The role of Environmental, Social, and Governance rating on corporate debt structure

Panagiotis Asimakopoulos[a], **Stylianos Asimakopoulos**[b], and **Xinyu Li**[b]

[a]Loughborough University, School of Business and Economics

[b]University of Bath, Department of Economics

Abstract

This paper examines the impact of having an Environmental, Social, and Governance (ESG) rating on a firm's debt structure, i.e. how firms change their leverage ratios and debt components when becoming ESG rated. Targeted market and book leverage ratios are reduced when firms become ESG rated. We show that the provision of ESG rating mitigates information asymmetry. Current leverage ratios are not altered significantly for ESG rated firms but these firms redistribute their financing sources from public debt (bonds debt) to private debt (bank loans). This substitution effect is mainly driven by environmental and social factors and is more pronounced for firms with high financial pressure, low growth opportunities and specialized assets. Debt restructuring remains valid under various robustness and endogeneity tests. These results are consistent with the trade-off and pecking order theories of capital structure.

Keywords: ESG rating, debt structure, public and private debt, leverage ratios, information asymmetry.

JEL Classification: G24, G31, G32, Q56

1 Introduction

Corporate sustainability and the impact of Environmental, Social, and Governance (ESG) considerations has received a lot of attention from firms, practitioners and policy-makers over the past few years. In particular, firms are encouraged to engage in socially responsible investment due to the sharp increase of interest from institutional investors, mutual funds, and relevant Corporate Social Responsibility (CSR) reports (Bassen et al., 2006). We can also observe a sharp increase of firms that became ESG rated over the recent decade. Figure 1 shows that the number of ESG rated firms in 2019 has more than tripled compared to 2010, according to Refinitiv data. In addition, it has been shown that ESG ratings can lead to a number of benefits via enhancing firm value (Servaes and Tamayo, 2013; Malik, 2015; Lins et al., 2017), reducing risks (Oikonomou et al., 2012; Albuquerque et al., 2019; Naseem et al., 2020), improving credit ratings (Jiraporn et al., 2014; Oikonomou et al., 2014), increasing employee productivity and efficiency (Lins et al., 2017), and enhancing social reputation and intangible assets (Dai et al., 2020).

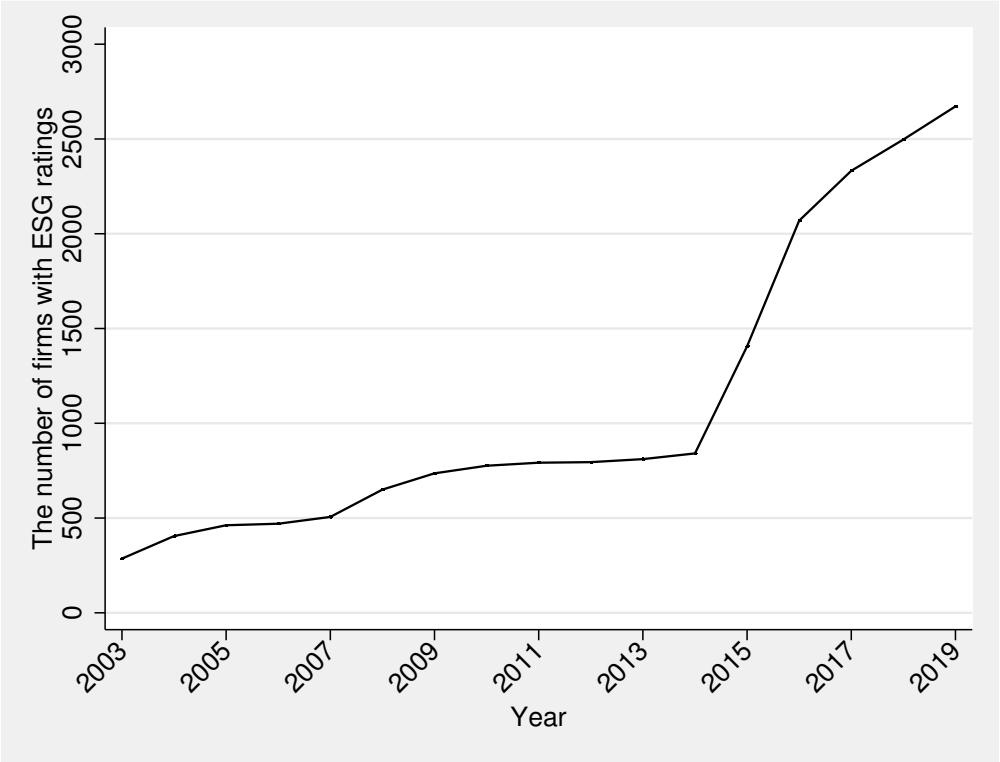

Figure 1: The number of firms with ESG ratings, using Refinitv data.

Particular emphasis has been given to whether ESG rated firms outperform non-rated firms when raising funds. To that end, many studies investigate the impact of ESG on

the cost of capital, but without reaching a consensus. Some studies argue that the overall ESG ratings lower financing costs (Sharfman and Fernando, 2008; El Ghoul et al., 2011; Oikonomou et al., 2014; Ng and Rezaee, 2015; Ge and Liu, 2015), while others show that the corporations' society-friendly performance have not been priced by markets (Menz, 2010; Chava, 2014; Flammer, 2021). It is noteworthy that the cost of capital is only one component of capital constraints affecting firms' financing decisions (Chava, 2014). However, only a few papers study how social responsibility and ESG ratings play a role in capital structure, i.e. access to various sources of financing. Specifically, Bae et al. (2011) find that employee treatment fairly decreases debt ratios, and Huang and Shang (2019) show that locating in regions with high altruistic tendency and mutual trust lowers firms debt ratio. The former paper is focusing only on one type of stakeholder, namely the employees, and ignore other stakeholders. The latter examines the impact of social capital on leverage at the regional level, not the firm level. Surprisingly, there has been no study that directly investigates the influence of firm-level ESG rating on their debt financing operations.

Our paper fills that gap and study the impact of ESG on firms' debt structure, i.e. the target (optimal) and actual leverage ratios, and debt composition. We further assess the individual ESG components to identify the key drivers of these effects. We employ a merged CRSP-Compustat, Capital IQ, and Refinitiv dataset. Our final sample consists of 11,018 firm-year observations with 2,347 unique U.S. firms during the period 2002 to 2019. Our results show that ESG rated firms reduce their target (optimal) market and book leverage ratios. We further show that firms choose to become ESG rated as a signal mechanism to reduce information asymmetry. Although ESG rated firms do not change significantly their current aggregate leverage ratios, when we delve deeper into the debt structure analysis we find evidence that firms with an ESG rating redistribute their debt from bonds to bank loans, i.e. towards "safer" sources of financing. Therefore, our paper shows how ESG rating operates under the two key capital structure theories, trade-off and pecking order theories.

Our work contributes to the expanding literature that investigates the role of ESG rating on firm financing via expanding the analysis to its role on optimal leverage and debt structure. We are able to provide a more in-depth understanding of how ESG rated firms operate in terms of their financing decision making process. To the best of

our knowledge, we are the first to show how an ESG rating affects the target (optimal) market and book leverage ratios, in line with the trade-off theory. We are also the first to show the redistribution effect on corporate debt structure towards internal sources of financing that arises via the mitigation of information asymmetry when firms become ESG rated, in line with the pecking order theory.

Therefore, the provision of ESG rating leads to a dual benefit. On the one hand, the increased information disclosed in the market by providing an ESG rating reduces asymmetric information because uncertainty regarding firm's ESG responsibility is limited. On the other hand, providing an ESG rating along with reducing asymmetric information plays the role of signalling mechanism to the capital markets and helping firms to redistribute their debt borrowing from bonds to bank loans, i.e. towards "safer" sources of financing. ESG rating agencies are specializing in evaluating the three pillars of firm's responsibility, i.e. environment, society and governance, conveying invaluable information to banks.

The remainder of this paper is organised as follows. Section 2 reviews relative previous literature and provides the main hypotheses. Section 3 introduces the data and descriptive statistics. Section 4 provides the benchmark estimations. Section 5 introduces various endogeneity tests. Section 6 offers a set of robustness checks, and section 7 concludes the paper.

2 Literature review and Hypotheses

In this section, we provide an overview of the related literature on firm-level ESG[1] and access to finance, and the discussion between trade-off and pecking order theories. We also form our main hypotheses.

2.1 ESG and access to finance

Are companies with a sense of sustainability in an advantageous position in terms of financing? Cheng et al. (2014) find that firms with superior ESG face lower capital constraints due to the mitigation of agency problems and lower information asymmetry.

[1]Corporate Social Responsibility (CSR), ESG, and sustainable finance are used interchangeably in this paper.

Other studies that focus on the cost of equity, i.e. El Ghoul et al. (2011) and Ng and Rezaee (2015), find that social strengths may reduce it. By contrast, Chava (2014) argue that environmental strengths have no effects on the cost of equity. Moreover, other papers focus on the cost of debt, i.e. the public debt (issue bonds) and private debt (bank loans). Goss and Roberts (2011), for example, show that firms that invest in positive ESG activities are charged from 7 to 18 basis points (bps) less than firms with negative ESG activities. Likewise, firms with environmental concerns in all dimensions pay about 25 bps higher than firms without these concerns (Chava, 2014). However, Menz (2010) indicates that for socially responsible firms the cost of bonds is higher compared to firms without CSR engagement.

Even though related studies document the importance of ESG on firm financing, they appear to be far from reaching a consensus. More importantly, these studies do not assess how ESG affects firms' debt structure directly.

2.2 Capital (debt) structure theory

Since Modigliani and Miller (1958) proposed that capital structure is irrelevant to firm value under a perfect capital market, the capital structure issue has been discussed by many researchers. The key capital structure theories studied are the trade-off theory and pecking order theory.

Trade-off theory suggests that firms take advantage of tax shields from debt financing, while firms face the potential risks of bankruptcy and financial distress simultaneously as they increase their leverage ratios. Tax savings and the cost of financial distress determine an optimal leverage ratio when both opposite forces are offset. Empirically, researchers are interested in whether this target (optimal) leverage ratio exists and whether it is possible to narrow the gap between actual leverage ratio and target leverage ratio. For example, a firm whose actual debt ratio deviates from the optimal debt ratio can mitigate this deviation by paying relatively small costs (Ju et al., 2005). Flannery and Rangan (2006) develop the partial (incomplete) adjustment model and argue that firms converge to their optimal capital structure, approximately at a speed of one-third per year, but Huang and Ritter (2009) say that the speed is moderate.

The pecking order theory, modified by Myers and Majluf (1984), begin from the asymmetric information issue. Information asymmetry is defined as the differing access

to information among parties (such as borrowers and lenders) and is noticeable in the financial market (Leland and Pyle, 1977). Generally, the borrower has more information on firm risk, prospects, and collateral. Keeping this information private benefits the firm to finance at an advantageous position and avoids leaking information to competitors, which results in competing in a worse position and further lowering future profits (Dhaliwal et al., 2011). The pecking order theory suggests that firms seek "safer" financing sources due to asymmetric information (Denis and Mihov, 2003). Specifically, if firms have insufficient financial budgets and need to search for capital, their borrowing order starts from internal financing, then debt and equity (Myers and Majluf, 1984).

Private debt and public debt both belong to debt, however, they are given different priorities (Denis and Mihov, 2003). Compared to corporate bonds, bank loans are regarded as inside debt (James, 1987). This is because commercial banks issue loans using firm private information and public information. In other words, asymmetric information is less severe if firms borrow from banks (Besanko and Kanatas, 1993). Overall, due to pecking order theory and asymmetric information, firms prefer to finance from banks rather than issuing bonds.

Although both trade-off theory and pecking order theory are proposed and examined, there is no empirical work on how ESG ratings affect firms' debt structure and financing decisions.

2.3 Hypotheses development

According to the existing findings that firms with ESG ratings might face lower market frictions and attract institutional and green investors (Bassen et al., 2006; Sharfman and Fernando, 2008; Chava, 2014; Cheng et al., 2014), meaning that the need for borrowing becomes weaker, we assume that these firms are able to reduce their target leverage ratios. Therefore, we propose our first hypothesis:

Hypothesis I: *Firms with ESG ratings exhibit lower target (optimal) leverage ratios.*

According to the pecking order theory, firms tend to prefer internal financing sources to alleviate asymmetric information problems. Considering that bank loans are regarded as safer financing option than bond issuing (James, 1987), we propose our second hy-

pothesis:

Hypothesis II*: ESG rated firms redistribute financing from external to internal sources, i.e. from issuing bonds to bank loans.*

Our second hypothesis is also supported from reasons beyond the pecking order theory. From the perspective of borrowers, using bank loans can avoid floatation costs of bond issues (Easterwood and Kadapakkam, 1991) and increase the stock prices (James, 1987; Lummer and McConnell, 1989), namely, borrowing from banks makes firms gain higher returns via decreasing cost and increasing rewards. Banks also provide higher flexibility of renegotiation, compared to bonds where bondholders are dispersed (Rajan, 1992; Chemmanur and Fulghieri, 1994; Denis and Mihov, 2003; Chen et al., 2020). From the perspective of lenders (banks), banks are eager to maintain a long-haul business relationship with ESG rated firms. The reason is that these firms are more likely to disclose highly readable information to show high ethical standards (Bacha and Ajina, 2019; Wang et al., 2018), which reduces banks' monitoring costs. Also, socially responsible firms have richer growth opportunities (Lins et al., 2017) and are less risky (Goss and Roberts, 2011; Mishra and Modi, 2013) so that these firms are potentially good borrowers. To attract these firms, banks might lower collateral and covenant requirements (Hasan et al., 2017) making bank loans even more appealing over bond issuance.

3 Data and descriptive statistics

In this section, we introduce our data sources and sample selection process. Next, we provide descriptive statistics for our full and matched sample respectively.

3.1 Database

To test our hypotheses we employ three different databases, Refinitiv, Capital IQ, and CRSP-Compustat merged (CCM) annual databases for U.S. firms from 2002 to 2019.

Refinitiv database (previously named Thomson Reuters Asset4 database) supplies firm-level ESG ratings, which covers more than 80% of global market capitalization. It starts in 2002 and has been used widely in relative studies over the past several decades.

For example, using this database, Halbritter and Dorfleitner (2015) examine the connection between firms social performance and financial performance, while Dai et al. (2020) explore whether socially responsible consumers could drive suppliers onto socially responsible behaviour. This database contains over 450 ESG scores, and each of them ranges from 0 to 100. Among these ratings, we choose the most comprehensive ESG score, the ESG combined (ESGC) score, as our main indicator to measure whether firms have ESG ratings or not. This ESGC score is an overall score that takes both positive and negative ESG aspects into account.

Capital IQ database provides debt structure information. There are seven debt financing sources: commercial paper, drawn credit lines (revolving credit), term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other debt. Finally, CRSP-Compustat merged (CCM) annually database offers firm-level data to describe firm characteristics.

3.2 Sample selection

After merging the above three databases, there are 4,762 unique firms and 36,921 firm-year observations. As a next step, we perform the standard data "cleaning" approach. To that end, we drop observations that meet the following criteria. (1) Financial firms (sic 6000-6999) and utilities (sic 4000-4049), because these firms use special regulations and we only consider common firms (25,992 observations left); (2) Observations whose total asset value is missing or zero (25,010 observations left); (3) Total debt level of the observation is missing or equals to zero (23,400 observations left); (4) Observations with book leverage or market leverage value outside unit circle [0,1], as in Colla et al. (2013) (17,991 observations left); (5) Observations prior to 2002 because the availability of comprehensive Capital IQ data starts in 2002 (16,536 observations left); (6) Observations where the difference of total debts between CCM and Capital IQ exceeds 10%, as in Lin (2016) and Colla et al. (2013). Specifically, total debt in the CCM database is the sum of short-term debt and long-term debt. In the Capital IQ database, total debt is the sum of all seven debt components. If the difference between the former and the latter is larger than 10%, we drop that observation (14,817 observations remaining); (7) Observations where debt ratios, using seven debt types divided by total debts respectively, have values larger than 1. At the end we also winsorize the 1st and 99th percentile of all variables. Our

final dataset consists of 11,018 firm-year observations with 2,347 unique U.S. firms during the period 2002-2019. Table 1 summarises each step followed in our data cleaning process.

[Insert Table 1 here]

3.3 Descriptive statistics of the full sample

In this paper, we classify main variables into three categories, which are debt structure, ESG, and control variables. Table 2 provides a description of the variables we used and the relevant source and Table 3 provides the descriptive statistics of these variables for our full sample.

Debt structure variables indicate different measurement of firms' leverage ratios and debt components. In the first class, we use book leverage and market leverage to show firms' overall leverage ratios. Book leverage is measured by long-term debt divided by the book value of assets. Similarly, market leverage equals the long-term debt over the market value of assets. For the full sample, average book leverage and market leverage ratios are 21.2% and 15.1% respectively. In the second class, we further construct two broad debt categories, bonds debt and banks debt. Following Colla et al. (2013) and Lin (2016), the bonds debt is the sum of senior bonds and notes and subordinated bonds and notes, and the bank debt is the sum of revolving credit and term loans. We find that these two types of financing sources account for 87% of total debt, suggesting that firms mainly use these forms of financing. This finding is also consistent with Lin (2016). Furthermore, bank debt ratio (53.5%) is higher than bonds debt ratio (33.5%), suggesting that private debt is more attractive to firms than public debt in our sample. In the third class, we utilize seven more detailed debt ratios, scaled by total debt, to analyse firms' debt structure. The summary statistics for these variables are very similar with Colla et al. (2013), which also uses the Capital IQ database to analyse firm debt structure. In our sample, the three most popular debt sources are term loans, senior bonds and notes, and revolving credit. Each one of them is above 20% of total debt, and the mean ratio of term loans reaches 31.9%.

ESG variables are used to assess whether firms are rated or non-rated. Ln(ESGC), defined as the natural logarithm of ESG combined score (ESGC), is the main ESG rating indicator we are using in our analysis. We further incorporate various firm characteris-

tics as control variables, such as total book value of assets, Market-to-Book ratio, sales, tangibility, profitability, Research and Development (R&D) expenditures, Sales, General and Administrative (SGA) expenses, sales-to-assets ratio, and dividend payment dummy variable.

[Insert Table 2 here]

[Insert Table 3 here]

3.4 Matched Sample

Due to the large imbalance between firms with ESG and without ESG scores, we perform a matching sample procedure. The number of ESG rated firms is 250, while that of non-rated firms is 2,097, as shown in Table 1. Specifically, we use a marginal propensity score matching approach. This approach helps us isolate the impact of having a firm with an ESG score on its debt structure since we are going to use a subset of firms without an ESG score that are similar to firms with an ESG score in terms of various firm characteristics.

Specifically, we follow a one-to-one matching procedure and we classify firms according to whether they receive an ESG rating at any period (Group A) and to firms that never become ESG rated (Group B). Each firm-year observation from group A will be matched with the closest observation in group B according to three control variables, sale-to-asset ratio, tangibility, and profitability.[2]

Table 4 shows that the size of matched sample is around 4,000 firm-year observations. Similar to the full sample, firms lean towards bank debt (52.1%). Also, the most appealing financing sources are still term loans, senior bonds and notes, and revolving credit.

For our empirical analysis we are going to use the matched sample to avoid reaching conclusions based on the heavily unbalanced full sample between ESG and non-ESG rated firms. However, we do perform a robustness check with the full sample and our key findings remain valid.

[Insert Table 4 here]

[2]In untabulated results we find that these three control variables appear to differ the most between these two types of firms. However, our results remain consistent even we choose additional control variables for the matching procedure.

4 Empirical analysis

4.1 Model

To assess how ESG rating affects a firm's target (optimal) leverage ratio, actual leverage ratio and debt components, we begin with the model for defining target leverage ratio. Following Bae et al. (2011) and Im et al. (2020), we initially define the target leverage ratio as:

$$d^*_{i,t} = \alpha + B^{'}\mathbf{X}_{i,t} + \eta_i \tag{1}$$

where the optimal debt ratio ($d^*_{i,t}$) is determined by a set of firm characteristics ($\mathbf{X}$). Following Bae et al. (2011) and Huang and Shang (2019), we use book value of total assets, the Market-to-Book ratio, sales, tangibility, profitability, R&D expenditures, SGA expenses, dividend payment and sale-to-asset ratio as firm characteristics in our estimations. In equation (1), we also introduce η_i indicating firm fixed effects, as in Im et al. (2020). Compared with the estimation model in Bae et al. (2011), the use of η_i allows the firm fixed effects to influence firms target debt ratio. Finally, to test our *Hypothesis I* we introduce ESG rating as an additional firm characteristic that takes the value of the actual ESG score when the firm is rated and zero otherwise.

As a next step, we assume that a typical firm has a long-term target leverage ratio and can partially adjust to it (Flannery and Rangan, 2006; Bae et al., 2011; Im et al., 2020). Therefore, we define the partial adjustment model as:

$$d_{i,t} - d_{i,t-1} = \lambda(d^*_{i,t} - d_{i,t-1}) + \gamma_t + \nu_{i,t} \tag{2}$$

where $d_{i,t}$ and $d_{i,t-1}$ denote actual debt ratios of firm i in time t and time $t-1$, respectively. The first term in the right hand side, $d^*_{i,t} - d_{i,t-1}$, indicates the difference of past debt ratio from the optimal debt level, and λ captures the speed of adjustment. γ_t reflects year fixed effects and $\nu_{i,t}$ is the error term for firm i in time t.

Substituting equation (2) into equation (1) we get:

$$d_{i,t} = \lambda\alpha + (1-\lambda)d_{i,t-1} + \lambda B^{'}\mathbf{X}_{i,t} + \gamma_t + \lambda\eta_i + \nu_{i,t} \tag{3}$$

where firm i's actual debt ratio in time t is determined by firm i's last period debt ratio,

firm characteristics (including the ESG rating in our case), year and firm fixed effects. To simplify further, we use a set of βs to substitute coefficients in equation (3). In more detail, $\beta_0 = \lambda\alpha$, $\beta_1 = (1 - \lambda)$, $B_2^{'} = \lambda B^{'}$, to get the following equation:

$$d_{i,t} = \beta_0 + \beta_1 d_{i,t-1} + B_2^{'}\mathbf{X}_{i,t} + \gamma_t + \theta_i + \nu_{i,t} \tag{4}$$

We treat equation 4 as our main regression model. Here, the dependent variable is the firm's actual debt ratio in time t, which is proxied by several variables. Initially, we use the standard (aggregate) level of firm debt ratios, i.e. book leverage and market leverage. This way we examine if firms that engage in ESG have a higher or lower overall leverage ratio than firms that do not take part in ESG. Next, we consider the bonds and bank debt ratios as another different measure of firms' financing position. According to this second group, we expect to find differences in choosing private financing (borrowing from banks) and public financing sources (issuing bonds) for firms with and without ESG score, as argued in our *Hypothesis II*. Finally, we also consider seven specific debt ratios separately to further assess firms' debt components. These components are commercial paper, revolving credit, term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other debts. All of these ratios are scaled by total debt (long-term and short-term debt).

Regarding independent variables, we have firm's i actual debt ratio at time $t-1$ and a set of control variables, $\mathbf{X}$. For control variables we include various firm characteristics and their ESG rating. These firm characteristics are as mentioned in equation 1 together with the natural logarithm of the ESG combined score (ln(ESGC)) for firms' ESG indicator. This index includes ESG score and relevant controversies. We further control for various unobservable time-invariant firm characteristics and year fixed-effects.

4.2 Baseline estimations

4.2.1 Target leverage ratio

Do firms that become ESG rated alter their optimal leverage ratio? To answer this question we compare firms' optimal leverage ratios before being rated and after they become rated. Note that at this part of the empirical analysis we only use a subset of firms that do get an ESG rating at a given year. The optimal leverage ratio is estimated

by the predicted value (residuals) of regressing market or book leverage ratios on firm characteristics, as defined in equation 1.

Table 5 shows that on average a firm's optimal market leverage ratio reduces from 15.9% to 12.6% after they become ESG rated. This reduction is at a magnitude of 20.7% and statistically significant. Similarly, optimal book leverage ratio drops to the level of 21% which is a 12.1% reduction in book leverage when the firm becomes ESG rated. This result verifies our *Hypothesis I*.

The main driving force of this result comes from investors' preference. Firms tend to search for investment to expand their operations and grow. However, not all investors are willing to invest in all kinds of firms. For example, Hong and Kacperczyk (2009) find that institutional investors, such as pension funds, do not invest in "sin" stocks that engage in producing tobacco, gaming, and alcohol. The announcement of green bonds contributes to the increase of long-term investors and green investors (Flammer, 2021). Consistent with these findings, our results indicate that firms take the advantage of attracting investors who are interested in ESG after they become rated. Thus, due to the higher growth opportunities that the ESG rated firms have they limit the use of borrowing to avoid underinvestment issues that arise from high leverage.

[Insert Table 5 here]

4.2.2 Asymmetric information

What is the role of the ESG rating signal to the market? It has been shown that firms with high ESG ratings will alleviate some of their capital constraints due to lower asymmetric information (Cheng et al., 2014). This implies though that firms have already received an ESG rating. Is it still the case that firms choose to become ESG rated as a signal to reduce information asymmetry? To answer this question we focus on the firms in our sample that become ESG rated at a given year, similar to the analysis in the previous subsection.

For firm asymmetric information proxies we use firm size measured by total assets, intangible assets as a share of total assets, and the volatility of firm's earning measured by EBITDA over total assets. Assuming that the ESG rating is used as a signal of managers' private information about firm's quality and respect towards the environment,

society and the stakeholders, it is expected that these firms that are in need of this signalling mechanism will increase their size, increase the level of intangible assets, and decrease their earnings volatility once they become ESG rated.

In Table 6 we show the mean values of size, intangible assets holdings and volatility of earnings for the same set of firms before and after they become ESG rated. The results indicate clearly that these firms chose to become ESG rated in an effort to reduce information asymmetry and improve their access to financial markets.

[Insert Table 6 here]

4.2.3 Debt (re-)structure

In this section we assess corporate debt structure and leverage ratios differences between ESG and non-ESG rated firms. Using equation 4 and the matched sample, as described in the previous section, we are able to isolate the role of becoming ESG rated on firms' debt structure and current debt ratios, controlling for a set of firm characteristics. In other words, in our empirical analysis the ESG coefficient acts as the differences-in-differences estimator.

Table 7 shows the results of regressing firms debt structure on ESG ratings, firm control variables, firm and year fixed-effects. In the first two columns, firms' leverage ratios are measured by overall market and book leverage. We find that, on average, there is no significant effect of ESG rating on firms' market and book current leverage ratios. As expected, firms do partially adjust their leverage ratios from period t-1 to period t (Flannery and Rangan, 2006), at a speed of adjustment of about 55.3% (one minus 44.7%) and 50.5% (one minus 49.5%), respectively. The results also show that firms with high level of profits and turnover rate (high sales-asset ratio) have low leverage ratios due to their higher current and future internal funding compared to their counterparts. As a result, there is no need to rely on borrowing from outside.

Even though it does not appear to be any significant effect from ESG ratings on total leverage, there still might be an impact on the actual debt structure of firms. To asses that the last two columns of Table 7 show the results from using bank and bond debt ratios as firm's leverage proxies. The results indicate that compared to non-rated firms, firms with ESG ratings tend to redistribute their source of financing from issuing

bonds to bank loans. This finding supports our *Hypothesis II* showing that when a firm becomes ESG rated it discloses some form of information to the public, leading to reduced information asymmetry.

The driving forces of this result come from both the supply and demand channels. From the perspective of demand, firms favour "safer" sources of funding, according to pecking order theory. Compared to bonds debt, bank loans are more internal because of banks' higher level of private information than dispersed bondholders, as in James (1987). Therefore, the newly acquired ESG rating will allow these firms to search for "safer" sources of financing.

From the perspective of supply, banks are eager to maintain a long-haul business relationship with socially responsible firms and thus make efforts to attract these kind of firms. The information disclosure of ESG rated firms decreases banks monitoring costs. Bacha and Ajina (2019) and Wang et al. (2018) find that CSR firms are more likely to disclose highly readable information to show high ethical standards. Therefore, lending to these firms helps banks save costs. In addition, socially responsible firms are more stable borrowers with richer growth opportunities and less risky (Goss and Roberts, 2011; Mishra and Modi, 2013; Lins et al., 2017).

Overall, although ESG ratings have no effects on firms' aggregate leverage ratios, firms with an ESG score tend to restructure their borrowing towards more internal sources of financing, from bonds to bank debt. These findings contribute to the related literature that assess the borrowing constraints of socially responsible firms, such as Chava (2014) and Goss and Roberts (2011) that argue that socially responsible firms are charged lower interest rates by banks.

We also delve deeper into debt structure, beyond bank and bonds, using the seven specific debt components. Table 8 shows the results from estimating equation 4 using as dependent variables the commercial paper (column 1), revolving credit (column 2), term loans (column 3), senior bonds and notes (column 4), subordinated bonds and notes (column 5), capital leases (column 6), and other debt (column 7) separately. The results show that ESG rated firms tend to reduce senior bonds and notes (column 4) and increase term loans (column 3). Therefore, the restructuring of debt for ESG rated firms takes place mainly via these two key debt components.

[Insert Table 7 here]

[Insert Table 8 here]

5 Endogeneity

It has been shown that endogeneity is a concern in corporate finance studies and can lead to biased and inconsistent parameter estimators (Wintoki et al., 2012; Roberts and Whited, 2013). In our setting, there are various possible causes of endogeneity. Specifically, we have individual firm heterogeneity; omitted variables; the fact that current values of the independent variables are employed as a function of past values of the dependent variable (leverage ratios); and reverse causality (simultaneity) between leverage and ESG ratings.

To control for the various endogeneity concerns, we perform three different estimations. We initially isolate the year when the firm becomes ESG rated via the introduction of a dummy that takes the value of one that year and zero otherwise. This way we are able to assess the turnover effect of a firm from non-ESG to ESG rated. Next we perform a standard Generalised Methods of Moments (GMM) approach and finally we also perform a two-stage least square (2SLS) estimation with an instrumental variable.

5.1 Turnover effect

Starting with the turnover effect from non-ESG rated to ESG rated we assess how do firms' leverage ratios alter when they get their initial ESG ratings, i.e. what happens to firms' debt structure following this shock. In this case, our key independent variable is an initial ESG rating dummy variable. If this year is the first year for a firm to be rated, this variable equals one and zero otherwise. Table 9 shows that firms redistribute from bond debt to bank loans after being rated for the very first time.

Compared to our benchmark estimations, this result appears to be more pronounced and highly statistically significant. This indicates that firms tend to restructure their debt immediately once they become rated, alleviating partially some of the endogeneity concerns.

[Insert Table 9 here]

5.2 GMM estimation

In our benchmark estimations we include firm fixed effects as a way to control any omitted time-invariant firm characteristics that could lead to biased and inconsistent estimators, alleviating partially the endogeneity concerns. However, given that we do include the lagged dependent variable as an estimator, the consistency of the fixed effect estimator parameters depends on having a large number of periods.

To make sure we alleviate that concern, we perform a Generalized Method of Moments (GMM) estimation, as suggested by Arellano and Bover (1995), using as instrumental variables past values of all our independent variables. Our results, as shown in Table 10, indicate that our key conclusions, regarding the redistribution effects of ESG ratings, remain valid.

[Insert Table 10 here]

5.3 Two-stage least squares estimation

As a final endogeneity test, we perform a two-stage least squares (2SLS) estimation. In the first-stage estimation, we use the past industry's average ESG combined score. In the second-stage estimation, we apply again equation 4 but this time we replace the ESG rating variable with the predicted value of the ESG rating from the first-stage estimation and the other control variables. This way, the estimated coefficient is consistent because the predicted value from the first-stage estimation is not correlated with the error term of the second-stage estimation.

Our instrumental variable, the lagged industry-level average ESG score, is expected to affect current firm-level ESG score. Firms observe the trends of their peers within the same industry and they will more likely tend to have similar ESG considerations and approaches. In addition, the lagged industry level average ESG score is less likely to be correlated with a firm's unobservable characteristics that are also related to its leverage ratio. In addition, firm's debt structure is unlikely to affect past industry-level average ESG ratings.

Table 11 provides the results. The first-stage regressions show that the variables used to predict the firm ESG combined score perform reasonable well with an R^2 around 35,6

under both of the key debt ratios, bank loans and bonds debt.[3] We also show that the overidentification test confirms the validity of our instrumental variable. The second-stage results confirm that our key predictions regarding the debt restructuring towards more internal sources of financing remain valid.

[Insert Table 11 here]

6 Robustness checks

In this section, we perform various additional tests to assess the validity of our key results.

6.1 A different ESG indicator

So far in our analysis we have used the combined ESG score as a CSR/ESG indicator. In Table 12 we replace this ESG indicator with the simple ESG score (excluding controversies).[4] The results show that our key outcomes remain consistent with our benchmark model. In particular, we still find that there is no effect on current book and market leverage ratios from becoming ESG rated and we are still observing the redistribution of financing sources from public to more private sources, i.e. bond debt to bank loans.

[Insert Table 12 here]

6.2 Assess the role of ESG individual components

In this subsection, we assess the role of the individual components of ESG on debt structure. Using again the matched sample we repeat our benchmark estimation of the partially adjusted model by replacing the overall ESG combined ratings with the individual ratings from the Environment, Social and Governance pillars separately.

Table 13 provides the results from bank loans in columns 1, 3 and 5, and bonds debt in columns 2, 4 and 6 for the E, S and G pillars respectively. We find that issuing bonds is consistently and significantly reduced under each pillar. Similarly, the bank borrowing

[3]Please note that we only assess the validity of the redistribution outcome here with the use of bank loans and bonds debt.

[4]We are still using the matching sample at the empirical analysis.

channel is re-enforced under every pillar (positive sign), but it is no statistically significant under the Governance pillar.

[Insert Table 13 here]

6.3 Firm heterogeneity

Firms' characteristics also play a role in the relationship between ESG ratings and debt structure. Hence, we test if the redistribution effect is more pronounced for a certain type of ESG rated firms.

Three firm characteristics are chosen. Firstly, financial pressure, which is proxied by cash flow over interest payments. We divide ESG rated firms into a low and high financial pressure groups. If the ratio of cash flow to interest payments is below the median, then this firm is classified into low financial pressure group. For simplicity, we only report key coefficients and t-statistics in Table 14 even though we do control for other factors as well as firm and year fixed effects, as in our benchmark estimations. The results suggest that ESG rated firms with high financial pressure engage mainly into redistributing their borrowing from external to internal sources, i.e. from bonds to bank debt. The reason for this behaviour is that low financial pressure firms have adequate funding and they are not in need of altering their financing sources. However, high financial pressure firms are in need of raising more funding. The use of ESG ratings helps them take advantage of the lower information asymmetry and borrow from banks instead of issuing bonds.

Secondly, we use the Market-to-Book ratio to proxy for firms' growth opportunities. Growth opportunities indicate the potential future ability to earn money. Results in Table 14 suggest that only firms with low growth opportunities substitute bonds for bank loans. This result is in line with Myers (1977) model suggesting that high growth firms limit their use of debt to avoid the underinvestment issues that might arise from high leverage position.

Thirdly, we use firms' alternative uses of assets, which are proxied by R&D intensity. On the one hand, specific assets need more R&D expenses to innovate. On the other hand, because of their limited functions, these assets are not used as collateral to borrow from banks. Therefore, firms with fewer alternative uses of assets are in need to increase their borrowing. Table 14 verifies this intuition showing that firms with relatively lower

alternative uses of assets tend to engage more to debt restructuring towards more internal sources of financing when they become ESG rated.

Overall, we find that our key debt redistribution outcome is more pronounced for ESG rated firms with high financial pressure, low growth opportunities, and assets with limited alternative uses.

[Insert Table 14 here]

6.4 Re-define the optimal leverage ratio equation

Some related studies have implemented the partial adjustment model using firm's controls lagged by one period instead of being contemporaneous. In our benchmark estimation we only incorporated contemporaneous firm characteristics to measure firms' target and current leverage ratios. At this robustness check we use one period lagged firm characteristics to assess if our key results regarding the target leverage ratio and debt structure for ESG rated firms are affected.

Therefore, in this case we estimate target (optimal) leverage ratio using equation 5:

$$d^*_{i,t} = \alpha + B^{'}\mathbf{X}_{i,t-1} + \eta_i \tag{5}$$

Table 15 shows that even if we use past values of firm characteristics, firms' target (optimal) market and book leverage ratios still decrease after the firms become ESG rated and this result is statistically significant.

[Insert Table 15 here]

Following up from the above, the partial adjustment model becomes equation 6:

$$d_{i,t} = \beta_0 + \beta_1 d_{i,t-1} + B^{'}_2\mathbf{X}_{i,t-1} + \gamma_t + \theta_i + \nu_{i,t} \tag{6}$$

In this case, all independent variables, excluding the ESG combined score, are lagged by one period. The results in Table 16 show that the ESG rating has a negative effect on firms' market and book leverage ratios but this is not statistically significant (columns 1 and 2), similar to our benchmark estimations. Assessing the redistribution effect from issuing bonds to bank loans, we still find that this remains valid and statistically signifi-

cant as in our benchmark estimations.

[Insert Table 16 here]

6.5 High vs. Low ESG score

In our analysis so far we only relied on whether firms had an ESG rating or not. This means that we did not pay attention to the level of that ESG score and its corresponding effect on debt structure. In this subsection, we split our firms to those that received an ESG rating above the median of our sample within a given year (High ESG rated firms) and to those that received an ESG score below the median value (Low ESG rated firms). After introducing a dummy variable that captures the quality of the ESG score, we add interaction terms of ESG rating with these dummy variables and we repeat our benchmark estimations.

Table 17 shows that the firms that obtain an ESG score above the median are in a better position to raise funds from banks. Even though the low ESG rated firms still increase their bank loans position, that increase does not appear to be statistically significant. Furthermore, we find that the level of ESG rating is irrelevant in the decrease of bonds debt since both high and low ESG rated firms significantly reduce that source of financing. These results support the fact that ESG rating acts as a way of conveying information to the public and thus reduce the asymmetric information issues leading to better access to internal sources of financing.[5]

[Insert Table 17 here]

6.6 Full sample analysis

Our empirical analysis has been focusing mainly on our matched sample to avoid any conclusions being reached due to the heavily unbalanced panel of ESG and non-ESG rated firms. In this robustness check we revert back to our full sample and we assess if we are still able to uncover the redistribution effect, from bonds debt to bank loans, for

[5]We have also performed a similar analysis for the effect of the level of ESG rating on target (optimal) market and book leverage ratios. Our findings are in line with our benchmark estimations and similar to the results provided in this subsection, showing that highly rated firms reduce more their target market and book leverage ratios compared to low ESG rated firms.

ESG rated firms.

The results provided in Table 18 show once again that our key redistribution outcome remains valid even under the full sample and the relatively small share of ESG rated firms.

[Insert Table 18 here]

7 Conclusions

In this paper, we focus on the impact of ESG rating on firm leverage ratios and debt components using a comprehensive dataset from various sources, such as CRSP-Compustat, Capital IQ and Refinitiv, for U.S. firms for the period 2002-2019.

We initially test how ESG ratings influence firms' target market and book leverage ratios. We find that when firms become ESG rated they tend to reduce their target (optimal) market and book leverage ratios. We also find that this result is more pronounced for firms that received an above average ESG rating. We further show that the ESG rating act as a signalling mechanism to reduce information asymmetry.

Next we assess if obtaining an ESG rating can lead to a lower current leverage ratio and debt restructuring. We find that, on average, ESG rated firms do not significantly alter their current market and book leverage ratios. However, delving deeper into the corporate debt structure, we find that ESG rated firms redistribute their funding towards more internal sources (according to pecking order theory), from bonds debt to bank loans. This result is more pronounced for firms with high financial pressure, low growth opportunities, and fewer alternative uses of assets. Furthermore, we find that Environmental and Social pillars are the ones that drive this result. These results appear to hold under various robustness and endogeneity checks.

Overall, these results support the fact that an ESG rating conveys information to the public leading to lower information asymmetry between the lender and the owner. It also appears that the higher is the obtained ESG rating the better would be the access to "safer" sources of financing. Finally, these results support the trade-off and pecking order theories of capital structure.

References

Albuquerque, R., Koskinen, Y., and Zhang, C. (2019). Corporate social responsibility and firm risk: Theory and empirical evidence. *Management Science*, 65(10):4451–4469.

Arellano, M. and Bover, O. (1995). Another look at the instrumental variableestimation of errorcomponents models. *Journal of Econometrics*, 68(1):29–51.

Bacha, S. and Ajina, A. (2019). Csr performance and annual report readability: evidence from france. *Corporate Governance: The International Journal of Business in Society*, 20(2):201–215.

Bae, K.-H., Kang, J.-K., and Wang, J. (2011). Employee treatment and firm leverage: A test of the stakeholder theory of capital structure. *Journal of financial economics*, 100(1):130–153.

Bassen, A., Meyer, K., and Schlange, J. (2006). The influence of corporate responsibility on the cost of capital. *Available at SSRN 984406*.

Besanko, D. and Kanatas, G. (1993). Credit market equilibrium with bank monitoring and moral hazard. *The review of financial studies*, 6(1):213–232.

Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, 60(9):2223–2247.

Chemmanur, T. J. and Fulghieri, P. (1994). Reputation, renegotiation, and the choice between bank loans and publicly traded debt. *Review of financial Studies*, 7(3):475–506.

Chen, H., Maslar, D. A., and Serfling, M. (2020). Asset redeployability and the choice between bank debt and public debt. *Journal of Corporate Finance*, 64:101678.

Cheng, B., Ioannou, I., and Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic management journal*, 35(1):1–23.

Colla, P., Ippolito, F., and Li, K. (2013). Debt specialization. *The Journal of Finance*, 68(5):2117–2141.

Dai, R., Liang, H., and Ng, L. (2020). Socially responsible corporate customers. *Journal of Financial Economics*, forthcoming.

Denis, D. J. and Mihov, V. T. (2003). The choice among bank debt, non-bank private debt, and public debt: evidence from new corporate borrowings. *Journal of financial Economics*, 70(1):3–28.

Dhaliwal, D. S., Khurana, I. K., and Pereira, R. (2011). Firm disclosure policy and the choice between private and public debt. *Contemporary Accounting Research*, 28(1):293–330.

Easterwood, J. C. and Kadapakkam, P.-R. (1991). The role of private and public debt in corporate capital structures. *Financial Management*, 20(3):49–57.

El Ghoul, S., Guedhami, O., Kwok, C. C., and Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, 35(9):2388–2406.

Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, forthcoming.

Flannery, M. J. and Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of financial economics*, 79(3):469–506.

Ge, W. and Liu, M. (2015). Corporate social responsibility and the cost of corporate bonds. *Journal of Accounting and Public Policy*, 34(6):597–624.

Goss, A. and Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, 35(7):1794–1810.

Halbritter, G. and Dorfleitner, G. (2015). The wages of social responsibility—where are they? a critical review of esg investing. *Review of Financial Economics*, 26(1):25–35.

Hasan, I., Hoi, C. K., Wu, Q., and Zhang, H. (2017). Social capital and debt contracting: Evidence from bank loans and public bonds. *Journal of Financial and Quantitative Analysis*, 52(3):1017–1047.

Huang, K. and Shang, C. (2019). Leverage, debt maturity, and social capital. *Journal of Corporate Finance*, 54:26–46.

Huang, R. and Ritter, J. R. (2009). Testing theories of capital structure and estimating the speed of adjustment. *Journal of Financial and Quantitative analysis*, 44(2):237–271.

Im, H. J., Kang, Y., and Shon, J. (2020). How does uncertainty influence target capital structure? *Journal of Corporate Finance*, 64:101642.

James, C. (1987). Some evidence on the uniqueness of bank loans. *Journal of financial economics*, 19(2):217–235.

Jiraporn, P., Jiraporn, N., Boeprasert, A., and Chang, K. (2014). Does corporate social responsibility (csr) improve credit ratings? evidence from geographic identification. *Financial Management*, 43(3):505–531.

Ju, N., Parrino, R., Poteshman, A. M., and Weisbach, M. S. (2005). Horses and rabbits? trade-off theory and optimal capital structure. *Journal of Financial and Quantitative analysis*, 40(2):259–281.

Leland, H. E. and Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The journal of Finance*, 32(2):371–387.

Lin, L. (2016). Collateral and the choice between bank debt and public debt. *Management Science*, 62(1):111–127.

Lins, K. V., Servaes, H., and Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *the Journal of Finance*, 72(4):1785–1824.

Lummer, S. L. and McConnell, J. J. (1989). Further evidence on the bank lending process and the capital-market response to bank loan agreements. *Journal of Financial Economics*, 25(1):99–122.

Malik, M. (2015). Value-enhancing capabilities of csr: A brief review of contemporary literature. *Journal of Business Ethics*, 127(2):419–438.

Menz, K.-M. (2010). Corporate social responsibility: Is it rewarded by the corporate bond market? a critical note. *Journal of Business Ethics*, 96(1):117–134.

Mishra, S. and Modi, S. B. (2013). Positive and negative corporate social responsibility, financial leverage, and idiosyncratic risk. *Journal of business ethics*, 117(2):431–448.

Modigliani, F. and Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review*, 48(3):261–297.

Myers, S. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2):147–176.

Myers, S. C. and Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics*, 13(2):187–221.

Naseem, T., Shahzad, F., Asim, G. A., Rehman, I. U., and Nawaz, F. (2020). Corporate social responsibility engagement and firm performance in asia pacific: The role of enterprise risk management. *Corporate Social Responsibility and Environmental Management*, 27(2):501–513.

Ng, A. C. and Rezaee, Z. (2015). Business sustainability performance and cost of equity capital. *Journal of Corporate Finance*, 34:128–149.

Oikonomou, I., Brooks, C., and Pavelin, S. (2012). The impact of corporate social performance on financial risk and utility: A longitudinal analysis. *Financial Management*, 41(2):483–515.

Oikonomou, I., Brooks, C., and Pavelin, S. (2014). The effects of corporate social performance on the cost of corporate debt and credit ratings. *Financial Review*, 49(1):49–75.

Rajan, R. G. (1992). Insiders and outsiders: The choice between informed and arm's-length debt. *The Journal of finance*, 47(4):1367–1400.

Roberts, M. R. and Whited, T. M. (2013). Chapter 7 - endogeneity in empirical corporate finance. *Handbook of the Economics of Finance*, 2:493–572.

Servaes, H. and Tamayo, A. (2013). The impact of corporate social responsibility on firm value: The role of customer awareness. *Management science*, 59(5):1045–1061.

Sharfman, M. P. and Fernando, C. S. (2008). Environmental risk management and the cost of capital. *Strategic management journal*, 29(6):569–592.

Wang, Z., Hsieh, T.-S., and Sarkis, J. (2018). Csr performance and the readability of csr reports: Too good to be true? *Corporate Social Responsibility and Environmental Management*, 25(1):66–79.

Wintoki, M. B., Linck, J. S., and Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, 105(2):581–606.

Table 1: The number of remaining firms and firm-year observations

	Firm			Firm-Year observations		
Process	With	Without	Total	With	Without	Total
After merging	437	4,425	4,762	2,238	34,683	36,921
Drop, non-common firms	304	3,262	3,566	1,590	24,402	25,992
Drop, if assets=. or =0	304	3,262	3,540	1,588	23,422	25,010
Drop, if debts=. or =0	292	3,153	3,445	1,520	21,880	23,400
Drop, if bl(ml)<0 or>1	290	2,894	2,923	1,491	16,500	17,991
Drop, if year<2002	290	2,550	2,840	1,491	15,046	16,536
Drop, if difference>10%	283	2,454	2,737	1,385	13,432	14,817
Drop, if debt ratios>1	250	2,097	2,347	1,132	9,886	11,018
Winsor 1% and 99%	250	2,097	2,347	1,132	9,886	11,018

Notes: This table shows the process of data clean. The first column describes conditions used to drop observations. Here, we drop observations in financial firms and utilities, without assets and debts or values of assets and debts are missing, are outside of unit interval, and are before the year 2002. Also, observations with total debt in CCM and Capital IQ databases exceeds 10% or any debt ratio exceeds one are deleted. We winsorize top and bottom 1% values. The second column to the fourth column introduce the number of rated firms, non-rated firms, and total firms respectively. The fifth to the seventh column show the number of remaining firm-year observations with ESGC scores, without ESGC scores and the number of all observations for each. In the end, there are 11,018 firm-year observations with 2,347 unique firms from 2002 to 2019.

Table 2: Variables Description

Variables	Description	Source
Debt structure		
Commercial paper ratio	Commercial paper / debt, where debt = debt in current liabilities (34) + long-term debt (9)	Capital IQ & CCM
Revolving credit ratio	Revolving credit / debt	
Term loans ratio	Term loans / debt	
Senior bonds & notes ratio	Senior bonds & notes / debt	
Subordinated bonds & notes ratio	Subordinated bonds & notes / debt	
Capital leases ratio	Capital leases / debt	
Other debt ratio	(other debt + total trust-preferred stock) / debt	
Bond debt ratio	(Senior bonds notes + subordinated bonds notes) / debt	
Bank debt ratio	(Revolving credit + term loans) / debt	
Market leverage	Long-term debt (9)/ ((assets (6) -common equity (60)) + price close (31) * common shares outstanding (25))	CCM
Book leverage	Long-term debt (9) / assets (6)	
ESG indicators		
Ln(ESGC)	Natural logarithm of ESG combined score	Refinitiv ESG
Ln(ESG)	Natural logarithm of ESG score	
Ln(EP)	Natural logarithm of environment pillar score	
Ln(SP)	Natural logarithm of social pillar score	
Ln(GP)	Natural logarithm of governance pillar score	
Firm characteristics		
Assets	Natural logarithm of assets (6)	CCM
Market-to-Book ratio	Market value of equity divided by book value of equity, i.e. price close (31) * common shares outstanding (25) / (stockholders' equity (144) + deffered taxes (74) + investment tax credit (208) -preffered_stock)), where preffered_stock = pstkrv (56) (if missing, use pstkl (10); if still missing, use pstk(130))	
Sales	Natural logarithm of sales (12)	
Tangibility	Property, plant, and equipment (8) / assets (6)	
Profitability	Operating income before depreciation (13) / assets (6)	
R&D expense	Research and development expense (46) / sales (12)	
SGA cost	Selling, general and administrative expenses (132) / sales (12)	
Dividend	Dummy = 1, if dividend payment (21) = 0	
Sales over assets	Sales (12) / assets (6)	
Financial pressure	Cash flow divided by interest payments, i.e. (operating income before depreciation (13) – interest and related expense (15) – income taxes (16)) / interest and related expense	
R&D intensity	R&D expenses (46) / number of employees (29)	

Table 3: Descriptive Statistics (full sample)

	N	Mean	P25	P50	P75	Std. Dev.
Debt Structure Variables						
Book leverage	11018	0.212	0.012	0.153	0.350	0.216
Market leverage	10981	0.151	0.005	0.090	0.243	0.172
Bond/debt	11018	0.335	0	0.118	0.707	0.385
Bank/debt	11018	0.535	0.044	0.586	0.984	0.410
Commercial paper/debt	11018	0.002	0	0	0	0.030
Revolving credit/debt	11018	0.217	0	0	0.336	0.338
Term loans/debt	11018	0.319	0	0.083	0.655	0.384
Senior b&n/debt	11018	0.286	0	0.006	0.603	0.375
Subordinated b&n/debt	11018	0.049	0	0	0	0.170
Capital leases/debt	11018	0.098	0	0	0.021	0.260
Other debt/debt	11018	0.040	0	0	0	0.161
ESG Variables						
Ln(ESGC)	11018	0.348	0	0	0	1.043
Control Variables						
Ln(asset)	11018	5.418	3.912	5.553	7.083	2.356
Profitability	10998	-0.069	-0.056	0.077	0.136	0.504
Ln(sale)	10455	5.054	3.638	5.270	6.731	2.457
Market-to-Book ratio	10681	2.523	0.824	1.732	3.425	11.402
Tangibility	11014	0.315	0.063	0.188	0.539	0.299
Dividend	11018	0.232	0	0	0	0.422
Sales/assets	11018	0.876	0.292	0.657	1.203	0.829
R&D expense	11018	0.372	0	0	0.051	1.889
SGA cost	9550	0.648	0.101	0.225	0.473	1.929

Notes: This table provides descriptive statistics of the main variables under the full sample. Data comes from merged CRSP-Compustat, Capital IQ ,and Refinitiv databases between 2002 and 2019. Variables are split into debt structure variables, ESG variables, and control variables. N denotes the number of firm-year observations. Noting that senior b&n and subordinated b&n means senior and subordinated bonds and notes; Research and Development expenditure is called R&D expense; SGA cost is Selling, General, and Administrative expense.

Table 4: Descriptive Statistics (matched sample)

	N	Mean	P25	P50	P75	Std. Dev.
Debt Structure Variables						
Book leverage	4328	0.243	0.049	0.212	0.379	0.211
Market leverage	4322	0.169	0.025	0.130	0.259	0.163
Bond/debt	4328	0.361	0	0.228	0.728	0.383
Bank/debt	4328	0.521	0.068	0.540	0.971	0.401
Commercial paper/debt	4328	0.003	0	0	0	0.031
Revolving credit/debt	4328	0.198	0	0	0.272	0.319
Term loans/debt	4328	0.323	0	0.118	0.637	0.377
Senior b&n/debt	4328	0.309	0	0.046	0.647	0.376
Subordinated b&n/debt	4328	0.052	0	0	0	0.175
Capital leases/debt	4328	0.090	0	0	0.018	0.250
Other debt/debt	4328	0.036	0	0	0	0.151
ESG Variables						
Ln(ESGC)	4328	0.870	0	0	2.262	1.506
Control Variables						
Ln(asset)	4328	6.499	5.252	6.546	7.855	1.966
Profitability	4328	0.089	0.061	0.109	0.156	0.155
Ln(sale)	4300	6.116	4.880	6.288	7.518	2.085
Market-to-Book ratio	4144	2.756	1.109	2.028	3.571	7.589
Tangibility	4328	0.270	0.064	0.167	0.416	0.260
Dividend	4328	0.292	0	0	1	0.455
Sales/assets	4328	0.903	0.436	0.755	1.211	0.661
R&D expense	4328	0.206	0	0	0.046	1.366
SGA cost	3989	0.318	0.096	0.204	0.365	0.849

Notes: This table provides descriptive statistics for the matched sample. Data is from merged CRSP-Compustat, Capital IQ ,and Refinitiv databases between 2002 and 2019. The variables are split into debt structure variables, ESG variables, and control variables. N denotes the number of firm-year observations. Noting that senior b&n and subordinated b&n means senior and subordinated bonds and notes; MB ratio is Market-to-Book ratio; SGA cost is Selling, General, and Administrative expense.

Table 5: T-test of optimal leverage ratio

	Before rated	After rated	T-test
Market leverage	0.159	0.126	0.033
Book leverage	0.239	0.210	0.029

Notes: This table reports t-statistics of firms target market and book leverage ratios before and after becoming ESG rated. The optimal leverage ratio is the predicted value (residuals) of regressing leverage ratios on firm characteristics.

Table 6: ESG rating and asymmetric information

Asymmetric information proxy	Before rated	After rated	T-test
Size	1329.68	8319.99	16.2143***
Intangible assets	0.2459	0.2842	3.6519***
sd(EBITDA)	0.0715	0.0463	-7.1432***

Notes: This table shows the impact when a firm becomes ESG rated on asymmetric information. We use three different proxies to capture asymmetric information: size (total assets), intangible assets scaled by total assets and the standard deviation of EBITDA over assets, for the same set of firms before and after they become ESG rated. This table reports the mean values and t-statistics of the difference between the two regimes. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 7: The regression of leverage and bank (bond) debt ratios on ESGC (matched)

	(1) ML_t	(2) BL_t	(3) Bank_t	(4) Bond_t
Ln(ESGC)	-0.003	-0.003	0.013*	-0.016***
	(-1.370)	(-0.981)	(1.920)	(-2.779)
Market leverage(t-1)	0.444***			
	(14.615)			
Book leverage(t-1)		0.494***		
		(14.555)		
Bank debt(t-1)			0.427***	
			(15.416)	
Bank debt(t-1)				0.465***
				(17.458)
Ln(asset)	0.056***	0.026	-0.036	0.057*
	(4.109)	(1.301)	(-0.968)	(1.959)
Market-to-Book ratio	-0.000	-0.000	0.001	-0.000
	(-0.539)	(-0.531)	(1.266)	(-0.257)
Ln(sale)	-0.016	0.005	-0.006	0.002
	(-1.162)	(0.284)	(-0.170)	(0.082)
Tangibility	0.107***	0.062	0.089	-0.297***
	(2.607)	(1.272)	(0.818)	(-3.254)
Profitability	-0.177***	-0.201***	0.110	-0.207***
	(-4.407)	(-3.800)	(1.224)	(-2.591)
R&D expense	-0.005	-0.001	0.025	0.045**
	(-0.573)	(-0.084)	(1.294)	(1.994)
SGA cost	-0.009*	-0.003	-0.005	-0.002
	(-1.648)	(-0.380)	(-0.266)	(-0.144)
Dividend	-0.001	0.010	-0.006	0.015
	(-0.143)	(1.144)	(-0.287)	(0.835)
Sales/assets	-0.004	-0.022	-0.022	0.007
	(-0.307)	(-1.246)	(-0.597)	(0.213)
Intercept	-0.173***	-0.046	0.460***	0.001
	(-4.371)	(-1.006)	(4.270)	(0.012)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	3203	3205	3205	3205
Adjusted R^2	0.361	0.344	0.225	0.304

Notes: This table describes the regressions of the market and book leverage ratios, and bank and bonds debt ratios on ESG combined score and various controls under matched samples. Data from merged CRSP-Compustat, Capital IQ, and Refibitiv databases between 2002 and 2019 are used. The dependent variables are market leverage, book leverage, bank debt and bonds debt in columns (1) to (4) respectively. For each regression, we also control firm and year fixed effects. Numbers in parentheses are robust t-statistics. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 8: The regression of seven specific debt ratios on ESGC (matched)

	(1) Cp_t	(2) Rc_t	(3) Tl_t	(4) Se_t	(5) Su_t	(6) Cl_t	(7) Other_t
Ln(ESGC)	-0.000	0.003	0.011*	-0.013**	-0.002	-0.003	0.004
	(-0.759)	(0.429)	(1.776)	(-2.210)	(-0.825)	(-0.706)	(1.644)
Cp(t-1)	-0.013						
	(-0.066)						
Rc(t-1)		0.372***					
		(10.609)					
Tl(t-1)			0.435***				
			(15.341)				
Se(t-1)				0.476***			
				(17.682)			
Su(t-1)					0.544***		
					(13.154)		
Cl(t-1)						0.389***	
						(6.670)	
Other(t-1)							0.237***
							(3.867)
Ln(asset)	-0.005	-0.076**	0.040	0.051	0.004	-0.029*	0.007
	(-1.456)	(-2.196)	(1.208)	(1.616)	(0.336)	(-1.801)	(0.549)
MB ratio	0.000	0.000	0.000	-0.000	-0.000	-0.000*	-0.000
	(0.578)	(1.274)	(0.490)	(-0.035)	(-0.349)	(-1.675)	(-0.677)
Ln(sale)	0.005	0.039	-0.047	0.005	-0.002	0.014	-0.008
	(1.481)	(1.116)	(-1.605)	(0.153)	(-0.118)	(0.997)	(-0.554)
Tangibility	0.006	0.119	-0.022	-0.279***	-0.022	0.104	0.087*
	(1.293)	(1.242)	(-0.205)	(-3.180)	(-0.502)	(1.499)	(1.870)
Profitability	0.002	0.113	-0.001	-0.218***	0.011	0.138**	-0.032
	(0.387)	(1.257)	(-0.010)	(-2.600)	(0.278)	(2.257)	(-0.998)
R&D expense	-0.000	-0.008	0.035**	0.042*	0.002	0.007	-0.073***
	(-0.503)	(-0.366)	(2.291)	(1.906)	(0.239)	(0.376)	(-3.393)
SGA cost	0.002	0.025	-0.031**	-0.004	0.002	0.005	-0.000
	(1.358)	(1.269)	(-2.506)	(-0.310)	(0.350)	(0.791)	(-0.067)
Dividend	0.001	-0.001	-0.006	0.003	0.010	-0.008	-0.015
	(1.033)	(-0.061)	(-0.280)	(0.176)	(1.205)	(-0.630)	(-1.301)
Sales/assets	-0.004	-0.020	-0.001	0.021	-0.014	0.001	0.015
	(-1.510)	(-0.535)	(-0.036)	(0.589)	(-1.127)	(0.088)	(1.212)
Intercept	0.011*	0.325***	0.157	-0.057	0.057	0.100	0.007
	(1.669)	(3.393)	(1.469)	(-0.517)	(1.257)	(1.573)	(0.165)
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3205	3205	3205	3205.000	3205	3205	3205.
Adjusted R^2	0.006	0.162	0.216	0.333	0.369	0.177	0.101

Notes: This table describes the regressions of seven specific debt ratios on ESG combined score and other firm controls. For each regression, we control for firm and year fixed effects. Numbers in parentheses are robust t-statistic. N denotes the number of firm-year observations. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 9: Regression of debt structure on initial ESGC scores

	(1) ML_t	(2) BL_t	(3) Bank_t	(4) Bond_t
Initial ESGC score	-0.009	-0.005	0.060***	-0.035*
	(-1.510)	(-0.608)	(2.778)	(-1.760)
Market leverage(t-1)	0.446***			
	(14.565)			
Book leverage(t-1)		0.495***		
		(14.381)		
Bank debt(t-1)			0.428***	
			(15.514)	
Bond debt(t-1)				0.468***
				(17.722)
Ln(asset)	0.056***	0.025	-0.035	0.054*
	(4.089)	(1.281)	(-0.913)	(1.855)
Market-to-Book ratio	-0.000	-0.000	0.001	-0.000
	(-0.547)	(-0.541)	(1.266)	(-0.298)
Ln(sale)	-0.016	0.005	-0.003	-0.001
	(-1.206)	(0.253)	(-0.088)	(-0.030)
Tangibility	(2.624)	(1.282)	(0.788)	(-3.214)
Profitability	-0.176***	-0.201***	0.102	-0.206**
	(-4.386)	(-3.820)	(1.106)	(-2.538)
R&D expense	-0.005	-0.001	0.024	0.044*
	(-0.574)	(-0.095)	(1.172)	(1.901)
SGA cost	-0.009*	-0.004	-0.005	-0.002
	(-1.650)	(-0.381)	(-0.280)	(-0.147)
Dividend	-0.001	0.010	-0.007	0.016
	(-0.103)	(1.172)	(-0.333)	(0.876)
Sales/assets	-0.004	-0.021	-0.023	0.008
	(-0.289)	(-1.233)	(-0.614)	(0.245)
Intercept	-0.168***	-0.040	0.437***	0.031
	(-4.281)	(-0.901)	(4.171)	(0.301)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	3203	3205	3205	3205
Adjusted R^2	0.361	0.343	0.226	0.302

Notes: This table examines the turnover effect of firms initial ESG ratings on debt structure. Numbers in parentheses are robust t-statistic. N denotes the number of firm-year observations. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 10: Relationship examination for ESG and debt ratios with GMM-IV approach

	Bank debt	Bond debt
Ln(ESGC)	0.054**	-0.038*
	(2.073)	(-1.739)
Bank debt(t-1)	0.511***	
	(8.438)	
Bond debt(t-1)		0.529***
		(8.097)
Ln(asset)	-0.038	0.045
	(-0.872)	(1.176)
Market-to-Book ratio	0.000	0.001
	(0.263)	(1.180)
Ln(sale)	-0.037	0.021
	(-0.903)	(0.546)
Tangibility	-0.004	-0.131
	(-0.026)	(-0.909)
Profitability	0.033	-0.082
	(0.531)	(-1.214)
R&D expense	-0.003	0.037
	(-0.102)	(1.290)
SGA cost	-0.005	-0.004
	(-0.306)	(-0.228)
Dividend	-0.052	0.030
	(-1.106)	(0.861)
Sales/assets	0.017	-0.000
	(0.331)	(-0.007)
Intercept	0.443	0.156
	(0.238)	(0.114)
Fixed Effects	Yes	Yes
Number of observations	7399	7399
m_2	0.772	0.285
J (p-value)	0.210	0.722

Notes: This table uses the Generalized Method of Movements approach. Lagged control variables are treated as instrumental variables with standard fixed effects. Data from merged CRSP-Compustat, Capital IQ, and Refinitiv databases between 2002 and 2019 are used under full sample. Numbers in parentheses are robust t-statistics. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 11: Relationship examination for ESG and debt ratios with 2SLS-IV approach

	Bank debt		Bond Debt	
	First Stage	Second Stage	First Stage	Second Stage
Lag_Ind_Ave_Ln(ESGC)	0.646***		0.645***	
	(12.865)		(12.879)	
$\widehat{Ln(ESGC)}$		0.055***		-0.031*
		(3.114)		(-1.937)
Controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Number of observations	7071	7071	7071	7071
F-statistic on instrument	165.503		165.878	

Notes: This table uses the Two-Stage Least Squares (2SLS) estimation with the lag of industrial average natural logarithm of ESG rating as an instrumental variable at the first-stage. Data come from merged CRSP-Compustat, Capital IQ, and Refinitiv databases between 2002 and 2019. The full sample is used. Numbers in parentheses are robust t-statistics. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 12: The regression of leverage, bank and bond debt ratios on ESG

	(1) ML_t	(2) BL_t	(3) Bank_t	(4) Bond_t
Ln(ESG)	-0.003	-0.003	0.013*	-0.016***
	(-1.348)	(-0.946)	(1.939)	(-2.822)
Market leverage(t-1)	0.444***			
	(14.616)			
Book leverage		0.494***		
		(14.557)		
Bank debt(t-1)			0.427***	
			(15.408)	
Bond debt(t-1)				0.464***
				(17.448)
Ln(asset)	0.056***	0.026	-0.036	0.057**
	(4.111)	(1.301)	(-0.972)	(1.965)
Market-to-Book ratio	-0.000	-0.000	0.001	-0.000
	(-0.540)	(-0.532)	(1.267)	(-0.259)
ln(sale)	-0.016	0.005	-0.006	0.002
	(-1.162)	(0.283)	(-0.171)	(0.083)
Tangibility	0.107***	0.063	0.089	-0.297***
	(2.608)	(1.272)	(0.817)	(-3.254)
Profitability	-0.177***	-0.201***	0.110	-0.207***
	(-4.408)	(-3.802)	(1.223)	(-2.588)
R&D expense	-0.005	-0.001	0.025	0.044**
	(-0.575)	(-0.086)	(1.296)	(1.989)
SGA cost	-0.009*	-0.003	-0.005	-0.002
	(-1.648)	(-0.380)	(-0.267)	(-0.142)
Dividend	-0.001	0.010	-0.006	0.015
	(-0.144)	(1.144)	(-0.283)	(0.829)
Sales/assets	-0.004	-0.022	-0.022	0.007
	(-0.306)	(-1.245)	(-0.598)	(0.214)
Intercept	-0.173***	-0.046	0.461***	-0.000
	(-4.376)	(-1.006)	(4.273)	(-0.002)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	3203	3205	3205	3205
Adjusted R^2	0.361	0.344	0.225	0.304

Notes: This table describes the regressions of the market and book leverage ratios, and bank-bonds debt ratios on ESG scores. The matched sample for the period 2002-2019 is used. Dependent variables are market leverage, book leverage, bank debt, and bonds debt for our four columns respectively. For each regression, we also control firm and year fixed effects. Numbers in parentheses are robust t-statistic. N denotes the number of firm-year observations. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 13: The regression of bank and bond debt ratios on E-S-G pillar score

	Environment		Social		Governance	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(EP)	0.012*	-0.020***				
	(1.907)	(-3.374)				
Ln(SP)			0.014**	-0.016***		
			(2.006)	(-2.867)		
Ln(GP)					0.009	-0.012**
					(1.477)	(-2.245)
Bank debt(t-1)	0.428***		0.427***		0.428***	
	(15.536)		(15.411)		(15.406)	
Bond debt(t-1)		0.465***		0.465***		0.466***
		(17.632)		(17.479)		(17.466)
Ln(asset)	-0.036	0.058**	-0.037	0.058**	-0.035	0.056*
	(-0.976)	(2.014)	(-0.985)	(1.988)	(-0.939)	(1.906)
Market-to-Book ratio	0.001	-0.000	0.001	-0.000	0.001	-0.000
	(1.253)	(-0.219)	(1.259)	(-0.252)	(1.280)	(-0.273)
Ln(sale)	-0.003	-0.001	-0.005	0.002	-0.006	0.003
	(-0.098)	(-0.033)	(-0.156)	(0.058)	(-0.176)	(0.099)
Tangibility	0.088	-0.297***	0.089	-0.297***	0.088	-0.297***
	(0.816)	(-3.296)	(0.819)	(-3.252)	(0.815)	(-3.248)
Profitability	0.113	-0.210***	0.111	-0.208***	0.111	-0.208***
	(1.279)	(-2.673)	(1.233)	(-2.606)	(1.234)	(-2.594)
R&D expense	0.027	0.042**	0.024	0.046**	0.027	0.042*
	(1.421)	(1.975)	(1.238)	(2.055)	(1.385)	(1.891)
SGA cost	-0.004	-0.003	-0.004	-0.002	-0.005	-0.002
	(-0.217)	(-0.234)	(-0.252)	(-0.168)	(-0.279)	(-0.118)
Dividend	-0.008	0.017	-0.006	0.015	-0.006	0.015
	(-0.360)	(0.960)	(-0.287)	(0.837)	(-0.283)	(0.822)
Sales/assets	-0.024	0.011	-0.022	0.007	-0.021	0.006
	(-0.659)	(0.310)	(-0.603)	(0.221)	(-0.583)	(0.188)
Intercept	0.448***	0.008	0.461***	0.001	0.453***	0.007
	(4.187)	(0.083)	(4.288)	(0.012)	(4.195)	(0.071)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3205	3205	3205	3205	3205	3205
Adjusted R^2	0.225	0.305	0.225	0.304	0.224	0.303

Notes: This table describes the regressions of bank/bonds debt ratios on E-S-G pillar scores under the matched sample. Numbers in parentheses are robust t-statistic. N denotes the number of firm-year observations. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 14: The effect of firm characteristics

Firm characteristics	Bank debt	Bond debt
Panel A: Financial Pressure		
Low	-0.000	-0.006
	(-0.054)	(-0.826)
High	0.022**	-0.020**
	(2.320)	(-2.346)
Panel B: Growth Opportunities		
Low	0.020**	-0.024***
	(1.979)	(-2.747)
High	0.007	-0.012
	(0.709)	(-1.387)
Panel C: Alternative uses of assets		
Low	0.016*	-0.015**
	(1.885)	(-2.029)
High	0.010	-0.019**
	(0.929)	(-1.996)
Control variables	Yes	Yes
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes

Notes: This table examines the effects of firm characteristics on the relationship between ESG ratings and debt structure. Financial pressure is proxied by cash flow over interest payment; growth opportunities is proxied by the Market-to-Book ratio; Alternative uses of assets are proxied by research expenses over the number of employees. Also, firms are divided into low and high characteristics groups around the median. This table only reports coefficients and robust t statistics, but we control for other factors and firm and year fixed effects. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 15: T-test of optimal leverage ratio using lagged controls

	Before rated	After rated	T-test
Market leverage	0.173	0.125	0.047
Book leverage	0.274	0.235	0.039

Notes: This table reports t-statistics of firms' target market and book leverage ratios before and after becoming ESG rated. The optimal leverage ratio is the predicted value (residuals) of regressing leverage ratios on last period's firm characteristics.

Table 16: The regression of leverage and debt structure using lagged controls

	(1) ML_t	(2) BL_t	(3) Bank_t	(4) Bond_t
Ln(ESGC)	-0.002	-0.002	0.015**	-0.014**
	(-0.725)	(-0.587)	(2.256)	(-2.538)
Market leverage(t-1)	0.450***			
	(14.845)			
Book leverage(t-1)		0.488***		
		(14.268)		
Bank debt(t-1)			0.433***	
			(15.598)	
Bond debt(t-1)				0.475***
				(17.881)
Ln(asset)(t-1)	0.033***	0.021**	-0.054**	0.069***
	(3.707)	(2.236)	(-2.232)	(3.401)
Market-to-Book ratio(t-1)	-0.000***	-0.000**	-0.000**	0.000
	(-3.947)	(-2.373)	(-2.110)	(1.104)
Ln(sale)(t-1)	-0.004	-0.000	-0.001	-0.004
	(-0.498)	(-0.030)	(-0.052)	(-0.209)
Tangibility(t-1)	0.056	0.060	0.090	-0.131*
	(1.246)	(1.360)	(0.969)	(-1.679)
Profitability(t-1)	-0.009	-0.032	-0.020	-0.001
	(-0.504)	(-1.091)	(-0.703)	(-0.039)
R&D expense(t-1)	0.014**	0.089***	-0.066*	0.080**
	(2.011)	(5.203)	(-1.691)	(2.433)
SGA cost(t-1)	0.000	0.000	0.000	-0.000
	(0.197)	(0.284)	(0.102)	(-0.191)
Dividend(t-1)	0.001	0.001	0.015	-0.005
	(0.189)	(0.182)	(0.839)	(-0.351)
Sale/assets(t-1)	0.000	-0.001	-0.021	0.043
	(0.043)	(-0.136)	(-0.622)	(1.562)
Intercept	-0.109***	-0.027	0.524***	-0.126
	(-3.265)	(-0.746)	(5.191)	(-1.482)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	3187	3189	3189	3189
Adjusted R^2	0.315	0.326	0.236	0.306

Notes: This table describes the regressions of the market and book leverage ratios, and bank and bonds debt on ESG combined score and firm controls under the matched sample. In this case the independent variables. apart from ln(ESGC), are lagged by one period. Numbers in parentheses are robust t-statistic. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 17: The role of high and low ESG score on debt and bank debt

	Bank debt	Bond debt
$Ln(ESGC)^{H}IGH$	0.015**	-0.017***
	(2.170)	(-2.676)
$Ln(ESGC)^{L}OW$	0.011	-0.015**
	(1.368)	(-2.337)
Bank debt(t-1)	0.427***	
	(15.419)	
Bond debt(t-1)		0.465***
		(17.439)
Controls	Yes	Yes
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N	3205	3205
Adjusted R^2	0.225	0.304

Notes: This table assessed the role of high vs. low ESG score on debt structure. Data come from merged CRSP-Compustat, Capital IQ, and Refinitiv databases between 2002 and 2019. The full samples is used. Numbers in parentheses are robust t-statistics. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.

Table 18: The regression of leverage and bank (bond) debt ratios on ESGC (unmatched)

	(1) ML_t	(2) BL_t	(3) Bank_t	(4) Bond_t
Ln(ESGC)	-0.006***	-0.004	0.010*	-0.012**
	(-2.878)	(-1.299)	(1.666)	(-2.248)
Market leverage(t-1)	0.371***			
	(16.667)			
Book leverage(t-1)		0.396***		
		(16.412)		
Bank debt(t-1)			0.370***	
			(20.907)	
Bond debt(t-1)				0.385***
				(20.687)
Ln(sale)	0.044***	0.019*	-0.053***	0.056***
	(6.168)	(1.955)	(-2.906)	(3.329)
Market-to-Book ratio	-0.000	-0.000	0.000	0.000
	(-0.651)	(-0.144)	(0.292)	(0.243)
Ln(sale)	-0.006	0.003	0.026	-0.018
	(-0.902)	(0.305)	(1.593)	(-1.142)
Tangibility	0.133***	0.101***	-0.006	-0.074
	(4.657)	(3.000)	(-0.096)	(-1.309)
Profitability	-0.050***	-0.054**	0.058**	-0.087***
	(-4.896)	(-2.467)	(2.055)	(-2.721)
R&D expense	0.000	-0.000	-0.012	0.027*
	(0.179)	(-0.009)	(-1.218)	(1.685)
SGA cost	-0.004	0.004	0.011	-0.012
	(-1.604)	(1.123)	(1.549)	(-1.579)
Dividend	-0.013	-0.002	-0.008	0.006
	(-1.621)	(-0.178)	(-0.506)	(0.526)
Sales/assets	-0.008	-0.020*	-0.027	0.016
	(-1.048)	(-1.886)	(-1.567)	(0.942)
Intercept	-0.152***	-0.008	0.479***	0.015
	(-6.011)	(-0.249)	(6.766)	(0.240)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	7389	7399	7399	7399
Adjusted R^2	0.256	0.207	0.160	0.195

Notes: This table describes the regressions of the market (book) leverage and bank (bonds) debt on ESG combined score for full samples. The dependent variables are market leverage, book leverage, bank debt ratio and bond debt ratio. The main independent variable is the natural logarithm of the ESG combined score. Other independent variables are the lag of dependent variables and firm characteristics. For each regression, we also control firm and year fixed effects. Numbers in parentheses are robust t-statistic. 1%, 5% and 10% significance levels are denoted by ***, ** and * respectively.