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The Effects of Corporate Social Performance (CSP) on Credit Ratings

- *Evidence from the European Market*

Authors:

Gustav Johannesson

Oscar Zedendahl

Supervisor:

Reda Moursli

Abstract

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Authors: Gustav Johannesson and Oscar Zedendahl

Advisor: Reda Moursli

Five keywords: Corporate Social Responsibility (CSR) · Corporate Social Performance (CSP) · ESG Factors · Credit Ratings · European Rating Market

Purpose: The purpose of this thesis is to fill the existing research gap in Europe by examining the effect of corporate social performance (CSP) on firms' credit ratings.

Methodology: Through a quantitative research strategy, we examine the relationship between CSP and firms' credit rating using a fixed effects regressions analysis based on a panel data set.

Theoretical perspectives: The theoretical perspectives that are trying to explain the relationship between CSP and firms' credit ratings are the agency, stakeholder and risk management theories. We are therefore using theoretical arguments from these theories.

Empirical foundation: The empirical foundation is built on a comprehensive panel data set of 3,687 firm-year observations representing 320 firms listed on the Europe STOXX 600 Index over the time period 2002-2018. Data is accessed from Thomson Reuters Eikon, Thomson Reuters ASSET4 and Thomson Reuters Datastream.

Conclusions: Our empirical findings suggest a positive and statistically significant relationship between CSP and firms' credit rating. The empirical results are consistent with our hypothesis and theoretical predictions after conducting several empirical tests and controlling for endogeneity. In terms of economic significance, our empirical results suggest that a higher level of CSP are awarded with a slightly higher credit rating. Our empirical findings can help corporate managers to make better-informed decisions when investing in CSR.

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Gustav Johannesson Oscar Zedendahl

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CRA	Credit Rating Agency
CSP	Corporate Social Performance
CSR	Corporate Social Responsibility
ESG	Environmental, Social and Governance
FE	Fixed Effect
IV	Instrumental Variable
OLS	Ordinary Least Squares
RE	Random Effect
S&P	Standard and Poor's

1. Introduction

Corporate social responsibility (CSR) is a widely discussed topic that has been of significant interest to both the academic and business world during the last decades. In recent years, the importance of CSR has increased significantly after corporate scandals like the Volkswagen emission scandal and the Deepwater Horizon oil spill (Balmer et al., 2011). Governments, media, and various stakeholders have increased their awareness of social and environmental consequences and are now more than ever holding companies accountable for their business activities (Porter & Kramer, 2006). As a result of the increased awareness and pressure from various stakeholders, companies are increasing their CSR investments and have become more transparent in their CSR reporting and in their efforts to present themselves as sustainable corporations (Siano et al., 2017). A survey conducted by KPMG shows that in 2017 77% of European public firms reported on corporate responsibility either in stand-alone or integrated reports, which is a 3% increase from 74% in 2015 (KPMG, 2017). However, increased CSR disclosure does not necessarily indicate a higher level of corporate social performance (CSP). Although CSR transparency is increasing, the quality of firms' practical CSR activities cannot solely be determined from their responsibility reports.

Furthermore, Standard & Poor's (2017) and Moody's (2015) reports that they have recently started to incorporate environmental, social, and governance (ESG) factors into their credit rating assessments. This is of high relevance to our study since the recent incorporation of ESG factors in credit rating assessments increases the importance of examining the effects of corporate social performance (CSP) on firms' credit ratings. CSP is used to measure a firm's CSR performance at a particular point in time. In general, there are three dimensions of CSP, environmental, social, and governance (ESG), which are used as a proxy for CSP. The recent incorporation of ESG factors in credit rating assessments supports the relevance of this study and the importance of our research question. Additionally, Stellner et al. (2015) argue that firms are increasingly dependent on external financing from the debt capital market, and a better credit rating could lower firms' cost of financing. This further reinforces the importance of studying CSP's effects on firms' credit ratings.

The research question of interest is whether a higher level of CSP is awarded by a higher credit rating from rating agencies. By using an ESG score as a proxy, we can observe CSP's effect on credit ratings. We expect a positive relationship between CSP and firms' credit ratings based on arguments from the stakeholder and risk management theories. As suggested by Waddock and Graves (1997), the stakeholder theory predicts that CSR activities should enhance a firm's relationship with key stakeholders and thereby create valuable intangible assets such as brand recognition, reputation, and increased customer loyalty. These perceived benefits could be valuable for firms during corporate scandals and crises by reducing the probability of default. Additionally, the risk management theory suggests that firms with a higher level of CSP have lower financial risks due to lower probabilities of regulatory prosecutions and fines related to irresponsible behavior (McGuire et al., 1988). Based on these arguments we are suggesting that firms with a high level of CSP should have a lower probability of default, and thus a higher credit rating.

Based on a sample consisting of 320 European firms over the time period of 2002 to 2018, we find a positive and statistically significant relationship between CSP and firms' credit ratings. Our main results suggest that firms with high levels of CSP are awarded with better credit ratings. Our empirical findings are robust after controlling for firm-specific variables, as well as industry, country and year fixed effects. We further address possible endogeneity problems through the instrumental variable approach. The empirical findings from the fixed effects regression are in line with our theoretical predictions based on the stakeholder and risk management theories. Through a better understanding of CSP's effect on firms' credit ratings, corporate managers can make more informed decisions when investing in CSR and when incorporating different CSR strategies into their business model. Thus, it is important to understand the effects of CSP on firms' credit ratings due to the incorporation of ESG factors in the credit rating assessments by rating agencies.

Furthermore, the main body of empirical research points to a weak positive relationship between CSP and firms' credit ratings. However, the findings across previous studies are divergent. Our results are in line with the majority of previous empirical research. Our empirical findings are supported by the finding of Attig et al. (2013), Jiraporn et al. (2014) and Oikonomou et al. (2014) who studies the relationship between CSP and firms' credit ratings in a US and a global context.

Previous empirical research that finds a positive relationship between CSP and firms' credit ratings explain their findings by using economic arguments from the stakeholder and risk management theories. However, our results contradict the findings from Menz's (2010) European study which finds no significant relationship between CSP and firms' credit risk. There is only a limited amount of research in Europe that focuses on the relationship between CSP and firms' credit ratings, and these studies are not in agreement on the direction of the relationship (Stellner et al., 2015; Menz, 2010).

We aim to contribute to research conducted in a European context. We base our predictions on the findings and economic arguments of Attig et al. (2013), Jiraporn et al. (2014), and Oikonomou et al. (2014). Relevant research finds support of a positive relationship between CSP and firms' credit ratings are studying the US or global markets, which is why our main contribution is identifying the positive effect of CSP on firms' credit ratings for European firms. Menz (2010) argues in his study that credit rating agencies (CRA) do not consider CSR activities when assessing firms' creditworthiness in Europe. With the recent incorporation of ESG factors in S&P's and Moody's credit rating assessments, we contribute to the European strand of literature by examining the effect CSP has on firms' credit ratings. Further, since studies conducted in a European context are not in agreement on the direction of the relationship (Stellner et al., 2015; Menz, 2010), the relevance of this study is further supported.

CRAs attention to ESG factors can explain the increased awareness of social responsibility in the European market and accordingly firms' increasing investments in CSR (Weber & Scholz, 2010). Further, Menz (2010) argues that the pressure of CSP is more significant from the credit market than from the equity market. In line with this argument, Stellner et al. (2015) suggest that debt financing is of increasing importance for firms which reinforces the importance of studying CSP's effect on firms' credit ratings. Through these arguments, we find strong support for why our research question is of relevance and contributes to the European strand of literature. We aim to fill the existing research gap and contribute by increasing the knowledge regarding the relationship between CSP and firms' credit ratings. To do so, we provide a more comprehensive understanding of the relationship in a European context. This study complements recent studies conducted in Europe by Menz (2010) and Stellner et al. (2015) who focus on bond ratings and yield spreads, by

shifting focus to firms' credit ratings. We further extend similar research conducted in US and global contexts of Attig et al. (2013), Oikonomou et al. (2014), and Jiraporn et al. (2014), by providing empirical evidence supporting that the positive relationship between CSP and firms' credit ratings also holds in a European context. This further contributes to the European strand of literature.

The remainder of the paper is organized as follows. Section 2 provides an overview of CSR, CSP, and ESG and highlights the incorporation of ESG in CRAs rating assessments. Section 3 lays out what is currently known about the topic from an empirical perspective. In section 4 we provide a theoretical background relevant to this study and develop our hypothesis. Section 5 describes the empirical methodology used to answer our research question. In section 6 we provide descriptive statistics, the sample construction and the regression models used. In section 7 we provide an empirical analysis of our regression results. Section 8 concludes our paper.

2. Corporate Social Responsibility and Credit Rating

In this section, we will provide an overview of the concepts of corporate social responsibility (CSR), corporate social performance (CSP), and environmental, social, and governance (ESG). Although some literature uses the terms CSR and CSP interchangeably, there are some distinguished differences between them. We aim to describe the important characteristics of each concept below. We then proceed to describe the credit rating assessments of CRAs, and how they incorporate ESG in their assessments.

2.1. Corporate Social Responsibility

Corporate social responsibility (CSR) refers to the accountability a firm holds to its stakeholders, and how the implied relationship will benefit various groups of stakeholders, as well as the society as a whole (Husted, 2000). CSR activities are voluntary actions and can include improvements in environmental compliance, relationships with key stakeholders, and governance practices (Jiraporn et al., 2014). Kolk (2016) argues in his study that the focus on CSR is growing at a faster rate in Western countries, which is why the literature on the subject has mostly been localized to

these regions. The importance of CSR has gained increased attention from various stakeholders, and has therefore lead to a broader focus on transparency in firms' public disclosures. The public attention to corporate activities has also increased, which has been observed as a cause and effect relationship after large corporate events such as the Enron scandal (Petrick & Scherer, 2003), the Volkswagen emissions scandal, and the Deepwater Horizon blowout (Balmer et al., 2011). As a result of recent scandals, investors and various stakeholders are pressuring companies to take accountability for their actions and act more responsible in activities affecting the environment and the society. At the same time, stakeholders are asking for more reliable public information about firms' CSR work. Therefore, companies have incentives to act more socially responsible and increase their efforts to be more transparent about their CSR activities (Braam & Peeters, 2018). Despite the increased pressure of CSR, some firms can be reluctant to increase their efforts in the area. This argument is supported by Crane et al. (2014) who suggests a trade-off between short-term costs and possible long-term benefits related to CSR investments is inevitable and can be difficult for firms to face.

2.2. Corporate Social Performance

Corporate social performance (CSP) can be defined as a firm's CSR performance at a particular point in time (Barnett, 2017). Thus, CSP can be used to measure the performance of CSR activities, and has been used in academic literature for several years (Wartick & Cochran, 1985). Increasing stakeholder demands, as supported by the stakeholder theory and resource-based view, influences the activities of firms in the social aspect. These activities will have a tendency to affect firms' CSP (Barney, 1991). CSP can be measured in different ways, for example as corporate philanthropy (Brammer & Millington, 2006), or pollution as a measure for environmental performance (Stanwick & Stanwick, 1998). Comparing the different CSP dimensions can be difficult, which is why composite scores are used to compare the overall CSP of firms across an industry or a region.

2.3. Environmental, Social, and Governance

Environmental, social, and governance (ESG) scores can be used to determine a firm's level of CSP. A composite ESG score can give a better understanding of the results of CSR activities. Thus, when observed at a point in time, an ESG score measures a firm's level of CSP. ESG is a generally accepted and standardized measurement of CSP in both a business and empirical context, and can therefore be used as a proxy. Furthermore, an ESG score is used as a comparable and reliable metric to compare the environmental, social, and governance dimensional performances between firms in a given industry or region (Thomson Reuters, 2019). We display six important components of each ESG dimension in Table 1. ESG scores can indicate how firms handle climate change risks, employee relationships, and the strength of their ownership structure. However, ESG scores can be criticized since they are commonly composed of data that is only available to the public domain. Therefore, they can be subject to misleading information if firms are not fully transparent in their disclosures.

2.4. Credit Rating

2.4.1. Credit Rating Agencies

There are three major credit rating agencies (CRA), Standard and Poor's Global Ratings (S&P), Moody's Investor Service (Moody's) and Fitch Ratings (Fitch). These CRAs are called the "Big Three" and they are dominating and controlling the global rating industry. In this study, we focus on the credit ratings from the "Big Three" due to their accountability and the availability of data on European firms. In 2018, S&P had a market share of 46 %, Moody's 32 % and Fitch 15 % in the European Union which highlights the "Big Three's" market dominance in Europe (ESMA, 2018).

2.4.2. Credit Rating Assessment

A credit rating is not a guarantee of a firm's probability of default, but rather an external opinion about a firm's credit risk. The credit rating relates to the ability and willingness of an issuer (the firm) to meet its financial obligations in full and on time (Ganguin & Bilardello, 2005). CRAs are

providing external credit ratings of individual financial instruments or entities' overall creditworthiness. A credit rating is an independent and objective assessment of an individual firm's creditworthiness and is presented as a letter-based score. Each rating agency uses unique letter-based scores but commonly the scores are divided into two groups, *investment-grade* and *speculative-grade* (S&P, 2018). The credit ratings of S&P are presented in an alphabet-oriented ordinal scale, ranging from AAA to D. Issuers that receive a rating of 'BBB-' or above are generally considered to be *investment-grade*, while those that receive a rating lower than 'BBB-' are generally considered to be *speculative-grade*. The credit ratings are made publicly available and are commonly shared freely by the rating agencies. Furthermore, the CRAs are mainly generating ratings at the request of an issuer and are charging them for a fee. However, there is a potential conflict of interest since the CRAs are getting paid by issuers and could therefore have incentives to assign inflated ratings (Stolper, 2009).

In the rating process, CRAs assess firms' internal and external factors, using both quantitative and qualitative data. The internal factors are part of their financial risk profile, and external factors are part of the business risk profile where industry risk, country risk, and the competitive position are incorporated (S&P, 2018).

The CRAs play a crucial role in a well-functioning capital market by reducing the information asymmetry. A credit rating is useful for firms when they raise money in the capital market and can have a significant impact on the cost of funding. Furthermore, a credit rating enables investors and other market participants to assess credit risk by a well-known scale, and can help them make more informed investment and business decisions (S&P, 2018). CRAs fill an important role in the capital market by providing information and thereby mitigating information asymmetries between issuers and investors regarding firms' creditworthiness (Santos, 2006).

2.4.3. Incorporation of ESG in the Credit Rating Assessment

A firm's ESG risks are increasingly being taken into consideration by CRAs when assessing their creditworthiness (PRI, 2017). S&P is considering firms' ESG risks as an essential element in their credit analyses, and the ESG methodology is therefore incorporated into their credit rating

assessments (S&P, 2017). Firms do not usually receive an explicit ESG score but ESG factors are incorporated into the overall credit rating analysis to provide a better overview of the firm's credit risk. Similar to S&P, Moody's credit rating assessment also incorporates the ESG risks into the overall credit risk (Moody's, 2015). Further, Moody's scores firms' ESG risks explicitly in some cases. S&P and Moody's do not see ESG risks as a main determinant of creditworthiness but rather as one of several elements that they consider in their credit rating assessments. The rating actions related to a firm's ESG risks can impact the credit rating by changes in (notches) either affecting the final credit rating or the rating outlook (Allianz, 2017). These notches are used as a modifier of the final credit rating, rather than directly impacting the preliminary evaluation of a firm's creditworthiness, as suggested by the framework of Ganguin and Bilardello (2005).

3. Literature Review

In this section, we seek to outline a comprehensive overview of existing empirical research on the relationship between CSP and firms' credit risk. This is provided to establish a link between the information provided in Section 2 and the empirical research in the area. We will provide insight on CSP's effect on firms' credit risk based on previous empirical findings. The following sections are divided based on the direction of the relationship found in each study, since results are divergent. Previous research has quantified firms' credit risk by assessing credit ratings, credit spreads, bank loan spreads and/or capital constraints.

3.1. Empirical Research Suggesting a Positive Relationship

Studies looking at the effect of CSP on firms' credit ratings and are of special interest to our study. A relevant study of interest is conducted by Attig et al. (2013), who studies the relationship between CSR and firms' credit ratings in a sample of 1,585 publicly listed firms in the US from 1991-2010. They find support for the argument that there should be a positive relationship, i.e. firms with better CSR are awarded with a higher credit rating. The authors argue that CSR activities can reduce the firm's credit risk and financial distress cost through two main arguments. The first argument is that CSR activities can impact a firm's credit rating through improved relations with key stakeholders and in turn increase long-term sustainability. The second argument

suggests that firms will be less likely to incur fee and regulation costs associated with socially irresponsible behavior. Furthermore, the findings of Oikonomou et al. (2014) support the arguments by Attig et al. (2013) by studying CSP's effect on corporate bond ratings and yield spreads. The study is conducted by using a sample of 3000 bonds, issued by 742 different firms in 17 industries over the time period 1992-2008. In addition to a better credit rating, findings also suggest that firms with a higher level of CSP are rewarded with lower corporate bond yield spreads. Their explanations of these relationships are supported by the idea that CSP efforts have a risk-mitigation effect for firms, and a better credit risk profile could therefore lead to a lower cost of financing from the fixed income market. Additionally, a recent study of interest related to our work is conducted by Stellner et al. (2015). Their study examines how CSP efforts are rewarded in a country-specific environment, using a sample of 872 European corporate bonds from 2006-2012. The authors suggest that if firms are based in a country with higher CSP performance on a country level, their CSP efforts will be rewarded by higher credit ratings and lower yield spreads. On the contrary, a firm based in a lower rated country will be penalized for their CSP efforts through lower credit ratings and higher yield spreads. The magnitude of the impact on a firm's credit risk is, according to Stellner et al. (2015) based on the public perception and the market's reaction to socially responsible behavior, which will determine the payoff of a firm's CSP efforts. Jiraporn et al. (2014) further suggest that firms' credit ratings are influenced by regional effects. Their findings suggest that, assuming exogenous assignments of US zip codes, firms' CSR is influenced by the variance of CSR between firms in the same three-digit zip code. The authors explain the regional influence as an effect of investor clientele, local competition, and/or social interactions. Due to these environmental factors, the authors argue that firms are pressured to invest in CSR to establish or sustain their competitive advantage in the region. The key findings of Jiraporn et al.'s (2014) study show that firms that increase their CSR by one standard deviation can see improvements in their credit ratings by as much as 4.5%, supporting the previous empirical research findings suggesting a positive relationship.

Further studies that examine the effects of CSP, yet with a different approach of assessing firms' credit risk are also of relevance to our work. Bauer and Hann (2010) conduct a study that only focuses on the environmental effects on firms' credit risk. The study is among others who focus only on the US market, and the authors use a sample of 582 US firms between 1995 and 2006. The

authors argue that environmental efforts should, if seen as a strength, award firms with a higher credit rating and a lower credit yield spread, leading to a lower cost of debt. In turn, Cheng et al. (2014) suggest that CSR activities can lead to better access to financing after studying 2,400 publicly listed firms globally. Their panel data regression analysis further supports the argument of a positive relationship, by finding that especially the environmental and social components of CSP should lead to lower capital constraints. Weber and Scholz (2010), in a study of 40 German banks, propose that sustainability as a CSP effort should have a positive impact on a firm's credit risk since it is a good determinant of expected financial performance, and can also improve the validity of the credit rating assessment. The authors argue that these factors will tend to be beneficial for the firm when credit rating agencies are assessing their credit risk. El Ghoul et al. (2011) suggest that credit ratings are subject to reductions through poor CSP when they face increases in idiosyncratic risk. The authors examine firms with higher investment levels in CSR factors in relation to firms which they define as "sin" firms, e.g. tobacco, alcohol and gaming firms. "Sin" firms have, according to Hong and Kacperczyk (2009), greater exposure to litigation risks on average. In the framework of El Ghoul et al. (2011), idiosyncratic risk is developed from the disclosure of information which could harm a firm's public perception. The authors argue that efforts to improve CSP can act as insurance against the adverse effect that poor CSP can have in terms of dramatic costs that the firm incurs.

3.2. Empirical Research Suggesting a Negative Relationship

In contrast to the findings from empirical research previously mentioned, Goss and Roberts (2011) find support of the argument that CSP should have a negative relationship with firms' credit risk for low-quality borrowers. With a sample of 3,996 loans granted to US firms from 1991-2006, the authors argue that low-quality borrowers with increased CSR efforts are penalized with a higher credit spread and pay between 7 and 18 basis points more than socially irresponsible firms. This suggested negative relationship is supported by the overinvestment hypothesis and is based on their argument that CSR investments can be considered a waste of important resources. This argument mainly applies to firms with a lack of resources that need to allocate resources within the company in a more efficient way. I.e. according to their study, any CSP efforts made by low-quality borrowers are considered overinvestments. Stellner et al. (2015) are further supporting this

argument, yet they propose that firms' will be penalized for CSP efforts only if the firm is based in a country with low ESG-score. Their study therefore suggests that CSP efforts will be viewed as an overinvestment in these countries, leading to a negative relationship between CSP and a firm's credit risk.

3.3. Empirical Research Suggesting no Significant Relationship

Attig et al. (2014) argue that overall, CSP efforts should have a positive relationship with a firm's credit risk. However, they also propose the argument that only specific dimensions of CSP will affect a firm's credit risk. E.g., they find no significant relationship between environmental performance and firms' credit risk. A firm's environmental efforts are therefore considered to have no impact on a firm's credit risk. Menz (2010) conducts a study on 498 European corporate bonds from 2004-2007, which further supports the argument that there should be no relationship between a firm's efforts in CSP and their credit risk. The explanation for the weak relationship between CSP and corporate bond spreads is that CSP efforts had not been incorporated into the pricing of corporate bonds as of 2010 in Europe.

3.4. Connecting Previous Empirical Research

The empirical research presented above have in common that they all examine the relationship between CSP and firms' credit risk, which is measured by credit ratings, bond yield spreads, bank loan spreads and/or capital constraints. Analyzing the results of the previous studies described above reveals the results to be inconclusive when examining the effect of CSP on firms' credit risk, although the vast majority of authors agree in their findings that the effect of CSP should be positively related to a firm's credit risk. However, the findings are not in consensus of how the individual dimensions of CSP relate to a firm's credit risk. E.g., while some studies find no significant impact of CSP on firm's credit risk (Menz, 2010), others find that only some dimensions of ESG drives the relationship (Attig et al., 2013). There are therefore inconclusive results that support how the individual dimensions affect firms' credit risk.

The empirical research methods are conducted in a similar manner, with a focus on comprehensive panel data sets and by using fixed effects regressions. However, the collection and usage of data differ slightly depending on the methods of assessing firms' credit risk, and the geographical characteristics of the sample. Previous studies focusing on the US market are mainly using data from Compustat to access credit ratings, and the KLD STATS database to provide ESG data (Attig et al., 2013; Oikonomou et al., 2014). However, studies conducted on the European market follow alternative processes to collect relevant data, by using ESG data from the Thomson Reuters ASSET4 database and Bloomberg to collect data on corporate ratings (Stellner et al., 2015). Although data collection and databases might differ among previous studies, they use similar research methods and identification strategies.

4. Theoretical Background and Hypothesis Development

In this section, we outline a comprehensive overview of the theoretical background of CSP's effect on credit ratings. To understand a possible relationship between CSP and firms' credit ratings we consider the arguments of the Agency Theory, Stakeholder Theory, and Risk Management Theory. Based on the theoretical framework we develop our hypothesis about CSP's expected effect on firms' credit ratings.

4.1. Agency Theory

According to the agency theory and the work by Jensen and Meckling (1976), a significant agency problem and conflict of interest exists between the managers of a firm and its shareholders. The agency problem relates to a firm's CSR engagements which can create a conflict of interest between managers and their shareholders. The existing agency problem is that managers can act and make decisions in self-interest, which is not in line with the objective of shareholder value maximization. Furthermore, the perspective of the agency view argues that managers tend to overinvest in CSR to enhance their own personal wealth and brand recognition, rather than acting in the best interest of shareholders. Friedman (1962) argues that firms should not be involved in philanthropic activities that do not create shareholder value and therefore suggest that shareholders should engage in philanthropic activities on their own. Barnea and Rubin (2010) argue that CSR

investments represent a misallocation of resources of which shareholders bear the costs. Agency costs arise from the conflict of interest between managers and shareholders. A firm's profit margin is expected to decline when CSR activities constitute agency costs from overinvestments in CSR. Thus, by recognizing agency costs from investments in CSR, firms investing in CSR activities should be expected to have lower credit ratings due to a lower profit margin and misallocation of resources from the perspective of the agency theory. However, although CSR investments tend to bear agency costs in the short-term, firm value can be enhanced through sustainability benefits which would also be absorbed by shareholders in the long-term.

4.2. Stakeholder Theory

According to the stakeholder theory, CSR activities improve long-term relationships with key stakeholders including customers, suppliers, employees, and regulators which can result in a long-term competitive advantage (Freeman, 2010; Jones, 1995). Better relationships with a firm's various stakeholder groups can create valuable internal resources and intangibles assets such as brand recognition, reputation, increased customer loyalty, and an increased ability to attract and retain talents within the firm (Fembrun & Shanley, 1990; Greening & Turban, 2000; Waddock & Graves, 1997). E.g., firms that have long-term and loyal relationships with their customers and suppliers are more likely to have customers that are willing to pay a premium for their sustainable product or service, and loyal suppliers who might accept longer payment terms. The resource-based view supports this argument by expressing that firms who dedicate resources to improve CSR will stand to gain a competitive advantage (Ho et al., 2019). Thereby, through stability and a competitive advantage over time, firms will have a lower probability of default (Stellner et al., 2015). Additionally, the stakeholder theory holds that more stable relations with the government and the financial community are beneficial during unstable times when the firm is facing a crisis or experiencing a higher probability of default. During these periods, increased efficiency in stakeholder engagements would be regarded as valuable. Based on the arguments described above that are in favor of CSR engagements, the stakeholder theory suggests a positive relationship between CSR and corporate credit ratings, which contradicts the arguments of the agency theory (Freeman, 2010; Jones, 1995; Waddock & Graves, 1997).

4.3. Risk Management Theory

The risk management theory and the risk mitigation view argue that CSR initiatives create a form of goodwill or moral capital that has a valuable function for the firm, since it works as "insurance-like" protection when negative corporate events occur (Godfrey, 2005). Moral capital leads to a more favorable risk profile and more stable financial performance because firms with high moral capital are less vulnerable when negative events occur. Additionally, firms with a higher level of CSP are associated with lower financial risks because of their lower probabilities of suffering legal prosecutions and fines that could affect the firm's financial risk and profitability (McGuire et al., 1988). The risk management theory therefore suggests a positive relationship between CSR and firms' credit ratings. Further supporting this argument, previous studies provide empirical evidence that supports the risk mitigation view. El Ghoul et al. (2011) provides empirical evidence that firms with higher CSR engagements have a lower idiosyncratic risk. Additionally, Jiraporn et al. (2014) provide empirical evidence that socially responsible firms are assigned a more favorable credit rating. The arguments under the risk management theory are in line with the stakeholder theory but are contradictory to the agency theory.

4.4. Hypothesis Development

Our hypothesis is based on the argument from the stakeholder and risk management theories (Freeman, 2010; Godfrey, 2005; Waddock & Graves, 1997). Keeping these arguments in mind, we believe that a higher level of CSP reduces the risk of financial distress and that the positive effect should also be considered by CRAs, thus reflected in the firm's credit rating. We are therefore suggesting that a positive relationship between CSP and firms' credit ratings exists.

We argue that CSR activities that lead to a higher level of CSP can increase a firm's credit rating by reducing the firm's credit risk and the probability of default. These effects are a result of a lower likelihood of incurring costs and fees associated with socially irresponsible behavior. Additionally, we suggest that CSR activities should improve firms' relationships with key stakeholders which will create internal resources and intangible assets, e.g. moral capital, improved reputation, and loyalty that will be valuable during business scandals and crises. As a result, firms that meet

stakeholder expectations should be able to hold a competitive advantage over time. Based on these arguments, we state the following hypothesis:

H_0: There is a positive relationship between Corporate Social Performance (CSP) and firms' credit ratings.

However, based on conflicting views and predictions between the agency theory and the stakeholder and risk management theories, the effect of CSP on firms' credit ratings remains an empirical question.

5. Empirical Methodology

In this section, we will describe the empirical methodology used to be able to answer our research question. We start to describe the empirical design used. We then give an overview of potential endogeneity concerns and describe the use of the instrumental variable approach.

5.1. Empirical Design

After identifying key financial ratios as control variables, a multivariate regression framework is used to examine the effect of CSP on firms' credit ratings. In the multivariable regression analysis, we regress credit ratings on different CSP proxies. This approach will help us answer our research question.

In our study, we use panel data and fixed effects (FE) which is in line with the most influential empirical papers in the research area conducted with a similar approach (Attig et al., 2013; Oikonomou et al., 2014). We use a panel data regression analysis to examine the effect of CSP on firms' credit ratings. We execute a fixed effects regression analysis based on the comprehensive panel data set from the period 2002-2018. One major advantage with the fixed effects model is that it only captures variation over time, thus enables us to discard omitted variable bias and unobserved heterogeneity over time.

To examine the relationship between CSP and firms' credit ratings, the following multivariate regression setup is applied:

$$CR_{it} = \beta_0 + \beta_1 \times ESG_{it} + \beta_2 \times CONTROLS_{it} + \varepsilon_{it}$$

$$CR_{it} = \beta_0 + \beta_1 \times ENV_{it} + \beta_2 \times SOC_{it} + \beta_3 \times GOV_{it} + \beta_4 \times CONTROLS_{it} + \varepsilon_{it}$$

where CR_{it} is a firm's credit ratings from one of the two major credit rating agencies, S&P or Moody's, where *i* is firm in the year *t*. In the first regression model, CSP is represented as the overall ESG score of a firm, and the β_1 coefficient examines the size of the effect the explanatory variable has on credit ratings. β_1 will give us an indication of the direction of the effect of *ESG* based on its sign (positive or negative), and the size of the coefficient will indicate the numerical change in *CR* for each 1-point increase/decrease in *ESG*. Thus, a one unit change in *ESG* will generate a β_1 unit change in *CR* and determine the economic significance. In the second regression model, the individual dimensions of ESG (*ENV*, *SOC*, and *GOV*) are used to study their individual effects on firms' credit ratings. The interpretation of coefficients β_1, β_2, and β_3 remains similar to the interpretation of β_1 in the first model, but captures the additional effect of each explanatory variable if all other explanatory variables are already accounted for. The same control variables are used for both models, and the interpretation is theoretically motivated and further discussed in section *6.2.3*. Additionally, all variables used in the models are discussed in Section 6.2. and presented in Table 4.

The Hausman test is used to differentiate between the fixed effects (FE) and the random effects (RE) models in order to detect which model that is preferable in our panel data set, and we further analyze this method and its results in subsection *7.1*. The fixed effects model is the most prominent option when using panel data (Gujarati & Porter, 2009). Fixed effects can also partly eliminate endogeneity issues due to omitted variable bias, and it controls for undetected heterogeneity when it is constant over time (Wooldridge, 2015).

5.2. Endogeneity

When examining the relationship between CSP and firms' credit ratings, the issue of endogeneity and causality often occurs and needs to be addressed. Endogeneity can occur due to several different reasons. Although we are already controlling for several important factors affecting firms' credit ratings, our empirical results on CSP's effect on credit ratings may be driven by omitted variables that are correlated with both CSP and the firm's rating. The issue of omitted variable endogeneity is addressed in two ways. Firstly, we have addressed the issue of omitted variables using fixed effects in our regression model where 8 firm-characteristic control variables are included. Secondly, endogeneity concerns are also partly mitigated due to the use of panel data, and by using panel data we can observe the same firms over a period of time as suggested by Wooldridge (2015).

Another concern is reverse causality when studying the relationship between CSP and firms' credit ratings. Previous literature, (Attig et al., 2013; El Ghoul et al., 2011; Oikonomou et al., 2014) have addressed the possible reverse causality problem. It can be arguable that companies which perform well financially and thereby obtain a high credit rating can invest more in CSR. In the case of this study, it means that our dependent variable credit rating (*CR*) might affect our explanatory variable of primary interest, the firm-specific ESG score (*ESG*). To be able to overcome the concerns regarding reverse causality, we follow the path of Attig et al. (2013) and El Ghoul et al. (2011) and handle possible endogeneity problems using the instrumental variable approach.

5.3. Instrumental Variable Approach

There is a possibility that credit ratings may be related to the firm-level ESG score. In order to deal with the possible endogeneity and causality problems, we use the instrumental variable approach, which is the most well-known method to address endogeneity problems. We define an instrumental variable (IV) that correlates with the endogenous variable but does not correlate with the error term as suggested by Roberts & Whited (2013) and Wooldridge (2010). By introducing the instrumental variable approach, we aim to measure the magnitude and direction of causation rather than only measuring the magnitude of the association. One can argue that firms with higher credit

ratings due to superior performance can better support investments in CSP. Chih et al. (2010) support this argument, and argue that firms who perform better financially will be more inclined to invest in activities that improve CSP. Based on support from Jiraporn et al. (2014), we argue that part of a firm's CSP can be attributed to its industry peers, and since it comes from outside the firm it can be considered exogenous.

In line with studies conducted by Attig et al. (2013) and El Ghoul et al. (2011), we introduce an industry-year average of the ESG score (*IND_ESG*) as our IV and use a two-stage least square (2SLS) regression analysis. *IND_ESG* is correlated with our explanatory variable, the ESG score of a given firm, but should not be correlated with the error term, making it a suitable IV based on relevance requirements provided by Roberts and Whited (2013). The motivation and logic behind the chosen IV are that it is less likely that the industry-year average ESG score is related to the firm-level ESG score. Industry-year changes in ESG are more likely to be exogenous given that there are multiple firms in an industry (the average number of firms in an industry is 32, the median 26).

We use a two-stage least square (2SLS) regression analysis to estimate the following model:

(i). $ESG = \alpha_0 + \alpha_1 \times IND\_ESG + \alpha_2 \times CONTROLS + \mu$

(ii). $CR = \beta_0 + \beta_1 \times \widehat{ESG} + \beta_2 \times CONTROLS + \varepsilon$

where (i) is the first stage and (ii) is the second stage of the 2SLS regression analysis. In order to interpret the results from the 2SLS estimate, we will analyze the strength, relevance, and exogeneity of *IND_ESG* to assure that we are using an appropriate instrumental variable approach.

To gain an impression of the strength of our instrumental variable, we test for the F-statistic in the first stage of the 2SLS model. We follow the framework of Stock and Yogo (2005), who suggest that IVs with F-values below 10 are considered weak, between 10-40 of moderate strength, and above 40 strong. We interpret the strength of the IV, given by its F-statistic, to indicate if the 2SLS regression analysis is biased towards the OLS regression results. Thus, a weak instrument would

indicate that we have a biased IV estimator and hypothesis tests with large size distortions as suggested by Stock and Yogo (2005).

In order to analyze the relevance of the instrumental variable, we examine the statistical significance and sign of the IV (*IND_ESG*) coefficient in relation to our explanatory variable (*ESG*). A statistical significance at the 1% level and a positive sign of the coefficient will indicate a relevant instrument.

In order to determine if the IV is exogenous we examine the results from the second stage of the 2SLS model. Endogeneity will be analyzed by the consistency of the IV estimator $\widehat{ESG}$ in regards to our explanatory variable *ESG* in our main fixed effects regression results. A consistent $\widehat{ESG}$ will preliminary indicate exogeneity and that we should not have endogeneity in terms of omitted variable bias.

Furthermore, few statistical tests are available to determine if the IV is directly correlated with the error term. Therefore, testing for correlation between the IV and important unobserved and omitted factors in the 2SLS regression analysis is difficult. Since the condition cannot easily be tested for, as further suggested by French and Popovici (2011), the most reliant guide to evaluate exogeneity of the IV estimator is through theoretical considerations, which in our case are outlined above in this section.

6. Data and Descriptive Statistics

In this section, we will describe the data used in the regression models and describe the characteristics of the sample. Further, we will go into detail about the different variables used in the regression models and lastly discuss the descriptive statistics of the variables used.

6.1. Sample Construction

To investigate the relationship between CSP and firms' credit ratings, we merge data from the databases Thomson Reuters Datastream and Eikon. We start our sampling process by using all

firms listed in the STOXX Europe 600 Index with an available ESG-score from Thomson Reuters Datastream over the period 2002–2018. The STOXX Europe 600 Index is a well-recognized index that represents large, mid and small cap firms across 17 countries of the European region. The main reason why we chose the STOXX Europe 600 Index is because it is an index that includes a broad set of firms, not only large listed firms in a specific region, which is important since we want to have a sample that represents the diversity in firm sizes in the European region.

We then use Thomson Reuters Eikon to gather necessary data of firms' credit rating history at a given point in time from 2002-2018. We primarily look at the long-term foreign ratings assigned by S&P, however, when this data is deemed inconclusive, we utilize the credit rating history given by Moody's. Next, we merge the ESG and credit rating data and exclude all firms which do not have a matching ESG score and credit rating at more than one point in the 2002-2018 period. Our final sample consists of an unbalanced panel data set of 3,687 firm-year observations representing 320 unique firms.

Table 2 presents the sample distribution based on the country and industry classifications. Companies from the United Kingdom, France and Germany make up most of the sample with a combined 55% of the overall sample which can be explained by the fact that they are among the largest countries in Europe with the most dominant stock exchanges. Table 2 further displays that our sample mainly consists of companies that operate in the Industrials and Financials industries.

Oikonomou et al. (2014) exclude banks and financial institutions in their sample since they have a vast amount of bonds outstanding, which could reduce cross-industrial variability significantly. However, since we are not looking at the individual bond ratings of a firm but rather the overall firm rating, we do not anticipate that including banks and financial institutions in our sample will significantly reduce its cross-industrial variability. We choose to include banks and financial institutions in our sample since their credit ratings and CSP characteristics are only marginally different compared to those of firms in other industries. The argument is based on the sample characteristics presented in Table 2.

6.2. Variable Definition

In this section, we aim to provide the reader with an overview of our dependent variable, explanatory variables, and control variables. In the following sections, we describe the variables in detail, and Table 4 provides an overview of all variables used in our regression models.

6.2.1. Dependent Variable

We define our dependent variable (*CR*) as a firm's credit rating score by converting S&P's and Moody's long-term credit ratings to an ordinal scale. We aim to assess CSP's effect on firms' credit ratings, and credit ratings from S&P and Moody's are used as our dependent variable since they serve as a measurement of a firm's creditworthiness. Firms' long-term credit ratings are used since they most accurately reflect the issuer's business and financial risks, and using long-term ratings is consistent with previous research in this field. Furthermore, we believe that due to the financial expertise and sophistication of rating agencies, they are more likely to realize the effect of CSP than the general public investor. We therefore consider credit ratings from the major CRAs to be the best dependent variable when examining the effect of CSP.

Table 3 provides S&P's and Moody's rating scales and our credit rating conversions. We follow Jiraporn et al. (2014) and determine credit rating scores using a conversion process in which firms that are AAA-rated are assigned a score of 22 and D-rated firms are assigned a score of 1. The method of using an ordinary scale for credit ratings is similar to previous research in the area (Attig et al., 2013; Oikonomou et al., 2014; Stellner et al., 2015).

6.2.2. Main Explanatory Variables

To examine the relationship between CSP and credit ratings, it is important to have reliable data on firm-specific CSP. To measure firms' level of CSP, we rely on Thomson Reuters ASSET4 ESG scores. The explanatory variable in our first regression model is the firm-specific ESG score (*ESG*). In our second model, we further introduce the individual dimensions of CSP, environmental (*ENV*), social (*SOC*), and governmental (*GOV*) scores. Definitions of all explanatory variables are presented in Table 4. The measurement of CSP is especially important,

and we consider the ESG score as a viable measure of CSP due to its high degree of reliance and comparability across industries and regions. Thomson Reuters ASSET4 is a reputable and trustworthy source for accessing ESG data (Stellner et al., 2015). The database is a predominant source in the ESG field, containing ratings on a wide range of CSR-related items compiled from various sources such as annual reports, CSR reports, global media publications, regulatory filings, and company disclosures (Thomson Reuters, 2019).

The ESG score is composed by Thomson Reuters and is based on over 400 ESG metrics, presented on a scale of 1-100. Firms with a score of 1 are considered to have the lowest level of environmental, social, and governance performance, while a score of 100 reflects the highest level of performance. Keeping this in mind, the ESG score reflects a balanced view of firms' performance in these areas. Furthermore, the individual dimensions of the ESG are individually given a score on the scale of 1-100, with 1 being the lowest level of performance in the area and 100 being the highest (Thomson Reuters, 2019).

In order to better reflect the CSP-credit rating relationship, we follow previous literature and propose two separate regression models, one with ESG scores on an aggregated level and one on a disaggregated level (Attig et al., 2013; Stellner et al., 2015). We believe that this will give us insight on the individual effects of each ESG dimension. As proposed by previous literature we should be able to observe which dimensions of ESG that most significantly will affect firms' credit ratings (Attig et al., 2013; El Ghoul et al., 2011).

6.2.3. Control Variables

A series of control variables are included in our regression models to isolate the effects of our explanatory variables on firms' credit ratings and are intended to control for firm characteristics. Relevant empirical research supports the strength and relevance of chosen control variables (Attig et al., 2013; Oikonomou et al., 2014; Stellner et al., 2015). The control variables are described in detail below and are presented in Table 4. We also present the mean, standard deviations, min. values, and max. values of all control variables in Table 5.

The natural logarithm of total assets (*SIZE*) is used as a proxy for firm size and controls for the size of the firm. We use this control variable because in general, larger firms tend to face lower business and financial risks and are therefore expected to have a higher credit rating. In specific, larger firms tend to cope better under economic downturns and when facing higher fluctuations in profitability, signaling a lower probability of default and thus a higher credit rating (Stellner et al., 2015). Firm leverage (*LEVERAGE*) is used as a variable to control for differences in firms' capital structure, as suggested by Ashbaugh-Skaife et al. (2006). Leverage, as measured by firms' total debt over total assets, is suggested by Oikonomou et al. (2014) to be associated with a higher probability of default. It is therefore suggested that firms with higher leverage will tend to have lower credit ratings due to their lesser ability to meet interest payments. The same argument can be applied for firms with a low coverage ratio. *COVERAGE* is defined as the ratio of a firm's earnings before interest and taxes (EBIT) over its interest expenses. Coverage should be positively related to firms' credit ratings because firms with a lower coverage ratio should be subject to a higher default risk (Stellner et al., 2015).

Further, Return on Assets (*ROA*) is a control variable used to control for firms' profitability and is defined as the ratio of EBIT over total assets. ROA is an accounting-based ratio which demonstrates the efficiency with which the firm uses its resources and assets. A firm's ability to produce a profit which covers its debt obligations needs to be controlled for since it should affect the credit rating. Firms with high ROA should have reduced default risk which would result in higher credit ratings since they are more likely to meet their obligations over time. Thus, we expect the coefficient of *ROA* to be positive. Firms operating profit margin *(MARGIN)* is measured by the firm's operating profit over revenues. A higher operating margin is expected to signal a lower probability of default, and thus a higher credit rating (Attig et al., 2013). *BETA*, or the historical beta of a firm is defined as the annualized standard deviation from stock returns. Beta captures the firm's systematic risk, which is expected to be positively associated with default risk. Therefore, we suggest that beta should be negatively associated with the firm's credit rating (Bhojraj & Sengupta, 2003). The following control variable *CAPEX* is defined as a ratio of capital expenditures over revenue. The capex ratio measures the firm's investment intensity and measures how many euro of CAPEX a firm makes per each euro of sales. We suggest that the capex ratio should be positively related to a firm's credit rating since higher ratios reflect a firm's financial

health (Stellner et al., 2015). The last control variable *PB* is the price-to-book ratio which is measured by the market value of equity over total assets. We incorporate the PB ratio as a control variable in our model since it is, according to Chan and Chen (1991), considered to be associated with higher financial distress costs.

Further, we introduce three dummy variables, (*INDUSTRY), (COUNTRY),* and *(YEAR)* to control for specific firm characteristics. We use the Industry Classification Benchmark (ICB) from FTSE Russell, which is a classification globally recognized for categorizing companies according to the industry they operate in. We further divide the *INDUSTRY* variable by identifying each firm's primary SIC code, and construct sub-groups accordingly. The series of dummy variables are introduced to account for the heterogeneity of risk among the different industries. We also introduce dummy variables to account for different country and year effects.

6.3. Descriptive Statistics

The variability in ESG scores have been examined across industries and countries, and the results are presented in Table 2. Looking at the CSP measures, we can see that the mean value is relatively high across the different industries and countries. The highest industry-average ESG scores are identified in the Oil & Gas, Telecommunication, and Technology industries, with ESG scores of 86.32, 85.90, and 84.16, respectively. The highest country-average ESG scores are identified in the countries Norway, Netherlands, and Portugal, with ESG scores of 89.85, 87.07, and 84.48, respectively. The lowest industry-average ESG scores are found in the Consumer Services, Industrials, and Financials industries with average ESG scores of 77.35, 76.81 and 70.64 respectively. Additionally, the lowest country-average ESG scores are found in the countries Poland, Denmark, and Luxembourg with ESG scores of 56.44, 60.37, and 61.06, respectively.

Additionally, the variability in credit ratings across industries and countries have also been examined, and the results are presented in Table 2. The highest industry-average credit rating is reflected by an A- rating, and the lowest by a BBB- rating. Similarly, the highest and lowest average credit ratings across the countries are A- and BBB-. Therefore, the individual mean of each industry and country does not deviate much from the overall industry and country means of

BBB+. However, the indication is that industries and countries with lower ratings deviate further from the overall means. We find that the overall means of ESG scores by industry and country are 81.30 and 75.20, respectively. When examining the ESG scores by industry characteristics, the deviation is lower from the overall industry mean than that of the deviation of countries' ESG scores from the overall country mean. This implies that the impact of the country characteristic on ESG scores should be greater than that of the industry characteristic.

Table 5 contains the essential descriptive statistics (mean values, standard deviations, minimum, and maximum values) for our dependent, explanatory and control variables (excluding the year, country, and industry dummy variables). The descriptive statistics are displayed after handling significant outliers (accounting-based ratios) using the 1% and 99% percentile in the winsorizing process so that outliers do not significantly affect the model estimates. Extreme values have been identified in the control variables *LEVERAGE*, *COVERAGE*, *MARGIN*, *ROA*, *CAPEX*, and *PB*, and the winsorizing process has been applied accordingly. The use of the winsorizing process is in line with previous studies (Oikonomou et al., 2014)

Our dependent variable, firms' credit ratings (*CR*) has a mean value of 15.318 (BBB+) and has a relatively low degree of variability, given the standard deviation of 2.419. The standard deviation of *CR* represents a 2-3 point notch of firms' credit ratings, further implying a relatively low deviation in our sample. The sample covers the spectrum of rating scores from a minimum of 7 (B-) up to the highest rating score of 22 (AAA).

Three of our main explanatory variables, *ESG*, *ENV*, and *SOC*, all follow similar patterns in their mean, standard deviations, min., and max. values. However, the mean of the *GOV* variable of 62.390 is significantly lower than the means of the three other explanatory variables (78.019, 77.669, and 78.394), indicating that firms on average have better performance in the environmental and social dimensions of ESG than in the governance dimension. Despite the lower mean of *GOV*, the composed *ESG* mean is closer related to the means of *SOC* and *ENV*, indicating that governance might not be equally significant in the aggregated ESG score's effect on credit ratings.

7. Empirical Analysis

In the following section, we provide an empirical analysis of our regression results which examines the effect of CSP on credit ratings. We follow the methods previously discussed in section 5, Empirical Methodology, when running our regression models. In section 7.1 we analyze results from pre-estimation diagnostic tests. In section 7.2. we analyze the results from the fixed effects estimation of ESG and credit rating. Further, we analyze the fixed effects estimation of ENV, SOC, and GOV and credit rating in section 7.3., and then proceed to analyze the results from the instrumental variable approach in section 7.4. The empirical results are presented in Table 7-11.

7.1. Diagnostic Tests Pre-Estimation

7.1.1. Breusch-Pagan Test for Heteroscedasticity

We use the Breusch-Pagan and White tests to test for heteroskedasticity in the data set (Breusch & Pagan, 1979; White, 1980). These are the two most prominently used tests when dealing with heteroskedasticity. By using these tests, we can determine if the error term is normally distributed as supported by the arguments of Wooldridge (2010). The Breusch-Pagan and White test results are displayed in Table 7. After conducting the heteroskedasticity tests, we reject the null hypothesis that the error term is normally distributed, given the p-values of 0.0000. Furthermore, our relatively large chi-square values of 17.86 and 21.43 indicate that we might have a problem with heteroskedasticity. Therefore, these results suggest that we need to handle possible heteroskedasticity problems in our data set. In order to handle heteroskedasticity problems, we use robust standard errors in our OLS and fixed effects regressions as suggested by Wooldridge (2015).

7.1.2. Hausman Test

We conduct a Hausman test in order to see which model, the fixed effects (FE) or random effects (RE) model, is preferable in our panel data set. Hausman (1978) introduce a test based on the difference between the coefficient estimates obtained by FE and by RE. The test evaluates the consistency of an estimator when comparing the coefficient estimates obtained by FE and RE, and a statistically significant difference is interpreted as evidence for the fixed effect model

(Wooldridge, 2015). The empirical results from the Hausman test are displayed in Table 7. After conducting the Hausman test, we reject the null hypothesis that the random effects model is most suitable, since the p-value is 0.000. Accordingly, this means that the FE model is the most suitable and efficient model to use in this study as the coefficients are more consistent than in the RE model. This is in line with our expectations, and with previous research in the area (Attig et al., 2013; Oikonomou et al., 2014; Stellner et al., 2015). The fixed effects model should account for serial correlations across time as well as for heteroskedasticity.

7.1.3. Pair-Wise Correlation Matrix

The Pair-wise Correlation Matrix is constructed to check for multicollinearity in our data sample and is used to give us a first indication of the regression results. Correlations of the variables are given on a scale between -1 and 1, where -1 represents a perfectly negative correlation and 1 represents a perfectly positive correlation as suggested by Wooldridge (2010). As further supported by Wooldridge (2010), the problem of multicollinearity arises when two variables have a correlation near 1. Table 6 displays the pair-wise correlation matrix. The correlation coefficients of financial interest are *ESG* and *CR* and their correlation indicate that companies with high *ESG* are associated with a better credit rating. Interestingly, there is a positive, though low, correlation of 0.156 between *CR* and *ESG* suggesting a positive, yet variating, relationship between the two variables. This observed positive correlation is in line with our expectations, supports our hypothesis, and is in line with predictions from previous studies in the area (Attig et al., 2013; Jiraporn et al., 2014; Oikonomou et al., 2014). Table 6 also presents a positive correlation between our explanatory variables *ENV* (0.0767), *SOC* (0.1209), *GOV* (0.0002) and dependent variable *CR*. Also noticeable, firm size (*SIZE*) has relatively high correlations with the explanatory variables *ESG*, *ENV*, *SOC*, and *GOV*, primarily indicating that larger firms tend to have better credit ratings.

The pair-wise correlation coefficients among most of our control variables are low, and at an initial view, the low correlations suggest that we will not have a problem with multicollinearity in our regression results. The highest correlation between variables tested in the same regression model takes place between the explanatory variables *ENV* and *SOC*, with a correlation of 0.7441. After analyzing the pair-wise correlation matrix, it appears that the correlation between the variables is

not high enough to be a concern for the induction of multicollinearity in the regression analyses as suggested by the framework of Wooldridge (2010).

7.2. Fixed Effects Estimation of ESG and Credit Ratings

To examine the effect of CSP on firms' credit ratings, we start by running our main regression model using the ordinary least squares (OLS) method. The regression results of the OLS model are presented as model 1 in the first column of Table 8. The estimated *ESG* coefficient is statistically significant at a 1% level and positively related to firms' credit ratings, suggesting that firms with a higher level of CSP are awarded with higher credit ratings, given the positive coefficient of 0.009. These results support our view that CSP is a relevant factor for CRAs when assessing a firm's creditworthiness. Furthermore, our empirical findings from the first regression model are in line with theoretical predictions and supported by findings from previous research suggesting a positive relationship between CSP and firms' credit risk as discussed in section 3.1 (Attig et al., 2013; Jiraporn et al., 2014; Oikonomou et al., 2014).

In our OLS regression model, all control variables are of statistical significance to the dependent variable *CR* on a 1% level. The positive and higher coefficients of the control variables *SIZE* 0.781 and *MARGIN* 2.978 indicate that larger and more profitable firms are less likely to default. Additionally, *COVERAGE, ROA,* and *PB* are positively and significantly related to firms' credit ratings with coefficient of 0.018, 0.020, and 0.1930, respectively. This suggests that greater interest coverage, higher return on assets, and higher price-to-book ratios reduce default risk and in turn enhance credit ratings. However, there are negative and statistically significant relationships between the control variables *BETA* and *CAPEX* and the dependent variable *CR* with coefficients of -1.129 and -0.819, respectively. This indicates that firms with higher standard deviations of systematic risk and higher capital expenditures relative to revenues will have a lower credit rating. Thus, the negative coefficient of *BETA* suggests there is an adverse effect of increased equity risk on firms' credit ratings. One possible explanation for the statistical significance of all the control variables is due to the careful selection from previous research in the field, which has resulted in a well-composed and strong regression model.

As further discussed in section 5, Empirical Methodology, we test for heteroskedasticity. We reject the null hypothesis of homoskedasticity after running the Breusch-Pagan and White tests for heteroskedasticity, as presented in Table 7. The results of these tests suggest that we have a problem with heteroskedasticity in our sample. Thus, the OLS assumption regarding the variance of residuals being constant for different explanatory variables is violated. The heteroskedasticity problem means that the variance is not minimal in the residuals, which as suggested by Brooks (2008), we need to address. To ensure we do not have a heteroskedasticity problem, we run our regression model using robust standard errors in the OLS regression as suggested by Wooldridge (2010). The regression results are presented as model 2 in the second column in Table 8. The *ESG* coefficient is still positive at 0.009 with only a slightly higher standard error, and still statistically significant at a 1% level which means that our results have not changed by much. Since the results are similar to the result from the OLS regression and the coefficient of interest (*ESG*) does not change between the regressions, heteroskedasticity should not significantly impact our regression results. The positive and significant relationship between *ESG* and *CR* still holds and supports our hypothesis.

To further handle a possible heteroskedasticity problem and omitted variable bias, we next run our regression model using fixed effects (FE) to gain further insight about the relationship, and the regression results are presented as model 3 in Table 8. One major advantage of a fixed effects analysis is that it only captures the variation over time and thereby minimizing the omitted variable bias. The results from the FE model are consistent with the results of the OLS robust standard errors regression model. The ESG coefficient is still positive at 0.006 and statistically significant at 1% level, indicating that the relationship still holds and is strong. Consistent with the results from OLS robust standard errors model, the fixed effects results show further statistical support of a positive effect of CSP on firms' credit rating.

We next introduce a fixed effects model with robust standard errors clustered at the firm level. The clustered standard errors at the firm-level are used to handle observations in the sample which

could be related to each other since the individual firm trait is identical for the groups within the clusters. Through this approach, we obtain unbiased standard errors in our regression model by accounting for heteroskedasticity across the clustered firms (Wooldridge, 2010). The results are presented as model 4 in Table 8. The coefficient of interest (*ESG*) did not change in magnitude and but is now statistically significant at a 5 % level instead of 1%. Consistent with the results from the fixed effects model, presented as model 3, the results from model 4 show further statistical support of a positive effect of CSP on firms' credit rating. Once again, the results presented in Table 8 confirm our prior analysis and suggest a robust relationship between CSP and firms' credit ratings. The *ESG* coefficient is positive between 0,009-0,006 throughout the different regression models and statistically significant (either on a 1% or 5% level) throughout the different regression models. Since the explanatory variable remains positive and statistically significant throughout the regression models, neither heteroskedasticity nor omitted variable bias is expected to be driving our results.

Overall, the results presented in Table 8 further suggest that non-financial information in terms of CSP is considered to be relevant in CRAs assessment of a firms' creditworthiness. The positive and statistically significant relationship between CSP and firms' credit ratings holds across the different regression models, suggesting that firms with a high level of CSP tend to be awarded with a slightly higher rating. The fact that our empirical findings suggest CSP has a positive effect on firms' credit ratings is in line with our predictions and hypothesis. The explanatory variable of interest, *ESG*, is assumed to be low since the ESG consideration is not a major factor in the credit rating assessment. Rating analysts are considering ESG risks and opportunities as part of firms' business and financial risk profile, and how the overall risk profile in turn can affect a firm's ability to meet its financial obligations.

In terms of economic significance, a firm's credit rating score is expected to increase by 0.006 for each one-unit increase in *ESG*, or 0.1419 points for each increase of one standard deviation in *ESG* (23.649). This suggests that CSP's effect on firms' credit ratings is relatively weak in terms of economic significance. The weak relationship is in line with our predictions that CSP only has a

minor influence in CRAs assessment of firms' creditworthiness, and empirical findings still have valuable practical implications.

7.3. Fixed Effects Estimation of ENV, SOC, and GOV and Credit Ratings

To extend our analysis, and gain a deeper understanding of how the individual dimensions of CSP affect firms' credit ratings, we introduce a second regression model with a disaggregated ESG score. In this section, we examine the relationship between the individual components of CSP and firms' credit ratings. To be able to examine the individual components of CSP's effect on firms' credit rating, we replace the aggregated ESG score with three individual scores of *ESG* as our new main explanatory variables: *ENV*, *SOC* and *GOV*. In line with arguments by Cheng et al. (2014), we predict the relevance among the individual components of CSP to differentiate.

Table 9 displays the results from our second regression model which examines the relationship between firms' credit ratings and the individual components of the ESG-score. Our empirical findings suggest that certain dimensions of the ESG score are more relevant than others in affecting a firm's credit rating. More precisely, results from models 5-8 presented in Table 9 suggest it is mainly improvements in the social dimension of ESG that has a beneficial effect on firms' credit ratings. This is supported by the estimated *SOC* coefficient which is positive and significant throughout models 5-8. Interestingly, the environmental (*ENV*) and governance dimension (*GOV*) has no significant impact on a firm's credit rating on an individual level when using clustered robust standards errors at the firm-level. To further elaborate on the results from Table 9, we additionally introduce a fixed effects model with robust standard errors clustered at the firm level, with *SOC* as the only explanatory variable. The results are presented as model 9 and 10 in Table 10. The coefficient of interest, 0.005, indicates that *SOC* is positive and statistically significant. This confirms our previous analysis that a firm's social performance is of relevance for its credit ratings also on an individual level.

According to these results, firms investing in CSR to improve their credit rating should primarily focus on the social aspect, while focusing on environmental and corporate governance efforts on

an individual level is considered to be redundant. The results suggest the effect of CSP on credit ratings is not captured to the same extent when the individual dimensions of CSP are examined. The empirical findings are in line with results from the study by Attig et al. (2013), which suggests that social performance is the main driver of CSP's impact on firms' credit ratings among US firms. Our results suggest that this relationship holds in a European context. Our results of the significance of the social dimension are also supported by the theoretical predictions of the shareholder perspective. The shareholder theory predicts that firms taking social responsibility can improve social welfare and will enhance their relationships with key stakeholders. These social investments will become a competitive advantage after addressing stakeholders' interests (Attig et al., 2013; Freeman, 2010).

7.4. Instrumental Variable Approach

In this section, we particularity control for endogeneity concerns and possible reverse causality between CSP and firms' credit ratings using the instrumental variable approach. Overall, the results of this robustness test presented in Table 11 supports our earlier empirical results on the relationship between CSP and firms' credit ratings, as the results are not materially different from our primary analysis.

As previously discussed in section 5.3., we use the instrumental variable approach to handle possible endogeneity problems between CSP and firms' credit ratings. We introduce the instrumental variable *IND_ESG* and analyze its relevance, strength and exogeneity to examine whether our main results are driven by endogeneity. The instrumental variable approach and the selected instrumental variable (IV) are in line with previous research in the area (Attig et al., 2013; El Ghoul et al., 2011).

First, by starting to analyze the relevance of the IV, we find that our instrumental variable *IND_ESG* is positive at 0.629 and statistically significant at a 1% level when analyzing the first-stage findings of the two stage least squares (2SLS) regression analysis. The fact that the IV is positive and highly correlated with our explanatory variable, *ESG*, confirms the validly and

relevance of the chosen IV. Furthermore, the first-stage regression results show that larger firms have a higher ESG-score, given by the high coefficient of *SIZE* at 0.523.

Second, we analyze the strength of the IV. Based on the framework of Stock and Yogo (2005) discussed in section 5.3., Instrumental Variable Approach, we find an F-statistic of 46.43 in the first stage of the 2SLS regression analysis which indicates that our IV is strong, given its F-value above 40. By studying the joint significance of our IV, we can expect that there is no relative bias of *IND_ESG* in our study due to its strength. Further, the strength of the IV suggests that we do not have a biased IV estimator or hypothesis tests with large size distortions.

Third, to examine the exogeneity of *ESG* in our regression model, we evaluate the consistency of the IV estimator $\widehat{ESG}$. We find that the coefficient of $\widehat{ESG}$ remains positive and consistent in the 2SLS regression analysis, and is therefore considered to indicate that we do not have an endogeneity problem regarding omitted variables bias. However, we cannot reject the null hypothesis of endogeneity since the results from the second stage of the 2SLS regression analysis are not statistically significant. A possible shortcoming in this research is that we cannot be certain we do not have an endogeneity problem that drives our regression results. The estimated coefficient of interest *ESG* can therefore have been affected by omitted variables bias. Even though the results from the IV approach are not fully conclusive, we have mitigated part of the endogeneity concerns by using a fixed effects regression model with clustered standard errors.

8. Conclusion

This study examines if firms with a higher level of CSP tend to have higher credit ratings. There are a limited number of studies that examine the effect of CSP on firms' credit ratings, and studies conducted in a European context have primarily focused on different measures of credit risk as their dependent variable. Additionally, findings from these studies are inconclusive. This study examines the relationship between corporate social performance (CSP) and firms' credit ratings. Using a sample of 3,687 European firm-year observations from 2002–2018 and controlling for firm-specific control variables as well as industry, country and year fixed effects, we find that CSP has a positive and statistically significant impact on firms' credit ratings. The empirical results are

consistent with our hypothesis and theoretical predictions after conducting several empirical tests and controlling for endogeneity. In terms of economic significance, our empirical results suggest that a higher level of CSP are awarded with a slightly higher credit rating.

Furthermore, we find that not all of the individual dimensions of CSP relates to a firm's credit rating which is consistent with our predictions. In particular, our empirical findings of the individual dimensions suggest that firms' social performance is the main driver of CSP's impact on firms' credit ratings among European firms. This implies that the most influential CSR investments to firms' credit ratings are those with a social dimension directed to the firm's key stakeholders. Our findings are supported by the stakeholder and risk management theories and are in line with findings from Attig et al.'s (2013) and El Ghoul et al.'s (2011) studies conducted on the US market. Furthermore, our findings also work as a complement to Menz (2010) and Stellner et al. (2015) and their finding from the European market.

We have differentiated our study from previous literature by assessing CSP's effect on firms' credit ratings, with the analysis based on an extensive data set focus in a broad and relevant time aspect. The main body of previous research which has studied this relationship has focused on the US market, and only a limited amount of research has been conducted in Europe. Our findings contribute to better knowledge regarding CSP's effect on firms' credit ratings by providing a more comprehensive understanding of the relationship in a European context. Our research question is therefore motivated by the lack of clear evidence of the relationship in Europe. This study extends research conducted in US and global settings, and by providing evidence that the positive relationship between the level of CSP and credit ratings hold in a European context we contribute to the European strand of literature. Additional contributions arise from our efforts to further investigate what the effects of the individual dimensions of CSP can have on firms' credit ratings.

Our findings have several practical implications. First, our empirical results should give corporate managers practical information useful when making decisions regarding CSR investments, since our findings suggest that a higher level of CSP can enhance their firm's credit rating. Given the fact that firms in general are dependent on external financing, a better credit rating could lower their cost of funding and indirectly improve the firm's long-term competitiveness. This is essential

in today's business environment where the importance of debt financing and access to the capital market is central. Second, managers should in addition to a broad approach to CSR investments, primarily invest in the social dimension since it contributes to the firm's ability to create valuable internal resources. Further, it can help the firm to develop and maintain close relationships with key stakeholders which can also lower the probability of default, and thus enhance their credit rating.

There are several possible extensions of this study that are interesting to examine in future research to gain a broader understanding of the effects of CSP. First, it would be interesting to investigate how country and institutional differences would affect the relationship between CSP and firms' credit ratings by dividing the sample into subcategories. Second, it would be interesting to narrow the focus of Cheng et al.'s (2014) study and investigate if CSP leads to better access to the capital market by applying their framework in a European setting. Third, by using a more dynamic approach, it would be interesting to examine if firms with lower levels of CSP, that decide to invest more in CSR to improve their CSP, see changes in their costs of debt financing over time as a result of higher credit ratings. This would allow for observations on how the casual relationship evolves in the long run.

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Table of Tables:

Table 1. Main ESG Components

Environmental (E)	Social (S)	Governance (G)
Energy usage	Employee relations	Accountability
Waste and recycling	Human rights	Shareholder rights
Innovation	Community relations	Ownership structure
Carbon emissions	Product responsibility	Bribery and corruption
Climate change risks	Health and safety	Board structure/diversity
Renewable energy use	Union relationships	Transparency

Sources: Clark et al. (2015); Thomson Reuters (2019)

Table 1 presents examples of ESG factors used in determining overall ESG scores.

Table 2. Sample Characteristics

Characteristic	Number of Firms	% of Firms	Average ESG Score	Average Credit Rating	Average Credit Rating Score
Panel A: Industry					
Basic Materials	26	8%	83,67	BBB	14,73
Consumer Goods	29	9%	83,27	BBB	14,9
Consumer Services	36	11%	77,35	BBB-	13,74
Financials	95	30%	70,64	A-	16,34
Health Care	16	5%	80,82	A-	16,01
Industrials	57	18%	76,81	BBB	14,61
Oil & Gas	12	4%	86,32	A-	16,47
Technology	10	3%	84,16	BBB-	13,45
Telecommunication	14	4%	85,9	BBB+	15,24
Utilities	25	8%	84,07	A-	16,06
Total/Average	**320**	**100%**	**81,30**	**BBB+**	**15,16**
Panel B: Country					
Austria	5	2%	71,42	BBB+	15,64
Belgium	7	2%	77,05	A-	14,8
Denmark	6	2%	60,37	BBB+	15,85
Finland	7	2%	82,69	BBB-	13,99
France	52	16%	80,14	BBB+	15,46
Germany	45	14%	75,5	BBB+	15,13
Ireland	4	1%	63,94	BBB-	13,7
Italy	16	5%	79,1	BBB+	15,91
Luxembourg	5	2%	61,06	BBB	14,25
Netherlands	16	5%	87,07	BBB+	15,65
Norway	5	2%	89,85	BBB+	15,47
Poland	6	2%	56,44	BBB	14,84
Portugal	2	1%	84,48	BBB-	13,88
Spain	21	7%	78,76	BBB+	15,38
Sweden	19	6%	72,46	A-	16,1
Switzerland	24	8%	78,19	BBB+	15,73
United Kingdom	80	25%	79,91	BBB+	15,05
Total/Average	**320**	**100%**	**75,20**	**BBB+**	**15,11**

Table 2 presents the sample characteristics. The sample is comprised of 320 unique firms over the 2002–2018 period. In Panel A we present the distributions by industry in the sample, and in Panel B the distributions by country. Furthermore, the table displays the average ESG scores and Credit Ratings (both in score and in S&P ratings) based on firms' industry and country classifications.

Table 3. Credit Rating Conversions

Score (1-22)	***Standard & Poor's***	***Moody's***	***Category***
22	AAA	Aaa	
21	AA+	Aa1	
20	AA	Aa2	
19	AA-	Aa3	
18	A+	A1	*Investment*
17	A	A2	*Grade*
16	A-	A3	
15	BBB+	Baa1	
14	BBB	Baa2	
13	BBB-	Baa3	
12	BB+	Ba1	
11	BB	Ba2	
10	BB-	Ba3	
9	B+	B1	
8	B	B2	*Speculative*
7	B-	B3	*Grade*
6	CCC+	Caa1	
5	CCC	Caa2	
4	CCC-	Caa3	
3	CC	Ca	
2	C	Ca	
1	D	C	

Table 3 presents the ordinal values assigned to firms' credit ratings when assessing our dependent variable (CR). Standard & Poor's and Moody's long-term issuer credit ratings are converted to an ordinal scale according to the following scale presented above: from 22 (AAA/Aaa) to 1 (D/C).

Table 4. Variable Definition

Variable	*Definition*
Dependent Variable	
CR	The *CR* variable is defined as the Credit Rating assigned by primarily S&P, and when data is deemed insufficient Moody's. The ratings between AAA and D are given on a scale of 1-22
Explanatory Variables	
ESG	The *ESG* score is given on a scale of 1-100, and reflects a firm's performance in CSP
ENV	The *ENV* score is given on a scale of 1-100, and reflects a firm's environmental performance
SOC	The *SOC* score is given on a scale of 1-100, and reflects a firm's social performance
GOV	The *GOV* score is given on a scale of 1-100, and reflects a firm's governance performance
Control Variables	
SIZE	*SIZE* reflects a firm's size, given by the natural logarithm of total assets
ROA	*ROA* reflects a firm's return on assets, given by a firm's net income to total assets
LEVERAGE	*LEVERAGE* is given by a firm's total debt over total assets
COVERAGE	*COVERAGE* reflects a firm's ability to service debt, given by EBIT over total interest payments
MARGIN	*MARGIN* reflects a firm's operating profit margin
BETA	*BETA* reflects a firm's historical beta coefficient, given by the standard deviation of systematic risk
CAPEX	*CAPEX* reflects a firm's capital expenditures ratio, given by capital expenditures over revenue
PB	*PB* reflects a firm's price-to-book ratio, given by current market price to book value
INDUSTRY	*INDUSTRY* is given by the industry-specific characteristic of a firm
COUNTRY	*COUNTRY* is given by the country-specific characteristic of a firm
YEAR	*YEAR* is given by the year observed

Table 4 presents all variables used in our regression models and their definitions. The dependent variable is collected from Thomson Reuters Eikon. All explanatory variables are collected from the Thomson Reuters ASSET4 database. All control variables are collected from Thomson Reuters Datastream.

Table 5. Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min.	Max.
Dependent Variable					
CR	4,266	15.318	2.419	7.000	22.000
Main Explanatory Variables					
ESG	4,381	78.019	23.649	2.810	98.250
ENV	4,389	77.669	23.680	8.420	97.420
SOC	4,389	78.394	23.051	4.420	99.450
GOV	4,388	62.390	23.108	1.980	97.870
Control variables					
SIZE	5,440	16.887	1.746	11.469	21.822
LEVERAGE	5,440	1.750	2.871	-2.720	16.550
COVERAGE	5,440	18.028	33.189	-9.660	119.250
MARGIN	5,440	0.138	0.135	-0.147	0.670
BETA	4,849	0.998	0.542	-6.872	16.030
ROA	5,440	6.743	7.297	-9.210	24.390
CAPEX	5,440	0.223	0.385	0.000	1.181
PB	5,440	3.365	3.619	-3.170	12.090

Table 5 presents the number of observations, mean values, standard deviations, min. values and max. values of the regression variables. The sample comprises 320 unique firms over the 2002–2018 period. We have handled outliers for the control variables (*LEVERAGE, COVERAGE, MARGIN, ROA, CAPEX*, & *PB*) using the winsorizing process by using the 1% and 99% percentile.

Table 6. Pair-wise Correlation Matrix

	CR	*ESG*	*ENV*	*SOC*	*GOV*	SIZE	LEVERAGE	COVERAGE	MARGIN	BETA	ROA	CAPEX	PB
CR	1												
ESG	**0.1053**	1											
ENV	**0.0767**	**0.8196**	1										
SOC	**0.1209**	**0.8823**	**0.7441**	1									
GOV	**0.0002**	**0.6523**	**0.3741**	**0.4386**	1								
SIZE	**0.4362**	**0.3133**	**0.2964**	**0.3362**	**0.1793**	1							
LEVERAGE	**0.1702**	**-0.0164**	**-0.0202**	**0.0291**	**-0.0125**	**0.4299**	1						
COVERAGE	**0.1565**	**-0.0630**	**-0.0653**	**-0.0811**	**-0.0645**	**-0.1281**	**-0.1463**	1					
MARGIN	**0.1351**	**-0.1633**	**-0.2019**	**-0.2225**	**-0.0334**	**-0.2268**	**-0.0403**	**0.1792**	1				
BETA	**-0.1290**	**0.1051**	**0.0514**	**0.0908**	**0.1618**	**0.2776**	**0.1133**	**-0.0107**	**-0.2027**	1			
ROA	**0.0694**	**0.0362**	**-0.0223**	**-0.0183**	**0.0667**	**-0.2783**	**-0.1603**	**0.3041**	**0.3598**	**-0.1396**	1		
CAPEX	**-0.0751**	**-0.0244**	**-0.0029**	**-0.0682**	**0.0141**	**-0.0880**	**-0.0626**	**-0.0466**	**0.2058**	**-0.0563**	**0.0269**	1	
PB	**0.0597**	**-0.0172**	**-0.0684**	**-0.0109**	**0.0555**	**-0.2580**	**0.0573**	**0.1727**	**0.1463**	**-0.1705**	**0.3274**	**-0.0769**	1

Table 6 presents the pairwise correlation coefficients between the regression variables. Correlation coefficients in boldface are significant at the 1% level. The sample comprises 3,687 firm-year observations representing 320 European firms over the 2002–2018 period. Definition and descriptions of all variables are provided in Table 4.

Table 7. Diagnostics Tests

Test	Null Hypothesis	Chi2 (1)	P-value	Reject or Accept
Breusch-Pagan	Constant Variance	17.86***	0.0000	Reject
White	Homoskedasticity	21.43***	0.0000	Reject
Hausman	Difference in coefficients not systematic	74.98***	0.0000	Reject

Table 7 displays the results from our diagnostics tests, the Breusch-Pagan test, White test, and Hausman test. The first two are used to test for heteroskedasticity in our linear regression model. The null hypothesis for these tests is that the error variance is constant (homoskedasticity). Since the p-values are below 0.05, we reject the null hypotheses and that heteroskedasticity can be assumed in our data sample. The third diagnostics test, the Hausman test, is used to determine if the FE or RE model is preferable. Based on the p-value, we can reject the null hypothesis that RE is the most suitable and efficient model. ***, **, * indicate statistical significance at the 0.01, 0.05 and 0.1 level, respectively in all three diagnostics tests.

Table 8. Regression Results with Aggregated ESG Score

	(1)	(2)	(3)	(4)
	OLS	OLS Robust	Fixed Effects	Fixed Effects Cluster (FIRM)
VARIABLES	*CR*	*CR*	*CR*	*CR*
ESG	0.00937***	0.00937***	0.00623***	0.00623**
	(0.00164)	(0.00188)	(0.00156)	(0.00289)
SIZE	0.781***	0.781***	0.480***	0.480***
	(0.0269)	(0.0284)	(0.0671)	(0.165)
LEVERAGE	-0.107***	-0.107***	-0.0148	-0.0148
	(0.0125)	(0.0131)	(0.0134)	(0.0328)
COVERAGE	0.0180***	0.0180***	0.0125***	0.0125***
	(0.00155)	(0.00201)	(0.00132)	(0.00277)
MARGIN	2.978***	2.978***	2.614***	2.614***
	(0.267)	(0.285)	(0.284)	(0.684)
BETA	-1.129***	-1.129***	-0.657***	-0.657***
	(0.0664)	(0.145)	(0.0519)	(0.167)
ROA	0.0203***	0.0203***	-0.00474	-0.00474
	(0.00577)	(0.00618)	(0.00431)	(0.00873)
CAPEX	-0.819***	-0.819***	0.217	0.217
	(0.188)	(0.185)	(0.187)	(0.300)
PB	0.193***	0.193***	0.104***	0.104***
	(0.0160)	(0.0188)	(0.0148)	(0.0301)
Constant	3.269***	3.269***	7.618***	7.618***
	(0.472)	(0.485)	(1.119)	(2.787)
Year Included	Yes	Yes	Yes	Yes
Country Included	Yes	Yes	-	-
Industry Included	Yes	Yes	-	-
Observations	3,687	3,687	3,687	3,687
R-squared	0.523	0.523	0.279	0.279
Number of Firms	320	320	320	320

Table 8 contains estimated regression results from the OLS, OLS robust, FE, and FE with clustered standard errors models. The dependent variable is the credit rating score (*CR*) and the explanatory variable is the ESG score (*ESG*). All regressions include a series of control variables described further in Table 4, and in section *6.2.3*. All accounting-based ratios are winsorized at the 1% level. We report robust standard errors in parentheses and ***, **, * indicates statistical significance at the 0.01, 0.05 and 0.1 level, respectively.

Table 9. Regression Results with Disaggregated ESG Score

	(5)	(6)	(7)	(8)
	OLS	OLS Robust	Fixed Effects	Fixed Effects Cluster (FIRM)
VARIABLES	*CR*	*CR*	*CR*	*CR*
ENV	-0.00418**	-0.00418**	0.000339	0.000339
	(0.00202)	(0.00211)	(0.00174)	(0.00284)
SOC	0.0131***	0.0131***	0.00393**	0.00393
	(0.00219)	(0.00257)	(0.00178)	(0.00289)
GOV	0.00147	0.00147	0.00223	0.00223
	(0.00166)	(0.00178)	(0.00142)	(0.00254)
SIZE	0.779***	0.779***	0.489***	0.489***
	(0.0272)	(0.0283)	(0.0671)	(0.166)
LEVERAGE	-0.110***	-0.110***	-0.0157	-0.0157
	(0.0125)	(0.0131)	(0.0134)	(0.0329)
COVERAGE	0.0182***	0.0182***	0.0124***	0.0124***
	(0.00155)	(0.00201)	(0.00132)	(0.00279)
MARGIN	2.990***	2.990***	2.649***	2.649***
	(0.267)	(0.285)	(0.283)	(0.680)
BETA	-1.139***	-1.139***	-0.661***	-0.661***
	(0.0663)	(0.144)	(0.0521)	(0.167)
ROA	0.0216***	0.0216***	-0.00328	-0.00328
	(0.00574)	(0.00617)	(0.00428)	(0.00878)
CAPEX	-0.704***	-0.704***	0.199	0.199
	(0.189)	(0.185)	(0.187)	(0.301)
PB	0.189***	0.189***	0.103***	0.103***
	(0.0160)	(0.0189)	(0.0148)	(0.0301)
Constant	3.224***	3.224***	7.499***	7.499***
	(0.470)	(0.481)	(1.118)	(2.797)
Year Included	Yes	Yes	Yes	Yes
Country Included	Yes	Yes	-	-
Industry Included	Yes	Yes	-	-
Observations	3,693	3,693	3,693	3,693
R-squared	0.525	0.525	0.278	0.278
Number of Firms	320	320	320	320

Table 9 contains estimated regression results from the OLS, OLS robust, FE, and FE with clustered standard errors models. The dependent variable is the credit rating score (*CR*) and the explanatory variables are *ENV*, *SOC* and *GOV*. All regressions include a series of control variables described further in Table 4, Section 6.2.3. All accounting-based ratios are winsorized at the 1% level. We report robust standard errors in parentheses and ***, **, * indicates statistical significance at the 0.01, 0.05 and 0.1 level, respectively.

Table 10. Regression Results from the Individual SOC Dimension

VARIABLES	(9) Fixed Effects *CR*	(10) Fixed Effects Cluster (FIRM) *CR*
SOC	0.00500***	0.00500*
	(0.00151)	(0.00292)
SIZE	0.523***	0.523***
	(0.0674)	(0.167)
LEVERAGE	-0.0235*	-0.0235
	(0.0135)	(0.0326)
COVERAGE	0.0140***	0.0140***
	(0.00132)	(0.00292)
BETA	-0.667***	-0.667***
	(0.0526)	(0.167)
ROA	0.00862**	0.00862
	(0.00415)	(0.00888)
CAPEX	0.159	0.159
	(0.189)	(0.302)
PB	0.119***	0.119***
	(0.0149)	(0.0312)
Constant	7.187***	7.187**
	(1.129)	(2.837)
Year Includeed	Yes	Yes
Country Included	-	-
Industry Included	-	-
Observations	3,694	3,694
R-squared	0.258	0.258
Number of Firms	320	320

Table 10 contains estimated results from the fixed effect and fixed effect with clustered standard errors models when using *SOC* independently as the explanatory variable. The regression results support the findings from Table 9, suggesting a positive effect of social performance on firms' credit ratings. We report robust standard errors in parentheses and ***, **, * indicates statistical significance at the 0.01, 0.05 and 0.1 level, respectively.

Table 11. 2SLS Instrumental Variable Approach

VARIABLES	(11) First-Stage *ESG*	(12) 2SLS *CR*
IND_ESG	0.629***	
	(0.0871)	
$\widehat{ESG}$		0.0173
		(0.0138)
SIZE	7.348***	0.721***
	(0.241)	(0.105)
LEVERAGE	-0.0536	-0.107***
	(0.125)	(0.0125)
COVERAGE	-0.00439	0.0179***
	(0.0156)	(0.00154)
MARGIN	-6.700**	3.027***
	(2.675)	(0.279)
BETA	0.967	-1.136***
	(0.666)	(0.0673)
ROA	0.335***	0.0176**
	(0.0576)	(0.00744)
CAPEX	11.01***	-0.909***
	(1.874)	(0.243)
PB	-0.208	0.195***
	(0.160)	(0.0161)
Constant	-92.86***	3.655***
	(7.695)	(0.815)
Year Included	Yes	Yes
Country Included	Yes	Yes
Industry Included	Yes	Yes
Observations	3,687	3,687
R-squared	0.390	0.520
Adjusted R-squared	0.3813	0.3813
F-Statistic	46.43	46.43

Table 11 contains estimated regression results for the instrumental variable approach from the first and second stages of the two stage least squares (2SLS) regression analysis. In the first stage we introduce *IND_ESG* as the instrumental variable, further explained in section 5.3. In the second stage $\widehat{ESG}$ is the IV estimator, further explained in section 5.3. We report robust standard errors in parentheses and ***, **, * indicates statistical significance at the 0.01, 0.05 and 0.1 level, respectively.