ESG and Cost of Debt

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Abstract

This paper studies the extent to which ESG (environmental, social, and governance) performance is priced into corporate loans. I construct a firm-specific ESG measure from 136 raw metrics related to the fundamentals of ESG components. The constructed ESG scores provide measurement transparency and exclude all traditional corporate governance factors that have been established to exert financial impact on firms. Through identification within lender-borrower’s persistent relationships over time, I find that a one standard deviation increase in a borrowing company’s ESG score leads to a 6.3 basis-point decrease in its loan spread. The reduction in loan spread can be explained through the credit risk channel, where highly rated ESG companies have a 4% lower default probability in the future. Better firm ESG scores also predict fewer financial restatements due to fraud, clerical error, and SEC investigation.

Keywords: ESG, Corporate Social Responsibility, Syndicated Loan, Cost of Debt, Credit Risk.
1. Introduction

ESG investment has been on the rise in the last two decades. In 2020, the U.S. Forum for Sustainable and Responsible Investment\(^1\) reported that professionally managed assets following socially responsible investment (SRI) strategies, first measured in 1995 at $639 billion, grew 25-fold. SRI strategies incorporate various environmental, social, and corporate governance (ESG) criteria in their investment analyses and portfolio selections. In the U.S. alone, assets under management following SRI strategies reached $17.1 trillion at the start of 2020, a 42% increase from 2018. These assets account for more than one out of every three dollars under professional management in the United States\(^2\).

Even though ESG-based evaluation of companies or portfolios has transitioned from niche to mainstream, much skepticism still surrounds ESG’s ability to generate real and financial impact through ESG initiatives. In June 2020, the U.S. Department of Labor proposed a policy requiring pension and 401(k) plans to place economic interest ahead of non-pecuniary goals, calling out ESG investing specifically\(^3\) The proposal is based on the belief that ESG does not add value.

Whether ESG is valued is idiosyncratic across investment products, financial markets, and clienteles. On the one hand, analysts at BlackRock say markets do not properly value the value of sustainability, and as investors shift money into sustainable funds, companies that perform well on environmental, social, and governance metrics should steadily increase in value and those that do not should fall\(^4\) On the other hand, Damon Hininger, chief executive of CoreCivic, complained that the company’s cost of capital had been increased by its “incorrect” characterization as a “non-ESG investment”\(^5\) suggesting corporate ESG is valued and priced. The utmost challenge still in the ESG space is proving ESG has a concrete financial impact for corporations.

The contradicting anecdotal evidence above points to two sides of the ESG debate. One side argues for the benefits of ESG. A higher ESG score is beneficial to a company through fewer agency frictions, reduced information asymmetry, lower litigation and regulation risks, more loyal customers, and a better firm reputation. The other side of the debate views ESG negatively. Managers derive private benefits from engaging in ESG investments, and

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\(^1\) USSIF is an organization based in Washington D.C.


\(^4\) Nauman, Billy. “BlackRock Highlights Changing Role of Sustainable Investments.” Financial Times, 28 Feb. 2020, [https://www.ft.com/content/8c670b24-59ba-11ea-a528-dd0f971fbeb](https://www.ft.com/content/8c670b24-59ba-11ea-a528-dd0f971fbeb).

good corporate social responsibility reflects agency problems. With a large amount of money flowing into the ESG investment space, it is important to understand the rationale for ESG.

This paper provides evidence for the benefit side of ESG by showing good ESG has a positive financial impact on firms. In particular, firms with comparatively high ESG ratings face a lower cost of debt in the syndicated loan market. Furthermore, the lower borrowing cost can be explained by the lower credit risk information contained in borrowers’ ESG scores. In using ESG scores in the analyses, I do not assume investors react directly or indirectly to borrowers’ ESG scores at face value. Instead, ESG scores are proxies for the ESG-related information that investors are processing. In essence, ESG is the amalgamation of private, public, and traditionally deemed non-financially material information, that can be related to regulation and litigation risks, management quality, and corporate financial health.

The current empirical literature in assessing the value of ESG is inconclusive due to two main difficulties. First, ESG scores as a metric are not standardized or transparent in their construction. Currently, there are a handful of competing ESG data providers, including MSCI ESG, Refinitiv Asset4, Sustainalytics, and RiskRep, that each collects their own data and uses unique internal proprietary models. Even though ESG scores are on average highly correlated across different ESG rating providers, the ratings for individual firms are not consistent across providers, unlike credit ratings for corporate bonds. More alarmingly, even ratings from the same data provider can vary across time. Berg (2020) found widespread differences in two vintage downloads of ESG ratings from the same ESG data provider, and these changes affect tests relating ESG scores to stock performance. The data provider’s major revisions are not documented and are retroactively applied to all historical scores in its database. Besides the standardization issue, ESG, as a combination of three components, can be biased by any single component that overpowers the other two components. Specifically, corporate governance has been shown to have a material financial impact on firms (Morck, Shleifer, and Vishny (1989), Gompers, Ishii, and Metrick (2003), Bhagat and Bolton (2019), Bebchuk, Cohen, and Ferrell (2009)). So, the effect of ESG is argued to be driven by its corporate governance part alone, and any conclusions drawn using the overall ESG metric is subject to such criticism.

To overcome the issue of inconsistent and opaque ESG rating standards, I construct my own ESG score from 136 raw metrics related to the fundamentals of each component: E (environmental), S (social), and G (corporate) governance, providing a simple weighted average model and a transparent view into the black box of ESG composition. To prevent the corporate governance component from potentially dominating the effects of environmental and social metrics, I exclude all traditional corporate governance measures from the ESG
construction process. I show that my constructed ESG scores are highly correlated with existing off-the-shelf ESG scores, and my results do not hinge on which ESG scores are used.

The second and more difficult challenge in existing empirical work is that ESG is inherently related to firm observable and unobservable characteristics. More specifically, ESG is endogenously determined through many firm financial and operational attributes. For example, larger and more profitable firms may have more capacity in improving their ESG practices; or perhaps more liberal and sustainability-conscious companies attract more innovative employees who contribute to increasing firm value.

The identification employed in this paper exploits the persistent borrower-lender relationship in the syndicated loan market, where companies have repeated contracts with the same lender over time. By focusing within borrower-lender pairs, I circumvent the issue that borrower or lender characteristics are omitted variables in determining borrowing costs. Moreover, I avoid the concern that borrowers are sorting into lenders that value ESG differently to their own advantage. Through comparing loans between the same borrower and lender over time, the loan spread change in different loan contracts can be attributed to the corresponding change in borrower’s ESG after controlling for loan, borrower, and lender traits.

The analysis is set in the syndicated loan market, which is ideal in examining how ESG transforms into risk evaluation. Unlike the equity or bond markets that contain much trading noise from uninformed or liquidity traders, the loan market I observe is a primary market, where loan characteristics are determined at the time of issuance. Even though the bank loan market is not completely free from the force of investor demand, as other secondary markets are flooded with, risk evaluation is the predominant determinant of how loans are priced. Syndicated loans are underwritten by banks who specialize in evaluating credit risk. Additionally, banks have access to information not available to outsiders that mitigates the problem of information asymmetry, and the practice to retain the loans on banks’ balance sheet ensures the appropriate incentive for lenders to monitor and price the loans correctly.

I conclude that company ESG performance has a material financial impact on a firm’s borrowing costs. I first conduct a cross-sectional test, comparing loans across borrowers who contract loans from the same lender within the same year. A one standard deviation improvement in a firm’s ESG score lowers its loan spread by 6.3 basis points. Then I employ the identification strategy of comparing loans over time within borrower-lender pairs and find the estimates to be similar. On the extensive margin, loans from firms that report ESG performance are priced 11 basis points lower than those from firms that do not report ESG performance. The estimated magnitude is consistent with the spread adjustment on existing ESG-linked loans that have floating rates based on improvement or deterioration of
borrower ESG scores. In general, ESG-linked loans lower loan spreads by 7.5 basis points when borrower ESG scores improve by one standard deviation.

Next, I examine which category of ESG contributes to lowering loan spreads and show that all three components influence loan pricing to some extent. By running a horse-race regression using all 9 categories of the ESG score, I find innovation under E, product responsibility under S, and implementation of CSR strategy under G are the most prominent drivers in lowering loan spreads. While the categorical scores are a more detailed breakdown of ESG, they are still a weighted sum of finer, underlying metrics. To avoid bias for how these scores are constructed, I run a principal component analysis on all 136 metrics, use the first three component scores in place of an ESG score, and find that only the first score is negatively related to loan spreads.

The final part of my analysis explores the mechanism through which ESG affects the cost of debt. Since the loan market is competitive, price is likely close to marginal cost, and there is little room for banks to express altruism by lowering spreads further than the break-even point. I explore two explanations for ESG’s role in setting loan spreads - credit risk and investors’ non-pecuniary preferences. The most direct way ESG can impact loan prices is through the information it conveys about credit risk. Many ESG supporters assert that ESG reflects regulation risks, litigation risks, and agency frictions; ESG, therefore, can be an additional indicator of debt repayment probability. In fact, Moody’s Investors Service, a bond credit rating company, is incorporating ESG issues into companies’ risk assessment.

On October 1, 2020, Moody’s upgraded a Brazilian company, Vale, from Ba1 to Baa3, citing improvements in Vale’s ESG practices.

Another alternative explanation is that investors of syndicated loans value good ESG for non-pecuniary reasons, hence pushing demand for loans to companies with better ESG scores. Both effects can be at play here, and I am not able to disentangle the two explanations. However, with mainstream credit rating agencies taking ESG considerations into account, the credit risk channel posits a more plausible explanation than purely investor’s non-pecuniary preferences. My evidence corroborates the credit risk channel as well, confirming that ESG conveys credit risk information about the borrowers because borrowing companies with higher ESG scores at loan issuance have a lower probability of covenant violations during the lives of the loans. A one-standard-deviation increase in ESG scores lowers the probability of loan default by 4%. While covenant violation is a realized outcome,

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firms can reveal embedded risks in other ways more subtly than a loan default. I examine the impact of ESG on firms’ future financial restatements and find that higher ESG scores predict lower probabilities of restatement due to fraud, clerical errors, or SEC investigation.

My paper contributes to the literature by showing that good ESG scores bring the tangible benefit of lowered borrowing costs in the syndicated loan market. Furthermore, I provide an explanation for why ESG generates such financial impact by showing ESG scores contain credit risk information independent from firm and loan characteristics. Moreover, I contribute to the literature on ESG score’s validity by building my own ESG score from fundamentals of the components, providing a transparent view into the inputs of a simple model.

Given my findings that firms derive benefits from having good ESG scores, it begs the question: why aren’t all firms investing in ESG improvements? Firms face a trade-off when deciding to adopt ESG-friendly practices. There may be various costs for implementing ESG corporate policies. For example, it is costly to change processes, improve overall working conditions, and hire employees to improve diversity or create ESG departments. Furthermore, ESG is a more recent phenomenon, and awareness of ESG’s real and financial benefit is only growing in the last couple of decades. When the benefit of ESG is not salient to managers, it will be difficult to evaluate the trade-off they face in adopting ESG practices. For my future research, I will examine the cost of improving firm ESG to evaluate the trade-off managers face for adopting ESG practices.

At the same time, the driving force behind the ESG momentum is intriguing. While I find evidence for credit risk to explain banks’ motivations for considering ESG financially, it does not rule out the possibility that investors’ non-pecuniary preferences are contributing to the effect concurrently. In another research project, I aim to examine the extent to which investors’ social preferences contribute to the decision to invest beyond the credit risk channel.

Finally, throughout this paper, I will use the following terms interchangeably to describe a company’s environmental, social, and corporate governance performance: ESG, corporate social responsibility, and sustainability. The rest of the paper is organized as follows: section 2 discusses the literature on ESG; section 3 presents the setting of my study and the empirical strategy; section 4 describes the data sources and variable constructions; section 5 reports summary statistics on the sample; section 6 presents my results; and section 7 concludes.


2. Literature

The value of ESG within a firm is intensely debated among investors. One view believes that a higher ESG rating is beneficial to a company through fewer agency frictions, reduced information asymmetry, lower litigation and regulation risks, more loyal customers, and better firm reputation. Ferrell, Liang, and Renneboog (2016) find that firms that engage more in CSR have less agency problem and waste of corporate resources. Harjoto, Laksmana, and Lee (2015) also conclude that CSR activities are associated with better internal and external corporate governance. Proponents of the view also believe that firms should maximize shareholder value, not market value. The former incorporates shareholders’ pro-social preferences (Hart and Zingales, 2017). Bénabou and Tirole (2006) suggest that CSR may be a form of delegated pro-social behavior, which can provide direct value to firm stakeholders even if it is financially costly. Empirical evidence supports the view that incorporation of stakeholder preferences can maximize firm value. Edmans (2011) finds that employee satisfaction predicts positive returns of the firm. Deng, Kang, and Low (2013) show that high CSR acquirers in merger and acquisition events realize higher merger announcement returns and larger increases in post-merger long-term operating performance.

An alternative view argues that ESG destroys shareholder value. ESG investments are a diversion of scarce resources, and firms with high ESG ratings suffer from agency problems. Managers engage in CSR activities to benefit themselves at the expense of shareholders (Krüger, 2015). Cheng, Hong, and Shue (2012) find empirical evidence supporting the argument that managers of large US firms enjoy private benefits from investing in CSR. Furthermore, several papers find that the benefits to stakeholders from CSR activities come at the direct expense of firm value (Manchiraju and Rajgopal, 2017), Di Giuli and Kostovetsky (2014), Masulis and Reza (2015)).

The empirical literature investigating the relationship between ESG and firm value is mixed and has left this debate largely unresolved. Although theoretical literature on this topic is still sparse, a few recent papers all suggest better ESG performance is associated with a lower cost of capital. Pastor, Stambaugh, and Taylor (2020) present a general equilibrium investment model based on environmental, social, and governance criteria. In the model, green assets have negative CAPM alphas stemming from investors’ preferences for green holdings; however, green assets can outperform brown assets during the ESG factor’s good performance. The out-performance can lead firms to make more green real investments that have positive externalities on society. Pedersen, Fitzgibbons, and Pomorski (2020) propose a theory that enables ESG scores to provide information about firm fundamentals in addition to affecting investor preferences. In their general equilibrium capital asset pricing model,
increases in ESG lower the required return. Oehmke and Opp (2019) take a corporate finance view of socially responsible investment. Their model features the interaction of firm financing constraints and negative production externalities, and socially responsible and financially-motivated investors are required jointly to achieve higher welfare than either investor type alone.

Along this line, several empirical papers support these models’ predictions. Hong and Kacperczyk (2009) show that sin stocks require higher expected returns. Hartzmark and Sussman (2019) use the release of Morningstar ESG ratings as a shock to the salience of the U.S. mutual fund market and find that highest rated ESG mutual funds received a net inflow of more than $24 billion, whereas lowest-rated ESG mutual funds experienced a net outflow of more than $12 billion. However, funds with large ESG exposure under-perform low ESG exposure funds supporting the argument that sustainable investments require a lower expected return. Neitzert and Petras (2019) and Lee and Faff (2009) also find that a higher ESG rating is associated with lower idiosyncratic risks. Other papers have shown that ESG results in a lower cost of debt. Conducting an event study analysis, Krueger, Sautner, and Starks (2020) find that cumulative abnormal returns are strongly negative around negative company environmental events.

The closest work related to the topic of this paper is Goss and Roberts (2011). They find that firms with social responsibility concerns pay between 7 and 18 basis points more than more responsible firms. I improve on the research by using two different ESG measures – Refinitiv ESG score and my own constructed ESG measure – both of which are continuous scores as opposed to binary indicators used in Goss and Roberts (2011). Furthermore, Refinitiv ESG is more widely used among investors and institutions which can more accurately reflect the information received by banks.

3. Empirical Methodology

3.1. Syndicated Loan Market

The analysis is taken to the syndicated loan market because it offers a setting where credit risk is the predominant force driving pricing, and lenders have almost full access to borrowing companies’ information. The loan market is a primary market as opposed to a secondary market like the public equity or bond markets where uninformed and liquidity traders can generate excessive noise that clouds the effect of ESG (Grossman and Stiglitz 1976). Loans are underwritten by banks who are more finely attuned to any impact of ESG than public lenders are due to banks’ expertise in evaluating credit risk. Banks also serve a
special intermediary role with superior knowledge of the borrowers’ quality \cite{Holmstrom1997,Ambrocio2019}. Through conducting due diligence, banks have a comparative advantage in screening corporate clients. As delegated monitors of the loan contracts, banks have access to information not available to outsiders, reducing the problem of information asymmetry. \cite{Altman2003} find that syndicated loan markets exhibit greater information efficiency than bond markets, with the loan market reflecting the probability of default before the bond market. Furthermore, portions of the loans are retained on bank balance sheets, creating an increased incentive for evaluating and pricing risk correctly.

Since banks have access to all borrowing companies’ operational and financial data, they can observe a wide range of characteristics beyond what is publicly disclosed or considered financially material - from gender composition and working culture to emission standards and health and safety conditions. These firm characteristics pertaining to environmental, social, and governance can be amalgamated into one metric that is now widely referred to as ESG. In using this overall ESG score, I do not assume that banks react directly or indirectly to borrowers’ ESG scores. Instead, ESG scores serve as a proxy for the ESG-related information that banks are processing. The underlying composition of ESG can convey credit risks related to litigation and regulation risks that impact a company’s cost of borrowing. In short, better ESG scores indicate lower risks present in the borrowing company that can affect debt repayment probability. One caveat with studying the syndicated loan market is that bank loans are short- to medium-term with an average maturity of 4.25 years, whereas ESG scores are argued to reflect risks in the long-term. Assuming loan prices reflect the repayment probabilities within the short life spans of loans, ESG scores may not contain much information about borrowing firms’ short-term credit risk. This caveat will dampen the results with a bias towards insignificant findings. Since I find that ESG scores are influential in determining loan spreads, the estimations are likely to be under-estimated moving forward.

Syndicated loans are effectively a sale of the loan to all participating lenders. The loan is usually arranged by one lead lender who is responsible for a fraction of the commitment. Even though multiple banks can participate in a loan and hold direct claims against the borrower, only the lead lender conducts the client’s due diligence and monitors the loan after its origination. Therefore, the lead lender is the main decision-maker and holds the most information by the nature of the syndication structure. The relationship between the lender and the borrower discussed in this paper is between the lead lender and the borrower.
3.2. Empirical Strategy

To obtain a loan, a firm approaches a bank for the financing need of a fixed amount. The bank prices the loan at a rate such that it is indifferent between lending and not lending because the syndicated loan market is competitive ([Ivashina, 2005]), leaving lenders unable to extract any rent. Furthermore, various evidence suggests that banks lend at near-zero margin to establish or maintain a long-term relationship with clients in order to offer other profitable services in the future ([Greenbaum, Kanatas, and Venezia (1989), Petersen and Rajan (1994)]). Because the loan is priced at its marginal cost, the risk premium on the loan, or loan spread, is based on the probability of repayment $\pi$; and repayment probability is a function of loan characteristics, borrower characteristics, and lender’s characteristics.

$$\text{Loan Spread} = \pi(\text{Loan Characteristics, Borrower’s Characteristics, Lender Characteristics})$$

Equation (1) corresponds to a testable empirical model

$$r_{ijlt} = \beta ESG_{it} + \xi L_{ijlt} + \delta X_{it} + \gamma_{jt} + \zeta_i + \varepsilon_{ijlt}$$

The left-hand side is the loan spread on the syndicated loan. The right-hand side - probability of repayment - is approximated by a linear equation of loan characteristics, $L_{ijlt}$, borrowing firm characteristics, $X_{it}$, and borrower’s ESG score, $ESG_{it}$. $\gamma_{jt}$ is time-varying lender characteristics, such as capital constraint, market power, or reputation. $\zeta_i$ is time-invariant borrower fixed effects that adjust for firm-specific unobserved borrower risks that impact loan rates uniformly across the years. $\varepsilon_{ijlt}$ is the residual. Notice that ideally, the regression would have borrower-year fixed effects instead of borrower fixed effects to adjust more finely to the time-variant traits at the borrower level, but doing so would also absorb the main variable of interest - ESG score.

This cross-sectional regression in equation (1) compares loans across all borrowers whose loans are syndicated by the same lead lender in the same year. The coefficient of interest, $\beta$, reveals how ESG impacts loan pricing. If $\beta > 0$, then higher ESG scores are associated with higher loan rates on average; if $\beta < 0$, higher ESG scores are associated with lower loan rates. Since ESG is posited to reflect lower litigation and regulation risks, agency conflict, and information asymmetry, the loan repayment probability is an increasing function in ESG. That is, the ESG score contains additional credit risk information besides all other determinants of loan risk, and a higher ESG score indicates a lower chance of default. Therefore, we would expect to see the coefficient, $\beta$, to be less than 0.

The cross-sectional test is a good starting point, but it is flawed because even borrowers
with loans from the same lender can differ in ways not captured by the control variables. For example, a lender can have different private information on two distinct borrowers that affect how loans to each of them are priced; or the varying preexisting lending relationships can determine the loan rate at which they charge the borrowers. Furthermore, it is possible that borrowers are sorting themselves to lenders. High ESG borrowers can opt to borrow from lenders known to value and price in ESG, whereas low ESG borrowers choose lenders who put little emphasis on ESG. To tease out the effect of ESG without these two layers of noise, I take advantage of the repeated borrowing relationship between lenders and borrowers over the years.

Identification of ESG’s impact on loan rates comes from the constant borrower-lender relationship over time. I focus on borrower-lender pairs that have repeated lending relationships as illustrated in Figure 1. Each lender needs to have multiple loans to each borrower. Lenders can lend to multiple borrowers, and borrowers can borrow from multiple lenders at the same time. By comparing only loans within a borrower-lender pair, I alleviate the omitted variable bias concern of borrowers optimally sorting to lenders that value ESG to their advantage in the loan market. The identification comes from the borrower’s ESG changes and the corresponding repeated lender’s change in loan spread on two different loans.

Fig. 1. Identification using repeated lender-borrower relationship

To empirically test that, the borrower fixed effects, $\zeta_i$, in equation (1) are replaced with
borrower-lender fixed effects, $\alpha_{ij}$, in the following model

$$r_{ijlt} = \beta ESG_{it} + \xi L_{ijlt} + \delta X_{it} + \gamma_{jt} + \alpha_{ij} + \varepsilon_{ijlt}$$ (2)

Unobserved borrower-lender characteristics affecting lending rates, such as pre-established banking ties, is absorbed through $\alpha_{ij}$. The coefficient of interest, $\beta$, represents how ESG impacts the spreads on loans contracted between the same borrower and lender over time.

4. Data Source

Data is composed of five parts - syndicated loans, company financial information, ESG scores, covenant violations, and financial restatement.

4.1. Syndicated Loan

Syndicated loan data is from Thomson Reuters’ LPC DealScan. It contains historical information on loan pricing, contract terms, and conditions. Chava and Roberts (2008) estimated that around 60% of DealScan data comes from SEC filings, and the rest are from loan syndicators and internal sources.

Dealscan has its own unique borrower and lender identification. To match borrowing firms to company financial data from Compustat, I add GVKEY, an identifier used in the Compustat database, from the linking table provided by Michael R. Roberts (Chava and Roberts, 2008). The linking table is updated through 2017. To extend the linking between borrower identification in Dealscan and Compustat’s GVKEY beyond 2017, I manually link unmatched companies.

To link lender identification to GVKEY, I use the mapping provided by Schwert (2018). Similar to the borrower mapping, the lender mapping is valid through the end of 2016, after which I manually link the remaining lenders. I match loans to only the lead lender in order to identify lender-borrower pairs. In the rare case where more than one lead lender is present, the loan observation is dropped.

I keep all loans syndicated in the United States since 2002, the year in which ESG data became available. The relevant loan characteristics I collect are maturity, loan size, number of lenders, performance price indicator, collateral indicator, covenant indicator, refinance indicator, seniority, loan type, and loan purpose. Details of the variables are listed in Table 1. Loan spread is winsorized at the top and bottom 2.5 percentiles.
4.2. Company Financial

Company financial statements are obtained through WRDS Compustat Quarterly. The list of financial controls I use are company size, return on equity (ROE), leverage ratio, and market-to-book ratio. The construction for each variable is listed in Table 2.

4.3. ESG Scores

4.3.1. Off-the-shelf ESG Scores

ESG stands for environmental, social, and corporate governance standards, incorporating each aspect’s evaluations into a score. I obtain company ESG scores through two sources: Refinitiv Asset4 database and Sustainalytics. Both of these providers rate companies on a 0 to 100 scale, where a higher number indicates better ESG performance.

Refinitiv Asset4 provides ESG ratings for over 7000 companies globally; available at an annual frequency between 2002 and 2019. This dataset also constrains the frequency and time period of my sample. The three parts of the environmental, social, and corporate governance criteria are evaluated separately. The final ESG score is a single combined score of all three components (E, S, and G), where each component is calculated based on more metrics. For example, the environmental score, E, is composed of evaluations based on emission, resource use, and innovation; social score, S, is based on measures of workforce, human rights, community, and product responsibility.

Sustainalytics contains monthly ESG scores since 2014. The shorter data availability span makes it an inferior data source to Refinitiv for my research purpose. However, I use Sustainalytics to validate my constructed ESG scores.

4.3.2. Constructed ESG Score

I collect 136 metrics relevant to the components - E, S, and G - from the database of over 400 metrics in Refinitiv. These 136 metrics can be broadly classified into 9 categories: emission, resource use, and innovation under environment; workforce, human rights, community, and product responsibility under society; and management and CSR strategy under corporate governance (Figure 2). Table 4a, 4b, 4c list the 136 metrics used in the construction of ESG scores. For corporate governance, I purposefully exclude traditional governance measures that have been studied extensively in the literature such as anti-dilution protection, proxy voting, etc. These measures have been shown to impact corporate performance and risk. The goal of constructing an ESG measure from scratch is to isolate the impact of corporate social responsibility as much as possible without the influence of other elements...
Each of the 136 metrics can be grouped into one of the nine categories: emission, resource use, and innovation under environment; workforce, human rights, community, and product responsibility under society; and management and CSR strategy under corporate governance. If the metric is continuous, I standardize it to have a standard normal distribution; if the metric is binary, it is left unchanged. Then I sum up the metrics within each category to obtain a category score. For example, there are 22 variables related to emission, 29 related to workforce, and 8 related to CSR strategy. These variables are summed up to form category scores for emission, workforce, and CSR strategy which are one part of E, S, and G, respectively. To compute the overall component scores for E, S, and G, I take the average category scores weighted by the number of metrics within each category. So,

\[
E = \sum_{i \in \{\text{Emission, ResourceUse, Innovation}\}} n_i \cdot \frac{\text{Score}_i}{\sum_{i \in \{\text{Emission, ResourceUse, Innovation}\}} n_i}
\]

\[
S = \sum_{i \in \{\text{Workforce, HumanRights, Community, ProductResponsibility}\}} n_i \cdot \frac{\text{Score}_i}{\sum_{i \in \{\text{Workforce, HumanRights, Community, ProductResponsibility}\}} n_i}
\]

\[
G = \sum_{i \in \{\text{Management, CSRStrategy}\}} n_i \cdot \frac{\text{Score}_i}{\sum_{i \in \{\text{Management, CSRStrategy}\}} n_i}
\]
where \( n_i \) indicates the number of metrics within each category.

The overall ESG score is similarly constructed as the weighted sum of the components: E, S, and G.

\[
\hat{ESG} = \frac{3 \cdot E + 4 \cdot S + 2 \cdot G}{3 + 4 + 2}
\]

The newly computed overall \( \hat{ESG} \) is on a scale of -3 to 8. In order to make the computed ESG measures comparable to other off-the-shelf ESG scores, I re-scale the overall ESG scores and the components to be between 0 and 100.

\[
\text{ConstructedESG} = \frac{\hat{ESG} - \min(\hat{ESG})}{\max(\hat{ESG}) - \min(\hat{ESG})} \times 100,
\]

where the component scores for E, S, and G are re-scaled similarly.

### 4.4. Covenant Violation

Covenant violation is collected from SEC filings following Nini, Smith, and Sufi (2012). I start with the sample of firms with syndicated loans in the DealScan database that can be matched to Compustat and Refinitiv ESG scores. After extracting 10-Q and 10-K filing, I search for the following five terms within 300 characters before or after the word “covenant”: “waiv,” “viol,” “in default,” “modif,” and “not in compliance.” Note that the keywords are identical to those used in Nini et al. (2012). For detailed discussion of the advantages and disadvantages of using covenant violation data from SEC filings, please see the data appendix in Nini et al. (2012)’s paper.

### 4.5. Financial Restatement

The restatement data set, provided by Audit Analytics, covers all public companies who have disclosed a financial statement in electronic filings since 2001. Data are extracted principally from SEC filings. Financial restatement can be due to one of the following reasons: accounting rule (GAAP/FASB) application failures; financial fraud, irregularities and misrepresentations; accounting and clerical errors; SEC investigation or inquiry; and other significant issues (Table 3).

The examination of financial restatement is at the firm level. For each firm-year observation, any of the five reasons for restatement is flagged 1 if the firm restates one or more financial filings in the next 24 months due to the corresponding reason.
5. Summary Statistics

The final sample contains 11,157 observations composed of 2,183 lender-borrower pairs, with 1,460 unique borrowers and 85 unique lenders between 2002 and 2019 (Table 5). Each lender-borrower pair has on average 5.1 loans with a standard deviation of 4.4. Each borrower has, on average, 7.6 loans in the sample with a standard deviation of 6.6. Lenders, on average, extend 131.3 loans with a standard deviation of 490.5. The number of lenders is a lot less than the number of borrowers because the syndicated market is predominantly led by large banks and institutions concentrated in the same group over time. Each year, an average of 25 lenders act as leaders of loans. Due to the lagged update of DealScan, loans in the last year of the sample, 2019, come from 84 lender-borrower pairs instead of the average of 378 across previous years. Overall, there are 6,816 lender-borrower-year observations in the sample.

Loans in the sample range between 0.3 million and 49 billion dollars in size, with an average loan size of 896 million. The average loan maturity is 51 months. Even though each loan in the sample only has one lead lender, the average loan has 10 participating lenders in the syndication. About 35% has performance pricing, under which loan rates can be adjusted if firm financial conditions improve under the contracted conditions. 37% of loans are secured with collateral, and over half of the loans have financial covenants in place.

Borrowers of the loans are public firms in the sample. Their financial ratios are collected from Compustat. The average borrowing firm has a total asset of 31 billion dollars, return on equity (ROE) of 0.14, 34% leverage, and 1.82 market-to-book (MTB) ratio.

Refinitiv’s ESG score is measured on a scale of 0 to 100. The mean ESG score from Refinitiv is 50.27 across the 6,347 borrower-year observations. My constructed ESG scores have a mean of 26.57 on the same scale of 0 to 100. Data for Sustainalytics are only available since 2014. With 12 years less of data, I have six times less Sustainalytics ESG scores for borrowers than the other two sources of ESG scores. I use Sustainalytics mainly as a validation for my constructed ESG scores. Table 6 has detailed statistics for each ESG score source. Figure 5-7 display the distributions of each ESG score. Refinitiv ESG scores has the most normal distribution, whereas the distribution of Sustainalytics ESG scores has thicker tails, and that of my constructed ESG scores is skewed right.

Covenant violation data are collected between 2002-2019 for the sample of firms that have syndicated loans any time between 2002-2019. There are 214,138 firm-quarter observations, and 23% of the firms report being in violation of a financial covenant in a credit agreement (Table 9). In comparison, Nini et al. (2012) document that between 10 percent and 20 percent of firms had a covenant violation in any given year between 1996 through 2008.
Financial restatement contains 6,617 firm-year observations, of which 813 (12%) had a restatement flag. Among those restatements, 12% are due to accounting rule mistakes, 0.3% due to fraud, 0.4% due to clerical errors, 0.5% due to SEC investigation, and 1.5% due to other reasons. Each firm-year observation can have more than one reason for restatement because the flag indicates restatement in any of the future 24 months; however, only less than 2% of the firm-year observations have more than one reason within a 2-year period.

6. Empirical Results

6.1. Constructed ESG Score

The major ESG score providers include Refinitiv Asset4, Sustainalytics, Bloomberg, MSCI ESG, and RepRisk. Each provider has its own internal proprietary model for rating ESG performance, which raises the concern that ESG scores are not standardized across the market, and analysis based on different scores can vary extensively. More alarmingly, the structural composition of ESG scores is opaque to most researchers and industry practitioners.

The typical approach to mitigating the non-standardization concern is to verify results using ESG scores from different sources (Ferrell et al., 2016). However, this approach does not resolve the issue that inputs of ESG scores are vague and obscure. To address both the model standardization and input transparency problems, I collect data on the most commonly used ESG evaluations metrics and provide a transparent and intuitive model for scoring company ESG performance. The construction process is explained in Section 4.

Another advantage of re-constructing the ESG score pertains to the concerns around corporate governance dominating the results. Since corporate governance has been shown in the literature to have a material financial impact on the company (Morck et al. (1989), Gompers et al. (2003), Bhagat and Bolton (2019), Bebchuk et al. (2009)), the other components - E and S - can be overpowered by the effects of G, and lead to a false conclusion of significance in all parts of ESG. The current off-the-shelf ESG scores include traditional corporate governance measures such as audit committee’s characteristics, presence of independent board members, CEO-board duality, voting provisions, and poison pills. In the ESG score that I construct, none of the conventional corporate governance measures is included to prevent them from driving the results; instead, under the component G, measures such as whether the company reports to an ESG/CSR regulating body or if the company has sustainability guidelines in place are factored into the calculation of G.

Since data are gathered through reports, documents, and government filings that com-
panies release, there are concerns that companies can choose to release as little information on their ESG standards and performances as possible. To the extent that companies doing well in ESG or proactively trying to improve ESG are more likely to publish information on their ESG performance, treating unreported ESG categories as zero is a fairly accurate representation of their ESG performance in that category. Assuming companies that work on ESG are more likely to publish ESG information, the more they disclose, the higher their overall ESG scores will be. If this were not true, disclosure of ESG would be unrelated to companies’ final ESG scores. To verify this, I utilize an ESG disclosure score from Bloomberg that measures each company’s sustainability reporting transparency. From an unreported regression, I regress disclosure score on ESG performance and find that the two are significantly correlated, supporting the assumption that companies that do well in ESG are more likely to disclose more information.

Another issue with nondisclosure pertains to disagreement over metric materiality – especially when it involves a smaller company that does not have the personnel to report every data point possible. This problem is less of an issue in this paper because I focus on public companies in the universe of Compustat. These large firms are likely to have the capacity for an ESG reporting team.

The constructed ESG score is highly significant with Refinitiv and Sustainalytics ESG score. Figures 9 - 13 plot the correlation between the off-the-shelf scores and the constructed ESG scores. All graphs display strong positive relationships. To further verify that the ESG categories that contribute to the constructed ESG scores are indeed relevant for off-the-shelf ESG scores, I compute correlations between the constructed categories and Refinitiv/Sustainalytics ESG scores. All categories are positively and significantly correlated with Refinitiv/Sustainalytics ESG scores, with emission, resource use, workforce, and CSR strategy showing the strongest relationship among all nine categories (Figure 8). In addition to the constructed ESG score, I take all 136 metrics and extract the first three components using principal component analysis. The three components are used to analyze the impact on loan spread in place of the uni-variate ESG score and display the same effects.

6.2. Does ESG Affect the Cost of Debt?

The empirical question of interest is to examine the impact of borrowers’ ESG scores on their cost of debt. Assuming higher ESG scores convey lower credit risk information, ESG improvement can contribute to lower loan spread. Figure 14 shows support for the hypothesized relationship. The figure is a non-parametric binned scatter plot showing loan spread over borrower’s Refinitiv ESG score. The stark negative relationship describes lower
loan spreads for higher borrower ESG scores, suggesting that ESG can be used as a proxy alone for credit risk to price loans without using any other controls.

The value of ESG is only noteworthy if it contains information orthogonal to existing financial metrics and loan characteristics. To refine that relationship, I first show ESG’s impact on loan spread in the cross-section with the following specification:

\[
 LoanSpread_{ijlt} = \beta \text{BorrowerESG}_{it} + \xi \text{LoanChar}_{ijlt} + \delta \text{FirmChar}_{it} + \gamma_{jt} + \zeta_i + \varepsilon_{ijlt} \tag{3} 
\]

\( LoanSpread_{ijlt} \) is the amount borrower, \( i \), pays in basis points over a floating base rate, usually three- or six-month London Interbank Offered Rate (LIBOR), for each dollar drawn down on the loan, \( l \), in year \( t \). It adds the spread of the loan with any recurring transaction fees paid to the lender, \( j \). \( \text{BorrowerESG}_{it} \) is the borrower’s annual ESG score. \( \text{LoanChar}_{ijlt} \) is loan-specific characteristics, including maturity, loan size, number of lenders, performance pricing indicator, collateral indicator, covenant indicator, refinance indicator, seniority category, loan type category, and loan purpose category. \( \text{FirmChar}_{it} \) is lagged quarterly company financial items: company size, return on equity, leverage ratio, and market-to-book ratio. \( \gamma_{jt} \) absorbs all unobserved variations for lender-year pairs, i.e., loan supply-side shocks that impact lenders differently over the years. \( \zeta_i \) is time-invariant borrower fixed effects. \( \varepsilon_{ijlt} \) is the residual. All standard errors are clustered at the borrower level.

Table 10 contains the regression results for equation (3). Columns 1-4 are variations of equation (3). Column 1 simply regresses loan spreads on borrowers’ ESG scores. Column 2 includes borrower fixed effects and loan issuance month fixed effects. Columns 3 and 4 add loan controls and firm controls incrementally. All standard errors are clustered at the borrower level to account for the persistent borrower traits in the sample. \( \beta \) coefficients for borrowers’ ESG scores are all statistically significant at the 5% level. On average, a one-point increase in a borrower’s Refinitiv ESG score leads to a 0.23 basis point reduction in the loan spread. To interpret the magnitude in a more friendly way, a one-standard-deviation (17.22) increase in a borrower’s Refinitiv ESG score is associated with a 4 basis-point reduction in loan spread. The same exercise is repeated using my constructed ESG score, for which the traditional corporate governance component is taken out of the overall ESG score. An additional point in ESG score lowers loan spread by 0.32; in other words, a one-standard-deviation (20.78) increase in the constructed ESG score leads to a 6.7 basis-point decrease in loan spread. Among the loan characteristics, loan spreads are decreasing in loan size, number of participating lenders, and having the performance pricing feature; loan spreads are higher when the loans are backed by collateral as secured loans are often a sign of more
risky debt. On the borrower characteristic side, larger (measured by total assets) and more profitable (measured by return-on-equity and market-to-book ratios) firms are associated with lower loan spreads, whereas higher leverage ratios correspond with higher loan spreads.

To better identify the effect of ESG on the cost of debt, I further add lender-borrower fixed effects to remove persistent yet unobserved characteristics such as relationship lending, private information that lenders have about borrowers, or borrowers sorting to lenders. The addition of the lender-borrower fixed effects requires repeated borrowing between the same lender and borrower, as illustrated in Figure 1. The identification comes from the borrower’s ESG changes and the corresponding repeated lender’s change in loan spread on two different loans. The empirical specification is

\[
\text{LoanSpread}_{ijlt} = \beta_{\text{BorrowerESG}}i + \xi_{\text{LoanChar}}_{ijlt} + \delta_{\text{FirmChar}}_{it} + \alpha_{ij} + \gamma_{jt} + \varepsilon_{ijlt}
\]

(4)

The addition of lender-borrower fixed effects absorbs borrower fixed effects, \(\zeta_i\), which drop out of the regression. Table 10 column (5) displays the regression result, which is consistent with the cross-sectional result. A one-standard-deviation (17.22) increase in borrower’s Refinitiv ESG score is associated with a four-basis-point reduction in loan spread.

The regressions are repeated using my constructed ESG score in Table 11. The advantage of using the constructed ESG score is that traditional corporate governance components are excluded from the metric as they have been proven to influence company financial performance. The most stringent specification is in column (5). Results suggest a one-standard-deviation increase in borrower’s constructed ESG score (20.78) lowers loan spread by 6.3 basis points. Figure 15 is a corresponding plot showing the relationship after controlling for loan and firm characteristics, lender-borrower and lender-year fixed effects, and loan issuance month.

The estimates may seem small in economic terms. An 6.3-basis-point decrease is only a 4% reduction in mean loan spread charged in the syndication market. However, more recently, the issuance of ESG-linked syndicated loans has increased consistently. These loans start with a standard loan spread. When the borrower’s ESG score changes through the loan’s life, the loan spread adjusts accordingly by how much the ESG improves or worsens. Overall, the existing ESG-linked loan contracts lower loan spread by roughly 7.5 basis points for a one-standard-deviation increase in ESG score. Comparatively, the result that changes in ESG scores adjust loan spreads by about 6.3 basis points concludes as reasonable. Furthermore, Murfin and Petersen (2016) find that loans differ in prices up to 7 basis points due to the seasonal cycle after controlling for firm and loan characteristics. The magnitude is similar to what I find here.
Given that ESG score matters for loan spread on the intensive margin, I examine the extensive margin of whether having an ESG score at all affects loan spread. ESG should provide additional information to lenders on borrowers’ credit risk regardless of the rating. Some information is better than no information. Besides, firms that do not disclose any ESG information possibly place little to no attention to their ESG performance and are more likely to have worse ESG valuations. That means, among all loans that I observe in the DealScan database, loans with ESG scores should have lower credit risk and better repayment probability than those without ESG scores. Indeed, the results in Table 15 column (5) indicates that firms who report on ESG performance pay, on average, 11 basis points less on their loans.

6.2.1. Strengthened Relationship Over Time?

Since the lender-borrower identification strategy relies on a variation of ESG and loan spread over time, a natural concern about an improved relationship over time between parties arises. For example, after the borrower pays off their first loan, the lender may offer a larger discount on credit spread on the next loan as they receive new information about the loan. While the lender-borrower fixed effects control for any initial information lenders have about borrowers, new information learned in the data sample period can correlate with borrowers’ ESG performance and simultaneously altering loan spread. I address this concern in two ways. In the first method, I control for the growing information that lenders have about borrowers at the time of loan-contracting; and second, I use a sub-sample of loans where ESG scores are decreasing over time to differentiate the effect of ESG from any confounding variables that can positively impact loan rates.

To control for the differing information that lenders learn about borrowers over time, I use three different relationship measures as proxies: relationship length, relationship strength, and total cumulative amount borrowed. Relationship length is defined as the number of years since the first loan was contracted between each pair of borrower and lender. Therefore, a more recently contracted loan between a borrower and a lender implies the pair has a longer running relationship at that point than when they contracted their previous loan. Relationship strength is defined as the number of cumulative loans contracted between each pair at any point in time. Similarly, relationship strength is increasing with time. Finally, the total cumulative amount borrowed is the log of total loan amount ever contracted between each pair of lender and borrower that grows with time. The measure for relationship control
is added to \((4)\) as follows:

\[
\text{LoanSpread}_{ijlt} = \beta \text{BorrowerESG}_{it} + \pi \text{Relation}_{ijlt} + \xi \text{LoanChar}_{ijlt} + \delta \text{FirmChar}_{it} + \alpha_{ij} + \gamma_{jt} + \epsilon_{ijlt}
\]

In Table 12 columns (1)-(3), relationship length, strength, and cumulative amount borrowed are added to control for the growing soft information that lenders learn about borrowers over time. The coefficients on constructed ESG score are nearly identical to the main specification without controlling for relationship, and the significance has not changed either. A 1 standard deviation increase in borrower’s ESG score is associated with a 6.3 to 6.5 basis-point decrease in loan spread compared to 6.3 basis points without controlling for relationship growth.

In the second way to address the concern of new information arising through the running lending relationship, I explore the same specification in a sub-sample where borrower ESG scores are decreasing over time. ESG scores are increasing over the years on average, as shown in Figure 3. At the same time, the information lenders learn about borrowers is also growing with time. Given that I observe new loans repeatedly, the information is more likely to be positive than negative for lenders to willingly and continually lend to borrowers. If new information learned and borrowers’ ESG scores contribute to loan spread change in the same direction, the effect of ESG on loan spread would be an over-estimate. In Table 12 columns (4)-(6), I use a sub-sample where borrowers’ ESG scores decreases with time to delineate the effect of ESG from any characteristics that are increasing with time, including but not limited to learned information.

Interestingly, the coefficients on borrower ESG score are higher in magnitude than in the main specification, rising from 0.3044 to between 0.3653 and 0.4103, which translates to a decrease in loan spread of as high as 8.5 basis points for one standard deviation increase in ESG score. There are several explanations for this increase in estimates. Just like bond ratings, a downgrade is often triggered by an important or serious change in the company’s risk assessment instead of an upgrade. If a company experiences deterioration in ESG score, it is more likely to reveal severe alterations to their ESG performance, especially since these ESG metrics are self-reported. Another possible explanation is due to attention. A decrease in ESG score is likely to alarm lenders more than an increase in ESG score about borrowers’ credit risk. Therefore, we see a more pronounced effect of ESG on loan spread, rather than an attenuated estimate if there were confounding variables in play when studying this sub-sample.
6.3. Which matters more? E, S, or G?

ESG measures are generally discussed in unity. ESG, nevertheless, encompasses a wide range of subjects from energy innovation and community involvement to implementation of CSR strategy. In this section, I study in detail which factor matters more to loan spread as not all ESG categories influence loan spread equally. Critics often argue that because ESG contains all three components, it is unclear whether environmental or social performance actually has an impact since corporate governance can be driving the result. In the previous section, I showed higher overall ESG scores lower loan spreads, where the new ESG scores exclude traditional corporate governance measures by construction. I further investigate the impact of the components E, S, and G separately in this section.

I use the same regression specification as in equation but replacing BorrowerESG with borrower’s score in emissions, resource use, innovation, workforce, human rights, community, product responsibility, management, and CSR strategy - the nine categories within the overarching ESG measure. Table displays the results. Column (1)-(9) use each individual category score as the variable of interest. Emissions, innovation, community, product responsibility, management, and CSR strategy are statistically significant and negatively associated with loan spread. The rest of the three categories are also negatively related to loan spread but are statistically insignificant. I also run a horse-race regression between all the categories by including all nine category scores in the same regression. Column (10) shows that each of E, S, and G has at least one category that drives loan spread down. Specifically, innovation under E (environment), product responsibility under S (social), and management and CSR Strategy under G (corporate governance) are significantly negative. Results suggest that each of E, S, and G are individually contributing to lowering the loan rates as opposed to one category driving the impact.

To further abstract away from any bias of models in the construction of ESG, I run principal component analysis on the 136 raw metrics and use the first three principal component scores in place of borrower ESG scores in equation . Table shows that the first principal component score (PC1) is a strong predictor of loan spread and the only significant component. Interpreting the economic meaning of the coefficients for the principal component scores is difficult. The coefficient on the first principal component is -1.4342. A higher PC1 is related to a lower spread charged on loans.

6.4. Why Does ESG Matter? - Credit Risk

Since the ESG score is a determinant of loan prices, lenders must value the information reflected through ESG scores. An obvious reason is that a firm’s ESG score is related
to its credit risk. A higher ESG score indicates a higher probability of repayment (i.e. through better management, less agency friction, more loyal customers, etc.). Therefore, reducing the required rate of return on the debt outstanding. Larcker and Watts (2019) find that green bonds and non-green bonds issued by the same firm do not differ in yields, supporting the view that investors care about the debt’s inherent credit risk. If ESG signals credit risk, it would be incorporated into debt pricing regardless. A counter-argument for observing an effect of ESG on loan spread is that banks pass through investors’ preferences for sustainability, demanding more green investments. Investor preferences can transpire in two ways, through deposits where corporate and retail depositors may prefer banks that invest in more sustainable projects; or through the secondary market where syndicated loans are structured into investment products, most commonly collateralized loan obligations (CLOs) that are owned predominantly by mutual funds, insurance, and institutions. These investor preferences can drive up demand for high-ESG rated loans, lowering loan prices. To further complicate matters, investor preferences can also be an endogenous reaction to the credit risk channel. Investors could prefer green investments due to their lower credit risk rather than out of non-pecuniary motives. I am unable to disentangle the two explanations completely - credit risk versus investor preferences - in this paper, but I find evidence supporting the credit risk channel.

6.4.1. Covenant Violation

If ESG conveys credit risk information, it should contribute to a borrower’s default probability. Specifically, given the previous results, a borrower having a better ESG score means a lower probability of default. First, I show that the probability of default is positively correlated with loan spread as loan price should reflect the compensation required to bear the appropriate credit risk (Figure 17). To investigate how a borrower’s ESG score relates to default probability, I examine ex-post covenant violations during the life of syndicated loans. Covenant violation technically constitutes a default event. If a firm reports a covenant violation in any quarterly report while a syndicated loan is outstanding, it is marked as having a covenant violation. I run the following regression to identify the impact of firm ESG on the probability of default.

\[
\text{CovenantViol}_{ijlt+\tau} = \beta \text{BorrowerESG}_{it} + \xi \text{LoanChar}_{ijlt} + \delta \text{FirmChar}_{it} + \gamma_{jt} + \varepsilon_{ijlt}
\]

(5)

\text{CovenantViol}_{ijlt+\tau} is a binary variable that equals 1 if loan \(l\) between borrower \(i\) and lender \(j\) had a covenant violation during the loan’s life. \(\text{LoanChar}_{ijlt}\) and \(\text{FirmChar}_{it}\) are loan and firm characteristics. \(\gamma_{jt}\) is lender-fixed effects, and \(\varepsilon_{ijlt}\) is the residual. The coefficient
of interest is $\beta$ in front of $BorrowerESG_{it}$ that will predict default probability after loan issuance. Note that the right-hand side variables are all from the point of time when the loan is priced, in advance of any covenant violation event. Hence, the regression is an estimate of how ESG score can predict the probability of default after controlling for loan and firm characteristics.

Results are shown in Table 16. Columns (1)-(4) are variations of equation 5. Column 1 has no controls; column 2 adds industry and lender-year fixed effects; column 3 further includes loan controls; and column 4 also has firm controls. All estimates for ESG score are statistically significant. In the most stringent specification (column (4)), a one-point increase in a borrower’s Refinitiv score lowers the probability of covenant violation by 0.15%. In other words, a one-standard-deviation increase in the Refinitiv ESG score predicts a 2.6% decrease in the probability of covenant violation.

I repeat the exercise using my constructed ESG score in Table 17. In the fully saturated specification (column (4)), a one-standard-deviation increase in the constructed ESG score lowers covenant violation probability by 4%. All estimates are statistically significant.

ESG scores’ ability to predict covenant violation even after controlling for relevant information at the time of loan issuance strongly suggests that ESG contains credit risk information. Even though I cannot rule out the possibility that investor preferences play a role in determining loan prices, I show that a higher ESG score reduces loan risk and predicts higher repayment probability.

6.4.2. Financial Restatement

Covenant violation is a realized outcome. There are many events that may not result in serious outcomes but can reveal inherent risks within the firm. In this section, I examine financial restatement to public filings and documents such as 10Q, 10K, and press releases and how that can be predicted by firm ESG scores. If company ESG scores are indicative of firm credit risk, high-ESG companies would have fewer financial reporting errors that affect companies’ market valuation.

Financial accounting mistakes can be due to innocent clerical errors, corporate management oversight, or even financial fraud. These restatements reflect underlying concerns within firm operations that increase credit risks. If high ESG scores are related to credit risks, then high firm ESG scores should predict a lower likelihood of financial mistakes.

$$Restatement_{it+24} = \beta FirmESG_{it} + \delta FirmChar_{it} + \nu_t + \varepsilon_{it}$$  \hspace{1cm} (6)

Equation (6) examines how firm ESG scores predict financial restatement two years
into the future. \( \text{FirmChar}_{dT} \) is a set of firm controls, including firm size, return to equity, leverage ratio, and market-to-book ratio. \( \nu_t \) is year fixed effects. \( \beta \) should be negative if firm ESG scores predict fewer financial mistakes in the following two years. Five types of restatement reasons are tested individually - accounting rule mistakes, fraud, clerical errors, SEC investigation, and other significant errors - as classified by the data provider Audit Analytics. Table 19 shows that across the 5 reasons for restatement, better firm ESG scores predict lower probabilities of restatement due to fraud, clerical errors, and SEC investigation.

7. Conclusion

This paper speaks to the debate of ESG’s value by providing support for the argument that ESG is value-enhancing. I study how firm ESG impacts the cost of borrowing in the syndicated loan market where credit risk is the first-order consideration in loan pricing.

To circumvent the issue of existing ESG measures, I construct a new ESG measure from 136 raw metrics using a simple weighted average model. The advantages of using my constructed ESG score are twofold: 1) Off-the-shelf ESG scores often have obscure and vague inputs to a proprietary model, whereas I present a simple and intuitive way to amalgamate all the relevant information into an overall ESG score; 2) I exclude all traditional corporate governance measures from the construction process as corporate governance has been shown to have a financial impact on corporations. By stripping away those parts of the (G) component, I alleviate the concern that the result is driven by corporate governance (G) solely. The constructed ESG score is highly correlated with off-the-shelf ESG scores, and the results of my paper do not depend on which ESG measure is used.

The identification of my empirical strategy hinges on the persistent borrower-lender relationship where borrowers have repeated loan contracts with the same lender. By comparing how loan spreads change between those loan contracts as borrowers’ ESG scores adjust in between contracts, I eliminate the issues with borrowers sorting to lenders. I find that a company’s ESG performance has a significant financial impact on a firm’s borrowing cost. A one-standard-deviation improvement in a firm’s ESG score lowers its loan spread by 6.3 basis points, consistent with how the loan market values ESG, evident through existing ESG-linked loans. Using the constructed ESG score, I find that all three components of E, S, and G influence loan pricing to some extent. Lastly, I provide evidence that ESG conveys credit risk information about the borrower. Specifically, better ESG predicts a lower probability of loan default and a lower probability of financial restatement.

While I showed that ESG has the benefit of lowering financing costs for firms, the decision
to improve ESG-friendly practices likely depends on the costs of implementation. In my future research, I will examine the ESG adoption costs to evaluate the trade-off managers face for adopting ESG practices and understand the heterogeneity in firm ESG performance. Moreover, I aim to study the extent to which non-pecuniary preferences motivate investors to consider ESG financially beyond the credit risk channel.
References


Appendix A. Figures

Fig. 3. Average ESG Score Over Time

Fig. 4. Average Syndicated Loan Spread Over Time
Fig. 5. Distribution of Borrower Refinitiv ESG Score

Fig. 6. Distribution of Borrower Sustainalytics ESG Score

Fig. 7. Distribution of Borrower Constructed ESG Score
Fig. 8. Correlation between Off-the-Shelf ESG scores and Constructed ESG Categories

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<th>Constructed Components</th>
<th>Correlation with Refinitiv ESG</th>
<th>Correlation with Sustainalytics ESG</th>
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<td>Resource Use</td>
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<td>Innovation</td>
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<td>CSR Strategy</td>
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<td>0.6434</td>
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Fig. 9. Correlation between Refinitiv and Constructed Overall ESG Scores

Note: Gray area is one standard deviation around the bin scatter points.

Fig. 10. Correlation between Refinitiv and Constructed Environmental Scores

Note: Gray area is one standard deviation around the bin scatter points.
Fig. 11. Correlation between Refinitiv and Constructed Social Scores

Note: Gray area is one standard deviation around the bin scatter points.

Fig. 12. Correlation between Refinitiv and Constructed Governance Scores

Note: Gray area is one standard deviation around the bin scatter points.
Fig. 13. Correlation between Sustainalytics and Constructed Overall ESG Scores

Note: Gray area is one standard deviation around the bin scatter points.
Note: This figure is a non-parametric binned scatter plot where borrower ESG scores on the x-axis are grouped into equal-sized bins, and each point plots the average loan spread within the bin. A linear fit line is displayed in red.
Note: This figure is a non-parametric binned scatter plot where borrower ESG scores on the x-axis are grouped into equal-sized bins, and each point plots the average loan spread within the bin. A linear fit line is displayed in red. Loan spread is residualized by removing controls of maturity, loan size, number of lenders, performance pricing indicator, collateral indicator, covenant indicator, covenant indicator, refinance indicator, seniority, loan type, loan purpose, borrower size, borrower return on equity, borrower leverage ratio, borrower market-to-book ratio, borrower industry, borrower-lender fixed effects, lender-year fixed effects, and loan issuance month.
Fig. 16. Residualized Loan Spread over Constructed ESG Score

Note: This figure is a non-parametric binned scatter plot where borrower ESG scores on the x-axis are grouped into equal-sized bins, and each point plots the average loan spread within the bin. A linear fit line is displayed in red. Loan spread is residualized by removing controls of maturity, loan size, number of lenders, performance pricing indicator, collateral indicator, covenant indicator, covenant indicator, refinance indicator, seniority, loan type, loan purpose, borrower size, borrower return on equity, borrower leverage ratio, borrower market-to-book ratio, borrower industry, borrower-lender fixed effects, lender-year fixed effects, and loan issuance month.
Fig. 17. Covenant Violation on Loan Spread
Appendix B. Tables

Table 1: Thomson Reuters’ LPC DealScan variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
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</thead>
<tbody>
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<td>Maturity</td>
<td>Number of months the facility is active</td>
</tr>
<tr>
<td>Loan Size</td>
<td>Log of amount committed by the lender pool</td>
</tr>
<tr>
<td>Number of lenders</td>
<td>Log of number of total lenders</td>
</tr>
<tr>
<td>Performance pricing indicator</td>
<td>Whether the facility has performance pricing</td>
</tr>
<tr>
<td>Collateral indicator</td>
<td>Whether the facility is secured</td>
</tr>
<tr>
<td>Covenant indicator</td>
<td>Whether the facility contains covenants</td>
</tr>
<tr>
<td>Refinance indicator</td>
<td>Whether the current deal refinances a prior deal</td>
</tr>
<tr>
<td>Seniority</td>
<td>Categorical variable of the facility's level of seniority</td>
</tr>
<tr>
<td>Loan type</td>
<td>Categorical variable of the loan type</td>
</tr>
<tr>
<td>Loan purpose</td>
<td>Categorical variable of the loan purpose</td>
</tr>
</tbody>
</table>

Table 2: Compustat quarterly items: construction of company financial information

<table>
<thead>
<tr>
<th>Description</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>SIZE = log(ATQ*1,000,000)</td>
</tr>
<tr>
<td>Return on equity</td>
<td>ROE = IBQ*4/SEQQ</td>
</tr>
<tr>
<td>Leverage ratio</td>
<td>LEV = SUM(DLCQ, DLTTQ)/ATQ</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>MTB = SUM(PRCCQ*CSHOQ, -SEQQ, ATQ)/ATQ</td>
</tr>
</tbody>
</table>
Table 3: Financial restatement variables

Financial restatement data are provided by Audit Analytics, covering all SEC registrants starting in 2001. Sources of restatement are extracted principally from the following SEC Filings: 8-K, 8-K/A, 10-K, 10-Q, 10-Q/A, 10-K/A, 10KSB, 10KSB/A, 20-F, 20-F/A, 40-F and 40-F/A. Restatement reasons are grouped into five categories listed in the table below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Restatement Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>Accounting Rule (GAAP/FASB) Application Failures</td>
</tr>
<tr>
<td>Fraud</td>
<td>Financial Fraud, Irregularities and Misrepresentations</td>
</tr>
<tr>
<td>Clerical Errors</td>
<td>Errors - Accounting and Clerical Applications</td>
</tr>
<tr>
<td>SEC Investigation</td>
<td>SEC involvement or inquiry</td>
</tr>
<tr>
<td>Other</td>
<td>Other Significant Issues</td>
</tr>
</tbody>
</table>
Table 4a: Raw metrics for the **Environmental** component

<table>
<thead>
<tr>
<th>Emissions</th>
<th>Innovation</th>
<th>Resource Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC or Particulate Matter Emissions Reduction</td>
<td>Environmental Products</td>
<td>Environment Management Team</td>
</tr>
<tr>
<td>Total Waste To Revenues USD</td>
<td>Noise Reduction</td>
<td>Policy Water Efficiency</td>
</tr>
<tr>
<td>Waste Recycled To Total Waste</td>
<td>Fleet Fuel Consumption</td>
<td>Policy Energy Efficiency</td>
</tr>
<tr>
<td>Total Hazardous Waste To Revenues USD</td>
<td>Hybrid Vehicles</td>
<td>Policy Sustainable Packaging</td>
</tr>
<tr>
<td>Water Pollutant Emissions To Revenues USD</td>
<td>Fleet CO2 Emissions</td>
<td>Policy Environmental Supply Chain</td>
</tr>
<tr>
<td>Environmental Expenditures Investments</td>
<td>Environmental Assets Under Mgt</td>
<td>Targets Water Efficiency</td>
</tr>
<tr>
<td>Policy Emissions</td>
<td>Nuclear Production</td>
<td>Targets Energy Efficiency</td>
</tr>
<tr>
<td>Targets Emissions</td>
<td>Labeled Wood Percentage</td>
<td>Environmental Materials Sourcing</td>
</tr>
<tr>
<td>Biodiversity Impact Reduction</td>
<td>Organic Products Initiatives</td>
<td>Toxic Chemicals Reduction</td>
</tr>
<tr>
<td>Flaring Gases</td>
<td>GMO Products</td>
<td>Cement Energy Use</td>
</tr>
<tr>
<td>Cement CO2 Equivalents Emission</td>
<td>Agrochemical Products</td>
<td>Green Buildings</td>
</tr>
<tr>
<td>Ozone-Depleting Substances</td>
<td>Animal Testing</td>
<td>Water Recycled</td>
</tr>
<tr>
<td>NOx and SOx Emissions Reduction</td>
<td>Renewable/Clean Energy Products</td>
<td>Environmental Supply Chain Management</td>
</tr>
<tr>
<td>e-Waste Reduction</td>
<td>Water Technologies</td>
<td>Env Supply Chain Partnership Termination</td>
</tr>
<tr>
<td>Emissions Trading</td>
<td>Sustainable Building Products</td>
<td>Land Environmental Impact Reduction</td>
</tr>
<tr>
<td>Environmental Partnerships</td>
<td>Real Estate Sustainability Certifications</td>
<td>Environmental Supply Chain Monitoring</td>
</tr>
<tr>
<td>EMS Certified Percent</td>
<td>Env R&amp;D Expenditures To Revenues</td>
<td>Total Energy Use To Revenues USD</td>
</tr>
<tr>
<td>Environmental Restoration Initiatives</td>
<td>Equator Principles or Env Project Financing</td>
<td>Renewable Energy Use Ratio</td>
</tr>
<tr>
<td>Staff Transportation Impact Reduction</td>
<td>Product Impact Minimization</td>
<td>Water Use To Revenues USD</td>
</tr>
<tr>
<td>Climate Change Commercial Risks Opportunities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Reported Environmental Fines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated CO2 Equivalents Emission Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Table 4b: Raw metrics for the **Social** component

<table>
<thead>
<tr>
<th>Workforce</th>
<th>Human Rights</th>
<th>Social</th>
<th>Community</th>
<th>Product Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee Satisfaction</td>
<td>Policy Freedom of Association</td>
<td>Total Donations To Revenues</td>
<td>Quality Mgt Systems</td>
<td></td>
</tr>
<tr>
<td>Policy Diversity and Opportunity</td>
<td>Policy Child Labor</td>
<td>Policy Fair Competition</td>
<td>Customer Satisfaction</td>
<td></td>
</tr>
<tr>
<td>Targets Diversity and Opportunity</td>
<td>Policy Forced Labor</td>
<td>Policy Bribery and Corruption</td>
<td>Policy Customer Health &amp; Safety</td>
<td></td>
</tr>
<tr>
<td>Women Employees</td>
<td>Policy Human Rights</td>
<td>Policy Business Ethics</td>
<td>Policy Data Privacy</td>
<td></td>
</tr>
<tr>
<td>Women Managers</td>
<td>Fundamental Human Rights ILO UN</td>
<td>Improvement Tools Business Ethics</td>
<td>Policy Responsible Marketing</td>
<td></td>
</tr>
<tr>
<td>HRC Corporate Equality Index</td>
<td>Human Rights Contractor</td>
<td>Whistleblower Protection</td>
<td>Policy Fair Trade</td>
<td></td>
</tr>
<tr>
<td>Flexible Working Hours</td>
<td>Ethical Trading Initiative ETI</td>
<td>Policy Community Involvement</td>
<td>Product Responsibility Monitoring</td>
<td></td>
</tr>
<tr>
<td>Day Care Services</td>
<td>Human Rights Breaches Contractor</td>
<td>OECD Guidelines for Multinational Enterprises</td>
<td>Product Access Low Price</td>
<td></td>
</tr>
<tr>
<td>Employees With Disabilities</td>
<td></td>
<td>Extractive Industries Transparency Initiative</td>
<td>Healthy Food or Products</td>
<td></td>
</tr>
<tr>
<td>HIV/AIDS Program</td>
<td></td>
<td>Community Lending and Investments</td>
<td>Embryonic Stem Cell Research</td>
<td></td>
</tr>
<tr>
<td>Average Training Hours</td>
<td></td>
<td>Product Sales at Discount to Emerging Markets</td>
<td>Retailing Responsibility</td>
<td></td>
</tr>
<tr>
<td>Internal Promotion</td>
<td></td>
<td>Diseases of the Developing World</td>
<td>QMS Certified Percent</td>
<td></td>
</tr>
<tr>
<td>Trade Union Representation</td>
<td></td>
<td>Corporate Responsibility Awards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover of Employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strikes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees Health &amp; Safety Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee Health &amp; Safety Training Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees Health &amp; Safety OHSAS 18001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Chain Health &amp; Safety Improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier ESG training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Costs Per Employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary Gap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Employment Creation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Announced Layoffs To Total Employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health &amp; Safety Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injuries To Million Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lost Days To Total Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training and Development Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4c: Raw metrics for the **Governance** component

<table>
<thead>
<tr>
<th>Governance Management</th>
<th>CSR Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Cultural Diversity, Percent</td>
<td>CSR Sustainability Committee</td>
</tr>
<tr>
<td>Board Gender Diversity, Percent</td>
<td>Integrated Strategy in MD&amp;A</td>
</tr>
<tr>
<td>Highest Remuneration Package</td>
<td>Global Compact Signatory</td>
</tr>
<tr>
<td>Sustainability Compensation Incentives</td>
<td>Stakeholder Engagement</td>
</tr>
<tr>
<td>Executive Members Gender Diversity, Percent</td>
<td>CSR Sustainability Reporting</td>
</tr>
<tr>
<td></td>
<td>GRI Report Guidelines</td>
</tr>
<tr>
<td></td>
<td>CSR Sustainability Report Global Activities</td>
</tr>
<tr>
<td></td>
<td>CSR Sustainability External Audit</td>
</tr>
</tbody>
</table>

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Table 5: Sample Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities</td>
<td>11,157</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakcages</td>
<td>7,634</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lender-borrower pairs</td>
<td>2,183</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities per lender-borrower pair</td>
<td>2,183</td>
<td>5.11</td>
<td>4.43</td>
<td>2</td>
<td>4.0</td>
<td>49</td>
</tr>
<tr>
<td>Packages per lender-borrower pair</td>
<td>2,183</td>
<td>3.51</td>
<td>2.81</td>
<td>1</td>
<td>3.0</td>
<td>32</td>
</tr>
<tr>
<td>Borrowers</td>
<td>1,460</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities per borrower</td>
<td>1,460</td>
<td>7.64</td>
<td>6.59</td>
<td>2</td>
<td>5.0</td>
<td>58</td>
</tr>
<tr>
<td>Packages per borrower</td>
<td>1,460</td>
<td>5.23</td>
<td>4.21</td>
<td>1</td>
<td>4.0</td>
<td>35</td>
</tr>
<tr>
<td>Lenders</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities per lender</td>
<td>85</td>
<td>131.26</td>
<td>490.48</td>
<td>2</td>
<td>7.0</td>
<td>3,514</td>
</tr>
<tr>
<td>Packages per lender</td>
<td>85</td>
<td>90.21</td>
<td>348.02</td>
<td>1</td>
<td>3.0</td>
<td>2,549</td>
</tr>
<tr>
<td>Year</td>
<td>18</td>
<td>2002</td>
<td>2019</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lender-borrower pairs per year</td>
<td>18</td>
<td>378.67</td>
<td>169.61</td>
<td>84</td>
<td>339.5</td>
<td>637</td>
</tr>
<tr>
<td>Borrowers per year</td>
<td>18</td>
<td>352.61</td>
<td>157.95</td>
<td>81</td>
<td>309.5</td>
<td>596</td>
</tr>
<tr>
<td>Lenders per year</td>
<td>18</td>
<td>24.67</td>
<td>5.59</td>
<td>14</td>
<td>24.5</td>
<td>35</td>
</tr>
<tr>
<td>Lender-borrower-year</td>
<td>6,816</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrower-year</td>
<td>6,347</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lender-year</td>
<td>444</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 6: ESG Score Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refinitiv ESG</td>
<td>6,347</td>
<td>50.27</td>
<td>17.22</td>
<td>6.49</td>
<td>48.49</td>
<td>94.57</td>
</tr>
<tr>
<td>Constructed ESG</td>
<td>6,347</td>
<td>26.57</td>
<td>20.78</td>
<td>0</td>
<td>20.82</td>
<td>98.35</td>
</tr>
<tr>
<td>Sustainalytics ESG</td>
<td>1,048</td>
<td>48.98</td>
<td>25.44</td>
<td>0</td>
<td>51.74</td>
<td>98.55</td>
</tr>
</tbody>
</table>

### Table 7: Summary of Loan Characteristics

<table>
<thead>
<tr>
<th>Loan Characteristics</th>
<th>Obs</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan Spread (Bps)</td>
<td>11,157</td>
<td>175.46</td>
<td>109.95</td>
<td>20</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td>Maturity (Months)</td>
<td>11,157</td>
<td>51.32</td>
<td>20.09</td>
<td>1</td>
<td>60</td>
<td>192</td>
</tr>
<tr>
<td>Loan size (Mil)</td>
<td>11,157</td>
<td>896</td>
<td>1,508</td>
<td>0.30</td>
<td>500</td>
<td>49,000</td>
</tr>
<tr>
<td>Number of lenders</td>
<td>11,157</td>
<td>11.46</td>
<td>8.11</td>
<td>1</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>Performance pricing = 1</td>
<td>11,157</td>
<td>0.35</td>
<td>0.48</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Collateral = 1</td>
<td>11,157</td>
<td>0.37</td>
<td>0.48</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Covenant = 1</td>
<td>11,157</td>
<td>0.56</td>
<td>0.50</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Refinance = 1</td>
<td>11,157</td>
<td>0.74</td>
<td>0.44</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 8: Summary of Borrowing Firm Characteristics

<table>
<thead>
<tr>
<th>Firm Characteristics</th>
<th>Obs</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total assets (Bil)</td>
<td>7,221</td>
<td>31.49</td>
<td>125.96</td>
<td>0.12</td>
<td>7.17</td>
<td>2,328.48</td>
</tr>
<tr>
<td>Return on equity (ROE)</td>
<td>7,221</td>
<td>0.14</td>
<td>4.11</td>
<td>-164.81</td>
<td>0.12</td>
<td>165.14</td>
</tr>
<tr>
<td>Leverage ratio</td>
<td>7,221</td>
<td>0.34</td>
<td>0.22</td>
<td>0.00</td>
<td>0.32</td>
<td>6.92</td>
</tr>
<tr>
<td>Market-to-book ratio (MTB)</td>
<td>7,221</td>
<td>1.82</td>
<td>1.07</td>
<td>0.23</td>
<td>1.50</td>
<td>20.24</td>
</tr>
</tbody>
</table>

### Table 9: Summary of Covenant Violation

<table>
<thead>
<tr>
<th>Covenant Violation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm-year</td>
<td>214,138</td>
</tr>
<tr>
<td>Covenant violation = 1</td>
<td>22.59%</td>
</tr>
</tbody>
</table>

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Table 10: Loan Spread on Refinitiv ESG Score

<table>
<thead>
<tr>
<th>Loan Spread</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrower Refinitiv ESG</td>
<td>-1.1637***</td>
<td>-0.4158***</td>
<td>-0.2978***</td>
<td>-0.2252**</td>
<td>-0.2310**</td>
</tr>
<tr>
<td>Maturity</td>
<td>0.0992</td>
<td>0.1137</td>
<td>0.1083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loan size</td>
<td>-5.1503***</td>
<td>-4.8494***</td>
<td>-5.5016***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Lenders</td>
<td>-6.8401***</td>
<td>-6.9780***</td>
<td>-6.7533***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Pricing = 1</td>
<td>-6.9321***</td>
<td>-6.5606***</td>
<td>-4.6892**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collateral = 1</td>
<td>24.8974***</td>
<td>21.6976***</td>
<td>24.3178***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covenant = 1</td>
<td>1.6551</td>
<td>1.9510</td>
<td>-0.4357</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-0.0017***</td>
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| Loan type | N | N | Y | Y | Y |
| Loan purpose | N | N | Y | Y | Y |
| Industry | N | N | N | Y | Y |
| Borrower FE | N | Y | Y | Y | N |
| Lender-Borrower FE | N | N | N | N | Y |
| Lender-Year FE | N | Y | Y | Y | Y |
| Month FE | N | Y | Y | Y | Y |
| Adjusted R-squared | 0.034 | 0.785 | 0.820 | 0.825 | 0.830 |

Note: All standard errors are clustered at the borrower level.
Table 11: Loan Spread on Constructed ESG Score

<table>
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<th>Loan Spread</th>
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<th>(4)</th>
<th>(5)</th>
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<td>-0.0809***</td>
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<td>-0.3242***</td>
<td>-0.3044***</td>
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<td>(4.1491)</td>
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<td>(1.5901)</td>
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| Loan type     | N | N | Y | Y | Y |
| Loan purpose  | N | N | Y | Y | Y |
| Industry      | N | N | N | Y | Y |
| Borrower FE   | N | Y | Y | Y | N |
| Lender-Borrower FE | N | N | N | N | Y |
| Lender-Year FE | N | Y | Y | Y | Y |
| Month FE      | N | Y | Y | Y | Y |
| Adjusted R-squared | 0.0003 | 0.785 | 0.820 | 0.825 | 0.830 |

Note: All standard errors are clustered at the borrower level.
Table 12: Loan Spread on Constructed ESG Score - Relationship Lending

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<th>(6)</th>
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<td>-0.3683**</td>
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<td>(3.7837)</td>
<td>(5.2363)</td>
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Note: All standard errors are clustered at the borrower level.
Table 13: Loan Spread on Constructed ESG Category Scores

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Note: All standard errors are clustered at the borrower level.
Table 14: Loan Spread on the First 3 Principal Component Scores of Raw ESG Metrics

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Note: All standard errors are clustered at the borrower level. Additional controls include loan type, loan purpose, and borrower industry fixed effects.
Table 15: Extensive Margin: Loan Spread on Having Refinitiv ESG Score

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<td>-11.8649***</td>
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<td>-4.2521***</td>
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<td>(1.0046)</td>
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<td>0.757</td>
<td>0.777</td>
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Note: All standard errors are clustered at the borrower level.
Table 16: Covenant Violation on Refinitiv ESG Score

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<th>(3)</th>
<th>(4)</th>
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<td>-0.3317***</td>
<td>-0.2156***</td>
<td>-0.1486*</td>
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<td>(0.0520)</td>
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<td>(0.7852)</td>
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<td>(1.1885)</td>
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<td>Performance Pricing = 1</td>
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<td>0.7111</td>
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<td>(1.6702)</td>
<td>(1.6758)</td>
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<td>(2.1629)</td>
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<tr>
<td>Refinance = 1</td>
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<td>(1.8679)</td>
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<td>Firm size</td>
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<td>(6.3577)</td>
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<td>Firm market-to-book</td>
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<th>N</th>
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<td>Industry</td>
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<td>Y</td>
<td>Y</td>
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<td>Lender-Year FE</td>
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<td>Y</td>
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<td>10,837</td>
<td>10,837</td>
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Note: All standard errors are clustered at the borrower level.
Table 17: Covenant Violation on Constructed ESG Score

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<th>(3)</th>
<th>(4)</th>
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<td>-0.3415***</td>
<td>-0.2393***</td>
<td>-0.1860**</td>
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<td>(0.0644)</td>
<td>(0.0767)</td>
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<td>Lender-Year FE</td>
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Note: All standard errors are clustered at the borrower level.
Table 18: Financial Restatement on Refinitiv ESG Score

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<th>Fraud (2)</th>
<th>Clerical Errors (3)</th>
<th>SEC Investigation (4)</th>
<th>Other (5)</th>
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<td>-0.0141**</td>
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<td>-0.0186***</td>
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<td>(0.0053)</td>
<td>(0.0060)</td>
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<td>(0.0007)</td>
<td>(0.0026)</td>
</tr>
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<td>2.4247***</td>
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<td>(0.0161)</td>
<td>(0.0243)</td>
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Industry Y
Year FE Y
Observations 6,617 6,617 6,617 6,617 6,617
Adjusted R-Squared 0.013 0.006 0.003 0.007 0.005

Note: All standard errors are clustered at the borrower level.
Table 19: Financial Restatement on Constructed ESG Score

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<th>Fraud</th>
<th>Clerical Errors</th>
<th>SEC Investigation</th>
<th>Other</th>
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<td>-0.0133**</td>
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<td>(0.0117)</td>
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<td>(0.0006)</td>
<td>(0.0026)</td>
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<td>(0.0172)</td>
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Industry  Y
Year FE    Y
Observations 6,617  6,617  6,617  6,617  6,617
Adjusted R-Squared 0.011  0.006  0.003  0.007  0.005

Note: All standard errors are clustered at the borrower level.