study is similarly to previous research using control variables that are likely to affect companies' cost of capital. The control variables in this paper are the natural logarithm of size (ln_size), leverage (lev), beta, capital intensity (capint) and market to book ratio (mtbr) (El Ghoul et al., 2011, and Yeh et al., 2019).

There are several panel data methods that can be used based on the different attributes of data used. Three popular methods are pooled OLS regression, random effect regression and fixed effect regression. In order to present reliable results it is important to check the robustness of the methods. Firstly, a Breusch and Pagan lagrangian multiplier test is used to check if the data should be pooled or if panel data is current. If the null hypothesis is rejected then a Hausman test will also be taken to decide whether the panel data should be using fixed or random effects regression. Furthermore, when testing for heteroskedasticity the results conclude that there is heteroskedasticity in all models and therefore all the regressions are run with robust standard errors (Greene, 2003).

Lastly, in order to assure the validity of our results two robustness checks will be conducted. The same regressions as the main models will be run, however, with new variables and changes in the number of observations. Firstly, due to the increased volatility during the year 2020 as an effect of the global COVID-19 pandemic, a comparison of the models when excluding 2020 is conducted. The exclusion of 2020 resulted in a dataset with 314 observations from 97 companies, meaning 154 fewer observations and 60 fewer companies. Secondly, a dummy variable is used as a proxy of the ESG scores and replaces the initial independent variable. The regressions from the robustness checks are run separately.

4.1 Dependent variables

The study will be running three regressions each one with either the WACC, COE or COD as the dependent variable. The dependent variables are collected from Refinitiv Eikon per 2022-04-08. As described in the theoretical framework for the WACC, Refinitiv Eikon weighs each category proportionally and includes equity stock, preferred stocks and debt (see appendix A for detailed variable description). The data for all three dependent variables are collected from the final day of each year which is equivalent to yearly frequencies.

COE is the return a company pays its equity holders from a theoretical perspective. Refinitiv Eikon follows the theoretical framework but uses an inflation adjusted risk-free rate instead of the nominal risk-free interest rate (see appendix A for detailed variable description). This results in data that is more comparable over the years.

COD represents the marginal cost for a company to issue new debt. Refinitiv Eikon follows the theoretical framework and adds the weighted cost of short and long term debt in compliance with the appropriate credit curve (see appendix A for detailed variable description).

4.2 Independent variable

The study uses the ESG-score as its independent variable for all models and the score is collected from Refinitiv Eikon per 2022-04-08. The framework increases transparency and enables a higher degree of comparability among firms and sectors which allow investors to make more complete decisions. Additionally, the information is collected from a company’s

auditable and published data and ranges from 0 to 100. Further explanation of the ESG score is presented in section 5.1.

4.3 Control variables

This study uses five control variables that have been selected in accordance with previous research. The first of these is the natural logarithm of size (ln_size) which is derived as the natural logarithm of a company's total assets, denominated in SEK. Secondly, leverage (lev) which is expressed in percentage and calculated as a ratio between a company's total debt to total equity, denominated in SEK. Another control variable is beta (see appendix A for description). Capital intensity is calculated as a ratio between total current assets divided by total assets, denominated in SEK. Lastly, market to book ratio (mtbr) is calculated as the company's latest closing price divided by its book value per share, denominated in SEK. In compliance with previous research the expected results for the control variables are ln_size (-), lev (+), beta (+), capint (-) and mtbr (+) (El Ghoul et al., 2011, and Yeh et al., 2019). The control variables are collected from Refinitiv Eikon per 2022-04-08.

4.4 Regression models

The following three models are the regression models that have been used for this study.

Regression model with WACC as the dependent variable:

$$WACC_{it} = \beta_0 + \beta_1 \times ESG_{it} + \beta_2 \times ln\_size_{it} + \beta_3 \times lev_{it} + \beta_4 \times beta_{it} + \beta_5 \times capint_{it} + \beta_6 \times mtbr_{it} + \varepsilon_{it}$$

Regression model with for COE as the dependent variable:

$$COE_{it} = \beta_0 + \beta_1 \times ESG_{it} + \beta_2 \times ln\_size_{it} + \beta_3 \times lev_{it} + \beta_4 \times beta_{it} + \beta_5 \times capint_{it} + \beta_6 \times mtbr_{it} + \varepsilon_{it}$$

Regression model with COD as the dependent variable:

$$COD_{it} = \beta_0 + \beta_1 \times ESG_{it} + \beta_2 \times ln\_size_{it} + \beta_3 \times lev_{it} + \beta_4 \times beta_{it} + \beta_5 \times capint_{it} + \beta_6 \times mtbr_{it} + \varepsilon_{it}$$

ESG = Environmental, social and corporate governance

ln_size = natural logarithm of a company's total assets

lev = leverage

$beta$ = company's beta

$capint$ = capital intensity

$mtbr$ = market to book ratio

ε = error term

4.5 Breusch and Pagan lagrangian multipliers test

Breusch and Pagan lagrangian multipliers test, also known as the LM test, tests the heteroskedasticity in a linear regression model. This is to test if the regression model should be using pooled OLS or panel data analysis. To apply the test, random effect regression is used to represent panel data. The null hypothesis states that there is no significant variance across the units, in this case companies, and therefore no need for panel data analysis. However, if the null hypothesis is rejected there is a need for panel data analysis as there is a significant variance across the units (Greene, 2003).

When testing for the WACC model, the test concludes that the null hypothesis should be rejected and thus that there is significant difference between the companies, meaning there is a panel effect. Similarly, the test was conducted for the two remaining models, COE and COD. The results were the same for COD as for the WACC above, however, the test did not reject the null hypothesis for the COE model (see appendix B). To decide whether the panel data analysis should use fixed or random effect regression the Hausman test is conducted, however, the model with COE will continue with pooled OLS due to insignificant results from the lagrangian multipliers test.

4.6 Hausman test

The Hausman test is based on a chi^2 distribution with degrees of freedom equal to the number of variables, in this study 6. It is used as a tool to choose between random effect regression or fixed effect regression when running panel data. For the Hausman test, the null hypothesis states that the random effect model is preferred which consequently means that the alternative hypothesis prefers the fixed effect model (Greene, 2003).

Once again the null hypothesis, in this case random effect regression, is rejected when the model with WACC as the dependent variable is tested. Consequently, fixed effect regression is more suitable for the data used in this model. The same results were received when testing for the model with COD as dependent variables (see appendix C).

5 Data

This paper uses historical data that is collected from Refinitiv Eikon. It analyzes publicly noted companies with available ESG-scores for the period 2015-12-31 to 2020-12-31. The reason for 2015 as the starting point is due to the availability of data regarding companies WACC. The end year was chosen as 2020 since financial data concerning the 2021 fiscal year was not yet fully available in Refinitiv Eikon. Consequently, our unbalanced panel data contains 468 observations from 157 Swedish publicly traded companies.

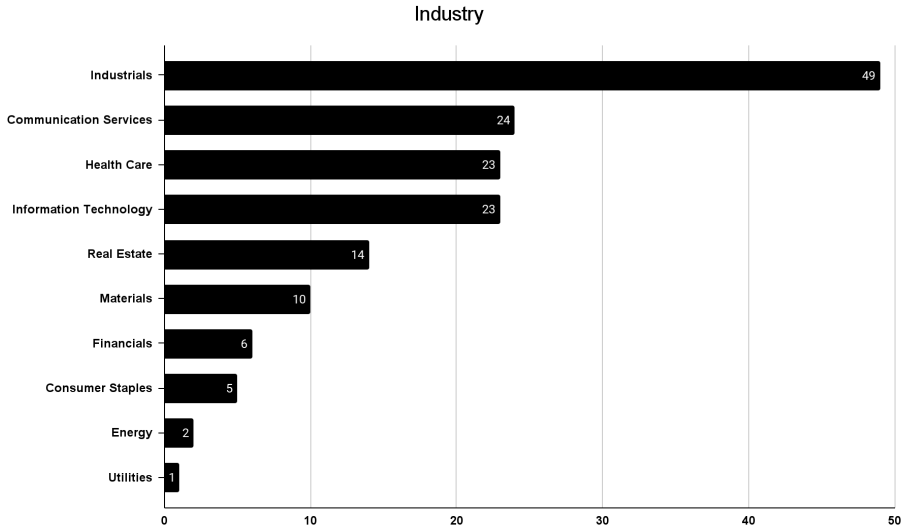
Due to limited data on ESG-scores for companies, this paper will be based on unbalanced panel data. This results in a much greater number of observations. Additionally, thanks to a favorable climate for the stock market in recent years, many new companies have chosen to go public and bring in more capital. According to Gustafsson (2021) more than 100 companies have chosen to go public only in 2021. The consequence is a lack of historical data on these newly listed companies, but the choice of unbalanced data enables some of these companies to be included and studied.

Moreover, companies with missing data have been removed since it provides no additional value for the topic studied. Banks have also been removed due to non-comparability of the balance sheet since they use borrowed funds to finance their business. The Primary Global Industry Classification Standard (GICS) was used to identify and remove all the banks from the dataset. GICS was developed by S&P Dow Jones Indices and MSCI with the aim to give a framework for industry classification system for listed companies (GICS Global Industry Classification Standard, 2019).

In order to assure that extreme values do not affect and skew the overall results, outliers for the dependent variables WACC, COE and COD have been removed. Outliers have been identified as values that are smaller or larger than 3 standard deviations from the mean. Using 3 standard deviations captures 99,7 % of all the observed data (Jaggia & Kelly, 2019).

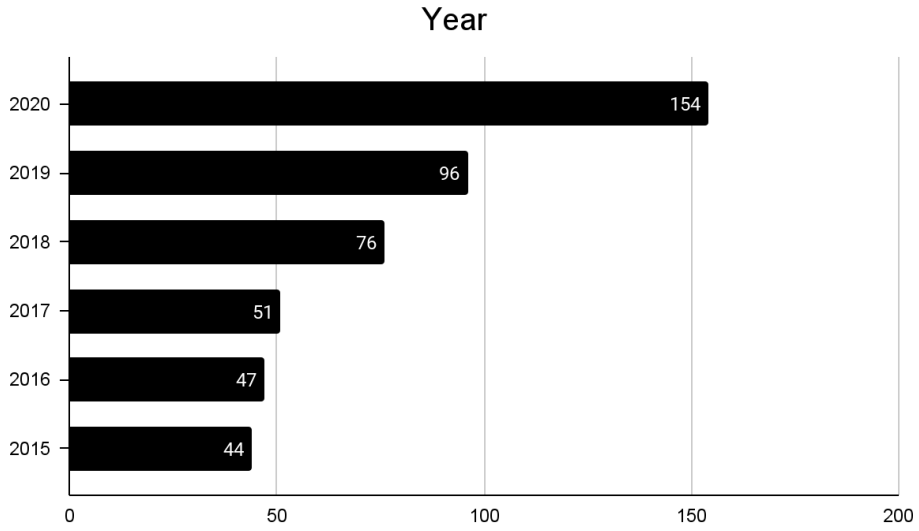
The two following figures present the distribution of industries and years. Our sample, consisting of 157 companies, includes 10 different industries. Industrials, which is the most dominant category, accounts for 31.2%. Communication services, health care and information technology are more or less of equal proportion and account for 15.3% to 14.6% individually. After that, in descending order, we have real estate (8.9%), materials (6.4%), financials (3.8%), consumer staples (3.2%), energy (1.3%) and utilities (0.6%). GICS was used to identify and aggregate each company to its corresponding industry. According to Refinitiv Eikon, there are 1003 public companies in Sweden. Furthermore, the distribution of years shows an increasing trend and indicates that a large proportion of the companies are observed less than 6 times.

Figure 1: Distribution of industries



This figure presents the industry distribution for all 157 companies used in this paper.

Figure 2: Distribution of calendar year



This figure presents the distribution of years for all 468 observations used in this paper

5.1 ESG-score

ESG-score is based on the firm's auditable and published data and measures a firm's relative performance across 10 main categories. More specifically, environmental issues address the topics resource use, emissions and innovation. Social includes the workforce, human rights, community and product responsibility. Corporate governance addresses the management, shareholders and CSR strategy (Refinitiv, 2021).

According to Refinitiv (2021) the score (0-100) is based on three different categories - environmental, social and corporate governance. The first quartile (0-25) indicates a poor ESG performance and the transparency is low in terms of ESG data. The second quartile (> 25-50) stipulates a satisfaction in ESG performance and the transparency is moderate in terms of ESG data. The third quartile (>50-75) equals a good ESG performance and transparency is above average in terms of ESG data. The fourth quartile (>75-100) indicates an excellent ESG performance and the transparency is of high degree in terms of ESG data. It can further be divided into a grade system which ranges from D- to A+.

The data is collected from annual reports, company websites, NGO websites, stock exchange filings, CSR reports and news sources. The scores are frequently updated on the basis of corporate reporting standards. However, in exceptional cases where company-specific events

can affect the overall score, it is being taken into consideration immediately. To better reflect the dynamics of a business the ESG-scores are segmented into either definitive or not definitive scores. The definitive scores include all years excluding the five most recent fiscal years and these scores cannot be changed. The remaining scores, which can be illustrated as a continuous variable, can change ESG-scores up to five fiscal years back in time. This enables, for instance, sensitive information withheld from investors to affect the company's rating. For example, since this report uses information from FY2015 to FY2020, FY2015 is considered a definitive score, however, FY2016 to FY2020 are not considered as definitive scores (Refinitiv, 2021).

In compliance with Refinitiv (2021) the methodology is based on three different steps: ESG category scores, materiality matrix and overall ESG score calculation and pillar score. The treatment of underlying data points is fragmented into two parts where the first part consists of binary questions. The second part sorts numerical data which include industry group relevancy. Subsequently, a percentile rank score and a benchmark is adopted. The materiality matrix, which uses a data-driven approach, splits down the categories into themes and the weight attached to the theme is determined by the relative importance. Lastly, in order to calculate the ESG and pillar score, the scores are aggregated and divided into the original 10 categories.

6 Results

6.1 Descriptive statistics

The table below presents descriptive statistics for all of the data used in this study, a total of 468 observations. It presents the number of observations, mean, standard deviation, minimum and maximum values for all of the variables. The mean of WACC indicates that companies have a weighted average cost of capital of almost 7% on average. The mean cost of equity, 8.27%, indicates that external equity financing is more expensive compared to external debt financing with a mean of 1.84%. The ESG-score mean is 54 and ranges from 2 to 95 with a standard deviation of 21. Consequently, the results indicate a very broad range of ESG-scores within the Swedish stock market. Looking at the level of leverage the descriptive data indicates that the mean leverage is almost 66%.

Table 1: Descriptive data

Variable	Observations	Mean	Std. dev.	Min	Max
wacc	468	6.964	2.1200	1.719	13.807
coe	468	8.269	2.224	2.612	14.828
cod	468	1.838	1.197	0.012	5.699
esg	468	53.767	20.786	2.241	94.603
ln_size	468	23.328	1.862	17.701	26.986
lev	468	65.850	58.033	0	636.851
beta	468	1.049	0.353	0.241	2.090
mtbr	468	3.440	3.769	-1.882	39.763
capint	468	0.387	0.227	0.002	0.990

This table presents the descriptive statistics for all the 468 observations between 2015 and 2020. It provides the number of observations, mean, standard deviation, minimum and maximum values for each of the variables used in all three models. Variable definition: weighted average cost of capital (WACC), cost of equity (COE), cost of debt (COD), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint).

6.2 Pearson correlation matrix

The following table presents the Pearson correlation matrix which presents correlations pairwise. It indicates that firms with higher ESG-scores tend to have lower WACC and COD while COE indicates the opposite, however, at a very low level and with neither of the correlations being significant. With a significant correlation at a 1% level, the matrix indicates that larger companies enjoy a higher ESG-score which is plausible since they have more resources to disclose their ESG information to investors. Regarding correlation between beta/WACC and beta/COE the beta is included in the calculation, therefore explaining a high correlation between the variables. Lev/WACC and ln_size/mtbr have a relatively higher and significant correlation at a 1% level. However, the overall correlation between the variables is low and suggests that multicollinearity is not a concern.

Table 2: Pearson correlation matrix

	wacc	coe	cod	esg	ln_size	lev	beta	mtbr	capint
wacc	1.000								
coe	0.857***	1.000							
	(0.000)								
cod	0.025	0.050	1.000						
	(0.591)	(0.282)							
esg	-0.041	0.002	-0.023	1.000					
	(0.375)	(0.958)	(0.625)						
ln_size	-0,187***	-0.063	0.070	0.657***	1.000				
	(0.000)	(0.172)	(0.148)	(0.000)					
lev	-0.407***	-0.071	0.211***	0.007	0.155***	1.000			
	(0.000)	(0.124)	(0.000)	(0.886)	(0.001)				
beta	0.833***	0.974***	0.015	-0.008	-0.090*	-0.065	1.000		
	(0.000)	(0.000)	(0.746)	(0.862)	(0.055)	(0.163)			
mtbr	0.244***	0.034	-0.216***	-0.168***	-0.410***	-0.230***	0.051	1.000	
	(0.000)	(0.464)	(0.000)	(0.000)	(0.000)	(0.000)	(0.276)		
capint	0.333***	0.231***	-0.104**	-0.016	-0.327***	-0.186***	0.231***	0.343***	1.000
	(0.000)	(0.000)	(0.025)	(0.736)	(0.000)	(0.000)	(0.000)	(0.000)	

This table presents the Pearson correlation matrix for the variables used in this paper. Variable definition: weighted average cost of capital (WACC), cost of equity (COE), cost of debt (COD), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint).

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

6.3 Model results

6.3.1 There is a significant negative relationship between a company's ESG score and its WACC

Table 3 presents the results from the fixed effect regression with WACC as the dependent variable. The model is significant at a 1% level with a F value equal to 121.4. Furthermore, the within R^2 indicates that 72.5% of the variation within the companies is explained by the variables used in the model. As for the variation between companies, the model explains 47% of the variation. The overall R^2 is the weighted average of within and between and is equal to 50%.

The output from table 3 indicates that the ESG variable and its negative coefficient of -0.014 is significant at a 5% level, meaning that firms with higher ESG score have lower WACC. Furthermore, the control variables ln_size, lev, beta and capint are significant at a 1% level while mtbr is significant at a 5% level. Ln_size has a negative coefficient of -0.887 indicating that firms of greater size are able to finance their operations at a lower cost. The same can be concluded for firms with higher leverage as the variable has a negative coefficient of -0.009. Market-to-book ratio also has a negative coefficient -0.038 which indicates that firms with a higher ratio also have a lower WACC. The positive coefficients 4.67 and 2.67 for variables beta and capint respectively indicate that firms with a greater systematic risk and higher capital intensity have a higher WACC.

In comparison with the expected results for the control variables ln_size (-) and beta (+), the results are consistent. However, the expectations of lev (+), mtbr (+) and capint (-) deviate from the regression results. In conclusion, the null hypothesis can be rejected and thus hypothesis 1 that *there is a significant negative relationship between a company's ESG score and its WACC* is supported.

Table 3: The results from fixed effects regression with WACC as dependent variable

	Model 1: WACC	
Variable	Coefficients	t-statistic
esg	-0.014**	-2.06
ln_size	-0.887***	-5.09
lev	-0.009***	-5.45
beta	4.676***	22.02
mtbr	-0.038**	-2.41
capint	2.675***	2.69
Cons	23.207***	5.77
Observations	468	
Groups	157	
F-value	121.4***	
R-squared:		
Within	0.725	
Between	0.470	
Overall	0.498	
LM Test	17.240***	
Hausman test	70.780***	

This table presents the results from fixed effects regression with WACC as the dependent variable. Variable definition: weighted average cost of capital (WACC), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

6.3.2 There is no significant relationship between a company's ESG score and its COE

Table 4 presents the results from the pooled OLS regression with COE as the dependent variable. This model is also significant at a 1% level with a F value equal to 1648.27. The R^2 value is equal to 0.95, indicating that the variables used explain 95% of the variations in COE.

Table 4: The results from fixed effects regression with COE as a dependent variable

	Model 2: COE	
Variable	Coefficients	t-statistic
esg	−0.160	-1.03
ln_size	0.043**	2.35
lev	−0.001	-1.30
beta	6.117***	94.87
mtbr	-0.007	-1.59
capint	0.196*	1.67
Cons	0.910**	2.24
Observations	468	
F-value	1648.27***	
R-squared:	0.9490	
LM test	0.000	

This table presents the results from pooled OLS regression with COE as the dependent variable. Variable definition: cost of equity (COE), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

Once again the ESG variable is negative, but in contrast to table 3 the ESG is insignificant and no conclusions can therefore be made for the COE. Moreover, the only significant control variables at a 5% level are ln_size and beta, both with a positive coefficient of 0.043 and 6.12 respectively. Ln_size is significant at a 5% level while beta is significant at a 1% level. This indicates that firms of greater size or higher systematic risk become subject to higher cost of equity. Capint is also significant, however, only at a 10% level and has a positive coefficient of 0.196. The remaining control variables lev and mtbr are insignificant even at a 10% level and thus no conclusions can be drawn.

In comparison with the expected results for the control variables, only beta (+) has a result that is consistent. The expectations of ln_size (-), mtbr (+) and capint (-) all deviate from the regression results. In conclusion, the null hypothesis cannot be rejected and hypothesis 2 that *there is a significant negative relationship between a company's ESG score and its COE* is not supported.

6.3.3 There is a significant negative relationship between a company's ESG score and its COD

Table 5 presents the results from the fixed effect regression with COD as the dependent variable. Once again the model is significant at a 1% level with a F value of 15.8. The within R^2 show that 25% of the variation in COD within companies is explained by the model. For the between and overall the R^2 is almost zero implying that there are other unobserved variables that explain most of the variation in COD between companies.

The output reports that ESG score has a significantly negative relationship with the COD at a 1% level. With a coefficient equal to -0.04, the results indicate that firms with higher ESG scores are able to borrow money at a lower cost. Interestingly, the ESG coefficient from table 5 is almost three times more negative compared to the ESG coefficients from table 3. In addition, the control variables ln_size and lev are significant at 1% and 5% level respectively while beta, mtbr and capint are insignificant. Ln_size has a negative coefficient of -1.189 which states that firms of greater size can finance their operations through debt at a lower cost. The positive coefficient of 0.006 for lev indicates that an increased leverage consequently reflects a cost increase in debt financing.

The results for the control variables ln_size (-) and lev (+) are consistent with the expectations. As for the insignificant variables beta (+) and capint (-) their coefficients align with the expectations while mtbr (+) deviates. In conclusion, the null hypothesis can be rejected and thus hypothesis 3 that *there is a significant negative relationship between a company's ESG score and its COD* is supported.

Table 5: The results from fixed effects regression with COD as dependent variable

	Model 3: COD	
Variable	Coefficients	t-statistic
esg	-0.040***	-3.93
ln_size	-1.189***	-4.17
lev	0.006**	2.38
beta	0.143	0.49
mtbr	-0.060	-1.63
capint	-0.314	-0.25
Cons	31.536***	4.96
Observations	468	
Groups	157	
F-value	15.80***	
R-squared:		
Within	0.247	
Between	0.029	
Overall	0.000	
LM test	76.666***	
Hausman test	95.100***	

This table presents the results from fixed effects regression with COD as the dependent variable. Variable definition: cost of debt (COD), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

6.4 Robustness check

6.4.1 Model results when 2020 is excluded

When the same regressions were performed without the year 2020 the results differed from the ones presented above. For the regression with WACC as the dependent variable, the ESG score was still negative, however, insignificant. As for the control variables ln_size, lev, beta and capint the results were reasonably similar to the ones presented in section 6.3.1. In contrast, mtbr became insignificant while maintaining a similar coefficient (see appendix D).

Continuing with the same regression model as in section 6.3.2 but without observations from 2020 yielded an even more insignificant relationship between ESG score and COE. With an insignificant but still negative coefficient, the results differed slightly compared to previous analysis. In contrast with part 6.3.2 only beta is significant at a 1% level while the remaining variables ln_size, lev, mtbr and capint deviated substantially, mainly as none of these variables were significant but also with different coefficients (see appendix D).

Lastly, the same regression model as in section 6.3.3 for COD as the dependent variable was run but without observations from 2020. The results still indicate a negative significant relationship at a 1% level between ESG score and COD. Regarding the control variables only ln_size is significant at a 1% level with a negative coefficient of -1.35. The remaining control variables are insignificant however the coefficients remain highly similar except for beta (see appendix D).

While the results from the model without the year 2020 show that the negative relationship between ESG scores and WACC is insignificant, the relationship between ESG scores and COD remains significant. This strengthens the evidence that higher ESG scores can decrease firms' cost of debt as it is shown to remain significant under less volatile times but also with fewer observations.

6.4.2 Replacing the independent variable

The second robustness test is performed by replacing the independent variable ESG-scores by a new proxy called esgDummy. The new variable is a dummy variable that is based upon whether a company's yearly ESG-score is above or below the median of the sample, 55.145. If their score is above the median, meaning above 50% of the sample scores, the dummy variable assumes the value 1 and 0 otherwise. It is plausible to assume that an ESG score above the median is relatively high since it is above 50% of the sample scores. Therefore the relationship between ESG scores and capital costs should be coherent with the main regressions.

The results from the three regressions with the new proxy are highly similar to the main regressions presented in section 6.3. There is a negative significant relationship between ESG-scores and WACC at a 5% significance level. Furthermore, the relationship between ESG-scores and COD is once again more significant with a negative coefficient at a 1% significance level. As for COE, the relationship remains insignificant but continues to have a negative coefficient (see appendix D). These results further strengthen the results from the main regressions since they are consistent. Interpretations of the results can therefore be made with confidence and reliability.

7 Discussion and implications

7.1 Discussion

When comparing our results with the literature mentioned above we find both similarities and differences. For example, the results regarding the negative relationship between ESG scores and COD coincides with the works of Yeh et al. (2019), Bhuiyan and Nguyen (2019) and Oikonomou et al. (2014). However, the insignificant results from the model with COE deviates from the findings of previous literature such as El Ghoul et al. (2011), Chouaibi et al. (2021), Suto and Takehara (2017) and Bhuiyan and Nguyen (2019) who all found a significant negative relationship. Furthermore, Suto and Takehara (2017) is the only of the aforementioned literature that has investigated the WACC and came to the same conclusions as we did, namely that there is a significant negative relationship with ESG scores.

The results of this study supports the theoretical framework presented in section 3.1. We are able to confirm that the stakeholder theory is applicable in practice since we see evidence of a negative relationship between firms' cost of capital and ESG scores. One possible explanation for the significant negative relationships found in this paper could be that the Swedish financial market and society has come far in the sustainability aspect. A good evidence of this is Yale's Environmental Performance Index (EPI) 2020 where Sweden is ranked at 8th place (Wendling, Z. A., Emerson, J. W., de Sherbinin, A., Esty, D. C., et al., 2020). Another example is that the Swedish parliament has decided that Sweden is to have 0 net emissions of greenhouse gases by 2045 (Sveriges Miljömål, 2022). Investors and stakeholders have therefore acknowledged the fact that firms should be rewarded for their contribution. Because of the financial markets rigidity, it is fascinating to see how adaptive the market has been in this aspect.

7.2 Implications

Accordingly, we believe that our findings have practical implications for asset managers, corporations and policy makers. We also believe that the report is contributing with further knowledge to the aforementioned research within the area.

7.2.1 Implications for asset managers

Firstly, we have proven that there exists a significant negative relationship between ESG score and both WACC and COD. Hence, the information is valuable for asset managers allocating capital to the Swedish securities market. Lowered cost of debt for a firm due to high ESG score means, ceteris paribus, less risk in terms of financial distress and gives firms more financial flexibility to pay its creditors. Additionally, a lowered WACC is equivalent to, ceteris paribus, a higher discounted cash flow, or in other words increased firm value. Consequently, asset managers could find these results highly valuable.

7.2.2 Implications for corporations

Secondly, our findings have implications for corporations. We believe that this report should increase the confidence level of pursuing additional investment within ESG activities as it has a proven effect on the cost of debt. A possible consequence of this could be a positive image which enables firms to attract more talented employees, gain brand recognition and increase the overall trust for the firm. The improved reputation could also have a positive impact on

firms' revenue due to higher customer loyalty (Menz, 2010). Moreover, our findings also help corporations understand how stakeholders value the ESG score. It enables the firm to establish an optimal ESG strategy from which they can reduce their financial costs.

7.2.3 Implications for policymakers

Thirdly, the results have practical implications for policymakers. Since policymakers have resources, commitment and power of the legislation they can strengthen the direction towards a sustainable future. It is important to create more robust and effective incentives for stakeholders to incorporate sustainability into their allocation. Decreasing cost of debt would lead to higher net present value and more investments which consequently generate stronger economic growth, increased employment, innovation and prosperity. Moreover, long-term competitiveness of the national economy can be increased due to relatively lower cost of debt.

8 Conclusion

This paper examines if more sustainable companies are rewarded with lower WACC, cost of equity and debt in Sweden. The framework used to evaluate firms sustainability is Refinitiv Eikon ESG-scores. For this paper, a sample of 468 observations from 157 publicly noted companies in Sweden between 2015 to 2020 has been used. We find a significant negative relationship with ESG-scores for two of our three models, more specifically, the WACC and COD. For the remaining model, COE, we do not find any significant relationship with the ESG-scores and cannot draw any conclusion. We are therefore only able to reject the first and the third hypotheses of this paper. In conclusion, the findings suggest that firms with higher ESG-score are rewarded with both lower weighted average cost of capital and cost of debt.

The findings of this paper further contribute to the current debate regarding sustainability work among businesses and its effects on firm value. While much of the previous research has focused on the cost of debt and equity capital in different markets, we have also chosen to focus on the effects on WACC which is a variable that is often used for firm valuation in corporate finance.

Our study shows one main limitation which can be suggested for further research proposals. The data contains observations from 157 companies where several companies have been observed only once. Since there are 1003 public companies in Sweden one should therefore be careful when interpreting the results. The absence of sufficient data can yield inappropriate results which is why we encourage future research to look at larger markets such as the entire Nordic region for instance. Also, as time goes by, more and more data on the Swedish stock market will be available and hopefully include a larger portion of the market. This would help strengthen any potential conclusions drawn in the future as they will be supported by more underlying data.

Furthermore, the validity of the ESG score can be questioned. This is a justified question but has not been expressed in the research proposal since it is outside of our scope. This study focuses on whether there is a significant relationship between ESG scores and the three dependent variables expressed above. Currently, the ESG score is the most widely used framework for evaluating companies quantitative sustainability performance. Until a better framework is introduced, the ESG scores remain as a standard for the financial market. However, we encourage future research to study the reliability of ESG scores presented by Refinitiv Eikon or potentially introduce a new framework.

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Appendix

A. Variable explanation

BANK - Primary Global Industry Classification Standard (GICS) industry description. GICS classifies with increasing granularity by sector, industry group, industry and sub-industry. (TR.GICSIndustry)

BETA - CAPM beta. A measure of how much the stock moves for a given move in the market. It is the covariance of the security's price movement in relation to the market's price movement. Based on data availability, various look back periods can be used to calculate it. In order of preference, Beta 5Y monthly, Beta 3Y weekly, Beta 2Y weekly, Beta 180D, Beta 90D daily are used in calculation. (TR.WACCBeta)

Capital Intensity - Ratio of total reported current assets and total reported assets.

- Total Current Assets: In the sum of Cash and short-term investments; total receivables, Net; Total inventory; Prepaid expenses and other current assets, total. (TR.TotalCurrentAssets)
- Total Assets: Represents the total assets of a company. (TR.TotalAssetsReported)

COD - Cost of debt represents the marginal cost to the company issuing new debt now. It is calculated by adding weighted cost of short term debt and weighted cost of long term debt based on the 1-year and 10-year points of an appropriate credit curve. (TR.WACCCostofDebt)

COE - The return a firm theoretically pays its equity investors. It is calculated by multiplying the equity risk premium of the market with the beta of the stock plus an inflation adjusted risk free rate. Equity risk premium is expected market return minus inflation adjusted risk free rate. (TR.WACCCostofEquity)

ESG - Refinitiv ESG score is an overall company score based on the self-reported information in the environmental, social and corporate governance pillars. (TR.TRESGScore)

LEV - This is the ratio of total debt as of the end of the fiscal period to total equity for the same period and is expressed as percentage. (TR.TtlDebtToTtlEquityPct)

LN Size - Natural logarithm of the total assets of a company. (TR.TotalAssetsReported)

Market to Book ratio - Price to book value per share is calculated by dividing the company's latest closing price by its book value per share. Book value per share is calculated by dividing total equity from the latest fiscal period by current total shares outstanding. (TR.PriceToBVPerShare)

WACC- "A Financial metric used to calculate a firm's cost of capital in which each category is proportionately weighted. All sources of capital including equity stock, preferred stock and debt are included in the calculation". (TR.WACC)

B. Breusch and Pagan lagrangian multipliers test

Testing for model 1: WACC

	Variance	Std. dev
WACC	4.493	2.120
e	0.436	0.660
u	0.343	0.586
	Test: Var(u) = 0	
chibar2(01)	17.24	
Prob > chibar2	0.000***	

Breusch and Pagan lagrangian multipliers test for model 1 with WACC as the dependent variable. Variable definition: weighted average cost of capital (WACC).

*** statistical significance at 1% level.

Testing for model 2: COE

	Variance	Std. dev
COE	4.944	2.224
e	0.284	0.533
u	0.000	0.000
	Test: Var(u) = 0	
chibar2(01)	0.000	
Prob > chibar2	1.000	

Breusch and Pagan lagrangian multipliers test for model 2 with COE as the dependent variable. Variable definition: cost of equity (COE).

Testing for model 3: COD

	Variance	Std. dev
COD	1.433	1.197
e	0.736	0.859
u	0.374	0.612
	Test: Var(u) = 0	
chibar2(01)	79.66	
Prob > chibar2	0.000***	

Breusch and Pagan lagrangian multipliers test for model 3 with COD as the dependent variable.Variable definition: cost of debt (COD).

*** statistical significance at 1% level.

C. Hausman Test

Testing for model 1: WACC

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	Std. error
ESG	-0.014	-0.008	-0.070	0.005
ln_size	-0.888	0.043	-0.930	0.161
lev	-.0001	-0.011	0.002	0.001
beta	4.676	4.750	-0.074	0.110
mtbr	-0.040	0.044	-0.082	0.023
capint	2.675	0.893	1.783	0.908
Test of H0: Difference in coefficients not systematic				
chi2(6)		70.78		
Prob > chi2		0.000***		

Hausman test for model 1 with WACC as the dependent variable. Variable definition: weighted average cost of capital (WACC), social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint).

*** statistical significance at 1% level.

Testing for model 3: COD

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	Std. error
ESG	-0.040	-0.012	-0.028	0.007
ln_size	-1.189	0.077	-1.266	0.210
lev	0.006	0.003	0.003	0.002
beta	0.143	0.050	0.093	0.148
mtbr	-0.060	-0.044	-0.016	0.030
capint	-0.314	-0.138	-0.176	1.189
Test of H0: Difference in coefficients not systematic				
chi2(6)		95.10		
Prob > chi2		0.000***		

Hausman test for model 3 with COD as the dependent variable. Variable definition: cost of debt (COD), environmental, social and corporate governance (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint).

*** statistical significance at 1% level.

D. Robustness check

Fixed effects regression for WACC without observations from 2020

	Model 1: WACC	
Variable	Coefficients	t-statistic
esg	-0.011	-1.39
ln_size	-0.833***	-6.31
lev	-0.009***	-4.68
beta	4.750***	13.89
mtbr	-0.041	-0.98
capint	2.925**	2.16
Cons	22.172***	7.36
Observations	314	
Groups	97	
F-value	46.33***	
R-squared:		
Within	0.665	
Between	0.609	
Overall	0.578	

This table presents the results from fixed effects regression with WACC as the dependent variable when the year 2020 is excluded. Variable definition: weighted average cost of capital (WACC), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

Pooled OLS for COE without observations from 2020

	Model 2: COE	
Variable	Coefficients	t-statistic
esg	-0.001	-0.26
ln_size	-0.041	-1.46
lev	-0.000	-0.73
beta	5.908***	68.07
mtbr	-0.019*	-1.92
capint	0.066	0.45
Cons	3.297***	5.39

Observations	314
F-value	883.92***
R-squared:	0.938

This table presents the results from pooled OLS regression with COE as the dependent variable when the year 2020 is excluded. Variable definition: cost of equity (COE), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

Fixed effects regression for COD without observations from 2020

	Model 3: COD	
Variable	Coefficients	t-statistic
esg	-0.044***	-3.50
ln_size	-1.349***	-3.30
lev	0.004	1.21
beta	-0.146	-0.35
mtbr	-0.072	-1.46
capint	-0.293	-0.12
Cons	36.886***	3.93
Observations	314	
Groups	97	
F-value	10.86***	
R-squared:		
Within	0.222	
Between	0.000	
Overall	0.010	

This table presents the results from fixed effects regression with COD as the dependent variable when the year 2020 is excluded. Variable definition: cost of debt (COD), environmental, social and corporate governance score (ESG), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.

* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.

Model results with new proxy esgDummy

	wacc	coe	cod
esgDummy	-0.276**	-0.027	-0.659***
	(-2.31)	(-0.48)	(-3.17)
ln_size	-1.002***	0.034**	-1.531***
	(-7.55)	(2.14)	(5.15)
lev	0.009***	-0.000	0.007***
	(-5.39)	(-1.24)	(5.73)
beta	4.568***	6.116***	0.096
	(22.45)	(94.56)	(0.34)
mtbr	-0.047***	-0.008*	-0.085**
	(-3.08)	(-1.71)	(-2.02)
capint	2.784***	0.179	0.058
	(2.76)	(1.53)	(0.04)
Observations	468	469	470
Groups	157	158	159
F-value	121.55***	1637.33***	11.06***
R-squared		0.949	
Within	0.724		0.219
Between	0.457		0.033
Overall	0.484		0.000

This table presents the results for all three regressions models but with a new proxy as the independent variable. Variable definition: weighted average cost of capital (WACC), cost of equity (COE), cost of debt (COD), dummy variable that takes the value 1 if a company's yearly ESG-score is above the median score of this sample and 0 if below (esgDummy), natural logarithm of firm size (ln_size), leverage (lev), a firm's beta (beta), market to book ratio (mtbr) and capital intensity (capint). Robust t-statistics are reported next to the coefficients.
* statistical significance at 10% level.

** statistical significance at 5% level.

*** statistical significance at 1% level.