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The impact of environmental, social and corporate governance responsibility on the cost of short- and long-term debt[1]

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Abstract: The aim of the paper is to examine the impact of environmental, social and corporate governance (ESG) responsibility on the short- and long-term cost of debt. Linear regression was applied to a unique dataset on CSR and cost of debt for 300 companies recognized in 2017 by Corporate Knights as the most sustainable companies in the world. The question about the link between CSR and cost of debt is important as there is still ongoing debate as to whether business should undertake activities in the field of CSR—managers and other stakeholders are still unsure of the outcomes. The findings show that the involvement in environmental issues decreases the cost of long-term debt whereas the involvement in social issues brings benefits to short- and long-term debt. Surprisingly the greater the involvement in corporate governance, the higher the cost of debt in all time horizons. Managers should expect a lower cost of debt from environmental and social activities mostly in the long run. Corporate governance expenditures may in turn be seen as a waste of company resources, cost of forgone opportunities, or—optionally—as an over-investment. The main novelty is the breakdown of CSR into three dimensions while examining various term structures of corporate debt.

Keywords: CSR, ESG, sustainability, cost of debt, short-term debt, long-term debt.

JEL codes: G32, M14, O16, Q56.

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Introduction

The concept of sustainable development and corporate social responsibility (CSR) is gaining in importance. More and more companies are devoting their actions and resources to incorporate environmental, social and corporate governance responsibility strategies (Horváth et al., 2017). The subject remains widely addressed in academic research and is being driven by various factors, in particular new concerns and expectations from stakeholders due to globalisation and large scale of industrial change, implementation of social and environmental criteria into the investment process and decision making of both investors and consumers as well as transparency of business activities brought about by the mass media and modern information and communication technologies (European Commission, 2001).

There is still an ongoing debate between shareholders (Friedman, 1970) and stakeholders capitalism (Freeman, 1984). The question whether the company should only meet the interests of its owners or fulfil the needs of other groups of stakeholders too remains open. Different attitudes to value creation in companies often find their source in the existing economic and cultural conditions in particular countries as well as in the applied principles of corporate governance. One could argue that shareholders should not be confronted with stakeholders since the former also belong to the other group, thus their objectives should be partially convergent. If the goal is long-term shareholder value maximisation it requires a meeting of the needs of the corporate environment. The conciliatory solution could be found in instrumental stakeholder theory (Donaldson & Preston, 1995), which claims that the company may benefit if it is able to develop the relationships with its stakeholders based on mutual trust and cooperation.

The vast number of studies (Clark, Feiner, & Viehs, 2015; Gillan, Koch, & Starks, 2021) point out the benefits of environmental, social and corporate governance actions. Those include possible: increase of the company's value, operational and financial performance, attractiveness, liquidity of shares, decrease in volatility, cost of capital (both equity and debt) and greater access to financing. This is thanks to the reduction of the risk premium (decrease of idiosyncratic risk, less information asymmetry, rating improvement), counterparty confidence, identification of new value drivers, better working environment, greater employee involvement, productivity, more economical use of resources, reduced costs of monitoring, supervision, coordination and reduced risk of negative public perception and penalties or transaction costs. It should be noted however that the outcomes of studies on CSR are not unanimous. Some authors suggest (e.g. Baird, Geylani, & Roberts, 2012; Lee & Faff, 2009; Magnanelli & Izzo, 2017) we shed new light on the empirical link between corporate social performance (CSP that involvement in CSR activities may be counterproductive. All of this underlines the importance and necessity

of further research on CSR. Undoubtedly by managing the environmental, social and corporate governance (ESG) issues one may shape the cost of capital.

This work contributes to literature on CSR and finance by examining the impact of CSR on the cost of debt. Firstly, although the relationship between corporate social performance (CSP) and corporate financial performance (CFP) is widely studied, cost of capital and particularly—the cost of debt—is somehow overlooked. Secondly, most studies use overall CSR/CSP indices as independent variables or divide them into CSR strengths and concerns as well as often excluding the corporate governance (CG) dimension (Aguinis & Glavas, 2012; Lu, Chau, Wang, & Pan, 2014). This is mostly due to their use of the MSCI ESG STATS database (formerly KLD Research and Analytics Inc.) as a data source. Thirdly, there is a lack of research which takes into account the short- and long-term perspective to the cost of capital. This article fills the gap providing a new insight into cost of debt based on new data from Thomson Reuters (TR) Eikon database and considering CSR dimensions (environmental, social and corporate governance) separately, as well as—looking closer at the term structure of interest rates—introducing the division of cost of debt into short- and long-term.

The aim of the paper is to examine the impact of different dimensions of ESG responsibility on the various types of corporate cost of debt, i.e. the impact of environmental, social and corporate governance issues on total, short- and long-term cost of debt and thereby to enhance the academic discussion and managerial practice. Tentatively it can be assumed that the greater involvement in all the aforementioned dimensions of CSR the lower the cost of debt (regardless of type). In the paper the linear regression model was tested to explore the relationship between different aspects of CSR involvement and various types of corporate cost of debt. The research sample includes 300 companies from all over the world with data obtained from Thomson Reuters Eikon database in 2017.

The structure of paper is as follows: Section 1 presents the theoretical framework, literature review and hypotheses development concerning the research, Section 2 describes the methodology used in the study (including sample, variables and analytical approach) and Section 3 shows the results of the work. The paper concludes with contributions and practical implications of the study as well as limitations and future research directions.

1. Literature review and hypotheses development

Studies published in recent years usually show a positive correlation between CSP and CFP (Peloza, 2009; Clark et al., 2015; Saha & Kabra, 2019; Gillan et al., 2021). Nevertheless the business case for undertaking socially responsible activities remains unclear. The CSP–CFP relationship is relatively weak and

questions about causality have not been answered reliably. In this context some managers "do not believe" and some "believe" that CSR "works" for shareholders.

Confusion around the CSP–CFP relationship has several sources although the "original sin" is treating CSP/CSR and CFP as homogenous concepts. Fortunately scholars have already begun to decompose them, and now "a clear trend is observed in the increasing focus […] on exploring the links between specific aspects of the two constructs" (Lu et al., 2014). It is a pity that the decomposition of CFP rarely concerns cost of capital.

Environmental, social and corporate governance issues as a part of both systematic and idiosyncratic risk may—if mismanaged—disrupt business operations. In terms of cost of equity and environmental issues El Ghoul, Guedhami, Kim and Park (2018) confirmed that this cost is lower in companies with a higher environmental responsibility and that this relationship remains relevant across different legal, economic and geographic characteristics. Gupta (2018) drew similar conclusions but stressed that the link is stronger if the country-level governance is weak and claims that the companies will benefit the most from the reduction of emissions and unnecessary wastage of resources.

With respect to environmental and social issues El Ghoul, Guedhami, Kwok and Mishra (2011) showed that companies with a better CSR score benefit from lower cost of equity, mostly due to investments in responsible employee relations, environmental policies and product strategies. In turn the participation in controversial (sin) industries increases the cost of equity. On the other hand it is in those industries that a specifically favourable impact of CSR on the cost of capital can be observed. The study by Jo and Na (2012) revealed that the CSR level in companies in controversial industries is negatively correlated with the cost of equity and the relationship is stronger than in non-controversial industries.

As regards the relationship between the level of corporate governance and the cost of equity the conclusions of the studies are generally positive. Cheng, Collins and Huang (2006) proved that respecting shareholders' rights and transparent reporting reduces this cost. The benefits of greater disclosure in the context of the cost of equity are also confirmed by Botosan (1997). The study indicated the existence of a negative correlation between the cost of equity and the disclosure level for firms with a low analyst following (for companies with high analyst following the relationship was not statistically significant).

However, contrary opinions can be found in literature as well (Botosan, 2006). If the market demands a premium only for systematic risk and the insufficient disclosure constitutes an element of diversifiable risk (for which no premium is due as it may be mitigated), then the decrease in the cost of capital should not occur. Additionally frequent disclosures may result in increased share price volatility due to short-term investor reaction.

The observed reduction in the cost of capital is not only limited to the cost of equity. Oikonomou, Brooks and Pavelin's (2011) study manifested that a high

level of CSP is associated with lower risk premium, higher bonds rating and lower corporate bond yield spreads. It is worth stressing that the effect becomes more intense with time—the longer the term to maturity, the stronger the effect. Also La Rosa, Liberatore, Mazzi and Terzani (2018) confirmed the existence of a negative correlation between the company's CSP level and the interest rate and a positive correlation between CSP and the debt rating. Moreover, the higher the CSP the higher the leverage allowance. However, the link was not statistically significant during crisis periods which, as the authors suggest, can be explained by the fact that in such times companies are expected to concentrate all their efforts on maintaining profitability. The above conclusions are confirmed by Ge and Liu (2015) who additionally point out that bonds of companies with better CSR performance require fewer covenants. They also state that bondholders are more likely to use CSR information to assess the creditworthiness of issuers with lower levels of corporate governance and higher information asymmetry and those operating in environmentally sensitive industries. On the other hand the relationship between CSR and cost of debt is more pronounced in the case of investment grade bonds and for financially healthier bond issuers. Also Goss and Roberts (2011) proved that the average spread for companies with CSR below average is from 7 to 18 basis points higher. However they failed to find evidence that lenders reward CSR leaders. Thus this modest reaction might suggest that banks perceive CSR as a second-order determinant of spreads. The study similarly indicated that the impact of CSR on the cost of debt depends on the borrower quality. In case of low-quality borrowers (secured) voluntary investments in CSR are perceived by banks through the agency costs and overinvestment which results in higher loan spreads (the relationship does not occur in case of high-quality, unsecured borrowers).

The study by Cheng, Ioannou and Serafeim (2014) focused on a company's ability to access finance in capital markets. It proved that companies with better CSR performance face significantly lower capital constraints, due to social and environmental engagement (in contrast the effect of CG dimension was positive, but statistically insignificant). What is interesting as Xu, Wu and Dao (2020) indicate, companies with higher CSR scores (in the field of environment, employee relations, community, and diversity) may also benefit from a higher level of trade credit and the suppliers' willingness to extend it. Moreover, such CSR aspects as human capital, network capabilities and general ecosystem on the side of financing institutions and business accelerators play an important role in the way they influence and boost performance of new venture firms (Shetty, Sundaram, & Achuthan, 2020).

As regards the reporting and communication Sengupta (1998) revealed the existence of a negative correlation between the disclosure quality and the effective cost of debt as well as yield to maturity. The relationship becomes especially important in periods of high volatility and uncertainty of the market environment.

A mixed impact of environmental risk management (ERM) on the cost of capital is presented by Sharfman and Fernando (2008). The study confirmed a negative correlation between the cost of equity (beta coefficient) and the ERM quality but in case of cost of debt the relationship proved positive. The effect of the increase of debt cost is, however, partially compensated by the possibility to raise more debt and thus a higher tax shield. The authors of the study additionally managed to confirm the positive impact of ERM on the WACC. Erragragui (2018) proved that only a few dimensions of CSP actually matter in creditors' perception of a firms' risks as there is no link between cost of debt and CSP score at a composite level. However more detailed analysis showed that environmental concerns (strengths) increase (decrease) cost of debt. Moreover governance concerns have no impact on cost of debt while CG strengths reduce the cost. In this vein Hoepner, Oikonomou, Scholtens and Schröder (2016) study proved that the level of country environmental and social responsibility is negatively correlated with the cost of corporate debt (with this relationship being twice as strong for environmental issues) but benefits from firm-level sustainability on the interest rate of bank loans could not be confirmed. The study by Ye and Zhang (2011) indicated that the relationship between CSR and cost of debt is more complex than the simple linear relationship suggested by other studies, i.e. this relationship is U-curve-shaped. In other words, a higher CSR level reduces the cost of debt when company CSR investment is lower than an optimal level and after this point the relationship is reversed (companies with extremely low or high CSR are subject to a higher cost of debt). What is worth noting that the optimal CSR level varies with firm size—it is higher for small firms than for large ones.

A negative impact of CSP on the cost of debt financing was revealed in the Magnanelli and Izzo's (2017) study. The research suggests that banks do not perceive CSR practices as an important factor in reducing a company's risk and that CSP does not play an important role in the process of determining the cost of debt.

According to the quoted studies the question about the impact of a company's ESG engagement on cost of debt (similarly on the cost of equity or business performance value) still remains open and there is no unanimity on the subject. However with reference to interest rates' term structure most theories assume that some kind of risk premium exists. Thus the investor should take the ESG risks into account in the analyses and investments. Also the investors' subjective risk perception (i.e. risk-aversion, risk-neutral, risk-seeking approach) and likewise the efficiency of capital market play an important role. Considering the above the universal hypothesis assumes that the mitigation of ESG risks and the management of ESG issues in the company can have a positive impact on its cost of debt. This seems to be confirmed in prior studies (Brooks & Oikonomou, 2018). The authors state in their meta-analysis of the literature that in general there is a strong negative link between CSP and

various types of financial risk (systematic, idiosyncratic, default and others) regardless of different markets and asset classes.

Contrary to similar hypotheses that can be found in the aforementioned studies this paper's hypotheses include different dimensions of CSR, i.e. environmental, social and corporate governance in the following way:

H0A. *The greater the involvement in environmental CSR, the lower the cost of debt.*

H0B. *The greater the involvement in social CSR, the lower the cost debt.*

H0C. *The greater the involvement in corporate governance CSR, the lower the cost of debt.*

The pure expectation theory (unbiased expectation theory) of term structure of interest rates assumes that their level is simply the outcome of investors' expectations about future interest rates and that short- and long-term bonds are perfect substitutes for each other (Fisher, 1930; Lutz, 1940). However, the liquidity preference theory (Hicks, 1946; Keynes, 1936) argues that perfect shiftability does not exist and that the longer the maturity the greater the uncertainty there is. In this case a risk-averse investor would demand a risk/liquidity premium (positive) for long-term bonds. The segmentation theory (Culbertson, 1957) goes even further suggesting that the market is divided into separate segments (e.g. due to regulations or institutional factors) and that therefore the interest rates for different terms to maturity are determined independently (investors do not change their segment). In turn the preferred habitat theory (Modigliani & Sutch, 1966) tries to reconcile the above theories by indicating that different investors are likely to have different habitats and can move across them, thus the risk premium does not have to be positive.

Taking all of this into account it is worth investigating if the CSR has a different impact on various types of cost of debt. The detailed hypotheses are as follows:

H1A. *The greater the involvement in environmental CSR, the lower the cost of short-term debt.*

H1B. *The greater the involvement in environmental CSR, the lower the cost of long-term debt.*

H2A. *The greater the involvement in social CSR, the lower the cost of short-term debt.*

H2B. *The greater the involvement in social CSR, the lower the cost of long-term debt.*

H3A. *The greater the involvement in corporate governance CSR, the lower the cost of short-term debt.*

H3B. *The greater the involvement in corporate governance CSR, the lower the cost of long-term debt.*

2. Methodology

2.1. Sample and analytical approach

The study includes 300 companies[4] from around the world recognized in 2017 by Corporate Knights as the most sustainable companies in the world. Notably in the ranking of top 100 companies published on January 16, 2017 the number of companies from individual industries reflects their structure—based on market capitalization—in the MSCI All Country World Index (MSCI ACWI Index). The data for 300 companies used here do not reflect the index and therefore the top 100 companies do not correspond fully to the publicly available ranking.[5] This is due to the fact that the extended ranking requested and obtained from Corporate Knights for the purpose of the study does not include the last stage of the public report methodology which is the matching of the individual industries' shares.

The sample was based on the Corporate Knights' ranking for several reasons. Firstly the ranking is well-designed in terms of methodology as it is presented. Secondly Corporate Knights has been publishing these reports on a regular basis for many years which makes them comparable and trustworthy. Thirdly academics use this ranking in the studies on the CSR–CFP relationship, e.g. Ameer and Othman (2012). Fourthly, by using any ranking of top sustainable companies the possible problem of missing data on ESG is radically diminished.

Corporate Knights Incorporated evaluates companies whose market capitalization exceeds USD 2 billion (about 4,000 companies from around the world). The first of the two basic stages of the assessment involves four criteria: reporting of non-financial information, financial condition, type of products manufactured and sanctions. With regard to the first criterion companies that do not publish at least 75% of key performance indicators (KPIs) defined for a given industry are rejected. Under the second criterion companies with a Piotroski F-Score below five are rejected. With regard to the type of products manufactured further analysis excludes companies which, according to the Global Industry Classification Standard (GICS) classification, produce military weapons or process tobacco. The last of the four criteria is used to exclude companies that were in the bottom quartile in terms of sanctions paid out in the rel-

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[4] The required minimum number of observations determining the reliability of the obtained regression results depends on the required power of the statistical test, the adopted significance level, the number of predictors and the expected effect size which in the case of multiple regression should be equated with the adjusted coefficient of determination (Tabachnick & Fidell, 2014, pp. 159–160). The performed variants of the calculations indicated that 100 companies are—under most assumptions—insufficient to ensure the high quality of the study.

[5] Thanks to the courtesy of Corporate Knights the study includes 300 companies which made it possible to obtain more reliable results than in the case of the 100 companies included in the "2017 Global 100 Most Sustainable Corporations in the World" report.

evant year. At the second stage, the pre-screened companies are evaluated based on KPIs defined for a given industry from a total pool of fourteen indicators.

It is worth presenting the distribution of the sample regarding categorical and non-categorical variables. The geographical distribution of the sample—before transformation of the variables with abnormal distribution and deletion of univariate and multivariate outliers described further—is presented in Figure 1.

Nearly half the companies under investigation comes from three countries, i.e. United States, France and the United Kingdom, as presented in Figure 1. Generally the sample is dominated by the countries of Latin civilization where an idea of corporate social responsibility has a more solid basis.
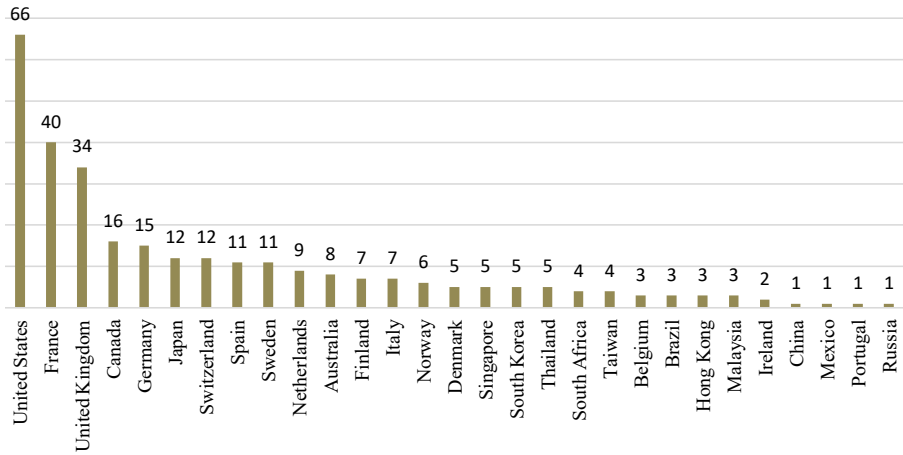
Figure 1. Number of companies in the sample by country
Source: Own work.

Industry distribution of the initial sample is presented in Figure 2.
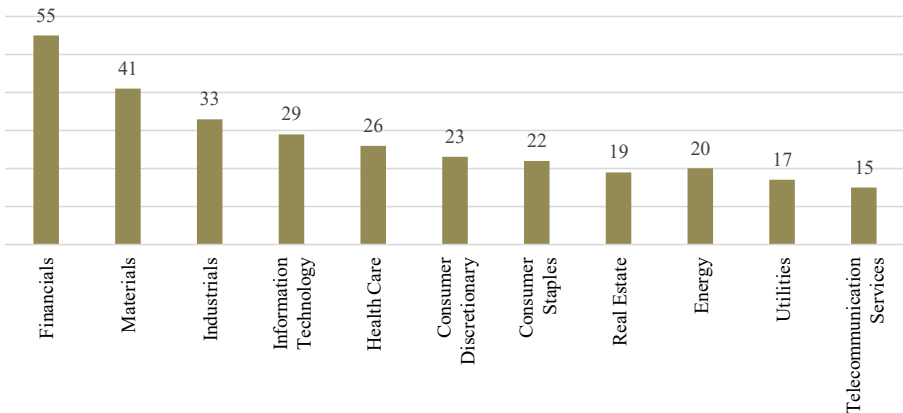
Figure 2. Number of companies in the sample by industry
Source: Own work.

The financial industry is the most numerous in the sample as presented in Figure 2. Although financial institutions are not commonly associated with the environment they are at the same time those who do not pollute it and what is more their involvement in social and corporate governance issues is increasingly growing. Companies from industries typically associated with the need to care for the environment, i.e. materials, industrials and energy, constitute the second, third and ninth largest group in the sample, respectively.

As far as non-categorical control variables are considered one may find that companies in the sample are "big" and "healthy" as a rule. The mean size of the companies in the sample of €120,980M was heavily affected by the inclusion of large companies—the largest of which had total assets of €2,165,467M—which may be deduced from the high positive skewness which equalled 4.22 as well as the high kurtosis which equalled 21.12. The age of the companies presented in years ranged from 1 to 180 with the mean of 48.62. The levels of skewness and kurtosis of the age variable are not far from the normal distribution. Asset structure, liquidity, profitability, leverage, risk and P/BV remained at a reasonable mean level however profitability and especially P/BV had relatively higher values of volatility. Moreover, their distributions were less normal. Regarding independent variables it is worth noting that companies in the sample are less involved in activities for the benefit of corporate governance than social or environmental issues—at least on the basis of the assigned scores. The negative skewness proves that there are more companies with a score higher than the mean. As far as dependent variables are considered the mean value of the short-term and long-term debt cost was 1.28% and 3.48% respectively. Cost of long-term debt was relatively more volatile than cost of short-term debt. Descriptive statistics of the initial sample are presented in details in the Appendix.

All the data was collected in accordance with the reporting period on the basis of which Corporate Knights made the ranking. The study is cross-sectional.

2.2. Dependent variables

Cost of debt, cost of short-term and long-term debt were acquired from TR Eikon. These variables strictly reflect components of WACC calculated in the database. Short-term and long-term debt make up the total debt that TR Eikon calculates as sum of the following items: bonds (convertible or not; secured and unsecured; including coupon bonds), debentures, bank borrowings, notes payable, mortgage loans, senior debt, subordinated notes, bills of exchange, interest-bearing financial liabilities (except derivatives), obligations from capitalized/financial leases, obligations bearing implied interest (e.g. reverse repurchase liabilities), any other interest-bearing liabilities, obligations from Islamic debt, the portion of hybrid debt presented within liabilities, financial liabilities whose nature is not specified by a company (in such cases TR Eikon assumes that these are interest-bearing) (Thomson Reuters, 2015).

2.3. Independent variables

The CSR score in the Thomson Reuters (TR) Eikon database, now Refinitiv Eikon, reflects the economic, social, environmental and corporate governance dimensions of CSR, however only the last three dimensions were used in the study as independent variables. Based on a comparison of advantages and disadvantages of TR Eikon in terms of CSR against other data providers, international rating agencies, as well as local and specialized agencies, this database seems to be one of the best in the field of CSR on an international scale (Herriott, 2016; Novethic Research, 2013).

As the methods of CSR calculation in the TR Eikon database systematically improve the basic methodological assumptions must be described (Thomson Reuters, 2017). In terms of the data used here TR Eikon used 61 indicators in three categories (resource use, emissions, innovation) to calculate *environmental* CSR, 63 indicators in four categories (workforce, human rights, community, product, responsibility) to calculate *social* CSR, and 54 indicators in three categories (management, shareholders, CSR strategy) to calculate *corporate governance* CSR.[6] Indicators for particular companies were collated with comparable companies and transformed to reflect normal distribution taking values from 0 to 100 on a continuous scale. Groups of comparable companies were defined based on the industry for *social* and *environmental* CSR and based on the country for *corporate governance* CSR. Corporate social responsibility data were calculated for periods corresponding to the annual reporting periods of particular companies some of which did not coincide with the calendar year. Therefore the data were collected for particular companies in line with the reporting period used by Corporate Knights to create its ranking.

2.4. Control variables

Control variables were chosen based on the literature review and are consistent with the well-recognized research of Ge and Liu (2015), Goss and Roberts (2011), Hoepner and others (2016), Magnanelli and Izzo (2017), Ye and Zhang (2011). Control variables were operationalized based on the methods used in studies on the relationship between CSR and cost of capital. The frequency of their use followed by the quality of operationalization was the basic selection criterion applied in the study. Control variables and their proxies are shown in Table 1.

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[6] As the results of the study are unexpected in relation to *corporate governance* CSR its categories should be explained in detail. The management category measures a company's commitment and effectiveness towards following best practice corporate governance principles. The shareholders category measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices. The CSR strategy category reflects a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes (Thomson Reuters, 2017).

Table 1. Control variables

Name	Proxy
Size	Total assets
Assets Structure	Quotient of tangible fixed assets and total assets
Liquidity	Quick ratio calculated as the quotient of current assets less inventories, and short-term liabilities
Profitability	Return on assets (ROA) calculated as the quotient of net profit and average assets from the end and beginning of the annual reporting period
Leverage	Debt weight calculated as the quotient of total interest-bearing debt outstanding and the sum of total interest-bearing debt outstanding and total equity
Risk	Beta coefficient calculated on the basis of weekly return rates over a 3-year period
P/BV	The ratio of price to book value
Age	Number of years since the incorporation
Country	Gross National Income (GNI) per capita with a correction resulting from currency differences—the so-called *Atlas correction*
Industry	11 industries according to the Global Industry Classification Standard (10 instrumental variables in dummy coding were created, with finance industry as reference industry)

Source: Own work.

2.5. Analytical approach

To test hypotheses the study explores through a linear regression models the relationship between CSR dimensions and the types of cost of debt. Data were prepared for the analysis per Tabachnick and Fidell (2014). This included the initial assessment of the data, transformation of variables with abnormal distribution, deletion of univariate and multivariate outliers and subsequent testing for normality, linearity, homoscedasticity, multicollinearity, and singularity using various techniques.

In order to obtain the lowest possible skewness of individual variables and thus to fulfil the regression assumptions three types of transformations were used if needed: inverse function (inv), decimal logarithm (log), and square root (sqrt) (Tabachnick & Fidell, 2014).[7] For the deletion of univariate outliers z-scores were calculated and all observation results for individual variables

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[7] These transformations should be used in the case of positive skewness. Therefore variables with negative skewness have been modified in such a way that their highest values take the lowest values. The values of variables which were initially reflected due to their negative skewness were then re-reflected, thus when interpreting the results of the analysis it is not necessary to remember the standardized regression coefficient sign change.

Table 2. Descriptive statistics, VIF, and Pearson's correlation coefficients of variables used in models 0, and 1A, 1B

	Variable	N	Min	Max	Mean	S. D.	VIF	1	2	3	4	5	6	7	8	9	10
1	sqrt_Debt Cost	282	1.00	2.57	1.76	0.34	n/a										
2	sqrt_Short Term Debt Cost	281	0.18	2.14	1.04	0.43	n/a	0.82									
3	sqrt_Long Term Debt Cost	282	0.76	2.94	1.82	0.40	n/a	0.86	0.89								
4	log_CSR Social	267	1.00	2.92	2.06	0.40	1.78	-0.19	-0.20	-0.20							
5	log_CSR Environmental	267	1.00	2.86	2.15	0.46	1.84	-0.15	-0.16	-0.20	0.51						
6	log_CSR Corporate Governance	267	1.00	2.97	1.73	0.42	1.10	0.19	0.09	0.22	0.04	0.03					
7	log_Size	299	8.73	12.34	10.45	0.72	2.75	-0.05	-0.11	-0.07	0.14	0.24	0.08				
8	sqrt_Assets Structure	294	0.00	0.96	0.40	0.26	2.53	0.08	0.10	0.09	0.13	-0.02	0.00	-0.37			
9	log_Liquidity	241	-0.51	0.60	0.00	0.22	1.46	0.00	-0.05	-0.06	-0.13	-0.08	0.03	-0.01	-0.14		
10	sqrt_Profitability	295	3.30	6.65	4.80	0.54	2.12	-0.12	-0.11	-0.12	-0.04	0.02	0.04	-0.42	0.03	0.02	
11	sqrt_Leverage	282	1.00	9.73	4.97	2.08	2.36	0.21	0.11	0.10	0.09	0.12	-0.05	0.53	-0.18	-0.17	-0.58
12	sqrt_Risk	296	1.14	1.84	1.51	0.11	1.53	0.13	0.15	0.15	-0.03	0.13	-0.02	0.26	-0.16	0.23	-0.26
13	log_P/BV	295	-0.68	1.59	0.35	0.39	2.73	-0.06	-0.04	0.01	-0.02	0.03	0.11	-0.47	0.20	-0.07	0.61
14	log_Age	298	0.48	2.26	1.54	0.36	1.17	-0.12	-0.12	-0.14	0.15	0.20	-0.05	-0.03	0.02	-0.05	0.01
15	Country	299	5,720	93,740	46,690	16,352	1.20	0.00	-0.03	0.01	-0.07	0.07	0.11	0.13	-0.13	0.09	0.10
16	Energy	299	0.00	1.00	0.06	0.24	2.25	0.00	0.01	0.06	-0.01	-0.08	0.03	0.04	0.29	0.10	-0.27
17	Consumer Staples	299	0.00	1.00	0.07	0.26	2.53	-0.04	0.01	0.02	0.07	0.06	0.01	-0.13	0.03	-0.26	0.24
18	Consumer Discretionary	299	0.00	1.00	0.08	0.27	2.04	-0.08	0.01	-0.03	-0.07	0.09	-0.11	-0.05	0.02	-0.07	0.01
19	Materials	299	0.00	1.00	0.14	0.34	4.03	0.17	0.16	0.17	0.19	0.03	0.07	-0.26	0.39	0.03	-0.02
20	Real Estate	299	0.00	1.00	0.06	0.24	2.12	0.12	0.02	0.01	-0.28	-0.07	0.06	-0.14	-0.10	-0.05	0.09
21	Health Care	299	0.00	1.00	0.09	0.28	2.26	-0.09	-0.08	-0.08	-0.01	-0.19	0.06	-0.08	-0.07	0.13	0.16

Variable	11	12	13	14	15	16	17	18	19	20	21	22	23	24
22 Industrials	299	0.00	1.00	0.11	0.31	-0.08	-0.08	-0.09	-0.03	0.07	0.00	-0.13	-0.04	0.10
23 Information Technology	299	0.00	1.00	0.10	0.30	0.01	-0.02	-0.03	-0.07	0.06	0.03	-0.04	0.36	0.15
24 Utilities	299	0.00	1.00	0.06	0.23	-0.07	-0.06	-0.05	0.15	-0.05	-0.01	0.03	-0.13	-0.09
25 Communication Services	299	0.00	1.00	0.05	0.22	0.07	0.04	0.04	0.05	0.06	-0.10	-0.08	-0.19	0.07

Variable	11	12	13	14	15	16	17	18	19	20	21	22	23	24
12 sqrt_Risk	0.18													
13 log_P/BV	-0.61	-0.30												
14 log_Age	0.04	0.00	0.00											
15 Country	-0.07	-0.03	0.17	-0.10										
16 Energy	0.05	0.19	-0.13	-0.07	-0.09									
17 Consumer Staples	-0.18	-0.23	0.32	0.09	0.02	-0.07								
18 Consumer Discretionary	0.00	0.02	-0.05	0.11	-0.04	-0.08	-0.08							
19 Materials	-0.02	0.01	0.03	0.11	-0.03	-0.10	-0.11	-0.12						
20 Real Estate	0.11	-0.15	-0.17	-0.03	-0.01	-0.07	-0.07	-0.08	-0.10					
21 Health Care	-0.28	-0.10	0.21	0.03	0.14	-0.08	-0.09	-0.09	-0.12	-0.08				
22 Industrials	-0.11	0.05	0.20	0.08	0.06	-0.09	-0.10	-0.10	-0.14	-0.09	-0.11			
23 Information Technology	-0.19	0.15	0.12	-0.03	0.01	-0.09	-0.09	-0.09	-0.13	-0.09	-0.10	-0.12		
24 Utilities	0.12	-0.24	-0.07	-0.10	-0.13	-0.06	-0.07	-0.07	-0.10	-0.06	-0.08	-0.09	-0.08	
25 Communication Services	-0.02	-0.19	0.09	-0.10	-0.01	-0.06	-0.06	-0.07	-0.09	-0.06	-0.07	-0.08	-0.08	-0.06

* In order to obtain the lowest possible skewness of individual variables, and thus to fulfil regression assumptions, three types of transformations were used if needed: inverse function (inv), decimal logarithm (log), and square root (sqrt).

Source: Own work.

which did not range between −3.29 and +3.29 were removed which corresponds to 0.1% of results in the normal distribution. The Mahalanobis distance was used to delete multivariate outliers and critical values were determined in accordance with the number of degrees of freedom for individual independent variable configurations at the significance level of 0.001. The whole procedure allowed the fulfilment of all the multiple regression assumptions.

3. Results

Descriptive statistics, Variance Inflation Factors (VIFs), and Pearson's correlation coefficients for variables in all models used in the study are shown in Table 2.

As imputation techniques may artificially inflate the quality of models it was decided to use the pairwise deletion technique to handle missing data. Together with univariate and multivariate outlier deletion this resulted in different numbers of variables although statistically satisfactory. Pearson's correlation analysis may suggest significant links between CSR dimensions and cost of debt as presented in Table 2. There is a significant negative correlation between *environmental* CSR and cost of short-term ($r = -0.16$, $p = 0.01$), and long-term debt ($r = -0.20$, $p = 0.00$), a significant negative correlation between *social* CSR and cost of short-term ($r = -0.20$, $p = 0.00$), and long-term debt ($r = -0.20$, $p = 0.00$), as well as a significant—and for a change—positive correlation between *corporate governance* CSR and long-term debt ($r = 0.22$, $p = 0.00$). Considering the independent variables high correlation values suggest a significant link between, leverage and size, leverage and profitability, P/BV and profitability as well as P/BV and leverage. Still, VIFs prove that no multicollinearity exists among predictors as VIF values are far from the threshold of 10. Other results of data processing are available on request due to their large volume.

Standardized regression coefficients, standard deviations and p-values for model 0 are presented in Table 3.

Regarding the results presented in Table 3 cost of debt is affected by *social* CSR ($beta = -0.162$, $p = 0.053$) and *corporate governance* CSR ($beta = 0.204$, $p = 0.002$). *P*-value of 0.000 indicate a good fit of the regression model to the data. On the contrary, R^2 value of 0.265, likewise adjusted R^2 value of 0.179 are less satisfying. In terms of control variables leverage and risk prove to be significant predictors.

Standardized regression coefficients, standard deviations and p-values for models 1A–1B are shown in Table 4.

Results presented in Table 4 prove that cost of short-term debt is affected by *social* CSR ($beta = -0.184$, $p = 0.035$) and *corporate governance* CSR ($beta = 0.127$, $p = 0.063$), whereas cost of long-term debt is affected by all three dimensions of CSR, i.e. *environmental* ($beta = -0.163$, $p = 0.057$), *social* ($beta = -0.170$, $p = 0.043$), and *corporate governance* ($beta = 0.233$, $p = 0.000$).

Table 3. Standardized regression coefficients, standard deviations, and *p*-values for model 0

Independent / dependent variables	Model 0 (sqrt_Debt Cost)		
CSR variables			
log_CSR Environmental	−0.126	(0.061)	[0.137]
log_CSR Social	−0.162	(0.070)	[0.053]
log_CSR Corporate Governance	0.204	(0.053)	[0.002]
Control variables			
log_Size	−0.097	(0.048)	[0.348]
sqrt_Assets Structure	0.056	(0.129)	[0.572]
log_Liquidity	0.019	(0.115)	[0.799]
sqrt_Profitability	−0.042	(0.057)	[0.641]
sqrt_Leverage	0.373	(0.016)	[0.000]
sqrt_Risk	0.206	(0.241)	[0.008]
log_P/BV	0.099	(0.089)	[0.337]
log_Age	−0.092	(0.062)	[0.174]
Country	0.001	(0.000)	[0.993]
Industries			
Energy	−0.024	(0.129)	[0.796]
Consumer Staples	0.130	(0.128)	[0.190]
Consumer Discretionary	0.021	(0.113)	[0.812]
Materials	0.223	(0.123)	[0.076]
Real Estate	0.113	(0.125)	[0.215]
Health Care	0.051	(0.112)	[0.588]
Industrials	0.023	(0.106)	[0.817]
Information Technology	0.099	(0.105)	[0.285]
Utilities	0.004	(0.135)	[0.967]
Communication Services	0.174	(0.142)	[0.059]

* Standardized regression coefficients, standard deviations (in parentheses), and *p*-values (in brackets) are shown in the table.
** Finance industry was used as reference industry.

Source: Own work.

Table 4. Standardized regression coefficients, standard deviations, and *p*-values for models 1A and 1B

Independent / dependent variables	Model 1A (sqrt Short Term Debt Cost)			Model 1B (sqrt Long Term Debt Cost)		
CSR variables						
log_CSR Environmental	−0.096	(0.081)	[0.276]	−0.163	(0.072)	[0.057]
log_CSR Social	−0.184	(0.092)	[0.035]	−0.170	(0.082)	[0.043]
log_CSR Corporate Governance	0.127	(0.069)	[0.063]	0.233	(0.062)	[0.000]
Control variables						
log_Size	−0.171	(0.063)	[0.113]	−0.102	(0.057)	[0.326]
sqrt_Assets Structure	0.047	(0.170)	[0.650]	−0.021	(0.152)	[0.831]
log_Liquidity	−0.062	(0.152)	[0.431]	−0.075	(0.135)	[0.323]
sqrt_Profitability	−0.089	(0.075)	[0.346]	−0.124	(0.067)	[0.176]
sqrt_Leverage	0.210	(0.020)	[0.036]	0.194	(0.018)	[0.045]
sqrt_Risk	0.231	(0.318)	[0.004]	0.244	(0.283)	[0.002]
log_P/BV	0.048	(0.118)	[0.655]	0.149	(0.105)	[0.152]
log_Age	−0.106	(0.082)	[0.133]	−0.099	(0.073)	[0.147]
Country	−0.008	(0.000)	[0.912]	0.019	(0.000)	[0.784]
Industries						
Energy	−0.049	(0.170)	[0.616]	0.033	(0.152)	[0.727]
Consumer Staples	0.127	(0.168)	[0.221]	0.141	(0.150)	[0.157]
Consumer Discretionary	0.049	(0.148)	[0.595]	0.058	(0.132)	[0.513]
Materials	0.167	(0.161)	[0.202]	0.228	(0.144)	[0.071]
Real Estate	−0.003	(0.165)	[0.978]	0.026	(0.147)	[0.776]
Health Care	0.018	(0.148)	[0.854]	0.005	(0.132)	[0.954]
Industrials	−0.026	(0.140)	[0.800]	−0.026	(0.125)	[0.795]
Information Technology	0.038	(0.138)	[0.689]	0.039	(0.123)	[0.676]
Utilities	−0.002	(0.177)	[0.986]	0.041	(0.158)	[0.660]
Communication Services	0.101	(0.187)	[0.292]	0.137	(0.167)	[0.140]

* Standardized regression coefficients, standard deviations (in parentheses), and *p*-values (in brackets) are shown in the table.

** Finance industry was used as reference industry.

 Source: Own work.

P-values of 0.003 and 0.000 indicate a good fit of the regression models to the data. On the contrary R^2 values of 0.201 and 0.258, likewise adjusted R^2 values of 0.108 and 0.172 respectively for models 1A–1B are disputable, which may indicate that control variables—although selected on the basis of the literature review—are not comprehensive and may omit some important phenomena. Although the rates are low they coincide with other studies suggesting that the phenomenon of cost of debt is not well recognized, e.g. Ye and Zhang (2011) reached 0.251 R^2 in the best fit model and Magnanelli and Izzo (2017) reached 0.357 adjusted R^2. In terms of control variables leverage and risk prove a positive significant relationship for both the cost of short- and long-term debt.

In the light of the above results only part of the hypotheses can be confirmed. The rest should be rejected due to the opposite and unexpected direction of the examined relationships or cannot be confirmed due to the predictors' insignificance. *Environmental* CSR is significant and beneficial only in relation to cost of long-term debt whereas *social* CSR is significant and favourable in all the models. Thus the cost-of long term debt—as the only one among the examined types of capital—is affected by all CSR dimensions. The hypotheses concerning *corporate governance* CSR and cost of total, short- and long-term debt—although the results are significant—should be rejected because, surprisingly, the greater the involvement in *corporate governance* CSR, the higher the cost of cost of debt. It should be highlighted here that *corporate governance* is the only CSR dimension that affects all specified types of cost of capital. Considering the standardized regression coefficients it may be concluded that the cost of long-term debt is generally the most strongly affected by CSR dimensions.

Conclusions

The purpose of this article was to examine the impact of company's ESG involvement on its cost of debt (total, short- and long-term). This work fills the gap since the majority of studies focus on value creation, business performance or cost of equity. The novelty is the breakdown of CSR into three dimensions in the study: environmental, social and corporate governance as well as exploration of the term structure of CSR effects thanks to a separation of the cost of debt into short- and long-term. The article uses also the alternative database, i.e. Thomson Reuters (TR) Eikon, instead of MSCI ESG STATS (former KLD) used by majority of studies.

The findings of this study are interesting and consistent with the literature which lacks the unanimity. As the results indicate the *environmental* CSR decreases the cost of long-term debt whereas *social* CSR brings benefits to all types of cost of debt (total, short-term and long-term). Similar results were manifested by Oikonomou and others (2011), Ge and Liu (2015) and La Rosa and others (2018). The cost-of long term debt (as the only one here) seems to

be affected by all three CSR dimensions as well as indicating (considering the standardized regression coefficients) the strongest link with ESG issues of all. This could suggest that CSR importance increases over time which is consistent with Oikonomou and others (2011) findings.

In turn the relationship between *corporate governance* CSR and cost of total, short-term and long-term debt proved to be strong, statistically significant but unfavourable, i.e. the greater the level of *corporate governance* CSR, the higher the cost of the capital. Moreover, the *CG* was the only CSR dimension that affected all specified types of cost of debt. This may be surprising but studies such as (Sharfman & Fernando, 2008; Ye & Zhang, 2011; Magnanelli & Izzo, 2017) have already revealed such a possibility (although they focused on ERM or overall CSR indices and not CG alone). This might suggest that lenders see CG CSR expenditures as a waste of company resources, the cost of forgone opportunities or perceive this dimension as relatively well managed thus further expenditures could be perceived as overinvestment. This is consistent with Goss and Roberts' (2011) findings that lenders are able to discriminate between valuable and wasteful CSR expenditures and punish the latter through higher loan spreads. It seems that lenders see environmental and social investments as more value oriented than CG expenditures especially in companies such as those from Corporate Knights' ranking (the most sustainable companies in the world) which are likely to have a high level of corporate governance. The environmental and social dimension of CSR (even if also well developed in those companies) give more opportunities to control and discover new value drivers as well as to create new products and innovations.

In terms of other independent variables it is worth noting that leverage and risk proved to have positive significant relationship with both cost of short- and long-term debt as well as with cost of debt regardless of the term. The results are fully consistent with the theory. Risk as well as leverage are the factors which prompt investors to demand higher rates of return.

The study thereby enhances the academic discussion and has implications for business practice. It indicates that, considering cost of debt, companies' activities should be focused on social and environmental aspects of CSR while avoiding the engagement in the CG dimension as well as the outcomes of CSR policy which should be expected in the long run.

Regarding the limitations of the study it must be stressed that the analyzed data come from a specific data base (Thomson Reuters) which is only one of the potential sources of the information on ESG performance. This choice has some advantages but the results of empirical research may vary depending on the selected data base as it has the key impact on the scope of retrieved data and measurement of variables. The same limitations relate to the sample of the analyzed companies. Moreover, it is worth pointing out that the measurement of the CSR/CSP score is a complex challenge and so is the investigation of the impact of environmental, social and corporate governance responsibility on

a company's cost of debt. Both the CSR level or cost of capital are hardly observable and need proper proxy (e.g. implied cost of capital, ratings, spreads, covenants) and definition. The selection and measurement of variables is therefore crucial (the overview of solutions and variables used in other studies on ESG/CSR in corporate finance can be found in Gillan et al., 2021). Those could be added in future research include: CAPEX, R&D expenditures, innovations or country sustainability level. The CSR, ESG measures could be also further disaggregated in order to find the specific, key CSR factors.

Appendix

Table A1. Descriptive statistics of the initial sample

Variable	N	Min	Max	Mean	S. D.	Skewness	Kurtosis
Debt Cost	283	0.00	5.63	2.21	1.18	0.33	0.02
Short-term Debt Cost	283	0.03	6.67	1.28	1.00	1.65	4.44
Long-term Debt Cost	283	0.58	8.67	3.48	1.44	0.62	1.00
CSR Social	268	14.24	96.81	86.60	12.64	−2.72	9.17
CSR Environmental	268	23.59	95.15	86.72	12.56	−2.74	8.66
CSR Corporate Governance	268	4.67	97.45	72.50	21.76	−1.09	0.37
Size *(in million Euro)*	300	534	2,165,467	120,980	281,660	4.22	21.12
Assets Structure	295	0.00	0.91	0.23	0.24	1.11	0.31
Liquidity	242	0.31	3.93	1.13	0.64	1.83	4.22
Profitability	300	−17.37	41.29	4.97	6.28	1.39	6.76
Leverage	300	0.00	0.83	0.24	0.15	0.49	0.13
Risk	299	−0.31	3.24	0.99	0.36	0.63	5.46
P/BV*	297	0.21	68.96	3.77	6.09	6.19	52.17
Age	300	1.00	180.00	48.62	39.07	1.09	0.34

* A general review of the collected data resulted in the removal of the three data points with the lowest values of the P/BV variable. It was found that they are grossly outliers and indicate unusual financial phenomena or errors in the database.

Source: Own work.

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