

CSR & debt funding: The impact of corporate social responsibility on borrowing costs in the market

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Abstract

This paper examines the relationship between credit ratings and aggregate, as well as individual pillar CSR scores during the periods of 2009 and 2014 for European corporations. The results indicate that the aggregate CSR scores did not influence credit ratings for either period. However, social pillar scores had a statistically significant impact on credit ratings during the financial crisis of 2009, but not during the 2014 period. Furthermore, the 2009 relationship is driven by firms that perform especially well in terms of social pillar performance, and firms that performed poorly saw their credit rating unaffected. The 2009 relationship is deemed to be a factor of society valuing social pillar CSR efforts more highly during a period with plenty of societal hardship. Hence, corporate managers should aim to identify which CSR pillar is of special importance at present to reap the benefits on the corporations' cost of debt in capital markets. Furthermore, managers should maintain a flexible organization as it pertains to CSR work, in order to quickly pivot into areas where the benefit for the organization is the largest.

Keywords: CSR, credit ratings, strategy, cost of debt

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1 Introduction

1.1 Background

In recent years, corporate social responsibility (CSR) has gradually become more and more of a focal point for companies globally. Today, strong CSR performance is considered not only to be good from a societal perspective but also to be beneficial for the company in question as it can strengthen stakeholder trust. It has been shown that a holistic CSR strategy can improve brand image and reputation by focusing on CSR activities on a global scale (Popoli, 2011). Subsequently, the strengthened brand and reputation can provide competitive advantages in terms of customers' higher perceived quality, higher customer satisfaction and higher customer loyalty (Ogba & Tan, 2009). Studies have found that perceived CSR develops a sense of trust among employees (Chakraborty et al, 2018) which in turn has been shown to give rise to higher labour productivity, product/service quality and better financial performance (Brown et al, 2015). Furthermore, research also suggests that CSR communication, when implemented correctly, can strengthen consumer perception of the corporate's reputation (Kim, 2017). The benefits of CSR activities also spill over to the capital markets where evidence suggests that firms with high CSR performance have significantly better stock returns in periods where the overall population has little confidence in corporations, such as during the financial crisis of 2008 (Lins et al, 2017). CSR has also shown to have a positive effect on the financial performance of companies, where empirical research points towards the statistically significant effects of CSR performance on the return on assets, value of assets and a negative relationship between the risk (measured by the amount of leverage deployed by a company) and its CSR activities (Sun, 2012). Moreover, studies on listed Australian and Japanese companies found that CSR activities gives rise to lower cost of capital as a result of greater information transparency and increased trust (Bhuiyan & Nguyen, 2020; Suto & Takehara, 2017). Hence, there are much empirical research evidence for the positive impact of CSR on both stakeholder relations as well as on the cheapness of capital in the markets.

The effects that CSR has on the cost of capital in the markets could in theory be a spillover effect from its effect on stakeholder relationships. A stable relationship with stakeholders provide a number of benefits. Employees have been shown to put

in more effort in the workplace when they feel that there is a positive relationship between themselves and their employers (Dukerich et al, 1994). Research has also shown that a stable relationship between a business and its customers has a positive effect on customer willingness to pay and the per customer quantity of consumption (Brown & Dacin, 1997) while also benefiting overall financial performance of the company (Chi & Gursoy, 2009). Lastly, studies have indicated that firms which have developed strong relationships with their suppliers obtains a competitive advantage relative to peers due to better communication and integration of the firms business with that of the suppliers' (Al-Abdallah et al, 2014). When studying all of these beneficial effects together, the advantages of high CSR performance from an operational perspective becomes apparent. This further implies that a business with high CSR performance should be considered less risky than one that performs poorly from a CSR perspective, all other things equal.

The term CSR is often vaguely defined and can hence obtain different meanings depending on the context. To be able to draw conclusions and conduct analysis based on CSR, there is a need to provide a proper definition of the term which is to be used throughout this paper. The chosen definition is the one established by the European Commission in 2011, which defines CSR as *the responsibility of enterprises for their impacts on society* (European Commission, 2011). Using this definition allows for the term CSR to encompass both environmental aspects, social aspects as well as other factors by which the corporation in question can impact local communities, stakeholders, the environment and future generations globally.

1.2 Hypothesis

As discussed in [section 1.1](#) there has been plenty of research published on the advantages of CSR performance for corporations from both an operational and financial perspective. A possible implication of this is that firms with a strong performance as it pertains to CSR activities should be considered to bear less operational and financial risks. By extension, investors could be more willing to provide cheaper funding for such firms, given that the apparent risk of default is lower. More specifically, the advantages of strong CSR performance should therefore allow firms to access capital in the markets for a lower cost, *ceteris paribus*. The primary hypothesis is hence that higher scores in the CSR metrics of the constituents of the EuroNext 100 should have a negative relationship with the cost of capital due to the many apparent operational and financial advantages of strong CSR performance.

1.3 Purpose

The purpose of this paper is twofold. First, it aims to examine if there exists a statistically significant relationship between the CSR metrics of the EuroNext 100 constituents and the corporations credit ratings. The second purpose is to examine the implications of such a relationship and identify how CSR managers and executives can utilize the results to lower their cost of debt capital.

1.4 Literature review

Multiple papers have been written on the relationship between CSR and credit ratings in the last couple of years. However, the results of such papers can vary based on geographical region and definitions of the relevant variables. In this section, relevant papers published on the CSR/credit rating relationship will be examined in order to compare such results to the those of this paper, presented in [section 3](#). The studies have been identified by the use of Google Scholar, where articles focused on credit ratings and CSR were searched for. The searches were limited to the time period between 2000-2022. The papers were chosen so as to give a broad perspective on the research which has been published on the topic globally.

A study by Kim & Kim (2014) analysed the relationship between non-financial information and credit ratings in the Korean markets. Utilizing both CSR scores and corporate governance scores in linear regression models, the authors found that both primary independent variables had a positive effect on credit rating scores. They attributed this to the reduced information asymmetry which came about because of higher CSR and corporate governance scores. However, other research have found that there exists no general relationship (Changchien et al., 2021). Instead, firms that already enjoyed great operational, marketing, sales, R&D etc. proficiency could see a positive effect from CSR activities on credit ratings. Hence, not all firms benefited from CSR activities on a cost of debt capital basis. Instead, only firms that were already capable in other areas of activity were found to reap the benefits from CSR. While studying the relationship between CSR and bond yield spreads for American firms, Ge & Liu (2015) also found that CSR and credit ratings covaried and that strong CSR performance yielded a better credit rating. Hence, the general research results indicate that there exists benefits from a cost of capital perspective in performing well in CSR measures.

Fabozzi, Wah Ng & Tunaru (2021) investigated the effects of CSR scores on credit

ratings, but for Japanese firms over the period of 2009 to 2015. They studied the three ESG pillars separately and found that the environmental and governance pillars had a significant positive impact. The social pillar did not show a significant relationship with credit ratings on any level. A similar pillar analysis was conducted by Wang (2020), breaking down CSR into six components: community, diversity, employee relations, the environment, human rights and product. Wang found that community, diversity, employee relations and environmental scores all had a positive impact on credit ratings. The degree to which CSR effects credit ratings also has been found to vary based on whether a company is performing very strongly or very poorly in its CSR activities. This was the results of a paper by Chen & Hsu (2015). They found that positive CSR performance has a bigger impact on credit rating forecasts than negative CSR performance for American firms. This result indicates that investors respond more heavily to positive changes in CSR performance than negative ones. Similar results were obtained by Carnevale et al. (2018) who analysed the effects of CSR up-/downgrades on credit default swap (CDS) spreads in European markets. The paper showed that CSR upgrades had a negative relationship with CDS spreads. This implies that increased CSR performance caused immediate decreases in CDS spreads, implying that firms' bonds were considered safer after the upgrade. However, no relationship was found between CSR downgrades and immediate moves in CDS spread. The CSR/rating relationship also varies based on the business, where sectors with large regulatory requirements, such as the energy, industrial, material and utility sectors saw their credit ratings more influenced by ESG scores (Chodnicka-Jaworska, 2021). Such firms run the risk of being impacted financially to a larger extent if the ESG performance is lacking due to regulatory requirements and hence obtains a lower credit rating.

Research has also indicated some differences between American and European firms in terms of the CSR/credit rating relationship. In a paper by Bannier et al. (2022), European and American firms were analysed to identify the effects of ESG pillar performance on market based credit risk metrics. The authors found that higher environmental pillar scores decreased market based credit risk metrics both for European and American firms. For the social pillar score, better performance led to lower market based risk metrics for European firms while actually increasing risk metrics for American firms. Hence there is some discrepancy between the two geographical regions in terms of the different pillar scores and their influences on credit ratings. Social pillar scores seem to be valued more highly in European markets than in their American counterpart's. Schuitema (2018) also identified some discrepancies between American and European markets. The results showed that aggregate CSR performance was positively related to credit ratings, but the relationship was stronger for American firms than for their European counterparts. The relationship existed for companies of both geographical areas but at a 99% significance level for American firms and a 90% significance level for European firms. This implies that

the relationship between credit ratings and CSR is less pronounced or potentially non-existent in Europe.

1.5 Limitations

As stated in the [Hypothesis](#) section above, the aim is to examine the relationship between CSR and cost of debt. However, cost of debt is a wide expression which includes everything from interest rates paid on conventional bank loans, interest payments on utilized credit facilities as well as coupon payments on corporate bonds which have been issued in the market. Here, the proxy for cost of debt that is to be used is coupon payments on bonds. The rationale behind this is that debt issued on markets is the only part of cost of debt which is directly tied to investors' view of the company in question, and hence reflect the trust investors have in the company.

The factors that govern the size of the coupon payments on corporate bonds can be divided into two primary categories. The first category encompasses all macroeconomic factors and includes current level of inflation, the prevailing interest rates set by the central bank of the country where the corporation does business as well as economic growth. The second category is all the idiosyncratic risk factors. There is some ambiguity as to which idiosyncratic factors impact cost of debt. However, some factors are widely used and accepted amongst practitioners, e.g.

- Profitability
- Leverage
- Liquidity
- Growth
- Size

Variations of these factors are included in the default model *RiskCalc*, which has been developed and used by the rating agency Moody's for estimating the default probabilities of corporations (Boral et al, 2000). All the idiosyncratic factors affect the credit rating of the corporation which in turn should convey all firm-specific risk that influences the size of the corporate bond coupons. Since CSR is a firm-specific factor, it should only have an effect on this category and it is for that reason that firms' credit rating will be used as a proxy for the idiosyncratic part of the coupon size.

This paper will look at certain periods in time to determine the effects of CSR on credit ratings. Corporations are dynamic entities and their financial as well as operational performance change over time. Studies have shown that CSR performance has a positive impact on stock returns during periods of low trust but not during times of normal/high trust (Lins et al, 2017). It is therefore appropriate to examine if this relationship holds as it pertains to credit scores as well. This paper will hence study two separate periods to see if results vary between periods of different levels of public trust in corporations. Using the Edelman Trust Barometer as the measure of public trust in companies, 2009 is identified as a year in which trust declined steeply in the European Union. According to the report, around 67% of respondents in France and Spain saw their trust in corporations decline since the previous year while the same figure for Germany was 73% (Edelman Trust Barometer, 2010). Therefore, this year will represent the "low trust" period and the reference period will be 2014 where public trust in corporations according to the survey was relatively high (Edelman Trust Barometer, 2015).

2 Methodology

2.1 Measure of CSR performance

How to package the complete CSR performance of a corporation into a single number is a complex issue in its own right. Various different measures exist, such as those provided by *MSCI database*, *Refinitiv* and *Bloomberg*. This paper uses the definition provided by the European Commission (EC), as stated in the end of the **Background** section. Hence, the chosen measurement to be used in the ordinal probit regression model should reflect this definition and therefore cover the degree to which enterprises impact society as a whole. The CSR measurement used here consists of ESG data provided by Refinitiv and is an average of a corporation's scores in the three main categories: Environmental, Social and Governance. While CSR is a broader term than ESG, the ESG aspect is deemed to cover the tangible parts of the CSR term and is therefore used as a measure of firms' CSR performance. The three categories are measured by what Refinitiv calls environmental, social and governance scores. The three pillar scores are defined in the following way by Refinitiv (2022):

Environmental Pillar Score Definition

The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.

Social Pillar Score Definition

The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.

Governance Pillar Score Definition

The corporate governance pillar measures a company's systems and processes, which

ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.

In order to create a single independent variable for the CSR performance of each firm, the average of the firms' score in each of the three pillars were used to construct a final measure of CSR performance. The measure is a number ranging from 0 to 100 with 100 being the highest rating a corporation can obtain in terms of CSR score and 0 is the lowest rating.

2.2 Measure of credit rating

There are a number of different credit rating agencies that are widely recognised and which are meant to reflect the probability of a specific corporation defaulting on its debt obligations or outstanding bonds. The most common credit ratings are determined by the rating agencies *Moody's*, *S&P Global*, and *Fitch Ratings*. There are however two primary issues with using the ratings provided by these agencies. The first being that none of these rating agencies cover all the corporations which make up the constituents of the EuroNext 100 index. This could be solved by instead using different ratings for different corporations but this yields another issue which is that the ratings of different agencies are not necessarily comparable with each other on a direct basis. The only credit rating which existed for all the EuroNext 100 constituents in both 2009 and 2014 was the one which *Bloomberg* provides, and hence it is used as a measure of credit rating in this paper.

The *Bloomberg* credit rating is called 1-year default risk and each rating reflects an interval of 1-year default probability, i.e., the likelihood that the corporation in question defaults on its debt in the coming 12 months. The ratings are categorized into 3 primary groups, *Investment grade* (IG), *High yield* (HY) and *Distressed* (DS). IG rated corporations are deemed to be financially sound with little risk of suffering a default in the short-term. Those corporations which obtain a HY rating are not considered to be financially stable and often experience higher price volatility and maintains a fairly high amount of leverage on their balance sheet. The third category, DS corporations, are often considered very likely to default and the risks associated with borrowing to such corporations are high. Hence, the borrowing rates that these companies obtain on debt capital markets are often extremely high as investors con-

sider repayments to be very uncertain.

Within each of these three primary categories, there are a number of subcategories which divides corporations into groups more specifically according to their 1-year probability of default. The full rating categories and the respective probability of default interval are displayed in *table 1* below.

Category	IG	HY	DS
1	0.0000-0.0020	0.5200-0.8800	10.0000-15.0000
2	0.0020-0.0040	0.8800-1.5000	15.0000-22.0000
3	0.0040-0.0080	1.5000-2.4000	22.0000-30.0000
4	0.0080-0.0152	2.4000-4.0000	30.0000-50.0000
5	0.0152-0.0286	4.0000-6.0000	50.0000-100.0000
6	0.0286-0.0529	6.0000-10.0000	
7	0.0529-0.0960		
8	0.0960-0.1715		
9	0.1715-0.3000		
10	0.3000-0.5200		

Table 1: The 1-year default probability intervals corresponding to each of the Bloomberg credit ratings. All probabilities are given in %. The three columns correspond to the three primary ratings, investment grade, high yield and distressed. Rows represent the subcategories in each of the three primary rating categories.

2.3 Control Variables

The regression analysis to be used in this paper to analyse the relationship between CSR performance and credit ratings (explained in detail in the [Choice of model](#) section) can be influenced by other factors which have an impact on corporations credit rating. To take this into account, regressions will be run both with and without a number of control variables. If the chosen CSR measure just happens to correlate with another factor which itself affects the credit rating, the uni-variate ordinal probit regression model could potentially yield a false positive result, which should be noticed in the regression model where the control variables are also included as independent variables. The control variables used are presented in the following sections together with a brief motivation behind their potential impact on credit ratings.

2.3.1 Return on assets

Return on assets (ROA) is a measure of profitability in relation to total assets, and is defined by:

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}}$$

Its impact on credit ratings is a consequence of the fact that a more profitable firm should have a higher equity value *ceteris paribus*. This is a direct consequence of the fact that a firm with high ROA utilizes its resources more efficiently than a similar company with a lower ROA. Since most credit models are built on the foundation that equity can be viewed as a call option on a firm's assets (Merton, 1974), the higher equity value that a corporation with high ROA experiences should mean a lower default probability and hence a stronger credit rating.

2.3.2 Leverage

There are a number of different measures of leverage used in financial analysis. One of the more common measures is the net-debt-to-capital ratio which is defined as:

$$\text{Leverage} = \frac{\text{Net debt}}{\text{Capital}}$$

where

$$\text{Net debt} = \text{Short-term debt} + \text{Long-term debt} - \text{cash \& cash-equivalents}$$

This reflects the ratio of capital to the total debt remaining after the company has paid of what it can using very liquid assets. A larger leverage implies that the company has relatively much outstanding debt. Hence, the probability that it will fail to honor its obligations should be deemed greater than if it had less leverage.

2.3.3 Current Ratio

The current ratio is a measure of the liquidity of a firm, or in other words how much easily obtained cash the firm has on its balance sheet. The definition is:

$$\text{Current Ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

The effect of the current ratio on the credit rating of a firm stems from the fact that it is less likely to default on short-term debt if such obligations have a value which is lower than the current, liquid assets that the firm holds on its balance sheet.

2.3.4 Sales growth

Sales growth is a measure of year-over-year growth in a firms sales. The measure is defined as:

$$\text{Sales growth} = \frac{\text{Current year sales} - \text{Previous year sales}}{\text{Previous year sales}}$$

The rationale behind sales growth having an effect on firm credit ratings is that a firm which grows rapidly will have a greater ability to repay its debts in the future, leading to less uncertainty and lower probability of default, implying a stronger credit rating.

2.3.5 Size

The chosen measure of size in this paper is the total value of the assets on the firms balance sheet. As previously mentioned, size is a measure which is used in many credit models to determine probability of default. Firms of a smaller size tend to be less diversified than larger corporations. Hence, the idiosyncratic risk factors associated with a smaller firm are often larger than for large conglomerates. The idiosyncratic risk has a direct effect on the credit worthiness of a firm and hence size should influence the firms' credit rating.

2.4 Choice of model

The hypothesis which was put forth in [section 1.2](#) is now to be empirically tested. The choice of test is a multinomial ordinal probit regression model. The model is common to use when dealing with a dependent variable which takes more than 2 ordinal, integer outcome values ('Ordered probit', 2022). The model utilizes a temporary outcome variable, Y , which is assumed to follow a standard normal distribution

$$Y \sim N(0, 1)$$

The relationships between this outcome variable and the independent variables are, for a given observation

$$y_i = \mathbf{x}_i' \boldsymbol{\beta} + \varepsilon_i$$

where ε_i is the residual of the model. Determining suitable threshold values of Y for the different credit rating outcomes allows one to model the ordered dependent variables by a linear regression model. As an example of the threshold values, say that there are only 3 credit ratings, IG, HY and DS. The threshold values of Y used to determine which credit rating a firm should have can be as shown in *figure 1* below. A value of $Y < -0.73$ implies IG rating, a Y value of $-0.73 < Y < 1.12$ implies HY rating and if $1.12 < Y$ the firm is deemed to have a DS rating.

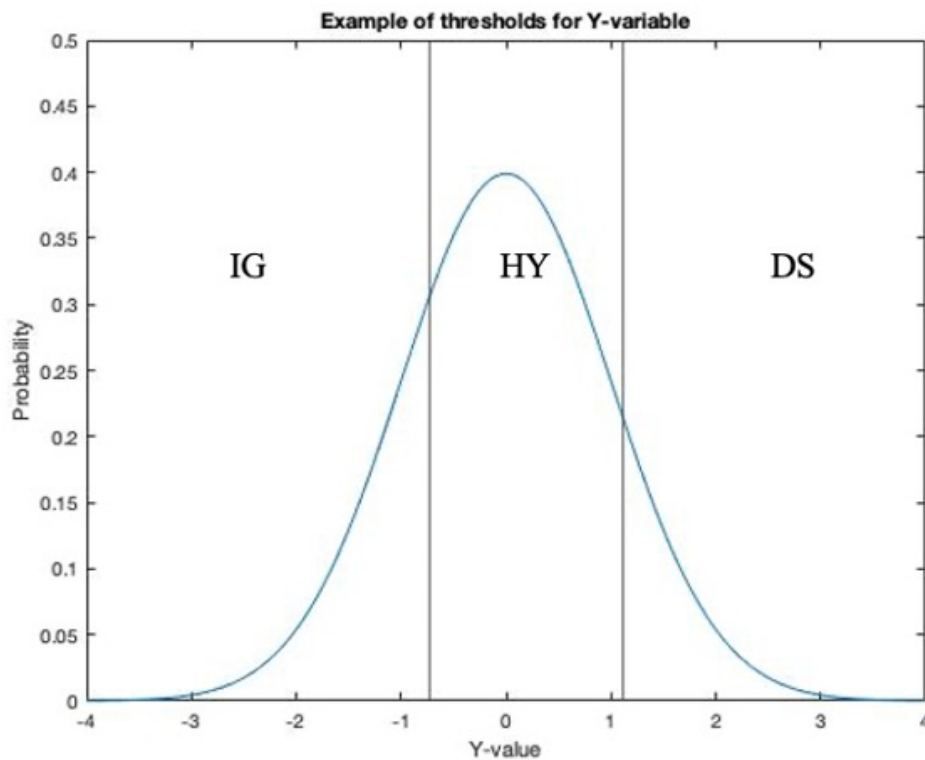


Figure 1: Example of the classification threshold values used in the multinomial ordinal probit regression model. The example assumes that there are three ordinal categories, IG, HY and DS. The Y-variable is assumed to follow a standard Gaussian distribution.

The approach is to use two different structures for each model, one composed of only credit rating and CSR and one larger model also taking into account the effects of a number of relevant control variables. This second model allows for controlling

that any statistically significant relationship between CSR and credit ratings is not due to accidental correlation between the CSR measure and other factors that has an impact on the credit rating. The control variables used in the second model were disclosed in the Control Variables section above. Furthermore, the two model structures will also be used to analyse the individual pillars of the CSR measure, that is the environmental, social and governance pillars respectively.

The first model, using the continuous CSR, allows for the examination of whether overall CSR performance carries explanatory power for the credit rating. The model using the individual CSR pillar scores, environmental, social and governance, tests if there is some specific aspect of CSR that is specifically powerful in determining credit ratings. Finally the model using dummy quartile variables instead of continuous variables examines if the explanatory power of any variable stems from firms only performing especially well or especially poorly.

3 Data and results

First, let's examine the raw data set which is used to produce the results. This allows for a proper understanding of the changes in the dynamics over the five years between 2009 and 2014 and will hopefully make the results clearer. Section 3.2, [Analysis and results](#), shows the results of the different regression models for both the 2009 period and the 2014 period.

3.1 Data overview

The data set is comprised of 67 firms, all of which are constituents of the EuroNext 100 index. They all stem from 6 European countries: France, the Netherlands, Norway, Portugal, Belgium and Ireland. The frequency of firms in the data set by geographical region is shown in *table 2* below. Furthermore, the firms in the data set belong to eight different sectors, the frequency of which are also shown in *table 2*.

	# of firms	% of data set
By geographical region		
France	37	55.2%
Netherlands	12	17.9%
Norway	6	9.0%
Portugal	4	6.0%
Belgium	4	6.0%
Ireland	4	6.0%
By sector		
Industrials	17	25.4%
Consumer	17	25.4%
Basic materials	9	13.4%
Communication services	6	9.0%
Healthcare	5	7.5%
Energy	5	7.5%
Utilities	4	6.0%
Technology	4	6.0%

Table 2: Frequency and percentage of data by geographical region and sector. Total data set consists of 67 firms belonging to six countries and eight sectors.

Table 3 below shows the mean, median, quartile limits, max, min and variance of each category of data used in the analysis.

Looking at the credit ratings of the relevant firms in 2009 and comparing with 2014, it is clear that the financial crisis had a large effect on credit ratings. An average firm in the index during 2009 was rated IG7 while in 2014 the average firm was rated IG3. This implies that the average firm was considered 12.4 times more likely to default within a year. Looking at the standard deviation of the credit ratings in the two periods, it is also apparent that the standard deviation actually increased in 2014 relative to the 2009 statistics. This implies that there was a greater spread in the credit ratings of corporations in 2014 which can be a consequence of more normal economic conditions where the credit rating is dominated by the idiosyncratic risk of the firm instead of the more general state of the economy.

The CSR performance of the firms also improved between 2009 and 2014 with the mean and median CSR scores increasing 4.79 and 2.65 respectively. Furthermore, the worst performing firm in 2014 had a CSR score of 26.60 compared to 20.55 in 2009. Hence, corporations undoubtedly increased their awareness and efforts of CSR activities during the five year interim. Looking at the individual pillars of the CSR data (E, S & G) the same behaviour as in the overall CSR score is seen in both the social and the governance pillar. As for the environmental aspect, the same holds although it is less pronounced than in the two other pillars, with the mean score increasing a few points while the median actually decreased by .35. This indicates the worst performers improved significantly which is also validated by the minimum value which increased from 7.75 to 17.28 in the interim period.

Furthermore, all control variables also improved, both average and median values, between the two periods, which is unsurprising considering the tough economic conditions that was brought on by the financial crisis of 2009. This is also shown in the credit ratings that improved in the interim, which should have been influenced to some degree by the company specific financial measures that are used as control variables in this paper. Moreover, the standard deviation of ROA and growth, which are typical financial measures of corporate performance, actually decreased in 2014 relative to 2009. This further points towards the very volatile conditions of the financial crisis where some firms performed well while most firms were hit hard and saw their performance vary wildly.

	Mean	Median	Q _{0.25}	Q _{0.75}	Min	Max	S.D.
2009 Data							
Rating	7.41	7	6	10	1	13	2.69
ESG	61.88	64.08	51.93	72.95	20.55	94.29	15.43
E	68.15	74.05	49.68	85.87	7.75	97.24	21.15
S	63.68	68.04	48.29	76.01	15.90	94.76	18.20
G	53.81	53.84	38.56	66.31	9.40	98.30	21.84
ROA	3.02	3.50	1.18	5.31	-13.06	12.07	3.94
Leverage	53.64	28.58	14.52	39.30	-145.22	79.48	39.94
Liquidity	1.39	1.19	0.92	1.68	0.42	3.30	0.66
Growth	-7.18	-5.64	-15.48	2.94	-51.16	56.37	16.55
Size	31.51	16.50	6.39	37.02	0.85	240.04	44.44
2014 Data							
Rating	3.49	2	1	5	1	11	2.83
ESG	66.67	66.73	57.90	77.41	26.60	91.57	12.96
E	71.50	73.70	57.62	86.57	17.28	97.05	18.26
S	70.89	74.20	60.03	85.10	29.55	98.10	17.08
G	57.61	62.91	37.97	75.55	11.75	95.22	21.79
ROA	3.79	3.57	2.10	5.65	-5.05	11.17	3.10
Leverage	25.86	23.81	12.17	40.31	-38.04	325.73	43.45
Liquidity	1.42	1.25	0.96	1.75	0.44	4.61	0.69
Growth	0.43	0.87	-2.73	6.06	-71.75	31.93	12.55
Size	38.13	18.56	7.44	41.16	1.34	291.83	55.61

Table 3: Statistics on the data used in the cross-sectional regression model. Data set contains 67 firms which are constituents of the EuroNext 100 index as of March 2022. Return on assets (ROA) and growth are given in percentage points. Size is given in billions of euros.

3.2 Analysis and results

The first models that were examined were the uni-variate regression model with only CSR as independent variable. First, results are provided for the period of 2009 and subsequently the results from the 2014 period will be displayed. The next section shows the results for the ordinal regression model using the 5 control variables as well as the CSR variable, yielding a total of 6 independent variables. Again, the 2009 model is presented first and then the results will be compared with those of the 2014 model. Following this is the regression models using the three ESG variables separately in both 2009 and 2014. This will break down the data further and show if the results in the first regressions are due to all three ESG pillars or if only some specific pillar has a statistically significant effect. This regression model will also be used together with the control variables in order to remove any accidental correlations producing false positive results. Finally, the last two sections will show the results of the regression models when using E, S & G quartile dummy variables instead of the continuous variables. Again, this model version will be used both for 2009 and 2014 as well as both with and without the five control variables presented in the [Control Variables](#) section.

The results of each regression analysis will now be presented in the tables below. Each table will show the values of the coefficients obtained from the regression as well as three confidence intervals corresponding to the significance levels of 90%, 95% and 99% respectively.

3.2.1 Regression with only continuous CSR variable

The results of the basic regression model with only a continuous CSR variable is displayed in *table 4* and *table 5* below, corresponding to 2009 and 2014 respectively. The results shows the estimated coefficient values of the regression model as well as the level of statistical significance of the coefficients.

2009 results - Regression with continuous CSR

Variable	Coeff value	90% confint	95% confint	99% confint
CSR	-0.003	-0.016 - 0.011	-0.019 - 0.013	-0.024 - 0.018

Table 4: The results of the 2009 uni-variate ordinal probit regression model using only continuous CSR as independent variable. Showing the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or *** next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .

The 2009 regression with only the continuous CSR variable as independent variable yielded a coefficient value of -0.003 which indicates an inverse relationship between the CSR performance of a corporation and its credit rating. This is in line with the papers hypothesis of better CSR performance decreasing the default probability of a corporation.

Now turning to the confidence intervals which shows if the regression coefficient of -0.003 obtained in the analysis is actually statistically different from zero. Starting with the 90% confidence interval, it shows that the interval actually does contain the value of 0. The same holds true for the confidence levels of 95% and 99% respectively. This means that the regression coefficient here is not actually different from 0 and hence the conclusion is that the relationship between the continuous CSR variable and credit ratings is deemed statistically non-existent. In other words, during 2009, continuous CSR scores had no impact on the credit ratings of the corporations that are studied in this paper, which are the constituents of the EuroNext 100 index.

2014 results - Regression with continuous CSR

Variable	Coeff value	90% confint	95% confint	99% confint
CSR	0.012	-0.005 - 0.029	-0.009 - 0.032	-0.015 - 0.038

Table 5: The results of the 2014 uni-variate ordinal probit regression model using only continuous CSR as independent variable. Showing the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or *** next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .

Table 5 above displays the results of the 2014 uni-variate ordinal probit regression

model with continuous CSR as the single independent variable. Looking at table 4, the coefficient value for the CSR variable was 0.012 implying that a greater CSR score actually gave rise to worse credit score. This is a rather counter-intuitive result but examining the confidence intervals for the regression coefficient shows that the intervals all cover 0. The regression coefficient is hence not significantly different from zero and the result should be interpreted as CSR not having any effect on the credit rating of corporations in the EuroNext 100 during the 2014 period.

Hence one can conclude that the overall CSR score of a firm in the EuroNext 100 had no significant power in determining the credit rating during the 2009 and 2014 periods. However, this raises the question of whether one or more of the three constituent pillars of the CSR score used in this analysis has statistical power to influence credit ratings on its own. That is what the paper will now proceed to examine in the following section.

3.2.2 Regression with separate, continuous, pillar scores

As discussed in the [previous section](#) the overall continuous CSR score did not carry any statistically significant power to influence the credit rating of corporations. The regression models in this section will hence aim to examine the influence that each individual pillar score has in determining the credit ratings. The two primary questions are whether any of the pillars effects the rating, and if so, has the dynamics of the relationships changed between 2009 and 2014?

To carry out this analysis, multivariate ordinal probit regression models will be used. The independent variables in the regression will be the three continuous pillar scores of environmental, social and governance performance for each firm. The results of the analysis is presented in *table 6* and *table 7* below, together with a brief discussion on the results.

2009 results - Regression with continuous pillar scores

Variable	Coeff value	90% confint	95% confint	99% confint
E	0.007	-0.004 - 0.018	-0.006 - 0.020	-0.010 - 0.024
S*	-0.015	-0.028 - -0.002	-0.031 - 0.001	-0.036 - 0.006
G	0.003	-0.007 - 0.013	-0.009 - 0.015	-0.013 - 0.019

Table 6: The results of the 2009 multivariate ordinal probit regression model using continuous environmental, social and governance pillar scores as independent variables. The table shows the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or * next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .**

Studying *table 6* above, the coefficient values for the environmental and governance pillars are positive while the corresponding value for the social pillar is negative. This implies that better environmental and governance performance actually worsened credit ratings while social pillar performance led to improved credit ratings. However, both the environmental and governance coefficients are non-significant at all three confidence levels, implying that there is no relationship between such performance measures and credit ratings. The more interesting result is the fact that the coefficient for the social performance variable is statistically significant at the level of $\alpha = 0.1$. This indicates that greater social pillar performance statistically improved credit ratings to some degree. However, it is not deemed significant at the levels of $\alpha = 0.05$ and $\alpha = 0.01$ which could imply that there is no relationship or it can be a consequence of limited data set size.

2014 results - Regression with continuous pillar scores

Variable	Coeff value	90% confint	95% confint	99% confint
E***	0.023	0.009 - 0.037	0.007 - 0.040	0.002 - 0.045
S	-0.002	-0.016 - 0.013	-0.018 - 0.015	-0.024 - 0.020
G	-0.008	-0.018 - 0.003	-0.020 - 0.004	-0.024 - 0.008

Table 7: The results of the 2014 multivariate ordinal probit regression model using continuous environmental, social and governance pillar scores as independent variables. The table shows the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or * next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .**

Examining *table 7* above, the results are quite different from the results presented for the 2009 period in [table 6](#). In the 2014 model the environmental regression coefficient is positive while the equivalent values for the social and governance pillars are negative. This indicates that better environmental performance actually yielded a worse credit rating than those corporations that performed poorly from an environmental point of view. The result seems rather counter-intuitive initially and there could be a number of explanations behind the relationship. For example, if firms during 2014 had started to invest more to reduce the environmental footprint of their operations, such firms could have lower cash reserves. They could also have neglected investments in other parts of their operations as environmental work became more of a focal point for corporations. Such behavior could be viewed as beneficial in the long-term but since the credit ratings used here reflect 1-year default risk, a short-term negative impact from such investments could be an explanation. The author of this paper believes that further studies could and should be done in order to comprehend the reason behind this result.

Looking at the confidence intervals, both the social and governance pillar score intervals cover the value 0 at all levels of α . This indicates that there is no statistical relationship between the two pillars and the credit rating of a corporation and hence they have no impact. On the other hand, the regression coefficient for the environmental pillar score is significant at all three confidence levels and hence it seems to have a clear statistical effect on credit ratings.

Looking at the two analyses' results together indicates a potential shift in which aspect of CSR that is deemed more important from a default perspective. During the financial crisis of 2009, the social aspect and what corporations did in societal terms were likely deemed more important in the eyes of lenders in public markets. On the other hand, in 2014, the primary CSR indicator which affected credit ratings was the environmental pillar. But in this case, larger focus on environmental performance had a negative impact on short-term (1 year) credit rating, which as discussed above could be due to a number of different factors.

3.2.3 Regression with pillar score and control variables

The results in [section 3.2.2](#) implied that there is a relationship between the social/environmental pillar performance and credit ratings in 2009 and 2014 respectively. The aim in this section is to control if the relationships are a result of accidental correlation between independent variables. Hence, the regression models here are the same as those in the previous section but with the inclusion of control variables. The results of the 2009 and 2014 analysis are presented in *table 8* and *table 9* below.

2009 results - Regression with pillar scores and control variates

Variable	Coeff value	90% confint	95% confint	99% confint
E	0.007	-0.006 - 0.019	-0.009 - 0.022	-0.013 - 0.027
S**	-0.020	-0.033 - -0.006	-0.036 - -0.003	-0.041 - 0.002
G	-0.003	-0.014 - 0.008	-0.016 - 0.010	-0.020 - 0.014
ROA***	-0.255	-0.333 - -0.178	-0.348 - -0.164	-0.378 - -0.135
Leverage**	0.009	0.002 - 0.016	0.001 - 0.017	-0.002 - 0.020
Liquidity	0.112	-0.276 - 0.500	-0.350 - 0.574	-0.495 - 0.720
Growth	0.000	-0.014 - 0.014	-0.017 - 0.017	-0.022 - 0.022
ln(size)	-0.021	-0.247 - 0.206	-0.290 - 0.249	-0.375 - 0.334

Table 8: The results of the 2009 multivariate ordinal probit regression model using continuous environmental, social and governance pillar scores as independent variables, together with the control variates. The table shows the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or * next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .**

Looking at *table 8* above, the results for 2009 are in line with those in [table 6](#). In other words, the only one of the three ESG pillar variables which is statistically significant at any level is the social pillar. The results indicate that obtaining a higher score in the social pillar implies that the firms credit rating should be better, all other things equal. The social pillar coefficient is significant at a 95% confidence level even in the presence of the control variates. This further confirms that the results presented in [section 3.2.2](#) are not due to accidental correlation with some other variable but instead the relationship actually exists.

Also mentioning the control variates, it is clear that return on assets (ROA) and leverage are significant and influences the credit rating of the corporations. Higher return on assets implies a better credit rating while the relationship is the opposite for the amount of leverage a firm deploys. Both of these relationships are to be expected and as such, does not come as a surprise.

2014 results - Regression with pillar scores and control variates

Variable	Coeff value	90% confint	95% confint	99% confint
E	0.007	-0.008 - 0.023	-0.011 - 0.026	-0.017 - 0.031
S	0.001	-0.014 - 0.016	-0.017 - 0.019	-0.023 - 0.025
G	-0.008	-0.019 - 0.003	-0.021 - 0.005	-0.025 - 0.009
ROA***	-0.192	-0.284 - -0.103	-0.302 - -0.087	-0.338 - -0.054
Leverage	0.003	-0.008 - 0.014	-0.010 - 0.016	-0.014 - 0.020
Liquidity	0.089	-0.356 - 0.533	-0.441 - 0.617	-0.608 - 0.784
Growth	-0.015	-0.034 - 0.005	-0.038 - 0.008	-0.045 - 0.015
ln(size)*	0.271	0.034 - 0.509	-0.011 - 0.555	-0.100 - 0.644

Table 9: The results of the 2014 multivariate ordinal probit regression model using continuous environmental, social and governance pillar scores as independent variables, together with the control variates. The table shows the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or * next to the variable name. As is standard, if the confidence interval covers 0, the coefficient is not considered statistically significant at the level of α .**

Table 9 above shows the results of the regression model with control variates for 2014. Unlike the results for the 2014 model using only pillar scores (table 7), there exists no statistically significant relationship between the pillar scores and the credit rating of a corporation. Hence, the results in section 3.2.2 which indicated that higher environmental pillar scores implied a worse credit rating, was in fact non-existent. Instead, they were a consequence of accidental correlation between the environmental pillar score and one of the control variates.

Comparing the 2009 and 2014 regression results, the only significant relationship is found in the social pillar. Furthermore, this relationship is only found during the 2009 period in which public trust in corporations was low. There are a number of potential explanations for these results. During the financial crisis of 2009, the population in general suffered tremendous economic hardship. Corporations which performed well in the social pillar of CSR could have been seen as less greedy and more morally sound. This boost to the image of the corporation could make it seen as less risky and which yielded a better credit rating. Simultaneously, corporations that performed very poorly in regards to the social pillar score could have seen their image severely damaged. In order to further examine which of the two scenarios that were prevalent, section 3.2.4 will run the regression using dummy quartiles on the social pillar scores.

3.2.4 Regression with social pillar quartiles and control variables

In this section, the regression model will consist of social pillar quartiles in the form of dummy variables together with control variates. It will be run on the 2009 data as this was the regression model that yielded statistically significant relationships between social pillar scores and credit ratings. The aim is to examine if the statistically significant effect is only prevalent in firms that performed especially poorly or especially well in terms of the social aspect of CSR. The results are presented in [table 10](#) below.

2009 results - Regression with quartile social pillar scores

Variable	Coeff value	90% confint	95% confint	99% confint
$I_{S,1}$	0.371	-0.265 - 1.008	-0.387 - 1.130	-0.625 - 1.369
$I_{S,2}$	-0.404	-1.019 - 0.210	-1.137 - 0.328	-1.368 - 0.557
$I_{S,3}$	0.404	-0.210 - 1.019	-0.328 - 1.137	-0.557 - 1.368
$I_{S,4}^{**}$	-0.767	-1.400 - -0.137	-1.521 - -0.016	-1.759 - 0.219
ROA ^{***}	-0.262	-0.341 - -0.184	-0.356 - -0.170	-0.387 - -0.141
Leverage	0.006	-0.001 - 0.013	-0.002 - 0.015	-0.005 - 0.017
Liquidity	-0.069	-0.468 - 0.331	-0.545 - 0.407	-0.695 - 0.557
Growth	-0.001	-0.015 - 0.013	-0.017 - 0.016	-0.023 - 0.021
ln(size)	0.001	-0.195 - 0.197	-0.233 - 0.235	-0.306 - 0.309

Table 10: The results of the 2009 multivariate ordinal probit regression model using quartile social pillar scores as independent variables. $I_{S,k}$ represents the k^{th} quartile social pillar dummy variable. The table shows the regression coefficients obtained from the regression model together with the lower and upper confidence interval bounds for three separate significance levels. The three significance levels used are $\alpha = 10\%$, $\alpha = 5\%$ and $\alpha = 1\%$. The level of statistical significance is indicated by *, ** or * next to the variable name.**

As is seen from *table 10*, the lone quartile that had a statistical effect on the credit rating was the 4th quartile. Its regression coefficient was negative, implying that if a corporation performed in the top 25% of firms, it also had a better credit rating. Hence, impact of social pillar scores on credit rating comes from being in a top performer, in which case the firms credit rating is better than those who do not perform as well in the social pillar of CSR.

Looking at the remaining three quartiles, one can see that the social pillar score did not impact credit scores. Interestingly, this means that if a corporation was ranked as having a terrible social pillar score, this did not impact their credit rating for the

better or for the worse. The same can be said for the two middle quartiles which were not statistically significant at any level either.

4 Conclusion & Validity

4.1 Conclusion

This paper did not identify any relationship between aggregate CSR scores and credit ratings for large European corporations. This is contradictory to a large portion of the research done globally on the relationship between CSR and credit ratings, which was discussed in [section 1.4](#). However, as also indicated in that section, the strong relationship between the two variables found in e.g., American firms (Wang 2020; Chen Hsu, 2015; Ge Liu, 2015) was not as prevalent amongst European firms (Schuitema, 2018). Hence, this paper's results from aggregate CSR scores is in line with previous research on European firms. There are a couple different factors that could explain the difference in effect for European firms relative to the rest of the world. One potential explanation is that for European firms, many aspects of CSR are legally defined. In most other regions, these same CSR aspects are voluntary efforts, to be undertaken only if the corporation is itself willing to do so (CSR Europe, 2010). Hence the difference in CSR performance between European firms is bound to be smaller relative to other regions. Because of this, a European firm's financial risk might not be as influenced by performing poorly relative to other European firms in terms of CSR, as such firms also performs relatively well when compared to bad performers in other regions. Another aspect which might have influenced the outcome for European firms is the fact that the Bloomberg 1-year default risk was used as a measure of credit rating. The more traditional rating agencies are likely to have a more in-depth methodology when determining credit ratings. These agencies are also based in the United States, which would imply that the coverage and understanding of the dynamics between CSR and credit risks should be better for American firms than the European counterparts. There does also seem to be some discrepancy between credit ratings and CDS spreads, as Carnevale et al. (2018) found a relationship between aggregate CSR measures and CDS spreads. This implies that CSR has some effect on market based credit risk metrics in European firms but as this paper has shown, the same does not hold for overall credit ratings.

If one instead looks at an individual CSR pillar basis, there does exist some statistical relationship with credit ratings. The results of sections [3.2.2](#) & [3.2.3](#) showed that the social pillar score did influence credit ratings, but only in one of the two pe-

riods examined, 2009. During this period, the financial crisis was in full effect and caused severe societal problems for the populations in the Euro area. Hence, firms that were perceived as putting in much effort to aid on societal matters could have benefited greatly from such endeavours. This in turn, builds trust with consumers and the population as a whole and could therefore be the reason why such firms saw their credit ratings strengthened during 2009. This reasoning is further strengthened by the fact that this relationship between social pillar scores and credit ratings was non-existent during the 2014 period. In this period, the overall effects of the financial crisis had dissipated and the societal problems were diminished, which meant that corporations efforts to aid societal issues were not as necessary and appreciated. The explanation that dedicated societal work was the reason that firms saw their credit ratings improve is also validated by the results of [section 3.2.4](#). That analysis showed that the statistical relationship came specifically from firms which performed exceptionally well (top quartile) in social pillar CSR work. This is in line with Carnevale et al. (2018) which found benefits of high CSR performance but no relationship for performing poorly. Hence firms that did much for society when it was needed were rewarded and those that did not saw no effects on their credit ratings.

4.2 Implications for corporations & managers

The results of this paper gives some guidelines and indications as to how management teams of European corporations should make decisions about CSR activities. Correctly done, CSR activities can yield the benefits of lower perceived credit risks and ultimately also lower debt financing costs on capital markets. The result that specific pillars of CSR carries influence during certain periods of time has some important implications for corporate managers. Since the regression model does not contain industry dummy variables, the implications should hold true no matter the industry. Specific pillars seems to affect credit ratings only at specific periods in time, which means that special focus should be directed to the areas of CSR which are of special importance at present. In this paper, the social aspect of CSR carried explanatory power for credit ratings during the financial crisis, but not during the more normal period of 2014. Hence managers would do well in remaining flexible in their CSR endeavours and not decide to permanently focus on one specific pillar. While an overarching CSR focus can be beneficial in other operational aspects, it does not seem to yield a lower credit rating. The three following steps should be used for managers of all types in order to reap the cost of debt benefits of CSR:

- Identify the CSR pillar which is of special importance at present

- Focus CSR endeavours on this specific pillar
- Remain flexible in CSR activities and be observant of changing dynamics in regards to which pillar is prioritized by the public.

Keeping these three steps in mind at all times should be sufficient for managers to be able to benefit from CSR efforts in terms of credit ratings and cost of capital. As it pertains to managers in different roles, the same principles hold. A corporate CEO should first and foremost make sure that their employees maintains the ability to shift their focus in terms of CSR efforts. Moreover, the CEO should remain vigilant in quickly identifying which areas of CSR that are of the highest importance for the populations where the corporation does business. Being able to quickly shift focus from one CSR pillar to another requires that CSR-earmarked capital is not tied up in specific projects for very long periods of time. Hence, CFOs should make sure that the capital which is to be used for CSR activities remains fairly liquid and accessible so that it can be deployed quickly where it will do the most good. CHROs and CMOs has to convey information about the CSR efforts internally and externally respectively, in an efficient manner. Again, being able to quickly pivot their focus, convey the current CSR activities in a concise manner and construct a good image of the corporation are of special importance for managers in these roles.

Furthermore, the strategy presented here is general in the sense that it should hold true no matter which period of time is being considered. It is also the case that no specific pillar is especially important at all times but instead what seems to matter is public perception about which pillar is currently important. Hence, remaining flexible as an organization and having managers which are proficient in identifying relevant focus areas is the key to lowering credit ratings through CSR activities.

4.3 Implications for further research

There is a lot of further research which can, and should, be done to verify the results of this paper and to gain more insights into the relationship between CSR and credit ratings. This paper examined the relationship during two periods, 2009 and 2014. Studies on other periods of time could be beneficial to validate the results. Furthermore, studying a larger number of periods could be beneficial in terms of identifying which pillars are important during different periods and if there exists some identifiable and predictable relationship as to which pillar will be of special importance going forward. For example, examining the period right after the Deepwater Horizon accident, and researching if the environmental pillar score had an influence on credit ratings after such a catastrophic environmental incident. Another interesting

period is the period during the Coronavirus pandemic. One could hypothesize that the social pillar performance was very important during this period since the public was negatively impacted on a large scale all over the world. Studies using different metrics within each pillar on a more granular level can also be beneficial in order to better understand which factors drive the explanatory power of the pillars. For example, using greenhouse gas emissions, water usage and usage of hazardous substances as independent variables instead of the aggregate environmental pillar score in the regression model. This analysis was conducted on the largest and most liquid blue-chip corporations in the Eurozone, and another dynamic might exist for firms of small/medium sizes. Hence, conducting a similar analysis using all firms in the STOXX Europe 600 index could provide further insight and yield results more relevant to managers of smaller firms. Finally, studies using a larger data set, such as the STOXX Europe 600 index mentioned above should be conducted. This would allow for the research to be conducted on an industry specific basis. Hence, varying dynamics for different industries can be identified using this approach and could provide valuable, tailored, strategic information to corporate managers. For example, corporations in specific industries, such as those that are classified as very environmentally/socially dangerous, could be more impacted by performing well from a CSR perspective. High performers are less likely to face public scrutiny as a result of bad working conditions/negative environmental impact as well as to be fined for such. Some interesting sectors in this regard is the Oil & Gas sector as well as the textile industry.

4.4 Validity

The data was gathered from Bloomberg as well as Thomson Reuters and when possible cross-referenced with other sources to make sure that the data used was reliable and accurate. The sample size of 67 corporations is relatively small and could have had an impact on the accuracy when determining the level of statistical significance of the regression coefficients. Moreover, the periods used in this analysis could have had an effect on the outcome. The financial crisis year of 2009 was a year with much volatility on financial markets and where many corporations saw their credit ratings decrease as a result of lower solvency and tough general market conditions. Should one only have chosen to study years with normal market conditions, such as the 2014 period, the outcome of the analysis could have been different. During times of relative macroeconomic stability, credit ratings tend to vary quite little. Hence, it is possible that the analysis of the 2009 period, with larger credit rating movements, produced false positives as the credit ratings accidentally co-moved with the social CSR pillar score. However, the probability of this is quite low since control vari-

ates were used to remove this accidental correlation factor. It is possible that some control variables not included in the models presented here led to the statistically significant results. Factors such as free cash-flow growth rates and cash-flow volatility has been shown to influence credit ratings in some research and since these were not included in the models of this paper, it could be a source of error. Lastly, it should be noted that correlation is not the same as causation. The analysis in this paper has been structured so as to statistically control for possible result traps and to avoid any false positives. However, scientific results should always be treated with caution and until replicated numerous times with similar results, one has to use it only as guiding information and not as an absolute truth.

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