

M.Sc. Thesis

Title: The impact of ESG sustainability scores on the firms access to bank loans

Abstract:

This thesis investigates the impact of ESG performance score of the companies in their ability to access loans from banks. The data used in this analysis is based on 4828 deals lent to 1645 US companies during the period of 2006-2016. For the accuracy of the results, the data was separated into the strength and concern factors based on each variable. They indicate whether the company has reported positive or negative performance for each E, S and G factors respectively. The extended regression analysis of the paper concludes that banks are more likely to give larger loans to the companies with higher strength scores, rather than those with lower strength scores. Furthermore, in terms of interest spreads charged on the loans, it was revealed that the bad performing companies in terms of social concern scores are more likely to be charged higher prices on their debts. For E and G factors a weak evidence of this relationship was found as well.

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1. Introduction

There have been wide discussions in the literature about the financial institutions' role in the world's sustainability and their contribution to the ongoing climate change and humanitarian crisis. Although financial institutions might not be as directly responsible for the excessive CO2 emissions into the atmosphere, or for the production of military weapons or the use of child labour in manufacturing, they might indirectly contribute to these causes through their lending to firms.

The idea of banks' essential role in the sustainable environmental, social and governance activity was brought to attention in 1991 when a small group of commercial banks from all over the world joined forces with the United Nations Environment Program – UNEP, establishing the UNEP Finance Initiative. The goal of this program was to increase the recognition of banks' indirect impact into the environment, encourage them in the process of sustainable development and to catalyze the “financial industry's awareness of the environmental agenda” (Thompson and Cowton 2004; UNEP FI, 2019).

Although the aim of the program was to direct the international banking industry's focus on sustainability issues and to influence their lending and financing activities in a way to contribute to the environmental and social goals, studies on the effectiveness of the UNEP FI statement reveal ambiguous findings (Coulson and Monks, 1999; Thompson and Cowton, 2004). It is to this day unclear to what extent the banks include the impact factors in their funding decisions, and whether the irresponsible borrowers are being punished for their poor quality of integrating environmental standards.

UNEP FI agreement's goal was to increase commitment to sustainable lending activities among the signatories. However, whether this agreement has achieved any difference in the lending behaviour of signatory banks have been under many discussions in the academic literature. Although the UNEP FI agreement is the historical point for the official recognition of banks role in the impact investing, according to a study by Weber et. al (2005), complete integration of environmental issues was not significantly different between the signatories and non-signatories of the UNEP agreement in 1999.

Out of all three ESG factors, the inclusion of the environment factor has been the most debatable over the years. In 2008, Weber, Fenchel and Scholz studied the European banks and their lending decisions using the in-depth interviewing method and concluded that some banks include environmental risk as the downside credit risk in the company's screening process and their credit risk management, however, this integration process is only at its infancy (Banhalmi-Zakar & Brown, 2010; Weber et al.,

2008). Despite the strong significant findings of the paper, this study only revealed a limited number of banks - 20 banks that included the sustainability and environmental criteria in their lending business.

In contrast, research by Banhalmi-Zakar and Brown (2010) show that, although banks do consider some environmental risks in their decision-making process, the extent of this depends on how these risks impact the borrower's future cash flows. Findings of the paper reveal that unless the firms' sustainability account poses a serious threat to its loan playability and financial statements, banks do not consider their sustainability in their credit risk management analysis.

Overall, previous studies show that the process of including all the E, S and G factors has been slow for financial institutions since the first signing of the UNEP FI agreement. Matthews and Rusinko (2010) suggest two reasons for the slow integration of banks to the sustainable lending. This is firstly, due to the limits of the comparable company to company data, and secondly, due to the lack of evidence for the direct relationship between the financial performance and the ESG scores. Furthermore, there has been very few studies investigating whether the firms' separate E, S and G scores affect the bank's lending decisions.

To fill the gap of knowledge and uncertainty in the previous literature and to add more insights into the green lending decisions of banks in recent years, this paper investigates whether banks punish the unsustainable companies with the lower deal amounts and higher fees. This is studied using several environmental, social and governance factors, banks' lending amounts and the cost of loans to the companies gathered from MSCI KLD and the DealScan databases respectively. The impact of individual E, S and G scores of the companies separate from their ESG scoring has never been broadly discussed in the literature, despite the increasing concerns of climate change and social concerns in the modern economy.

Since the signing of the infamous Paris Agreement¹ on climate change in 2016, 186 states and the EU swore to prioritize the environment in their policies. Thus, as the environment became the focus of many countries, this paper tried to look into the unexplored area in the previous literature concerning the specific environmental scores of borrowing companies and their effects in their loan access. Since the previous research has stressed the importance of overall ESG performance of the companies on their long term financial performance as well as their cost of loans, this paper derives regression models for

¹ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

each of the E, S and G factors separately, and compare their impacts on lending decisions of financial institutions. Hence the central research question of this paper was formulated as the following:

How does the borrower's ESG sustainability scores affect the banks' lending decisions?

The findings of the research shed light into this “grey area” of literature and bring incentives for tightening regulations for the banks' lending activities concerning the sustainability. The results of the extended OLS regression analysis comparing the lending activity of the banks show that, among all three ESG factors, the social strength and concern factors were the most important to impact the spread charged on the loan, whereas all three E, S and G Strength factors showed expected positive significant relationships with the amount of deals lent to company. Besides, even though the good quality companies seemed to get larger deals than those companies that do not report positive environmental activities, the environmentally irresponsible firms seemed to also borrow more amount of deals than the ones that did not report any poor environmental performance.

The second part of this paper investigates whether the companies were rewarded or punished accordingly based on their E, S and G behaviour. Despite the insignificance of the coefficients, there seemed to be a positive relationship between the prices charged on the loan, and the environmental concerns scores of the companies. This implies that the companies involved in controversial environmental, social and governance activities were more likely to face higher loan spreads than those with no reported controversies. These results were more significant for the social performance scores of the companies, implying that banks consider the social performance of a company as a priority relative to its environmental performance. In contrast, companies showing higher quality E, S and G performance were not rewarded by discounts on their loans.

Overall, the findings of this research have given an important reflection of the US banks' lending activity based on separate E, S and G factors during the decade before The Paris Agreement was signed. Further research could look into the ten years after 2016, to compare whether the US banks' lending behaviour has changed since the climate change agreement took place.

The remaining of the paper is structured as follows: section two will cover the theoretical framework behind the research topic, including discussions of several literary works on sustainable bank lending, as well as debates around the effects of separate ESG factors and the overall ESG scores affecting the banks' investment decisions. Section three will explain the data gathered for the research and discuss the descriptive statistics of the data, thereafter, section four will capture the methodology, and finally, the results and the conclusion will be covered in section five and six respectively.

2. Theoretical Framework

For the last few decades, following the UNEP Finance Initiative, academic research has tilted its focus into analyzing the relationship between the impact factors of the companies and their financial performance. An increasing number of asset management funds has started considering overall social responsibility in their investment decisions, by screening the companies by their overall CSR and ESG scores. The section below will give several insights into this literature and will explain the reasoning behind the hypothesis of this paper using previous academic research.

2.1. Literature Review

The financial institutions role in environment has been neglected until the 1990s when the number of commercial banks signed a voluntary agreement to include environment in their lending decisions, which became known as the UNEP² Financial Initiative and has since been recognized as the first-ever official document which introduces the environmental factors into the financial decision making.

Since then, many researchers have looked into the application of environmental as well as social and governance decisions into the banking sector. The previous literature has brought interesting findings concerning the implication of including these factors in the lending process of banks.

Among many researchers, Weber, et al. (2008) conducted an interesting study where the lending activities of the UNEP FI signatories were compared to the non-signatories. The authors use a postal questionnaire method, where the 205 European banks were asked yes-no questions regarding their consideration of environmental risks in the lending process. Out of the 50 companies that responded to the questionnaire, the signatories of the UNEP FI agreement reported that they include the environmental activities in their credit risk management process more often than the non-signatories of the agreement. The findings of this report revealed that 85.7% of banks took the environmental risk into account in the rating phase of the credit risk management process. Only 9 banks included environment in the entire credit risk management process including all the rating, costing, pricing, monitoring and the workout phases. Despite the limited findings and the restricted data of the paper, Weber's conclusions showed developments in the past decade regarding sustainable bank lending practices.

² <https://www.unepfi.org/about/background/>

Another paper written by Coulson and Monks (1999) provides an overview of the cases where environmental factors have played a large role in the credit risk of the company and thus explains the importance of including these factors in the lending decisions of the banks. Throughout the paper, the authors present many cases where the negligence of environmental risks by banks had caused significant losses to them in terms of liabilities. After the US Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the banks in the US were held liable for lending to the companies that were polluting. The implication so the CERCLA was that in case the borrowing company caused the contamination, the lenders were obligated to cover the costs of the cleanup process as well as were penalized for their engagement in the indirectly financing the polluting firms. Since the introduction of this act, many cases were brought to court where the lending party was held liable for the irresponsible actions of the borrowers. However, in this case, government initiatives such as CERCLA only provides impacts on the lending decisions of the banks that directly finance the firms with contaminated sites, especially in the case of real estate firms. Banhalmi-Zakar and Brown (2010) introduce three types of environmental risks that banks create by lending to irresponsible firms. These include direct, indirect and reputational risks to the bank. Direct risks refer to the actual damage caused to the firm through their operations in contaminated areas, whereas indirect risks are explained as borrower's inability to repay its loans due to the extra costs risen because of their engagement in unsustainable projects. Indirect risks might arise due to strict environmental regulations and fines. These risks are the most common risks according to Thomson and Cowton (2004), since the introduction of new regulatory bills and legislations, or due to a change in the consumer preferences towards a more sustainable good, a borrower company's products can be eliminated from the market, increasing their probability of default. Finally, as the authors describe, reputational risks that banks face are usually due to the negative media coverage of the firm's controversial projects financing, such as the use of nuclear energy, accidents in the coal mining operations. Banhalmi-Zakar and Brown (2010) suggest that these risks are the reasons banks should include an environmental screening of the companies in their credit risk analysis.

Furthermore, recent studies have investigated the importance of sustainable lending in the financial performance context. More specifically, Ahmed, Ahmed and Hasan (2018) supports the ESG consideration in the lending decisions due to the positive relationship between ESG and financial performance of the companies. Ahmed et al. (2018) concluded that banks considering the environmental, social and governance factors in their decisions, perform better in the long term. The authors conduct the research using the data on separate E, S and G factors and use the Return on Assets variable as the dependent variable of the regressions. Their findings reveal that among the ESG factors, the environment

was the least important whereas the governance factor was the most significant in influencing the ROA of banks. These findings imply that environmental factors to this day are not prioritized within the ESG context, and despite the increasing warnings concerning the climate change, the environment is ranked only third in importance to the financial institutions.

On the other hand, studies show that screening each company in every lending process is not easy, and determining the sustainability scores of the companies is not straightforward in reality. Among many others, Thompson and Cowton's (2004) study revealed that the information scarcity and inefficiency are one of the reasons that environmental aspects are not entirely considered in creditors lending decisions. This postal questionnaire study was based on 141 banks operating in the UK, including 13 retail banks, 23 British merchant banks and randomly selected 15% of the 457 British and foreign banks. The authors add that although banks are not interested in measuring the environmental risks and negative externalities caused by their debtor companies, they are "supportive of, and at least not opposed to" the increased disclosure of environmental practices in companies. Their findings reveal that banks prefer to see the environmental activities of the firm in their annual reports, which is a common tool for them in evaluating the company's credit risk. However, the banks analyzed by Thompson and Cowton (2004) do not show priority or high commitment to the social accounting principles in their credit analysis. The study reveals that the motivation for banks to evaluate environmental activities of the borrowers is mainly driven by a concern of managing potential financial risks as opposed to meeting any environmental requirements. The results of this paper imply that although the banks are the largest finance providers of the economy, they do not seem much enthusiastic about including the environmental activities in their lending decisions unless borrowers' activities are directly affecting their loan payability.

A more recent study has been conducted by Deloitte in 2017, on the Nigerian banks focusing on sustainable investing. Deloitte's latest sustainable banking research highlights important trends in the banking industry towards ESG conscious lending and investments, and some challenges faced by financial institutions in the process (Deloitte, 2017). In this survey of Nigerian Banks, the Deloitte Global Sustainability Services leader Eric Dugaley suggests that the traditional banking sector has changed over the years, in terms of their capital market decisions - in addition to just risk and return, the new banking sector adopts "impacts" into their capital decisions as well. In this article, Dugaley notes that the biggest difficulty with sustainable investing in modern times is the inability to determine the risk and return of the green projects. Despite the challenges of sustainable banking, studies have shown business benefits such as higher and more stable profits and stronger growth of responsible banks relative to the irresponsible ones.

Further in this study, Bola Asiru also discusses the importance of sustainable banking. He adds that the benefits of sustainable banking can range from investor confidence to improved reputation for banks (Deloitte, 2017). According to this study (2017), the Nigerian banks are increasingly shifting their focus from only managing their environmental and social risks to also looking for more sustainable investing opportunities by screening the companies by their green and sustainable actions. The Deloitte study on Nigerian Banks concluded that the banks were “highly committed to sustainability” and saw potential links between their sustainable investments and their business benefits, however, the study also revealed that the banks lacked the important data and the tools to integrate sustainable banking principles in their core company values and their goals (2017).

Despite the increased interest of banks in ESG investing, the progress has been slow over the past years since the UNEP FI agreement (Banhalimi-Zakar and Brown, 2010). Some researchers also explain the reasons for slower progress in “green lending” with the potential undesired consequences for the companies that are trying to maintain their ESG scores. In a paper written by Weber, Scholz and Michalik (2010), the authors list some of the ways that “environmentally friendliness” might be costly to the borrowers, which can affect their loan payments. In their study, Weber et al. (2010) try to analyze ways in which banks can incorporate sustainability risks into their credit risk management process. They suggest that environmental risks could pose important problems to the lenders as the debtors' earnings can be affected by their investments into expensive green technologies, which in turn might affect the firms' ability to repay their debts. Another problem might arise when the firms require additional capital for the sustainability purposes which as a result might increase the bank's credit risk.

2.1. Hypotheses

Although many researchers have tried to investigate the relationship between ESG activities of the firms and their access to loans, none had so far conducted a study on the direct effects of environmental, social and governance scores of borrowers and the lending activities of the banks. Furthermore, the analysis of this relationship was typically only limited to a number of questionnaires sent to the companies individually, which restricted the size of the data. To cover the gap on this topic in modern literature, the following thesis will focus on the latest available KLD data of 2006-2016, partially following the research of Goss and Roberts (2010).

Goss and Roberts (2010), uses the data on Corporate Social Responsibility of the firms, and analyses the overall effect of CSR performance on the price of a loan. The authors conclude that the firms performing poorly in CSR scoring were charged 7-18 basis points higher bank spreads than the

ones that were more responsible. The findings of the paper also suggest that irresponsible borrowers also face shorter maturities. However, the lenders showed indifference of pricing regarding the high-quality CSR companies.

Considering the above research, as well as the gaps in the literature, this thesis tries to investigate the following hypotheses:

H(a). There is a positive relationship between the higher separate ESG scores of the firms and the amount of the deal lent to them.

H(b) Loan prices are higher for firms with negatively impacting E, S and G activities.

To sum up, during the past decade, especially following the latest news on the increasing global temperatures, unfair treatment of women in the workplace and the controversies surrounding the use of child labour by companies, encouraging impact investments has become the primary goal of many governments. The important implications of the research for the government policy as well as economic literature makes the hypotheses even more interesting to investigate.

Following section will explain the data and methodology used to construct the paper and will discuss the statistical analysis of the environmental data gathered on the companies.

3. Data

The paper analyses the yearly bank lending data between the period of 2006-2016 to examine the relationship between the ESG scores of the companies and the amount of a deal lent to them by banks. Data used in this analysis includes 4828 deals lent to 1645 companies throughout the given period. The following section will give a detailed explanation of the dependent and control variables used in the regression models.

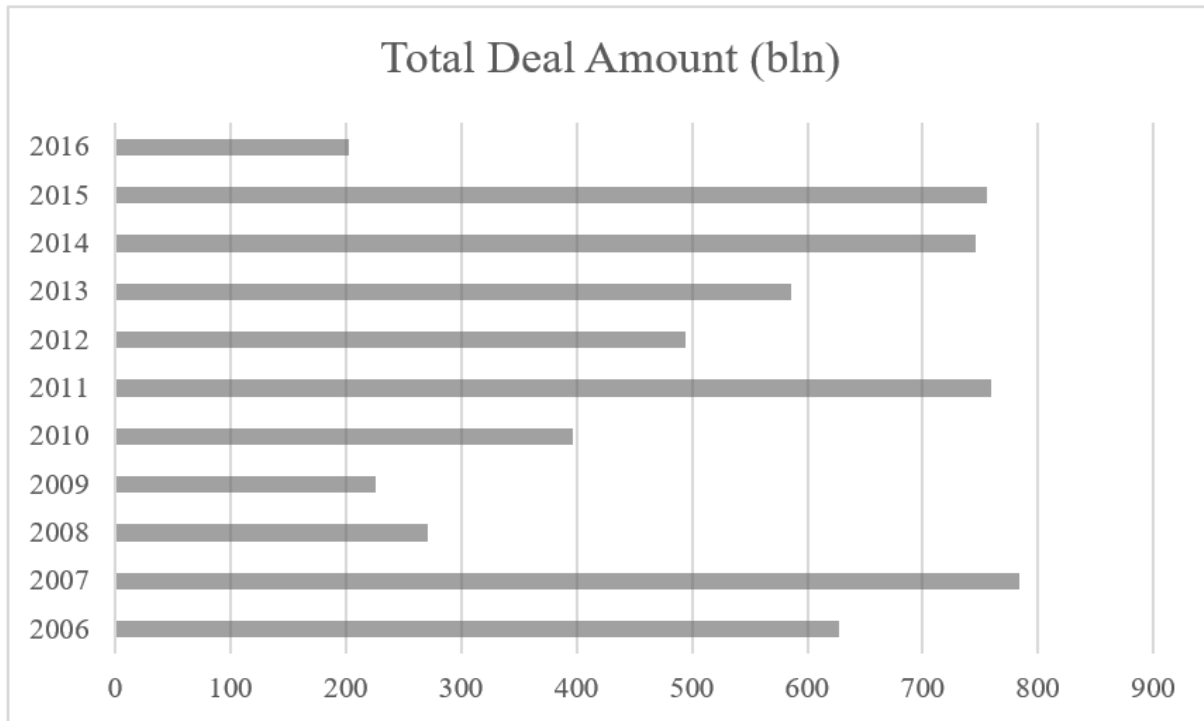
3.1. Dependent variable

There are two dependent variables used in this analysis: total deal amounts lent to individual companies and the interest spread charged by banks for each company. The sample includes 4828 observations in total, which were retrieved from WRDS-Thomson-Reuters' LPC DealScan, also known as Loan Pricing Corporation DealScan³. Despite the broad and detailed information provided on loans

³ <https://wrds-www.wharton.upenn.edu/pages/support/data-overview/wrds-overview-dealscan/>

in the Dealscan database, there is only tickers and company name available as identifiers. Therefore, to merge the control variables from Compustat and MSCI ESG information on firms, the company tickers are used.

Figure 1. Total deal amount based on industries on years



The deal amounts are calculated as the sum of deal amount for each company by year. Since there are both cross-sectional and time-series variables in the data, the data is grouped by panel variable - unique company identifier and the time variable - year. The bar chart below represents the deal flow into the companies throughout the sample period of 2006-2016.

As can be seen from the bar chart above, in the two years - prior to the Financial Crisis, US banks lent around 1.4 trillion dollars total worth of deals to the companies which later on turned out to have disastrous consequences. During the crisis years, the amount of deals lent decreased significantly to 260 billion and 220 billion in 2007 and 2008 respectively. In the following years, deals in total increase, reaching the pre-crisis period levels - 760 billion in 2015. However, in 2006, the amount of deals borrowed by companies reduces more than three times the year before, which can be associated with the sudden decision of raising the interest rates by the US Federal Reserve⁴ making borrowing costs higher.

⁴ <https://www.npr.org/sections/thetwo-way/2017/06/14/532942522/fed-raises-key-interest-rate-for-the-fourth-time-since-2015?t=1574414420897>

Overall, the data on bank lending deals reflect the economic conditions of the US during the period between 2006 and 2016.

Figure 2. Total deal amount based on industries of the borrowing companies

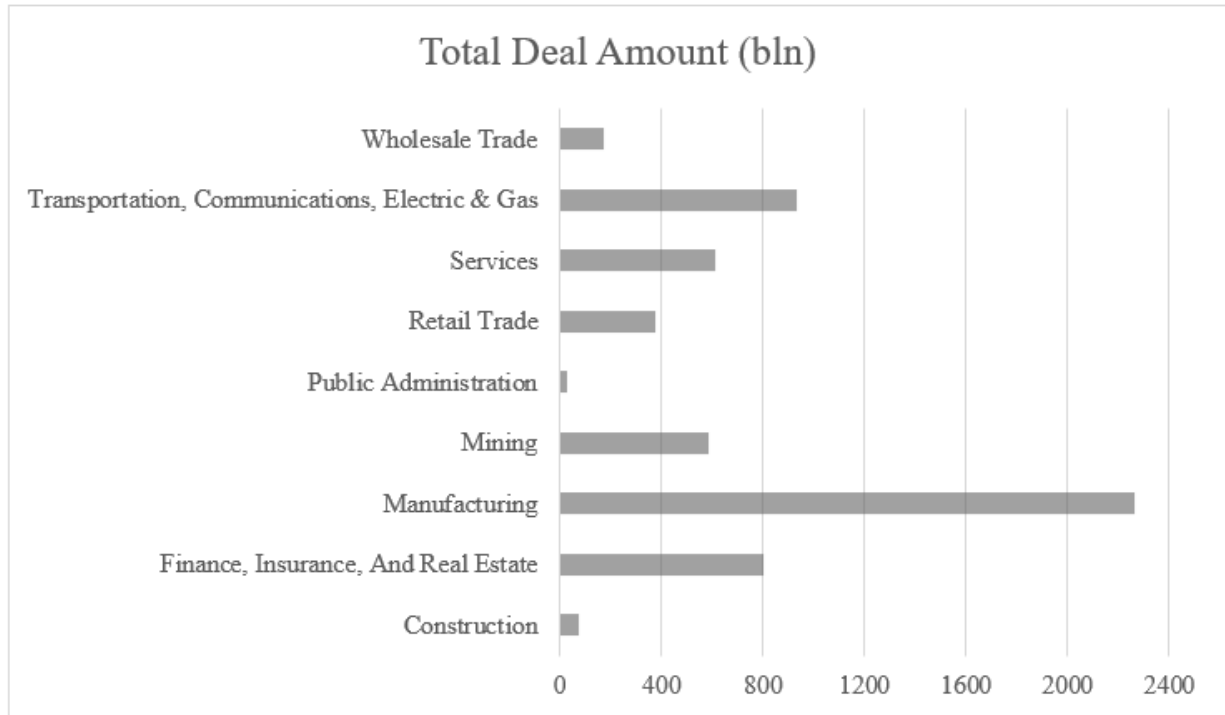


Figure 2 illustrates the total dollar amounts borrowed by the US companies in the years between 2006 and 2016. The chart shows that the highest borrowing industry during the given period, is the manufacturing industry, with the deals reaching 2300 billion USD. The next highest borrowers are Transportation, Communication, Electric and Gas which accounts for the 900 billion dollars of deals. As in line with the hypothesis, significantly lower deals were lent to the Mining Industry, which is one of the highest environment-polluting industries.

Following the methodology of Goss and Roberts (2010), for the second hypothesis, the interest spread charged by banks is taken as the cost of bank loans. The spreads charged by banks is retrieved from the Loan Pricing Corporation DealScan⁵ database and aggregated for each company per year similar to Goss and Roberts' (2010) paper.

⁵ <https://wrds-www.wharton.upenn.edu/pages/support/data-overview/wrds-overview-dealscan/>

3.2. ESG variables

The company-specific binary data on ESG variables were retrieved from the KLD MSCI database. The data covers 47 indicators of ESG scores, including 14 environmental, 29 social and 4 corporate governance factor. Table 1 (a-f) in the Appendix shows the full description of all the binary ESG variables obtained for the analysis. As shown in the tables, each of the ESG factors is reported either as a strength variable - indicating positive engagement or a concern variable - indicating negative engagement by the company. This enables us to analyse the data on an aggregated basis for positive and negative E, S and G performance. Following the paper by Goss and Roberts (2010), the Environmental Strength and Concern, Social Strength and Concern, Governance Strength and Concern variables were derived as a sum of all the strength and concern variables for each factor respectively. Thereafter, overall ESG strength score and ESG concern score variables were generated as shown below:

$$\text{ESG_Strength} = \text{E_Strength} + \text{S_Strength} + \text{G_Strength}$$

$$\text{ESG_Concern} = \text{E_Concern} + \text{S_Concern} + \text{G_Concern}$$

3.3. Control variables

For the accuracy of the analysis, and to eliminate the omitted variable bias, several control and fixed variables were used. As the main determinants of the company's financial stability, these four main variables were taken into account: a company's profitability, size, leverage ratio and growth. The data on the financial information of the US companies throughout the analysed period is obtained from the WRDS Compustat database and was later merged with the ESG MSCI and Dealscan by company tickers. The measure for the profitability of the borrowing company was calculated as its earnings to assets ratio as shown below:

$$\text{Profitability} = \frac{\text{Earnings Before Interest and Taxes}}{\text{Total Assets}}$$

The common equity is taken as a proxy of the size of the company. It represents “the common shareholders' interest in a company in the event of liquidation of company assets. Common equity is adjusted by the preferred stockholders' legal claims against the company” (WRDS, 2019).

As a proxy for the growth of the firm, net sales information is obtained from Compustat. This variable shows “gross sales (the amount of actual billings to customers for regular sales completed during the

period) reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers, for each operating segment” (WRDS, 2019).

Thereafter, the long term equity and common equity variables for the companies were retrieved to measure to determine the leverage ratio. Debt to Equity ratio is calculated using the following formula as a proxy for leverage ratio:

$$\text{Debt to Equity} = \frac{\text{Long Term Debt}}{\text{Common Equity Total}}$$

Another important variable in this analysis is Auditor Opinion - a categorical variable that is obtained from Compustat ranging from 0 to 5. This variable contains the code ranging from 0 to 5 and represents the auditors’ opinion on a company's financial statements. The full description of the variable is illustrated in Table 1 below:

Table 1. Description of the Audit Opinion categorical variable

| Category | Description |
|--|--|
| 0 Unaudited | The financial statements were not audited because they represent consolidated accounts and the auditor's letter refers only to parent accounts |
| 1 Unqualified | The financial statements are presented fairly and the auditing firm approves of the accounting principles reflected in the financial statements, the consistency of their application and the adequacy of financial disclosure. |
| 2 Qualified | The financial statements are presented fairly , but the auditing firm is concerned about either limitation on the scope of the examination or unsatisfactory financial statement presentations. |
| 3 No Opinion | The auditing firm does not express an opinion regarding the company's capability to continue business operations. |
| 4 Unqualified with additional language | The auditing firm 's opinion is unqualified, but explanatory language has been added to the standard report. |
| 5 Adverse Opinion | This code indicates that the financial statements are not presented fairly and the auditing firm does not approve of the accounting principles reflected in the financial statements, the consistency of their applications or the adequacy of financial disclosure. |

Moreover, to see the possible relationship between the independent variables the correlation matrix is derived as shown in Table 2:

Table 2. Correlation matrix of the independent variables

| | ESG CONCERN | ESG STRENGTH | E STRENGTH | S STRENGTH | G STRENGTH | E CONCERN | S CONCERN | G CONCERN | LOG SPREAD | LOG DEAL AMOUNT | EBIT/TA | LOG COMMON EQUITY | LOG DEBT SALE | LOG DEBT TO EQUITY | AUDIT OPINION |
|------------------|-------------|--------------|------------|------------|------------|-----------|-----------|-----------|------------|-----------------|---------|-------------------|---------------|--------------------|---------------|
| ESG_CONCERN | 1 | | | | | | | | | | | | | | |
| ESG_STRENGTH | 0.3679 | 1 | | | | | | | | | | | | | |
| E_STRENGTH | 0.3408 | 0.8435 | 1 | | | | | | | | | | | | |
| S_STRENGTH | 0.2986 | 0.8412 | 0.4425 | 1 | | | | | | | | | | | |
| G_STRENGTH | -0.037 | 0.1395 | 0.0348 | -0.0134 | 1 | | | | | | | | | | |
| E_CONCERN | 0.7023 | 0.2214 | 0.2541 | 0.1259 | 0.002 | 1 | | | | | | | | | |
| S_CONCERN | 0.8904 | 0.3369 | 0.2806 | 0.3056 | -0.0394 | 0.3824 | 1 | | | | | | | | |
| G_CONCERN | 0.5009 | 0.2247 | 0.2049 | 0.1915 | -0.0503 | 0.1046 | 0.3255 | 1 | | | | | | | |
| LOG_SPREAD | -0.1092 | -0.1451 | -0.1126 | -0.1318 | -0.02 | -0.0904 | -0.0813 | -0.0728 | 1 | | | | | | |
| LOG_DEALAMOUNT | 0.3444 | 0.4044 | 0.342 | 0.3329 | 0.0865 | 0.261 | 0.3 | 0.1564 | -0.3537 | 1 | | | | | |
| EBIT/TA | -0.0019 | 0.0532 | 0.0427 | 0.0553 | -0.0313 | -0.0718 | 0.0333 | 0.0302 | -0.0501 | 0.0685 | 1 | | | | |
| LOG_COMMONEQUITY | 0.4127 | 0.4811 | 0.4101 | 0.4033 | 0.0542 | 0.301 | 0.3631 | 0.1986 | -0.1753 | 0.6832 | 0.0297 | 1 | | | |
| LOG_SALE | 0.4636 | 0.5081 | 0.4263 | 0.4342 | 0.0499 | 0.2903 | 0.4237 | 0.2651 | -0.2167 | 0.684 | 0.1766 | 0.7611 | 1 | | |
| DEBT_TO_EQUITY | 0.0007 | -0.0135 | -0.0101 | -0.012 | -0.0045 | -0.0098 | -0.0128 | 0.0535 | 0.0003 | 0.0023 | -0.0022 | -0.1445 | -0.02 | 1 | |
| AUDIT_OPINION | 0.1854 | -0.0355 | -0.0405 | 0.0019 | -0.1034 | 0.0938 | 0.1884 | 0.0952 | -0.0104 | 0.0306 | 0.048 | 0.0249 | 0.058 | -0.0148 | 1 |

As observed from this figure, all the financial explanatory variables are only low to moderate correlated with each other, which eliminates the possibility of multicollinearity in the analysis.

Last but not the least, in this research, the time, industry and size variables were used as fixed variables to see their impacts on the results. For that reason, a categorical size variable was created by dividing the data into quartiles of total assets, splitting the size into four categories. The descriptive summary Table 2 in the Appendix shows the summary statistics of each variable used in this paper.

4. Methodology

The aim of this paper is to analyse whether there is any impact of the separate ESG scores of the companies to banks' lending amounts and the spreads. To get to the bottom of this research, I have designed the methodology consisting of 8 regression models for the first hypothesis of the thesis investigating the effects of ESG on deal amounts, and the remaining 8 regression models for the second part of the second hypothesis – where the dependent variable is interest spread, similar to the paper written by Goss and Roberts (2010). Firstly, to see the overall relationship between the general ESG scores and the deal amounts lent to firms, the first 2 regressions below were obtained:

1. Regressing the ESG strength factor and control variables against the dependent variable - deal amounts.

$$\log_DealAmount = \alpha + \beta_1(ESG_Strength)_{i,t,s} + \beta_2(DebtToEquity)_{i,t,s} + \beta_3 \log(Gross_Sales)_{i,t,s} + \beta_4(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_6 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \epsilon_{i,t,s}$$

2. *Regressing the ESG concern factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_1(ESG_Concern)_{i,t,s} + \beta_2(DebttoEquity)_{i,t,s} + \beta_3 \log(Gross_Sales)_{i,t,s} + \beta_4(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_6 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

The results from these two regressions give a simplistic idea of whether the banks consider the overall corporate social responsibility factor into account when making lending decisions. Afterwards, to see the separate effects of all three factors of ESG, in the bank lending process, the models below for separate E, S, G strength and concern variables were obtained using the OLS multivariate regressions:

3. *Regressing the E strength factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_5(E_Strength)_{i,t,s} + \beta_5(DebttoEquity)_{i,t,s} + \beta_5 \log(Gross_Sales)_{i,t,s} + \beta_5(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_5 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

4. *Regressing the S strength factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_5(S_Strength)_{i,t,s} + \beta_5(DebttoEquity)_{i,t,s} + \beta_5 \log(Gross_Sales)_{i,t,s} + \beta_5(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_5 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

5. *Regressing the G strength factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_5(G_Strength)_{i,t,s} + \beta_5(DebttoEquity)_{i,t,s} + \beta_5 \log(Gross_Sales)_{i,t,s} + \beta_5(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_5 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

6. *Regressing the E concern factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_5(E_Concern)_{i,t,s} + \beta_5(DebttoEquity)_{i,t,s} + \beta_5 \log(Gross_Sales)_{i,t,s} + \beta_5(Audit_Opinion)_{i,t,s} + \beta_5(EBIT/TA)_{i,t,s} + \beta_5 \log(Common\ Equity)_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

7. *Regressing the S concern factor and control variables against the dependent variable - deal amounts.*

$$\log_DealAmount = \alpha + \beta_5(S_Concern)_{i,t,s} + \beta_5(DebttoEquity)_{i,t,s} + \beta_5 \log(Gross_Sales)_{i,t,s} +$$

$$+ \beta_5 (\text{Audit_Opinion})_{i,t,s} + \beta_5 (\text{EBIT/TA})_{i,t,s} + \beta_5 \log(\text{Common Equity})_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s}$$

8. *Regressing the G concern factor and control variables against the dependent variable - deal amounts.*

$$\begin{aligned} \log_DealAmount = & \alpha + \beta_5 (\text{G_Concern})_{i,t,s} + \beta_5 (\text{DebttoEquity})_{i,t,s} + \beta_5 \log (\text{Gross_Sales})_{i,t,s} + \\ & + \beta_5 (\text{Audit_Opinion})_{i,t,s} + \beta_5 (\text{EBIT/TA})_{i,t,s} + \beta_5 \log(\text{Common Equity})_{i,t,s} + u_i + u_t + u_s + \varepsilon_{i,t,s} \end{aligned}$$

Thereafter, to investigate the second hypothesis, 8 more regressions were designed to analyse the relationship between the interest spreads charged by banks and the ESG scores of the firms. In this case, the same models were used, only the dependent variable was taken as the log_SPREAD. Since the amount of the deal is also a factor affecting the loan price, this variable was also included in the second of the regressions as a control variable. As Goss and Roberts (2010) findings suggest, the banks are more likely to punish the firms for their ESG underperformance and this is observed more often than rewarding overperforming firms with discounts in spreads. Therefore, to test this theory in this paper, both the concerns and the strengths regarding E, S, G factors were regressed against the interest spread. The example module obtained is illustrated below:

9. *Regressing the ESG strength factor and control variables against the dependent variable - spread.*

$$\begin{aligned} \log_Spread = & \alpha + \beta_1 (\text{ESG_Strength})_{i,t,s} + \beta_2 (\text{DebttoEquity})_{i,t,s} + \beta_3 \log (\text{Gross_Sales})_{i,t,s} + \\ & + \beta_4 (\text{Audit_Opinion})_{i,t,s} + \beta_5 (\text{EBIT/TA})_{i,t,s} + \beta_6 \log(\text{Common Equity})_{i,t,s} + u_i + u_t + u_s + \varepsilon_{it} \end{aligned}$$

The remaining 7 regressions use E_Strength, S_Strength, G_Strength and E_Concern, S_Concern, G_Concern and ESG_Concern factors accordingly, in the place of ESG_Strength above.

The multivariate OLS regressions with time, size and industry fixed effects are used. To make the variables in the regression models more linear and more comparable to each other, all the variables except for the categorical and ratio variables were converted to logarithmic values. Logarithmic transformations are used to normalize the highly skewed variables, this also decreases the chances of negative skewness in errors.

The regression models include α - the intercept, the dummies for time fixed-effects, industry fixed effects and size fixed effects - u_t , u_i , u_s respectively. β_1 to β_6 represent the coefficient values for the corresponding control variables and finally, ε_{it} represents the error term in the regression.

5. Results

The following section will report the underlying results obtained from the regression analysis for both hypotheses and will explain potential reasons behind (in)significance of the coefficients.

5.1. Discussion of the Environmental factors and the Deal Amount

To explore the first hypothesis of “Banks lending amount increases as the debtors ESG scores are higher” I have gathered the data on financial ratios covering the four main measures: efficiency, profitability, liquidity and solvency - essential for the lender analysis procedure. The OLS multivariate regression results of the first analysis is reported below. In this case, the dependent variable is the logarithm of a deal amount - *LOG_DEAL_AMOUNT*. The table consists of four models where the ESG Strength (1), Environmental Strength (2), Social Strength (3), and Governance Strength (4) scores of the companies are taken as the main explanatory variables in each model. These variables show the aggregated scores for the positive involvement of companies in each of the sectors of ESG. Table 3 below illustrates the results of this regression analysis.

Table 3. The regression analysis of Strength factors regressed against the dependent variable of deal amount

| Model | (1) ESG_STRENGTH | | (2) E_STRENGTH | | (3) S_STRENGTH | | (4) G_STRENGTH | |
|--------------------------|------------------|----------|----------------|----------|----------------|----------|----------------|----------|
| VARIABLES | Coefficients | t values | Coefficients | t values | Coefficients | t values | Coefficients | t values |
| <i>ESG_STRENGTH</i> | 0.0372*** | (2.716) | | | | | | |
| <i>E_STRENGTH</i> | | | 0.0425* | (1.745) | | | | |
| <i>S_STRENGTH</i> | | | | | 0.0456** | (2.231) | | |
| <i>G_STRENGTH</i> | | | | | | | 0.177** | (2.348) |
| <i>EBIT/TA</i> | 0.123 | (0.764) | 0.124 | (0.769) | 0.130 | (0.809) | 0.135 | (0.836) |
| <i>LOG_COMMON_EQUITY</i> | 0.109*** | (4.815) | 0.113*** | (4.990) | 0.112*** | (4.974) | 0.115*** | (5.085) |
| <i>LOG_SALE</i> | 0.206*** | (8.557) | 0.211*** | (8.785) | 0.208*** | (8.638) | 0.213*** | (8.882) |
| <i>DEBT_TO_EQUITY</i> | 0.000855*** | (2.924) | 0.000870*** | (2.920) | 0.000857*** | (2.951) | 0.000870*** | (2.923) |
| <i>AUDIT_OPINION</i> | 0.0258** | (2.006) | 0.0261** | (2.024) | 0.0257** | (1.994) | 0.0268** | (2.077) |
| <i>Constant</i> | 17.53*** | (83.49) | 17.48*** | (83.41) | 17.51*** | (83.80) | 17.46*** | (83.53) |
| <i>Observations</i> | 4,661 | | 4,661 | | 4,661 | | 4,661 | |
| <i>R-squared</i> | 0.514 | | 0.514 | | 0.514 | | 0.514 | |

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As expected, the first model depicts significant positive relationship between the overall ESG_Strength variable and the LOG_DEAL_AMOUNT variable. Specifically, the coefficient of the ESG_Strength variable is 0.0372 which is significant at the 1%.

In other words, as the ESG Strength score of the company increases by 1 unit, the amount of deal package lent to the company increases by 3.72%. This result is in line with the banks' increasing commitment to the corporate social responsibility goals and gives insight of the effectiveness of the signed UNEP FI agreement in 1991. This result gives a generic idea of the banks' level of ESG consideration.

To investigate the effect of each of the Strength factors separately, modules (2-4) were derived. Module 2 shows the results of the regression where the main explanatory variable is the aggregated Environmental Strength score of the company. The coefficient of 0.0425 has a t-value of 1.745, hence, it is significant at 10%, and shows the positive impact on the deal amount. Using the same methodology as earlier, after converting this coefficient into a percentage value, it is clear that the amount lent to the company increases by 4.25% as the Environmental Score increases by 1 unit. This finding confirms the initial hypothesis of this paper, and thus illustrates that the higher Environmental score affects the bank's lending decisions.

The 3rd and 4th models as shown in Table 3, illustrate the effects of Social and Governance Strength on the deal amounts respectively. The findings show that, the Social score of the companies plays almost as equal role as the environmental score in the bank lending decisions. The coefficient of the Social Strength score is 0.0456 with a t-value of 2.231, hence significant at 5%. However, interestingly, the governance strength score of the companies show a much higher coefficient, 0.177, with a significant t-value of 2.348. This finding still suggests that the positive governance activities of the firms are the most important factor affecting the bank lending decisions. As the appendix Table 1(e) shows, these positive governance decisions include companies that have programs, guidelines, and clear policies to avoid corrupt business dealings, have strong partnerships with local communities, and have a high level of disclosure and transparency, as well as the ability to manage the systematic risks in financial markets (WRDS, 2019).

To reduce the potential omitted variable bias, several other variables that affect the lending decisions of banks were included in the regression. Across all 4 models in this analysis, all the explanatory variables behave similarly as expected. To be more specific, EBIT/TA ratio, which is used as a proxy for the company's profitability, shows the coefficient of 0.123 (0.124, 0.130, 0.135 in

modules 2 to 4 respectively), with an insignificant t-value of 0.764. Despite the insignificance related to the limited data, the finding suggests that there is a relatively higher correlation between the earnings of the company and its access to larger deals. This is somewhat in line with the earlier studies on bank lending and credit risk management, since the higher profitability of the companies indicate its creditworthiness, and therefore allows banks to lend them more deals.

Another explanatory variable in this analysis is the logarithm of the Common Equity value of companies. As mentioned earlier, the common equity, obtained from WRDS, is taken as a measure of the size of the company. The results of the analysis shows a significant relationship between the size of the company and its loan access. This finding is also similar to the earlier literature on credit risk management and shows once again that the larger companies are more likely to be able to gain larger deals from banks. The coefficient of common equity value is 0.109 with a t-value of 4.815, which is significant at 1% level. The similar results are also obtained in modules 3, 4 and 5 (0.113, 0.112, and 0.115 respectively). The coefficient is interpreted as: 1% increase in the size of the company, increases the amount of deals lent by banks by 10.9%, 11.3%, 11.2% and 11.5% with respect to different regression models.

As a proxy for growth, the logarithmic of sales of the company was used. As expected, the higher sales, indicate that the company has better access to loans, which is illustrated by the higher deal amounts. The coefficient of sales is 0.206 with a 1% significant t-value, which shows a stronger impact of profitability of the company in credit lending. The results of this regression suggests that a 1% increase in the value of sales, increases the amount of deals lent to the company by 20.6% in module 1, and 21.1%, 20.8%, and 21.3% in modules 2, 3 and 4 respectively. This result is justified by the earlier credit risk management studies mentioned earlier, and shows that the profitability of a company is almost twice as stronger factor in determining the lending amount, compared to the size factor.

Another financial variable commonly used in credit risk scoring of the companies, is the debt to equity ratio, which measures the level of leverage in the company. The results of this research suggest that the debt to equity ratio is only of minor significance in measuring the lending amounts given to firms. Even more surprisingly, the findings show a positive relationship between company's debt levels and the amount lent to them by banks. To be more specific, the coefficient of the Debt to Equity ratio in all 4 models is close to zero, but is a positive number with a 1% level of significance. This means, as the Debt to Equity ratio increases by 1 unit, the amount of deals lent to the company increases by 0,086%. Despite the small size of the coefficient, the positive relationship is counterintuitive. This finding can be justified by the higher funding needs of distressed companies, which means, the more

indebted the company is, the more funding it will require. However, due to the negligible size of this coefficient, the effect of this ratio on bank lending will be dismissed in this research.

Last but not least, besides the financial variables affecting the deals lent to the company, this paper also looks into the third party variable that might have an effect on the bank's lending decisions. As discussed earlier, audit opinion, is an overall assessment of the company's financial status, and it is ranked from 0-4 with the best performers being 0, and the worst performers being 4. Findings of this paper suggest that the higher score by an Audit plays a small role in the firms' borrowing amounts. The coefficient of audit opinion is 0.0258, which suggests, the firms in the worst performer category are more likely to get larger deals from banks and the ones that are in the best performing category are less likely to get larger credit deals. This finding is understandable since, the financially unstable firms tend to be audited more often and get lower ratings, which might be the reason of their need for more debt funding.

To analyze whether a similar relationship exists between the ESG concern variables and the deals, the aggregated concern variables for individual ESG scores have been regressed against the deal amounts. The results of the regression in Table 4 below show conflicting findings.

Table 4. The regression analysis of Concern factors regressed against the dependent variable of deal amount

| Model | (1) ESG_CONCERN | | (2) E_CONCERN | | (3) S_CONCERN | | (4) G_CONCERN | |
|--------------------------|-----------------|----------|---------------|----------|---------------|----------|---------------|----------|
| VARIABLES | Coefficients | t values | Coefficients | t values | Coefficients | t values | Coefficients | t values |
| <i>ESG_CONCERN</i> | 0.0664*** | (4.303) | | | | | | |
| <i>E_CONCERN</i> | | | 0.0688** | (2.074) | | | | |
| <i>S_CONCERN</i> | | | | | 0.0897*** | (3.903) | | |
| <i>G_CONCERN</i> | | | | | | | 0.123** | (2.372) |
| <i>EBIT/TA</i> | 0.177 | (1.105) | 0.153 | (0.954) | 0.154 | (0.957) | 0.149 | (0.930) |
| <i>LOG_COMMON_EQUITY</i> | 0.104*** | (4.634) | 0.114*** | (5.032) | 0.108*** | (4.763) | 0.113*** | (5.036) |
| <i>LOG_SALE</i> | 0.194*** | (7.957) | 0.211*** | (8.742) | 0.197*** | (8.115) | 0.207*** | (8.553) |
| <i>DEBT_TO_EQUITY</i> | 0.000832*** | (2.811) | 0.000868*** | (2.905) | 0.000851*** | (2.929) | 0.000840*** | (2.795) |
| <i>AUDIT_OPINION</i> | 0.0235* | (1.834) | 0.0260** | (2.014) | 0.0237* | (1.848) | 0.0251* | (1.944) |
| <i>Constant</i> | 17.64*** | (83.82) | 17.48*** | (83.33) | 17.61*** | (84.22) | 17.52*** | (83.71) |
| <i>Observations</i> | 4,661 | | 4,661 | | 4,661 | | 4,661 | |
| <i>R-squared</i> | 0.516 | | 0.514 | | 0.515 | | 0.514 | |

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For all the models, there is a significant positive relationship between the deal amounts and the ESG concern factors. This raises the question of whether the UNEP FI agreement had any impact on the bank lending behavior. To be more specific, the findings show that a unit increase in the aggregated ESG concern factor leads to an increase of 6.64% in the amount of money borrowed by the company. Looking at the coefficients of E, S, and G factors separately, a positive relationship with a significant t-values are observed. The finding of this regression indicates that after controlling for the size, country, industry and time effects, a unit increase in the E concern factor of the company leads to a 6.88% higher borrowing amounts for the company. Similarly, for the Social Concern variable, deals lent to a company increases by 8.97% and 12.3% when the score of the negative Social and Governance practices increase by one unit respectively. This indicates that banks are still willing to give higher funds to the companies with problematic ESG factors. The relatively higher coefficients of concern variables as opposed to the strength variables show that, although the companies that report ESG sustainability factors get rewarded for their positive actions, unsustainable companies are not restricted funding by banks.

5.2. Discussion of the Environmental factors and the Spread

The regression models for the second hypothesis were obtained to test the relationship between the company's ESG performance and loan prices. The hypothesis 2 predicts that the companies with higher concern scores must be punished by higher borrowing spreads. In this case, the dependent variable is taken as the logarithm of spread - *LOG_SPREAD*. The Table 5 shows the relationship between the dependent *LOG_SPREAD* variable and the individual E, S and G factors strength scores. Since the amount of deals are one of the major determinants of the interest spread charged on the deal, this variable is also included as an explanatory variable in the regressions. Firstly, as Model 1 illustrates, a higher ESG strength variable is associated with a lower spread charged. Although the coefficient of this factor is not significant at any level, it is still possible to see the negative relationship. To be specific, a 1 unit increase in the overall ESG strength variable is associated with a 0.316% lower spread charged during the deal. This indicates that companies who perform better in overall ESG scores, are likely to get lower prices for their debts. However, when looking at the E, S and G factors separately, this relationship fades significantly. For the Environmental and Governance strength factor, this relationship is positive and statistically insignificant. In other words, according to this regression model, the higher the Environmental or Governance scores of companies are, slightly higher spreads are charged by banks in borrowing deals. For the Social performance factor, this relationship is negative, which indicates that the higher the Social performance of the company, the better the prices are for its borrowed deals. The

results of this regression can be due to the behavioral finance phenomenon, which suggests that market punishes bad performance more often than it rewards the good performance.

Table 5. The regression analysis of Strength factors regressed against the dependent variable of Spread

| Model | (1) ESG_STRENGTH | | (2) E_STRENGTH | | (3) S_STRENGTH | | (4) G_STRENGTH | |
|--------------------------|------------------|----------|----------------|----------|----------------|----------|----------------|----------|
| VARIABLES | Coefficients | t values | Coefficients | t values | Coefficients | t values | Coefficients | t values |
| ESG_STRENGTH | -0.00316 | (-0.474) | | | | | | |
| E_STRENGTH | | | 0.00243 | (0.215) | | | | |
| S_STRENGTH | | | | | -0.0103 | (-0.969) | | |
| G_STRENGTH | | | | | | | 0.00852 | (0.196) |
| LOG_DEAL_AMOUNT | -0.141*** | (-10.35) | -0.142*** | (-10.38) | -0.141*** | (-10.36) | -0.142*** | (-10.41) |
| EBIT/TA | -0.0489 | (-0.855) | -0.0496 | (-0.868) | -0.0482 | (-0.843) | -0.0492 | (-0.858) |
| LOG_COMMON_EQUITY | 0.0220* | (1.868) | 0.0214* | (1.812) | 0.0223* | (1.894) | 0.0215* | (1.819) |
| LOG_SALE | -0.00877 | (-0.808) | -0.00944 | (-0.872) | -0.00837 | (-0.775) | -0.00934 | (-0.871) |
| DEBT_TO_EQUITY | 0.000102*** | (2.704) | 0.000102*** | (2.687) | 0.000103*** | (2.710) | 0.000102*** | (2.685) |
| AUDIT_OPINION | 0.00315 | (0.562) | 0.00322 | (0.574) | 0.00307 | (0.547) | 0.00325 | (0.577) |
| <i>Constant</i> | 7.957*** | (33.00) | 7.968*** | (33.13) | 7.951*** | (33.20) | 7.967*** | (33.42) |
| <i>Observations</i> | 2,897 | | 2,897 | | 2,897 | | 2,897 | |
| <i>R-squared</i> | 0.158 | | 0.157 | | 0.158 | | 0.157 | |

Robust t-statistics in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Following the findings of Goss and Roberts (2010), to test the behavioral finance explanation, and hence the third hypothesis, final regression models are obtained using the ESG concern factor variables. Table 6 below shows the relationship between the spreads charged and the Environmental, Social and Governance concern scores of the variables. Overall, as expected, the higher coefficients are obtained for the ESG Concern variables than the ESG Strength variables, which somewhat verifies the final hypothesis of the paper. Looking at the E, S, and G factors separately, despite the positive relationship between the scores and the spread, the only statistically significant variable is Social concerns. As the appendix Table 3 shows, the social concerns include some of the serious negative involvements such as employee relations controversies, child labor and health and safety concerns. This finding suggests that for all three E, S, and G variables, negatively impacting companies are most likely to be punished by higher spread rates by banks. This relationship is most evident in the company's involvement in social

controversies. For the aggregated ESG concern, the coefficient of 0.0119 shows that a 1% increase in the ESG concern variable, is associated with a 1.19% increase in the spread rates charged by banks. This value is 1.67%, 2.26% and 2.98% for E, S, and G strength factors separately.

The positive association between the ESG concern variables and the Spread charged, indicate that there is indeed a desired positive correlation between the spread charged and the ESG concern scores of irresponsible firms. Only for the Social concern factor this relationship can be identified as a causation, due to significant t-values at the 5% level. The overall reluctance of banks adjusting their spread rates can be explained in many ways. One reason is that the Environmental factors do not cause a direct threat to the company's financial returns and cash flows, therefore it does not influence the credit risk. And if the credit risk of the company is not affected, the banks are hardly changing the interest spread charged on the loans. Another explanation might be due to the relationship between the banks and the borrowing corporates. To maintain the close relationship, banks might be reluctant to change their pricing for specific firms, and sometimes grant certain discounts.

Table 6. The regression analysis of Concern factors regressed against the dependent variable of Spread

| Model | (1) ESG_CONCERN | | (2) E_CONCERN | | (3) S_CONCERN | | (4) G_CONCERN | |
|--------------------------|-----------------|----------|---------------|----------|---------------|----------|---------------|----------|
| VARIABLES | Coefficients | t values | Coefficients | t values | Coefficients | t values | Coefficients | t values |
| <i>ESG_CONCERN</i> | 0.0119 | (1.468) | | | | | | |
| <i>E_CONCERN</i> | | | 0.0167 | (0.936) | | | | |
| <i>S_CONCERN</i> | | | | | 0.0226** | (2.048) | | |
| <i>G_CONCERN</i> | | | | | | | 0.0298 | (1.104) |
| <i>LOG_DEAL_AMOUNT</i> | -0.142*** | (-10.38) | -0.142*** | (-10.43) | -0.142*** | (-10.38) | -0.141*** | (-10.42) |
| <i>EBIT/TA</i> | -0.0412 | (-0.709) | -0.0426 | (-0.731) | -0.0450 | (-0.781) | -0.0519 | (-0.908) |
| <i>LOG_COMMON_EQUITY</i> | 0.0206* | (1.757) | 0.0212* | (1.796) | 0.0206* | (1.748) | 0.0219* | (1.857) |
| <i>LOG_SALE</i> | -0.0122 | (-1.095) | -0.00999 | (-0.924) | -0.0126 | (-1.150) | -0.00762 | (-0.690) |
| <i>DEBT_TO_EQUITY</i> | 9.79e-05*** | (2.606) | 0.000101*** | (2.661) | 0.000101*** | (2.682) | 0.000110*** | (2.886) |
| <i>AUDIT_OPINION</i> | 0.00303 | (0.539) | 0.00322 | (0.574) | 0.00294 | (0.523) | 0.00332 | (0.593) |
| <i>Constant</i> | 8.004*** | (32.80) | 7.980*** | (33.43) | 8.007*** | (32.71) | 7.951*** | (33.51) |
| <i>Observations</i> | 2,897 | | 2,897 | | 2,897 | | 2,897 | |
| <i>R-squared</i> | 0.158 | | 0.158 | | 0.159 | | 0.158 | |

Robust t-statistics in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Furthermore, looking into the remaining independent variables used in this regression, it is possible to observe interesting relationships. Firstly, the variable for deal amount is observed to have a significant effect on the spreads on loans. The 1% increase in size of the deal, leads to a 14.2% lower spreads during the year. The coefficients for this variable are the same in all 4 models and show a significant t-value at 1% level. This strong negative relationship can be explained by the simple economies of scale theory, where the higher amounts lead to lower costs.

Secondly, in this regression model, as opposed to the previous ones where the deal amount was the dependent variable, the direction of the relationships are closer to what was expected. In other words, here, the debt to equity variable shows a significant positive relationship with the spreads charged. This means, more indebted companies are charged higher interests on their loans than companies with lower debt in their balance sheets. Moreover, when the audit opinion of the company is ranked as “bad”, getting loans is more likely to be expensive for the company. For all the models, this indicates that a 1% increase in the audit’s bad opinion is associated with a 0.303% increase in the price of the loan, in this case the spread. As the coefficients of LOG_SALE and EBIT/TA variables indicate, in this case, more profitable and companies with a better growth potential are more likely to get discounts in the loans, as compared to the ones with poor financials. Similarly, larger firms that have higher common equity, are charged lower spread for their loans. The coefficient of size (common equity) is 0.0206 for Model 1, 0.0212, 0.0206, 0.0219 for Models 2, 3 and 4 respectively. For all models the relationship is significant at 10%.

5. Conclusion

This thesis aims to shed light into the previous literature of bank lending behaviour and to investigate whether the modern banks incorporate the E, S and G factors in their lending decisions. Amid the climate change and the humanitarian crisis of the 21st century, this research brings important findings to the economic literature. Although the operating activities of financial institutions are not directly affecting the environment and the society in general, by financially supporting and funding the irresponsible and unsustainable firms they contribute to the ongoing environmental and humanitarian crisis. To test the impact of ESG factors on the bank’s lending behaviour and credit risk management, clustered E, S and G strength and concern factors are collected and regressed first, against the amount of a deal lent to firms, and secondly, the spread charged on those deals. Since the credit risk management process involves analysing companies by their size, leverage ratio, growth, and profitability, the corresponding control variables were added to the analysis. Since the KLD MSCI statistics only provide a binary data on ESG determinants, I follow the methodology of Goss and Roberts (2010), to gather the concern factors and strength factors together for each E, S and G factors. Each aggregated concern and

strength factor is gathered and regressed separately to avoid multicollinearity and any additional noise in results. The extended 16 OLS multi-factor regressions making up for 4 models are obtained to achieve the conclusions in this extended analysis. The findings show that, out of all three ESG factors, environmental factor is last factor driving the lending behaviour of firms. To be specific, in the first part of the analysis, where the responsibility level of the firms was regressed against the amount of deals lent by banks, the environmental strength score of the firms was only the third important, only after governance and social strength scores. This indicates that firms that reported diversity in their boards and showed no sign of governance controversies were likely to get larger deals by banks than the green companies, where the size, industry and time factors were fixed. This might be due to the lack of data for the environmental comparison of companies, whereas the governance structure of many public companies is available and easier to interpret. However, out of all the models, the ESG strength factor showed the most significant results, meaning that despite the lower influence of E factor, overall positive ESG activities of firms can get them larger funding. On the other hand, when the ESG aggregated concern factors were regressed against the deals, it became clear that the banks still fund unsustainable companies with negative environmental social and governance activities. This adds to the existing debate in economic literature. The controversial finding may be interpreted as the higher funding needs of ESG irresponsible firms in terms of bad financial performance, which could cause more demand for bank loans by those firms. Additionally, it is important to note that the ESG strength and ESG concern factors are not the opposite of each other. To be more specific, a company involving in environmentally unsustainable activities can still show some aspects of environmental strength.

The second part of the thesis investigates whether the irresponsible firms are being charged higher prices for their loans. Although the findings show very small numbers, it is observed that there is a positive relationship between the company's negative environmental activities and the spread charged on the deal by banks. However, this relationship is only significant for the social scores of the companies, in other words, when the companies are being involved in child labour, or any employee-related controversies, the terms of the loans are for the worse for them. In contrast, it is observed that, for the strength scores of the companies, the results are much weaker. This shows that the banks only change their behaviour when the firm has an extremely bad reputation in terms of their ESG scores, and they do not grant similar discounts in the case where the ESG performance of the borrower is outstanding. This result is consistent with the earlier theories of Kahneman on Loss Aversion (McGraw, Larsen & Kahneman, 2010), as well as the findings of Goss and Roberts (2010).

The implications of this research are important in understanding the financing decisions of modern banks. Despite the increasing awareness of the environmental crisis and societal concerns, banks

do not seem to restrict funds to the environmentally and socially damaging controversial firms. However, there is still a significant positive relationship between the firm's ESG Strength activities, and the amount of deals lent to them. This implies that the better performing responsible companies get higher deals than those that do not show higher strength factors. Additionally, although both the environmental and governance factors are taken into consideration in lending, they are only of mild importance when pricing the loans. There is however a significant relationship between social concern factors and the interest spreads, meaning that the most important factor out of all ESG factors is the social scoring of the company, in terms of its impact on loan pricing. This can be explained by the larger availability of data on social scores of the companies in KLD MSCI database, compared to the other two factors. Furthermore, it might be due to the increasing media coverage of the gender equal pay, board diversity and child labour controversies of the firms that encourage banks to adapt their pricing for firms with higher social concern scores.

Despite the importance of the findings and large implications of the paper into the scientific as well as the economics literature, there are a few limitations involved. Due to the limited data, and only binary characteristics of the existing KLD ESG data, there are still many questions that need to be answered in this field. The problem of lack of ESG reporting done by firms (Thompson, & Cowton, 2004), as well as public access to the existing ESG questionnaires of the companies has made this research limited.

Further research into this field could focus on the years after 2016, which would reflect the weather Paris Environment act of 2016 had any impact on the way banks treat environmentally irresponsible companies. Furthermore, looking into the ESG scores of the banks themselves in addition to the borrowing companies could shed light on whether the sustainable banks are more likely to charge higher or restrict loans for the negatively performing companies.

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Appendix

Table 1(a). Descriptions of the Environmental Strength variables

| Variable | Ful name | Description |
|----------|---|--|
| E_BPS_1 | Beneficial Products and Services | The company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits. (The term “environmental service” does not include services with questionable environmental effects, such as landfills, incinerators, waste-to-energy plants, and deep injection wells.) |
| E_PP_1 | Pollution Prevention | The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs. |
| E_CE_1 | Clean Energy | The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency. The company has demonstrated a commitment to promoting climate-friendly policies and practices outside its own operations. KLD renamed the Alternative Fuels strength as Clean Energy Strength. |
| E_EOS_1 | Environment Other Strength | The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities. |
| E_MSS_1 | Management Systems Strength | The company has demonstrated a superior commitment to management systems through ISO 14001 certification and other voluntary programs. This strength was first awarded in 2006. |
| E_NCWS_1 | Natural Capital = Water Stress | The company manages the risks of water shortages impacting their ability to operate, losing access to markets due to stakeholder opposition over water use, or being subject to higher water costs. Companies that proactively employ water efficient processes, water recycling and alternative water sources score higher. |
| E_NCBL_1 | Natural Capital - Biodiversity & Land Use | The company manages the risks of losing access to markets, or incurring litigation, liability, or reclamation costs due to operations that damage fragile ecosystems. Companies that have policies and programs designed to protect biodiversity and address community concerns on land use score higher. |
| E_NCMS_1 | Natural Capital - Raw Material Sourcing | This indicator is designed to assess how companies manage the risks of damaging their brand value by sourcing raw materials with high environmental impact. Companies that have policies and procedures to source materials with lower environmental impact and participate in initiatives to reduce environmental impact of raw materials production score higher. |
| E_WM_1 | Waste Management | The company manages its risk of incurring liabilities associated with pollution, contamination, and the emission of toxic and carcinogenic substances. Companies that have strong programs and performance in reducing toxic emissions score higher. |
| E_REC_1 | Recycling | The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry. |

Environmental Strengths

Table 1(b). The description of the Environmental Concern variables

| | Variable | Ful name | Description |
|-------------------------------|-----------------|---------------------------|--|
| Environmental concerns | E_RP_0 | Regulatory Poblems | The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations |
| | E_SE_0 | Substantial Emissions | The company's legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD |
| | E_CC_0 | Climate Change (fom 1999) | The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies. In 1999, KLD added the Climate Change Concern |
| | E_SCM_0 | Supply Chain Management | The company is involved in the controversies related to the environmental impact of a it's supply chain and the sourcing of natural resources. Factors affecting this evaluation include, but are not limited to, a history of widespread or egregious environmental impacts in a firm's supply chain, legal cases, resistance to improved practices, and criticism by NGOs and/or other third-party observers. |

Table 1(c). The description of the Social performance Strength variables

| | Variable | Ful name | Description |
|------------------------------|----------|---|---|
| Social Performance strengths | S_IG_1 | Innovative Giving | The company has a notably innovative giving program that supports nonprofit organizations, particularly those promoting self-sufficiency among the economically disadvantaged. Companies that permit nontraditional federated charitable giving drives in the workplace are often noted in this section as well. |
| | S_UR_1 | Union elations | The company has taken exceptional steps to treat its unionized workforce fairly. KLD renamed this strength from Strong Union Relations. |
| | S_CPS_1 | Cash Pofit Shaing | The company has a cash profit-sharing program through which it has recently made distributions to a majority of its workforce. |
| | S_EL_1 | Employee Involvement | The company strongly encourages worker involvement and/or ownership through stock options available to a majority of its employees; gain sharing, stock ownership, sharing of financial information, or participation in management decision-making |
| | S_BOD_1 | Board of Directors | Women, minorities, and/or the disabled hold four seats or more (with no double counting) on the board of directors, or one-third or more of the board seats if the board numbers less than 12. |
| | S_WMC_1 | Women and Minoity Contacting | The company does at least 5% of its subcontracting, or otherwise has a demonstrably strong record on purchasing or contracting, with women- and/or minority-owned businesses. |
| | S_DOS_1 | Diversity Other Strength | The company has made a notable commitment to diversity that is not covered by other KLD ratings. |
| | S_BED_1 | Benefits to Economically Disadvantaged | The company has as part of its basic mission the provision of products or services for the economically disadvantaged. |
| | S_PS_1 | Product Safety | The company has recently paid substantial fines or civil penalties, or is involved in major recent controversies or regulatory actions, relating to the safety of its products and services. |
| | S_HROS_1 | Human Rights Other Strength | The company has undertaken exceptional human rights initiatives, including outstanding transparency or disclosure on human rights issues, or has otherwise shown industry leadership on human rights issues not covered by other KLD human rights ratings |
| | S_SOAF_1 | Social Oppotunities - Access to Finance | The company is providing lending, financing, or products to underrepresented or under-banked communities. Top performing companies will offer products and services to communities with limited or no access to financial products |
| | S_HCD_1 | Human Capital Development | The company attracts, retains, and develops human capital based on their provision of benefits, training and development programs, and employee engagement; and avoids labor unrest or reduced productivity due to poor job satisfaction. |
| | S_CR_1 | Customer Relations | The company is involved in the controversies related to its customer relations. Factors affecting this evaluation include, but are not limited to, a history of involvement in customer-related legal cases, predatory lending, widespread or egregious instances of discrimination, fraud or unfair treatment, resistance to improved practices, and criticism by NGOs and/or other third-party observers. |

Table 1(d). The description of the Social performance Concern factors

| Variable | Ful name | Description |
|----------|------------------------------------|---|
| S_NEI_0 | Negative Economic Impact | The company's actions have resulted in major controversies concerning its economic impact on the community. These controversies can include issues related to environmental contamination, water rights disputes, plant closings, "put-or-pay" contracts with trash incinerators, or other company actions that adversely affect the quality of life, tax base, or property values in the community. |
| S_HSC_0 | Health and Safety Concern | The company recently has either paid substantial fines or civil penalties for willful violations of employee health and safety standards, or has been otherwise involved in major health and safety controversies. |
| S_EROC_0 | Employee Relations Other Concerns | The company is involved in an employee relations controversy that is not covered by other KLD ratings. |
| S_MCC_0 | Marketing-Contacting Concern | The company has recently been involved in major marketing or contracting controversies, or has paid substantial fines or civil penalties relating to advertising practices, consumer fraud, or government contracting. (Formerly: Marketing/Contracting Controversy) |
| S_AT_0 | Antitrust | The company has recently paid substantial fines or civil penalties for antitrust violations such as price fixing, collusion, or predatory pricing, or is involved in recent major controversies or regulatory actions relating to antitrust allegations. |
| S_POC_0 | Product Other Concerns | The company has major controversies with its franchises, is an electric utility with nuclear safety problems, defective product issues, or is involved in other product-related controversies not covered by other KLD ratings. |
| S_AlcI_0 | Alcohol Involvement | The company derives revenues by involving in procedures such as producing, distributing, licensing, supplying or/and owning of alcoholic products/company. |
| S_GMBL_0 | Gambling Involvement | The company derives revenues by involving in procedures such as producing, distributing, licensing, supplying or/and owning of gambling products/company. |
| S_MLTY_0 | Military Involvement | The company derives revenues by involving in procedures such as producing, distributing, licensing, supplying or/and owning of military products/company. |
| S_BC_0 | Burma Concern (fom 1995) | The company has operations or direct investment in, or sourcing from, Burma. KLD started assigning concerns for this issue in 1995 |
| S_HROC_0 | Human Rights Other Concerns | The company's operations have been the subject of major recent human rights controversies not covered by other KLD ratings. |
| S_FIRE_0 | Firearms Involvement (fom 1999) | The company derives revenues by involving in procedures such as producing, distributing, licensing, supplying or/and owning of firearms company/products. |
| S_FEC_0 | Freedom of Expression & Censorship | The company is involved in controversies related to the impact of a firm's operations on freedom of expression and free speech. Factors affecting this evaluation include, but are not limited to, cooperating with repressive governments seeking internet user data or requiring censorship, resistance to improved practices, and criticism by NGOs and/or other third-party observers. |
| S_HRV_0 | Human Rights Violations | The company is involved in controversies related to the impact of a firm's operations on human rights. Factors affecting this evaluation include, but are not limited to, a history of involvement in human rights-related legal cases, widespread or egregious complicity in killings, physical abuse, or violation of other rights, resistance to improved practices, and criticism by NGOs and/or other third-party observers. |
| S_CL_0 | Child Labor | The company is involved in child labor controversies in a firm's supply chain. Factors affecting this evaluation include, but are not limited to, a history of involvement in child labor-related legal cases, widespread or egregious instances of child labor in the firm's supply chain, resistance to improved practices, and criticism by NGOs and/or other third-party observers. |
| S_BODM_0 | Board of Directors - Minorities | This indicator identifies companies with no minorities on their board of directors. |

Social Performance concerns

Table 1(e). The description of the Governance performance Strength variables

| | Variable | Ful name | Description |
|----------------------|----------|------------------------------------|---|
| Governance strengths | G_CPI_1 | Corruption & Political Instability | This indicator is designed to assess how companies manage the risk of suffering operational disruptions or loss of market access due to violence, property destruction or sabotage, political instability, demands for bribes, and costly litigation related to corrupt practices. Companies that have programs, guidelines, and clear policies to avoid corrupt business dealings, have strong partnerships with local communities, and have a high level of disclosure and transparency score higher. |
| | G_FSI_1 | Financial System Instability | This indicator is designed to assess how a company manages its systemic risk in financial markets. Companies that institute strong governance structures and demonstrate a high level of transparency score well. |

Table 1(f). The description of the Governance performance Concerns variables

| | Variable | Ful name | Description |
|---------------------|----------|-------------------------------------|---|
| Governance concerns | G_CGOC_0 | Corporate Government Other Concerns | The company is involved with a controversy not covered by KLD's other corporate governance ratings. |
| | G_C_0 | Controversial Investments | The company has either paid substantial fines or civil penalties as a result of affirmative action controversies, or has otherwise been involved in major controversies related to affirmative action issues. |

Table 2. Summary Statistics

| | Variable | Observations | Mean | Std. Dev. | Min | Max |
|--|--------------------------------|--------------|-----------|-----------|-----------|-----------|
| | <i>LOG_SPREAD</i> | 2,986 | 5.230811 | 0.4008195 | 1.098612 | 7.244227 |
| | <i>LOG_DEAL_AMOUNT</i> | 4,826 | 19.99087 | 1.367978 | 13.8917 | 24.66212 |
| | <i>ESG_CONCERN</i> | 4,828 | 0.7854184 | 1.34973 | 0 | 10 |
| | <i>ESG_STRENGTH</i> | 4,828 | 0.9223281 | 1.515466 | 0 | 9 |
| | <i>E_STRENGTH</i> | 4,828 | 0.410522 | 0.851563 | 0 | 5 |
| | <i>S_STRENGTH</i> | 4,828 | 0.4774234 | 0.8765219 | 0 | 5 |
| | <i>G_STRENGTH</i> | 4,828 | 0.0343828 | 0.1822292 | 0 | 1 |
| | <i>E_CONCERN</i> | 4,828 | 0.2139602 | 0.5507174 | 0 | 3 |
| | <i>S_CONCERN</i> | 4,828 | 0.4828086 | 0.8702401 | 0 | 6 |
| | <i>G_CONCERN</i> | 4,828 | 0.0886495 | 0.3120593 | 0 | 2 |
| | <i>EBIT/TA</i> | 4,817 | 0.0770241 | 0.100357 | -1.767769 | 0.8201753 |
| | <i>LOG_COMMON_EQUITY</i> | 4,673 | 7.088903 | 1.571385 | -2.312635 | 12.0691 |
| | <i>LOG_SALE</i> | 4,816 | 7.662667 | 1.639083 | -1.931022 | 13.08885 |
| | <i>DEBT_TO_EQUITY</i> | 4,807 | 2.336324 | 63.10592 | -776.587 | 3526.545 |
| | <i>AUDIT_OPINION</i> | 4,815 | 2.116511 | 1.450301 | 1 | 4 |
| | <i>SIC categories</i> | 4,828 | 4.392709 | 2.333382 | 1 | 9 |
| | <i>Year</i> | 4,828 | 2010.497 | 2.986849 | 2006 | 2016 |
| | <i>Total_Assets_categories</i> | 4,817 | 2.482873 | 1.116811 | 1 | 4 |