Corporate ESG Profiles, Matching, and the Cost of Bank Loans

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Abstract

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I examine the impact of corporate Environmental, Social, and Governance (ESG) profiles on the matching between lenders and borrowers and loan pricing. High ESG firms are more likely to obtain loans, which come with lower interest rates. These effects are driven by low ESG banks that attempt to improve their ESG profiles by lending to high ESG firms at lower rates. I support these findings using the FTSE4Good US Index rebalance events as shocks to borrowers' ESG reputation. I also find that borrowers improve their ESG ratings while seeking a loan and reduce that effort after obtaining it.

1 Introduction

Environmental, Social, and Governance (ESG) issues are becoming increasingly important in the corporate world. This trend has increased the demand for socially responsible lending, which aims to improve the impact of economic activities that are financed through bank loans. A growing number of banks have recently responded to these social stances by integrating ESG criteria into their lending practices. As of September 22, 2019, for example, banks with more than $47 trillion in assets signed on to the United Nations-backed sustainable banking principles for a paradigm shift in the sector.[1] Other recent events also illustrate that increasing numbers of banks are deciding to scale back or divest from some controversial industries (e.g., gun manufacturing industries), while utilizing lending to promote or encourage sustainable practices.[2] [3] All of these changes in lending standards suggest that banks are shifting the borrowers they will associate with through loans, producing a commensurate shift in the composition of banks' loan portfolios.

Despite the elevated importance of sustainability in making lending decisions, we have limited understanding of how sustainability profiles affect the matching between a borrower and a lender, and of the effects of the matching on yield spreads. I shed light on these issues by studying the following questions: 1) Is a borrower with high ESG performance more likely to receive a bank loan? 2) Does the loan spread charged by a bank change with a borrower's ESG and how does any relation vary with the bank's ESG level? 3) Which ESG sub-components have the most significant impact on loan pricing? 4) How does a borrower's ESG behavior change around loan origination? [4]

There are three contrasting viewpoints on ESG in the extant literature. One view is that ESG is a manifestation of agency problems between shareholders and managers. The

[1] https://news.un.org/en/story/2019/09/1046982

[2] https://www.bankingdive.com/news/orourke-gun-financing-twitter-petition-bank-visa-mastercard/562836/

[3] https://www.bloomberg.com/news/articles/2019-05-05/how-do-gooder-companies-can-score-cheaper-loans-quicktake?srnd=premium-canada

[4] In this study, a bank's ESG is defined as a weighted average of its borrowers' ESG scores. A low (high) ESG bank refers to a bank that has borrowers with low (high) sustainability performance.

agency view argues that managers would engage in ESG activities for their private benefits. They spend corporate resources to improve their personal reputation or image, or to entrench themselves in the firm (Benabou and Tirole, 2010; Kitzmueller and Shimshack, 2012). Under this view, one would predict that a bank may be reluctant to offer a loan to high ESG-rated borrowers, or the bank may charge a higher interest rate to them. An alternative view is that firms maintaining poor ESG practices are riskier. Specifically, borrowers with poor ESG policies are more likely to encounter financial or legal problems, which ultimately reduce their value. In favor of this position, Hoepner, Oikonomou, Sautner, Starks, and Zhou (2020) find a risk-reduction effect from shareholder engagement on ESG issues using a proprietary database, and Chava (2014) reports that banks charge higher interest rates on the loans issued to borrowers with environmental concerns. Under this viewpoint, one would argue that a bank prefers to extend a loan to borrowers with high ESG scores, or the bank grants a loan with a lower spread to them. Lastly, the third view is that there are no significant relations between the propensity to receive funds and a borrower's ESG profiles.

However, beyond this traditional approach, this study is particularly interested in how a bank's lending behaviors vary depending on the ESG of firms in its portfolio.[5] I consider the hypothesis that increasing demand for responsible lending has pressured low ESG banks into making their lending standards more ESG-oriented, or that the banks themselves see the necessity to align their loan portfolio holdings with the trends. Thus, compared to high ESG banks, low ESG banks would have a stronger incentive to lend to borrowers who are seen as sustainable and socially responsible. To the extent that high ESG-rated borrowers prefer to borrow from a high ESG lender, however, it would be difficult for a low ESG lender to match with them. In this situation, the low ESG profile lender would need to offer a lower interest rate to borrowers with high ESG reputation to increase the probability of being associated with them.

In this study, I use the Sustainalytics ratings as proxies for firms' sustainability perfor-

[5]I characterize low and high ESG banks by the ESG ratings of their lending portfolio firms.

mance. The database provides individual sub-components of ESG ratings as well as the overall ratings, and thus it enables me to examine the relative importance of each sub-component in the analysis. I obtain data on corporate loans from Loan Pricing Corporation's (LPC) DealScan. Stock and financial characteristics are from the Center for Research in Security Prices (CRSP) and Compustat, respectively.

In order to examine the impact of corporate ESG credentials on approval likelihood for a bank loan, for each firm receiving a loan at time t in my sample, I construct a control group by choosing firms at time t that do not get a loan and have similar characteristics in terms of industry classification, book assets, book leverage, and market-to-book ratio. I assume that firms in both groups have comparable capital policies, financing capabilities, and preferences for bank loans. The evidence shows that high ESG firms are more likely to receive a loan than their matched peers.

As an alternative matching approach, I construct a sample of firms potentially demanding a loan because data on bank loan applications are not available. Specifically, I create the sample of financially constrained firms from the universe of Compustat firms using three popular measures frequently used in the literature: the Kaplan-Zingales (KZ) index, Whited-Wu (WW) index, and Hadlock-Pierce (HP) index. However, constrained firms could use alternative financing tools such as equity issuance instead of bank loans. To control for this possibility, I further narrow down the sample of constrained firms to those that do not issue equity.[6] Then, I identify whether a firm received a loan in a given year. Consistent with my initial matching results, the estimation results show that the propensity to receive a loan increases with a borrower's ESG reputation. This finding holds across different proxies for financing constraints. Overall, all of these findings reinforce the role of ESG profiles as a matching criterion between firms and banks.

Next, I provide evidence that, after controlling for borrowers' credit quality, loans to high ESG borrowers have a lower yield spread. I then split the entire sample into low and

[6]Results hold irrespective of this additional restriction.

high ESG bank groups to investigate differential incentives of each group to match with a firm having high sustainability performance. The former group refers to banks whose ESG profiles belong to the lower quintile of the distribution. The latter group refers to banks whose ESG profiles belong to the upper quintile of the distribution. Interestingly, I find that the observed pricing effects are mainly driven by banks with previously low ESG lending standards. This finding suggests that low ESG banks show strong preferences for lending relationships with a high ESG-rated firm to increase their ESG reputation, and thus they are willing to offer favorable interest rates. Further, the fact that the spread reduction is limited to low-ESG banks is inconsistent with the hypothesis that high-ESG firms simply have lower risk. Overall, all these observations suggest that a bank's preference for corporate ESG depends critically on the ESG profiles of its existing borrowers.

I further investigate the relative impact of sub-scores for environmental, social, and governance performance on loan spreads. An awareness of environmental challenges, which include global warming and forest fires, has been heightening. In practice, banks have shown an interest in environmental sustainability by committing to the Paris Agreement on climate change or the United Nations Environment Programme Finance Initiative.[7] [8] If financial institutions indeed incorporate environmental factors in their loan process, they may charge higher interest rates to firms with environmental concerns.[9]

On the other hand, creditors may be concerned with social issues under federal law, such as the Community Reinvestment Act, which is "intended to encourage depository institutions to help meet the credit needs of the communities in which they operate, including low- and moderate-income neighborhoods."[10] In recent years, there has been a growing interest in gender issues and human rights. Banks may respond to this growth by considering the social factors in loan pricing.

[7]https://www.unepfi.org/news/industries/banking/collective-commitment-to-climate-action/

[8]https://www.weforum.org/agenda/2019/09/how-banks-can-be-more-sustainable/

[9]https://www.wsj.com/articles/banks-taking-a-closer-look-at-esg-risks-in-credit-underwriting-11578438224

[10]For more information, please visit https://www.ffiec.gov/cra/

Further, corporate governance issues such as conflicts of interest and board independence could influence lending decisions. Poor governance practices at the C-suite level may lead to bad business decisions, which can worsen credit quality and lower firm value. Thus, creditors may prefer to lend to firms with good governance structures.

I find that the social component of ESG ratings has the most significant impact on loan pricing, followed by the environmental factor. In contrast, I do not find evidence of the governance ratings influencing loan prices. Consistent with my previous findings, I also find that the observed effects are further driven by low ESG banks relative to high ESG banks.

To better document a plausible causal link between a firm's sustainability and loan spreads charged by a bank, I employ the biannual FTSE4Good US Index rebalance events as shocks to a firm's ESG reputation. A firm is included in or excluded from the Index after FTSE-Russell evaluates its ESG performance relative to other firms.[11] To examine different responses from banks by their ESG credentials, I compare yield spreads two years before and after the reconstitution events. Results show that companies that are newly added to the Index receive a loan with more favorable interest rates from banks connected to existing borrowers having low sustainability scores (low ESG banks). As a robustness test, I examine the effect of the FTSE4Good membership on loan spreads according to a bank's sustainability type. My results are robust to using this alternative measure of corporate ESG performance. That is, only low ESG profile banks offer a lower spread to the firms in the FTSE4Good US Index.

Lastly, evidence shows that borrowers tend to clean up their ESG before seeking a loan, and then they reduce such effort after receiving the loan. The post-loan reduced ESG is driven by borrowers matching with high ESG banks. That is, some borrowers improve their ESG prior to seeking a loan from a high ESG bank. After receiving the loan, however, they reduce the investment in ESG. The subcomponent analysis further shows that the decrease

[11]FTSE-Russell describes "the FTSE4Good Index Series is a series of benchmark and tradable indexes for ESG (Environmental, Social and Governance) investors. The index series is derived from the globally recognized FTSE Global Equity Index Series, offering FTSE Russell's world-famous hallmark of cutting-edge index design and calculation technology."

in sustainability is mainly caused by the environmental and social components.

This paper contributes to the existing literature on banking and on ESG. First, unlike previous literature documenting that the matching of firms and banks relies on size (Stein, 2002), geographical proximity (Petersen and Rajan, 2002), and pre-existing relationships (Petersen and Rajan, 1994; Bharath, Dahiya, Saunders, and Srinivasan, 2007), this paper provides new evidence that a borrower's ESG reputation can play a role as a matching criterion between firms and banks. Specifically, after constructing a sample of firms potentially seeking a bank loan, I find that high ESG standard firms are more likely to receive a loan. This finding is robust to the alternative matching methodology. This paper also reports that lenders tend to associate with borrowers that maintain similar ESG profiles, but nonetheless that low-ESG banks attempt to improve their sustainability profile by offering loans to high ESG-rated firms at favorable terms. This paper is among the first that shows that corporate ESG credentials can affect the matching process between lenders and borrowers, through interaction with a bank's ESG profile.

Further, while extant research conducted on ESG is extensive, the banking industry is often excluded from these studies. Despite the critical roles banks play in the economy and the surge of interest in sustainable lending, little is known about a bank's lending behaviors in the context of ESG. To the best of my knowledge, this is the first paper presenting evidence that a bank's ESG profile measured based on its loan portfolio plays a significant role in determining yield spreads offered to new borrowers. This paper enhances our understanding of financial institutions' ESG concerns and actions by showing that banks improve their ESG-reputation by providing generous loan spreads when their ESG credibility is low.

While prior literature mainly focuses on the impact of corporate ESG on firm-level measures such as valuation or cost of capital, little is known as to when and why borrowers shift their sustainability actions. This paper improves our understanding of the motivation behind borrowers' ESG behaviors by providing the first evidence that borrowers attempt to make themselves ESG-friendly before a loan contract, especially with high ESG lenders.

Interestingly, borrowers significantly do not invest to maintain the ESG after getting a loan.

The remainder of the paper proceeds as follows. Section 2 describes the data and summary statistics. Section 3 reports the methodology and empirical results. Section 4 concludes.

2 Data and Summary Statistics

This study employs Sustainalytics' scores to measure the degree to which companies invest in sustainable and socially responsible actions. The Sustainalytics data provide monthly time-series ESG scores and cover 4,500 companies worldwide from August 2009 to October 2018. The Sustainalytics research team follows several procedures to execute an independent evaluation of firms' ESG ratings. Specifically, a team of analysts gathers firm-level data via its disclosure, media coverage, and non-governmental organization reporting to examine information based within their analytical framework. This is followed by a quality and peer-review process. Research is then conducted at the indicator level by analyzing a set of generic and industry-specific metrics, which are scored and weighted to determine a firm's overall sustainability performance. For each indicator, analysts assess the extent to which a company satisfies relevant ESG practice standards. On this basis, a score out of 100 is assigned to each indicator according to a set of internal criteria, with a higher value indicating better performance on that indicator.

I obtain corporate loan data from LPC DealScan over the 2009 to 2018 period. This database provides information on loan characteristics such as yield spreads, maturity, facility amount, purpose, type, and other contract terms. Most loans covered in DealScan are syndicated. Following the literature, I focus my attention on the lead arranger(s) rather than syndicate participants, because the lead bank(s) assume an active role in originating the loan contract. The DealScan database enables me to identify the lead arranger(s) for each loan. Specifically, I classify a bank as a lead if the "LeadArrangerCredit" field designates

"Yes" (Gopalan, Udell, and Yerramilli, 2011; Houston and Shan, 2020) or if a bank is a solo one (i.e., the cases where a bank lends without forming a syndicate).

Borrowers' stock and financial data are available from CRSP and Compustat, respectively. The Chava and Roberts (2008) link file enables me to combine the sample of loans from DealScan and borrowers' financial information from CRSP and Compustat into a single dataset. The Schwert (2018) lender link table connects DealScan lender names with identifiers in Compustat and Bankscope for all lenders with at least $10 billion in loan volume or at least 50 loans. The observation unit in my sample is the borrower-lender-loan triple, with borrower characteristics measured before loan origination. The firms with Standard Industrial Classification (SIC) codes between 6000 and 6999 (financial industries) or between 4900 and 4999 (utility industries) are excluded from the sample. I restrict my sample to U.S. borrowers and U.S. lenders.

[Table 1 here]

Table 1 presents summary statistics for the sample of loans, lenders, and borrowers along with macroeconomic condition characteristics. Specifically, Panel A of Table 1 reports loan and lender characteristics used in empirical analyses. The median loan has a facility size of $808.50 million, a maturity of 60.00 months, and a loan spread of 175.00 basis points. The median relationship length between a borrower and a lender is 1.00 year, and the median pair has 2.00 transactions in my sample. The median lender has a value-weighted ESG of 59.00.

Next, Panel B of Table 1 exhibits borrower characteristics. The median firm in my sample has an ESG score of 56.00, environmental (E) score of 52.64, social (S) score of 54.00, and corporate governance (G) score of 67.00. It also has a log value of total assets of 9.19, maintains a market-to-book ratio of 1.11, has a cash ratio of 0.07, is levered with a leverage ratio of 0.32, and has a credit rating of 13.00, which corresponds to a letter rating BBB-. Measures of macroeconomic conditions are summarized in Panel C of Table 1. The median term spread is 177.00 basis points, and the median credit spread is 99.00 basis points.

Lastly, Panel D of Table 1 shows the pair-wise correlation coefficients among the firm-level independent variables used in the regression analyses. I find that the environmental (E) and social (S) elements are strongly correlated with the overall ESG rating, while the governance (G) scores are relatively less associated with it. Moreover, the correlation between the credit rating and the ESG score is low, with a coefficient value of 0.22. The correlation matrix also displays that all firm-level characteristics other than market-to-book and book leverage are positively associated with ESG ratings. Definitions of each variable are presented in Appendix A.

3 Empirical Strategy and Results

3.1 Matching Results

3.1.1 Unconditional Matching Results based on Construction of a Control Group

I examine whether a firm with high ESG credibility is more likely to receive a loan from a bank. For this test, I first identify a sample of firms that receive a bank loan (i.e., subject firms) during the sample period. For each subject firm, I then create a control group by choosing firms that operate in the same industry and have comparable firm size, leverage, and market-to-book ratio.[12] Specifically, for each subject firm at time t (year-quarter), I select all other firms at time t (year-quarter) that (a) belong to the same 4-digit SIC code; (b) have book assets within a 30% bracket around the subject firm; (c) have book leverage within a 30% bracket around the subject firm; (d) have market-to-book ratios within a 30% bracket around the subject firm; and (e) do not get a loan. These matching procedures are slightly different from those of Bernstein, Lerner, and Mezzanotti (2019) since I consider market-to-book ratios to better control for a firm's growth opportunities in future states of the world, which could have a direct impact on the demand for funds. These processes result

[12]This matching process is similar to the one used in Bernstein, Lerner, and Mezzanotti (2019).

in 275 subject firms and 314 control firms in my sample. An assumption that underlies this methodology is that both subject and control groups have similar capital policies, financing capabilities, and preferences for bank credit.

[Table 2 here]

In Table 2 Panel A, I compare the observables of subject firms to those of matched control firms and find that the characteristics between the two groups are similar. Specifically, tests for mean differences of a set of firm controls – book assets, market-to-book, cash, book leverage, and credit quality - between the two groups demonstrate that they are all statistically insignificant except ESG, which is marginally significant with a t-statistic of 1.87. Overall, t-tests for the difference of means indicate that the matching procedures result in comparable groups in the sample being analyzed.

$$Match_{i,t} = \alpha + \beta ESG_{i,t} + \delta_t + I_{ind} + \xi_{i,t} \tag{1}$$

To test the role of ESG profiles in the bank matching process, I estimate regressions in which the dependent variable ($Match$) is an indicator that takes the value of one if a firm receives a loan in a given year-quarter and zero otherwise, and a firm's ESG ratings are my main independent variable. Year-quarter (δ) and industry (I, 2-digit SIC codes) fixed effects are controlled for in the model. Finally, the standard errors are clustered by firm and year-quarter.

The coefficient of interest in the regression, β, captures the effect of corporate ESG profiles on the tendency to get a loan. According to the agency view, it is expected to be negative, indicating that a bank is less likely to extend a loan to a firm which spends resources on socially responsible endeavors. On the other hand, the coefficient on ESG would be positive under the alternative view, which states that ESG-minded firms are safer. Thus, which view is supported by the data is an empirical question.

I document the unconditional matching outcomes from the regressions in Table 2 Panel

B. Coefficients on ESG are significantly positive at the 5% level, suggesting that a bank loan is more likely to be issued to firms investing corporate resources in sustainable and socially responsible activities. Overall, all findings regarding unconditional matching between a lender and a potential borrower support the positive role of ESG credentials as a matching criterion.

3.1.2 Unconditional Matching Results based on Financial Constraints

In this section, I repeat the unconditional matching analysis in Table 2 using a different methodology. The purpose of this section is to ensure that the results are robust to an alternative matching method.

For this, I first construct a sample of firms potentially seeking a bank loan. Since there are no publicly available data displaying applications for corporate loans, one is not able to observe whether a firm attempts to get a loan but fails to get it, or whether the firm does not want (or need) it. To overcome this data issue, I create a sample of firms potentially demanding funds by identifying financially constrained firms based on the Kaplan-Zingales (KZ) index, Whited-Wu (WW) index, and Hadlock-Pierce (HP) index.[13]

Being constrained itself, however, does not necessarily imply that constrained firms try to obtain funds from a bank. They might use other financing options, such as the sale of new equity. To deal with the issue to some degree, I narrow down my sample by choosing only firms who do not issue stock in a given year. Following Fama and French (2005), I define an equity issuance as the product of the split-adjusted change in shares and the average of the split-adjusted stock price at the beginning and end of the fiscal year being more than 1% of book assets. This additional restriction enables me to have a more refined sample of firms potentially seeking a bank loan by controlling for alternative financing choices that firms might utilize. The empirical analysis is based on the probit, logit, and linear probability

[13]Following the literature, firms are sorted into terciles based on their index values in the prior year. Firms in the top tercile are classified as financially constrained and those in the bottom tercile are classified as unconstrained.

model as follows:

$$Match_{i,t} = \alpha + \beta ESG_{i,t} + \delta_t + I_{ind} + \xi_{i,t} \tag{2}$$

In the regression model, $Match$ is a dummy variable that equals one if a firm receives a loan from a bank at time t. ESG is the main explanatory variable that measures the firm's yearly average sustainability performance at time t. Calendar year fixed effects (δ) are included to control for time variation in market conditions, and industry (2-digit SIC codes) fixed effects (I) are added to deal with the possibility that a bank's lending decisions could be influenced by industry that a firm belongs to. Finally, the standard errors are clustered by firm and year.

[Table 3 here]

Table 3 presents the results. The coefficients in Panel A are estimated using a sample of all constrained firms, and thus it also includes firms that raise capital through equity financing. Columns 1 through 3 of Panel A report the unconditional matching results based on the Kaplan-Zingales (KZ) index. Consistent with the results in Table 2, the evidence shows that the coefficients on the covariate of interest are positive and statistically significant at the 1% level. These findings indicate that the likelihood of receiving loans increases with a firm's ESG ratings, and the relation holds regardless of model specifications. These patterns do not change when estimating with the Whited-Wu (WW) index (Columns 4 through 6). The last three columns (Columns 7 through 9) of Table 3 Panel A demonstrate the regression results from the sample of constrained firms based on the Hadlock-Pierce (HP) index. The results remain intact: bank loans are more likely to be issued to firms with high sustainability scores.

In Panel B, I repeat the same analysis as in Panel A, using the sample of financially constrained firms without equity issuance. This extra data filtering process reduces the sample size and accordingly decreases statistical power. However, it should help reduce the

effects of noise inherent in the sample by controlling for an alternative financing option that a potential borrower could utilize. Comparing Panels A and B reveal that the results are robust to the data procedure and reinforce the interpretation of ESG profiles as a matching standard between a bank and a firm.

3.1.3 Conditional Matching Results

This section investigates whether lenders are more likely to match with borrowers that have similar ESG credentials. For this, I first compute a lender's ESG as follows. For every lender, I identify its existing borrowers that have outstanding loan balances before it originates a new loan. Then, I compute a weighted average of its borrowers' ESG scores using loan facility amount as a weighting variable and define it as Lender ESG. The empirical analysis is executed based on the following regression model:

$$Ln(ESG)_{i,t} = \alpha + \beta LenderESG_{j,t-1} + \varsigma X_{i,t} + \tau Y_t + \gamma Z_{i,j,t} + I_{ind} + \nu_i + \chi_j + \xi_{i,j,t} \qquad (3)$$

I estimate an OLS regression in which the dependent variable is a borrower's ESG rating ($Ln(ESG)$), and the explanatory variable of interest is a lender's ESG profile based on its lending portfolio ($LenderESG$). X is the vector of borrowers' characteristics that I employ as control variables. These variables contain the log of total assets, market-to-book ratios, cash, book leverage, and Standard & Poor's (S&P) credit rating. I include the term and credit spreads (Y) at the time of the loan origination to control for macroeconomic conditions. Z is the vector of loan characteristics that contain facility amount, maturity, collateral requirements, purpose, and type. I also add industry (I, 2-digit SIC codes), borrower (ν), and lender (χ) fixed effects to account for unobservable time-invariant industry, borrower, and lender heterogeneity, respectively. The standard errors are clustered by borrower and year.

[Appendix B here]

Appendix B reports the results from the regression. I find that the coefficient estimates of Lender ESG are statistically significant at the 1% level and positively related to the borrower's sustainability scores. This finding indicates that, given that matching of a lender and a borrower occurs in the loan market, the matched borrower's ESG profile at t tends to increase as the lender's ESG at t-1 increases. This pattern is in line with Houston and Shan (2021) documenting that lenders are more likely to grant a loan to borrowers with similar ESG credentials. However, this finding also suggests that it could be difficult for low ESG profile banks to match with high ESG-rated borrowers, an issue I explore further in the next section.[14]

3.2 Loan Pricing Results

3.2.1 Impact of Corporate ESG Profiles on Loan Spread Rates

In this section, I examine the effects of a borrower's ESG credentials on loan pricing. The agency view of ESG argues that a lender charges a higher yield spread on the loans issued to borrowers with high sustainability performance. The alternative view, which states that high ESG standard firms are safer, claims that lenders make loans with favorable interest rates to borrowers who spend resources on ESG activities.

The conditional matching tests allow me to distinguish this ESG-is-safer hypothesis from the hypothesis that banks seek to improve their own ESG reputation by associating with high ESG firms. If such banks desire to increase their ESG reputation, but have difficulty connecting themselves with ESG-minded firms, low ESG lenders can offer loans with favorable terms to high-ESG firms to increase the lenders' probability of matching (and associating) with them. The empirical analysis is performed based on the following OLS specifications:

$$Ln(Spread)_{i,j,t} = \alpha + \beta Ln(ESG)_{i,t} + \varsigma X_{i,t} + \tau Y_t + \gamma Z_{i,j,t} + I_{ind} + \nu_i + \chi_j + \xi_{i,j,t} \qquad (4)$$

[14]The results remain intact with the inclusion of proxies for relationship lending.

In the model, the dependent variable is the natural logarithm of the loan spread over London Interbank Offered Rate (LIBOR) charged by a bank, and the key independent variables are a borrower's ESG scores. X is the vector of borrowers' traits, which contain the log of total assets, market-to-book, cash, book leverage, and credit rating. Y and Z respectively denote macroeconomic variables (i.e., term and credit spreads) and the vector of loan traits that include relationship length, relationship strength, loan amount, maturity, collateral, purpose, and type.[15] I also control for the industry (I), borrower (ν), and lender (χ) fixed effects, and the standard errors are clustered by borrower and year.

[Table 4 here]

Columns 1 to 4 in Table 4 report the results based on the full sample. I find that the coefficients of a borrower's ESG ratings are significantly negative at the 1% level in all columns. This finding suggests that irrespective of a lender's ESG status, high ESG profile borrowers receive favorable treatment in the loan market. The economic magnitude is also sizable. The yield spread decreases by 4.1% when a borrower's ESG score increases by 10%. Given that the median borrower's ESG score is 56 and the median spread rate is 175 basis points, this result means that the spread decreases by 7.18 basis points (= 175*0.041) when the borrower ESG increases by 5.6 (= 56*0.1). The same calculation with a one standard deviation increase in the borrower's ESG rating (8.32) corresponds to a reduction in loan premia by 10.67 basis points (= (7.18*8.32)/5.6), which is approximately 6.1% of the median spread. These findings are also in line with the unconditional matching analyses in Tables 2 and 3. In support of the alternative risk-reduction view, the evidence suggests that high

[15]Papers in the literature differ on whether they control for non-price contract terms such as collateral or financial covenants in the loan spread regressions. A line of research (Campello and Gao (2017), Schwert (2018), and Gao, Li, and Ma (2020), among others) includes none of them in their models. Regarding the issue, Schwert (2018) states that "Due to sparse data on non-price loan terms, such as covenants and collateral requirements, I am unable to control for them. The loan spread premium estimates are unbiased as long as the control variables include all of the price-relevant factors that are also correlated with bank capital." Another line of research controls for either only collateral requirements (Bharath, Dahiya, Saunders, and Srinivasan (2011), among others) or both non-price lending terms (Ivashina (2009), among others). My paper considers collateral in the model since it enhances model fitness measured by R square.

ESG borrowers are more likely to receive bank loans, and their loans come with lower interest rates.

I also find that lending relationship reduces interest rates charged by a bank. Specifically, the coefficients on Relationship Length are significantly negative, suggesting that a longer relationship between a borrower and a lender is associated with a lower loan spread. The estimate in Column 2 shows that an increase in relationship length by one year reduces the yield spread by 0.2%. Similarly, one unit of increase in Relationship Strength decreases the spread by 0.9%. This finding is consistent with the banking literature establishing the benefits of relationship lending. Berger and Udell (1995), for instance, report that the longer the length of the lending relationship, the more generous are the credit terms. Specifically, they find that small firms with longer relationships tend to pay lower interest rates and are less likely to be asked to pledge collateral.

Next, I examine whether lenders' own ESG profiles affects their attitudes towards a borrower's sustainability metrics. As discussed in the Introduction, the public and investors have become more knowledgeable and interested in ESG issues, which include climate change, employee treatment, and a company's leadership and governance practices. The increased focus on ESG may influence a bank's lending practices, and the composition of its loan portfolio has changed accordingly. In particular, this shift is more pronounced if a lender holds loan portfolios consisting of borrowers with poor ESG policies. As the results regarding conditional matching in Appendix B indicate, however, lenders tend to associate with borrowers having comparable ESG credentials. This pattern suggests that high ESG borrowers may not want to borrow from a low ESG lender because doing so may tarnish their own image or reputation by association. Therefore, such a lender may have difficulty attracting firms with high sustainability performance. In this case, the lender is willing to charge a significantly lower rate on the loans offered to high ESG firms in order to gain their business. However, this relation will not hold if (low ESG) lenders think of a borrower's ESG as inconsequential or lending practices are not affected by their existing ESG portfolios.

To test this association, I split the full sample used in Columns 1 to 4 in Table 4 into low and high ESG lender groups. Specifically, I sort all lenders in my sample into five groups according to their ESG profiles every year. Then, I define the bottom quintile of the distribution as low ESG, while I do the top quintile of the distribution as high ESG. The estimation results based on a subsample of low ESG lender groups are reported in Columns 5 to 8 in Table 4. The estimates based on a subsample of high ESG lenders are reported in Columns 9 to 12 in Table 4. I employ the same set of controls as those used in Columns 1 to 4 in Table 4.

There are a couple of noteworthy patterns in Columns 5 through 12. The results show that the coefficients on the covariate of interest in Columns 5 to 8 are significantly negative at the 1% level, suggesting that lenders having low ESG loan portfolios give a loan with favorable interest rates to a borrower with high ESG reputation. The effect is also economically meaningful. Take Column 8, for example. The yield spread decreases by 9% when borrower ESG rating rises by 10%. This calculation implies that the loan spread charged to the median firm declines by 15.75 basis points (= 175*0.09) when its ESG score improves by 5.6 (= 56*0.1). Similarly, a one standard deviation increase in the borrower's ESG measure (8.32) is associated with a decrease in the yield spread by 23.4 basis points (= (15.75*8.32)/5.6), which is roughly 13.4% of the median spread.

On the other hand, Columns 9 and 12 in Table 4 present the evidence that, compared to low ESG lenders, high ESG lenders show less sensitive lending behaviors. I find that the coefficients of interest are also negative but marginally significant at the 10% level. The difference between the low and high bank coefficients is significant at the 5% level.[16] The coefficient values also reduce to about a third of those in Columns 5 to 8. This finding indicates that high ESG lenders are simultaneously more attractive to high ESG borrowers and less in need of attracting them, such that they do not offer reduced spreads. All in

[16]For this and all other similar tests throughout this paper, I calculate the significance of the difference by pooling the subsamples into a single regression model in which I interact borrower characteristics with a dummy for whether the bank is low or high ESG.

all, results suggest that a lender's loan pricing decisions are significantly influenced by the composition of its loan portfolios.

An important implication from Table 4 is that the extent to which low ESG lenders have changed the composition of their portfolios is likely to be larger. As a result, the differences in ESG credentials between low and high ESG lenders are expected to be decreasing over time. To confirm whether the implication is verified in the data, I compare the median ESG values of each group over time.

[Figure 1 here]

Figure 1.A exhibits time series of a lender's median ESG scores by its ESG group. I find that the ESG values of each lender group increase until 2014, after which they slightly decrease. Figure 1.B demonstrates time series of the differences in the scores between the two groups and, interestingly, they tend to decline over time; the difference was 9.81 in 2009, and it was 4.31 in 2017. These downward patterns seem to suggest that low ESG profile lenders indeed have increasingly embedded sustainability factors into their loan process and have aligned their portfolios accordingly.

To give credence to my interpretation of the pattern in Figure 1, however, one issue to be further examined is to confirm that the spread in borrower ESG scores is not itself tightening over time. For this, I compute the cross-sectional standard deviation and the interquartile range. Figure 2 presents figures exhibiting time series of each statistic, which clearly shows that both measures are not shrinking over time, and thus the convergence in lender portfolio scores is not simply an outcome of a tightening distribution of ESG scores in general.

3.2.2 Regressions of Loan Spreads on ESG Sub-components

In this section, I document the impact of the three ESG sub-scores on loan prices. For this test, I use the same set of controls and specifications as in Table 4, except that overall ESG ratings are replaced with individual ESG sub-components.

[Appendix C here]

Appendix C presents the results. In Panels A, B, and C, I focus on the effect of the environmental (E), social (S), and governance (G) factors on loan spreads, respectively. Across all panels in Appendix C, Columns 1 to 4 report estimates based on the full sample. Columns 5 to 8 show the results based on a sub-sample of low ESG creditors, while Columns 9 to 12 contain the results based on a sub-sample of high ESG creditors.

I find that loans to borrowers with high social scores come with the most favorable spreads, especially when a lender's sustainability is low. The economic effect is also sizable. Take Column 8 Panel B, for instance. When a borrower's social rating goes up by 10%, the spread goes down by 6.1%, which is roughly 10.68 basis points (= 175*0.061) for the median firm. Similarly, one standard deviation increase in the social scores (10.01) is related to a decrease in interest rates by 19.80 (= (10.68*10.01)/5.4) basis points per year, roughly 11.31% of the median spread. Next, the evidence shows that the second important factor is the environmental rating, and the effect is more pronounced when a lender's ESG profile is weak. In a similar calculation, the estimate in Column 8 Panel A implies that a standard deviation increase in the environmental score corresponds to an annual decrease in spreads by 18.1 basis points, which amounts to about 10.3% of the median yield spread. Lastly, I do not find any significant relation between governance quality and loan spreads across all specifications, with estimates of the key coefficient sometimes positive and sometimes negative.

3.2.3 Identification Using FTSE4Good US Index Inclusion Events

The results so far document that corporate ESG credentials have a significant impact on both matching and loan pricing. More importantly, the effects on spreads become larger when lenders have a stronger incentive to improve the level of sustainability revealed through their loan portfolio holdings. Although I control for a battery of covariates that help to mitigate the potential omitted variable bias, the interpretation of the main findings from the OLS

regression could still be contaminated by a few endogeneity concerns. For example, firms with high-quality management could be more likely to make socially responsible investments; at the same time, they are also more likely to receive a loan with a favorable interest rate, especially from banks having low sustainability loan portfolios. The bias potentially causes both borrower ESG ratings and loan spreads to vary simultaneously and thus confounds the causal interpretation of the main findings.

To better establish a potential causal relationship between borrower ESG practices and bank lending, I perform difference-in-differences (DiD) analyses using the semi-annual FTSE4Good US Index rebalance events as shocks to borrowers' ESG reputation.[17] Launched in 2001, the Index measures the performance of firms concerning environmental, social, and governance criteria using over 300 indicators. Since its inception, the Index series have played a role as a salient ESG benchmark for investors. After FTSE Russell (re-)evaluates a firm's sustainability policies and practices relative to other firms, it determines the firm's inclusion to or exclusion from the ESG Index.[18]

To implement the DiD analyses, I go through the following data filtering procedures. For a given firm-rebalance pair, I first require the firm included in the Index to obtain at least one bank loan two years both before and after the rebalance event. Then, I only choose loan origination data closest to the event to better estimate the pure effects of the shock. The empirical specifications are as follows:

$$\begin{aligned} Ln(Spread)_{i,j,t} = \alpha + \beta Post_t \times LenderESG_{j,t} + \kappa LenderESG_{j,t} + \mu Post_t \\ + \varsigma X_{i,t} + \tau Y_t + \gamma Z_{i,j,t} + I_{ind} + \nu_i + \chi_j + \xi_{i,j,t} \end{aligned} \tag{5}$$

The model represents a panel regression of the all-in-drawn spread over a 48-month

[17] Employing changes in a firm's membership in FTSE4Good Index, Starks, Venkat, and Zhu (2020) find that long-term investors tend to prefer high ESG profile firms significantly more than do short-term investors. Deng, Kang, and Low (2013) report that the announcement returns are significantly greater for merger deals by the FTSE4Good firms than for those by non-FTSE4Good firms.

[18] For more information, please visit https://www.ftserussell.com/products/indices/FTSE4Good

window around the Index rebalances. *Post* takes the value of one for loans originated after the events, and zero for those originated before the events. *LenderESG* refers to a lender's ESG profile before each loan origination. The coefficient of the interaction term captures the different behavior of banks for inclusion stocks. If low ESG-profile lenders indeed have stronger preferences toward high ESG-profile firms in comparison to other lenders, the coefficient on the interaction should be positive. As before, X is the vector of borrowers' characteristics that I use as controls, which include size (log assets), market-to-book ratio, cash, book leverage, and credit scores. Y denotes macroeconomic factors (i.e., term and credit yield spreads), and Z is the vector of loan characteristics that contain relationship length, relationship strength, amount, maturity, collateral, purpose, and type. I, ν, and χ respectively refer to the industry (2-digit SIC codes), borrower, and lender fixed effects. Finally, standard errors are clustered at the borrower and year level.

[Table 5 here]

Table 5 presents the main results. The coefficient on *Post* shows that the baseline effect of the FTSE certification is to produce significantly lower spreads. The positive and significant coefficient estimate for the interaction term of interest shows that banks with higher ESG profiles make smaller reductions in the spread they offer to an included firm. This finding is robust to different model specifications. The evidence from the rebalance events supports a causal interpretation of the divergent effect of corporate sustainability on a bank's lending practices depending on its ESG type. Overall, the results in Table 5 further corroborate the role of the interplay between lender and borrower ESG credentials in loan pricing.[19]

[19]A related question is whether an association with a low ESG profile lender financially hurts a high ESG-rated borrower. A trade-off may exist for the high ESG borrower between the potential negative consequences of the match and favorable loan rates. However, I do not find any evidence that borrower performance deteriorates after receiving a loan from the low ESG lender.

3.2.4 Robustness: Impact of FTSE4Good Index Membership on Loan Spread Rates

To further investigate whether yield spreads a lender charges are affected by its loan portfolio holdings, I employ firms in the FTSE4Good US Index as an alternative sample of sustainable firms. As before, low ESG profile banks are defined as those in the bottom quintile of the distribution and high ESG banks are defined as those in the top quintile of the distribution. The empirical models are as follows:

$$Ln(Spread)_{i,j,t} = \alpha + \beta FTSE4Good_{i,t} + \varsigma X_{i,t} + \tau Y_t + \gamma Z_{i,j,t} + I_{ind} + \nu_i + \chi_j + \xi_{i,j,t} \quad (6)$$

In the regression, the dependent variable is the natural logarithm of the annual spread paid over LIBOR, and the explanatory variable of interest is the FTSE4Good indicator that equals one if a borrower is the Index member at the period of loan origination and zero otherwise. The other variables and specifications used in Table 6 are the same as those in Table 4.

[Table 6 here]

The results based on the low ESG lender group are presented in Columns 1 through 4. The coefficients on the covariate of interest are negative and statistically significant at the 1% level. Consistent with my prior findings, this relation indicates that the FTSE4Good firms receive favorable treatment from low ESG standard lenders. The effects are also economically sizable. The Index membership lowers the spread by 23.5% (e.g., Column 2). Given that the median firm in my sample borrows \$807.00 million with the spread of 175.00 basis points, the number (23.5%) is equivalent to \$3.32 million (= \$807.00*1.75%*23.5%) per year. The remaining four columns of Table 10 report the regression results from a subsample of the high ESG lender group. The coefficient estimates of FTSE4Good (Indicator) are positive and indistinguishable from zero. The difference between the low and high ESG bank coefficients is significant at the 1% level. On balance, my findings further support that, in addition

to a borrower's ESG, a lender's ESG credentials play a significant role in determining loan spreads offered to firms with differing ESG ratings.

3.3 ESG Clean-up Results

3.3.1 Changes in a Borrower's Overall ESG around Loan Origination

Lastly, I examine whether borrowers spend more resources on ESG endeavors before getting a loan. To compare a borrower's ESG practices around loan origination, for a given borrower-loan pair, I require the borrower to have data available to compute the first difference of Sustainalytics ratings ($ESG_{i,t}$ - $ESG_{i,t-1}$; t=monthly frequency) both before and after loan origination. The event windows are defined as one, two, three, and four quarters before and after each facility's start date. After identifying fluctuations in monthly ESG values captured in each event window, I then compute the net changes in ESG by adding up the differences. The following example clarifies how I calculate net changes in sustainability around a loan origination date. If a firm's variations in ESG ratings ($ESG_{i,t}$ - $ESG_{i,t-1}$) captured in a one-quarter window before a loan contract are 2, -1, and 1.5, the net change in ESG for the firm is computed as 2.5 (= 2-1+1.5). Similarly, if its changes in ESG in a one-quarter window post-loan are 0.5, -1, and 1.5, then the net change is 1. The empirical analysis is performed based on the following OLS specification:

$$\Delta ESG_{i,t} = \alpha + \beta Post_{i,t} + \nu_i + \xi_{i,t} \tag{7}$$

The model represents a regression of net changes in ESG over different windows around loan origination. The independent variable of interest is *Post* which takes the value of one for ΔESG after the loan contract and zero otherwise. I control for the borrower (ν) fixed effects, and the standard errors are clustered by the borrower level.[20]

[Table 7 here]

[20]Results remain intact with the additional inclusion of industry fixed effects.

Table 7 reports the results. Columns 1 through 4 contain estimates based on the full sample. Columns 5 through 8 report the regression based on the subsample of borrowers getting loans from low ESG lenders, while Columns 9 through 12 show the regression based on the subsample of borrowers getting loans from high ESG lenders. The coefficients on *Post* in Columns 1 to 4 indicate that borrowers make less effort to improve their sustainability profiles after they receive a loan.[21] Across windows, the decreases in ESG post-matching range from 0.321 to 0.551. Further, the analyses in Columns 5 to 12 show that the post-loan reduced ESG ratings are mainly driven by borrowers matching with high ESG banks.[22] All in all, the findings suggest that some borrowers look to associate with high ESG banks and thus attempt to enhance their ESG credentials to make that happen before the loan. Then, they reduce that effort after the loan.

3.3.2 Changes in a Borrower's ESG Sub-components around Loan Origination

In this subsection, I repeat the same analyses as in Table 7 with the Sustainalytics sub-components. In Panels A, B, and C, I report the regression coefficients using environmental (E), social (S), and corporate governance (G) scores, respectively. Across the Panels, Columns 1 to 4 are based on the full sample. Columns 5 to 8 are based on the subsample of borrowers associating with low ESG banks, while Columns 9 to 12 are based on the subsample of borrowers associating with high ESG banks.

[Appendix D here]

Appendix D documents the results. Evidence reveals that the reduced ESG post-matching is mainly driven by environmental (E) and social (S) components and, particularly, the E

[21] Appendix E documents the mean changes in ESG before and after loan contracts. The statistic for a one-quarter window in Panel A exhibits that borrowers enhance their ESG level by 0.3628 while seeking a loan. Once they receive the loan, however, they increase it only by 0.0419. Similar patterns are observed in different windows.

[22] Panel C in Appendix E displays that borrowers associating with high ESG lenders increase their ESG by 0.4849 to 0.8512 before loan origination. Variations in ESG after the loans seem relatively negligible, with values from -0.0339 to 0.0638.

components have the most significant impact on the variations in sustainability, followed by the S components. However, I do not find any meaningful relationship with governance (G) components. This may suggest that governance quality is stickier so that it may take more time to modify, or that firms are less willing to alter it relative to the E or S sub-elements.[23]

4 Conclusion

In this paper, I report novel evidence regarding the mechanisms behind the matching of a firm and a bank and the economic implications of this matching for the cost of bank loans. The results show that high ESG firms are more likely to receive bank loans, and their loans come with lower yield spreads from low ESG banks.

To establish evidence of causality, I use the semi-annual FTSE4Good US Index reconstitution events. Employing DiD methodology, I find that borrowers experiencing a positive ESG shock receive loans with a significantly lower rate from banks with weak ESG credentials. These relations are further supported by the FTSE4Good Index constituent data. All in all, the results of my analyses consistently suggest that the interaction of the lender's and the borrower's ESG profile play a significant role in loan pricing. Last but not least, evidence shows that firms improve their ESG profiles before seeking a loan, and then once they get the loan, they decrease the effort.

A topic that one can further explore is how this matching and corresponding changes in loan portfolios affect bank performance. For example, it would be interesting to study whether offering a loan with lower spreads worsens a (low ESG) bank's profitability. Another interesting question would be how a bank's ESG lending principles are associated with other metrics such as deposits. As indicated by a recent anecdote, a bank may advertise its sustainability lending policies and attempt to receive more deposits from customers that share ESG values.[24] In line with the evidence, one plausible scenario is that the match with

[23] I document the mean changes in ESG sub-components around loan origination in Appendix F.

[24] https://www.veritycu.com/about-us/about-us/values-based-banking.html

an ESG-focused borrower helps low ESG banks attract more deposits, which in turn allow them to make more loans.[25] Empirically investigating these questions is a potentially fruitful topic for future research.

[25]Homanen (2018) reports that banks involved in financing the Dakota Access Pipeline project that sparked environmental concerns had significantly lower deposit growth rates, suggesting that depositors are reactive to information other than financial fundamentals.

References

[1] Berger, Allen N. and Gregory F. Udell (1995), "Relationship Lending and Lines of Credit in Small Firm Finance." Journal of Business, 68, 351-381.

[2] Bernstein, Shai, Josh Lerner, and Filippo Mezzanotti (2019), "Private Equity and Financial Fragility during the Crisis." Review of Financial Studies, 32, 1309-1373.

[3] Bharath, Sreedhar T., Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan (2007), "So What Do I Get? The Bank's View of Lending Relationships." Journal of Financial Economics, 85, 368-419.

[4] Bharath, Sreedhar T., Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan (2011), "Lending Relationships and Loan Contract Terms." Review of Financial Studies, 24, 1141-1203.

[5] Campello, Murillo and Janet Gao (2017), "Customer Concentration and Loan Contract Terms." Journal of Financial Economics, 123, 108-136.

[6] Chava, Sudheer and Michael R. Roberts (2008), "How Does Financing Impact Investment? The Role of Debt Covenants." Journal of Finance, 63, 2085-2121.

[7] Chava, Sudheer (2014), "Environmental Externalities and Cost of Capital." Management Science, 60, 2223-2247.

[8] Deng, Xin, Jun-koo Kang, and Buen Sin Low (2013), "Corporate Social Responsibility and Stakeholder Value Maximization: Evidence from Mergers." Journal of Financial Economics, 110, 87-109.

[9] Fama, Eugene F. and Kenneth R. French (2005), "Financing Decisions: Who Issues Stock?" Journal of Financial Economics, 76, 549-582.

[10] Farre-Mensa, Joan and Alexander Ljungqvist (2016), "Do Measures of Financial Constraints Measure Financial Constraints?" Review of Financial Studies, 29, 271-308.

[11] Gao, Huasheng, Kai Li, and Yujing Ma (2020), "Stakeholder Orientation and the Cost of Debt: Evidence from State-level Adoption of Constituency Statutes." Working paper, Available at SSRN 2878415.

[12] Gopalan, Radhakrishnan, Gregory F. Udell, and Vijay Yerramilli (2011), "Why Do Firms Form New Banking Relationships?" Journal of Financial and Quantitative Analysis, 46, 1335-1365.

[13] Hadlock, Charles J. and Joshua R. Pierce (2010), "New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index." Review of Financial Studies, 23, 1909-1940.

[14] Hoepner, Andreas G. F., Ioannis Oikonomou, Zacharias Sautner, Laura T. Starks, and Xiaoyan Zhou (2020), "ESG Shareholder Engagement and Downside Risk." Working paper, Available at SSRN 2874252.

[15] Homanen, Mikael (2018), "Depositors Disciplining Banks: The Impact of Scandals." Working paper, Available at SSRN 3293254.

[16] Houston, Joel F. and Hongyu Shan (2020), "Corporate ESG Profiles and Banking Relationships." Working paper, Available at SSRN 3331617.

[17] Ivashina, Victoria (2009), "Asymmetric Information Effects on Loan Spreads." Journal of Financial Economics, 92, 300-319.

[18] Kaplan, Steven N. and Luigi Zingales (1997), "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" Quarterly Journal of Economics, 112, 169-215.

[19] Petersen, Mitchell A. and Raghuram G. Rajan (1994), "The Benefits of Lending Relationships: Evidence from Small Business Data." Journal of Finance, 49, 3-37.

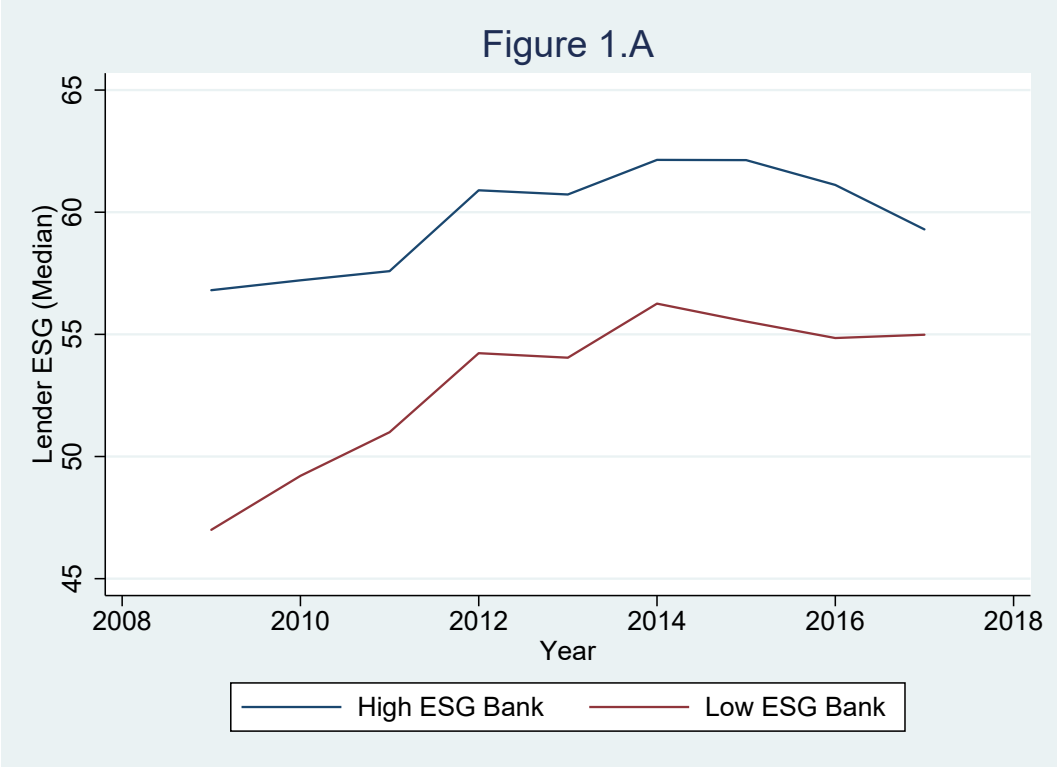
[20] Petersen, Mitchell A. and Raghuram G. Rajan (2002), "Does Distance Still Matter? The Information Revolution in Small Business Lending." Journal of Finance, 57, 2533-2570.

[21] Schwert, Michael (2018), "Bank Capital and Lending Relationships." Journal of Finance, 73, 787-830.

[22] Starks, Laura, Parth Venkat, and Qifei Zhu (2020), "Corporate ESG Profiles and Investor Horizons." Working paper, Available at SSRN 3049943.

[23] Stein, Jeremy C. (2002), "Information Production and Capital Allocation: Decentralized versus hierarchical Firms." Journal of Finance, 57, 1891-1921.

[24] Whited, Toni and Guojun Wu (2006), "Financial Constraints Risk." Review of Financial Studies, 19, 531-559.



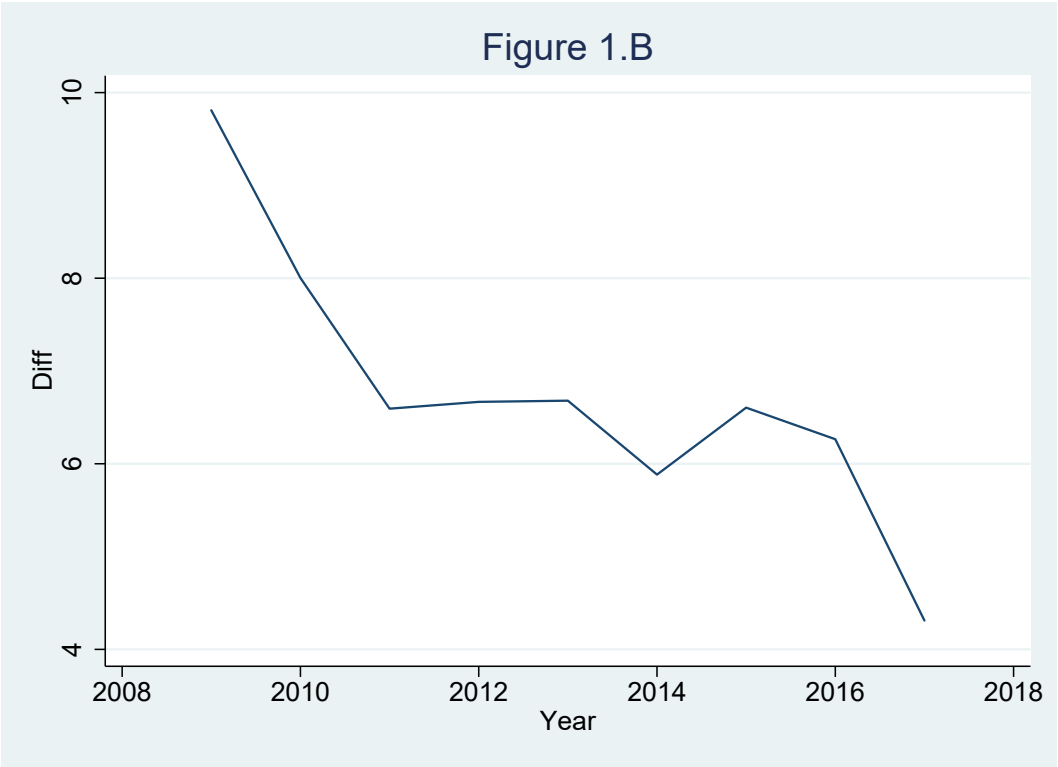
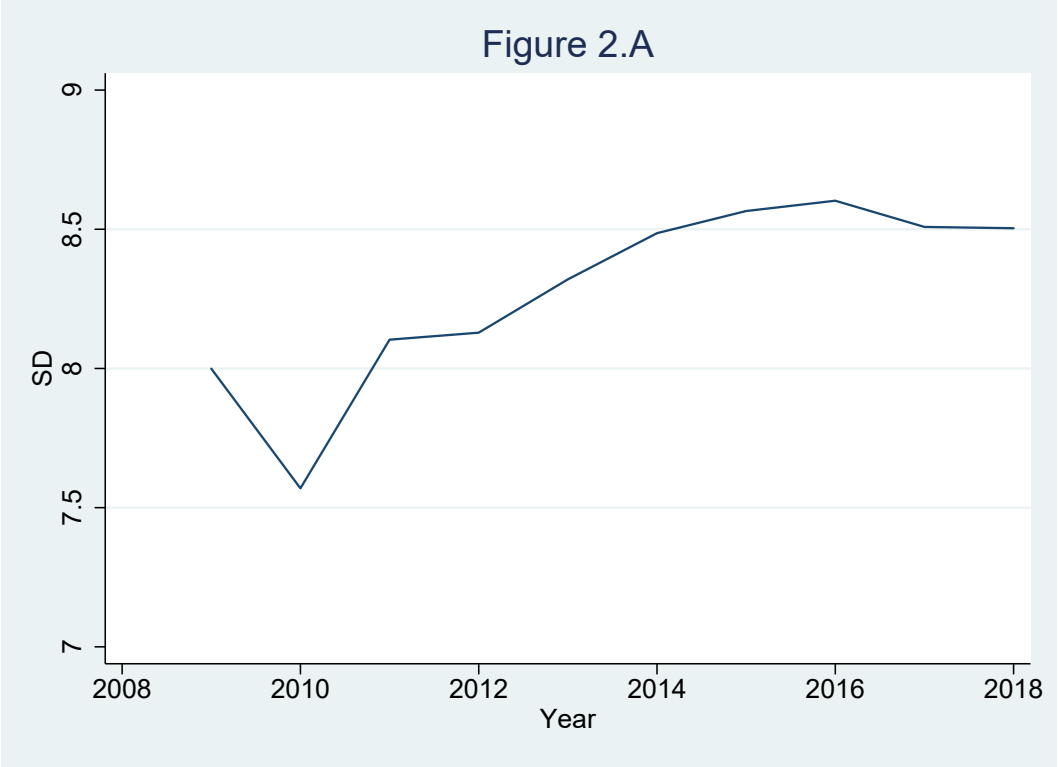


Figure 1: Figure 1.A exhibits time series of a lender's median ESG scores by its ESG group. Figure 1.B demonstrates time series of the differences in the scores between the two groups.



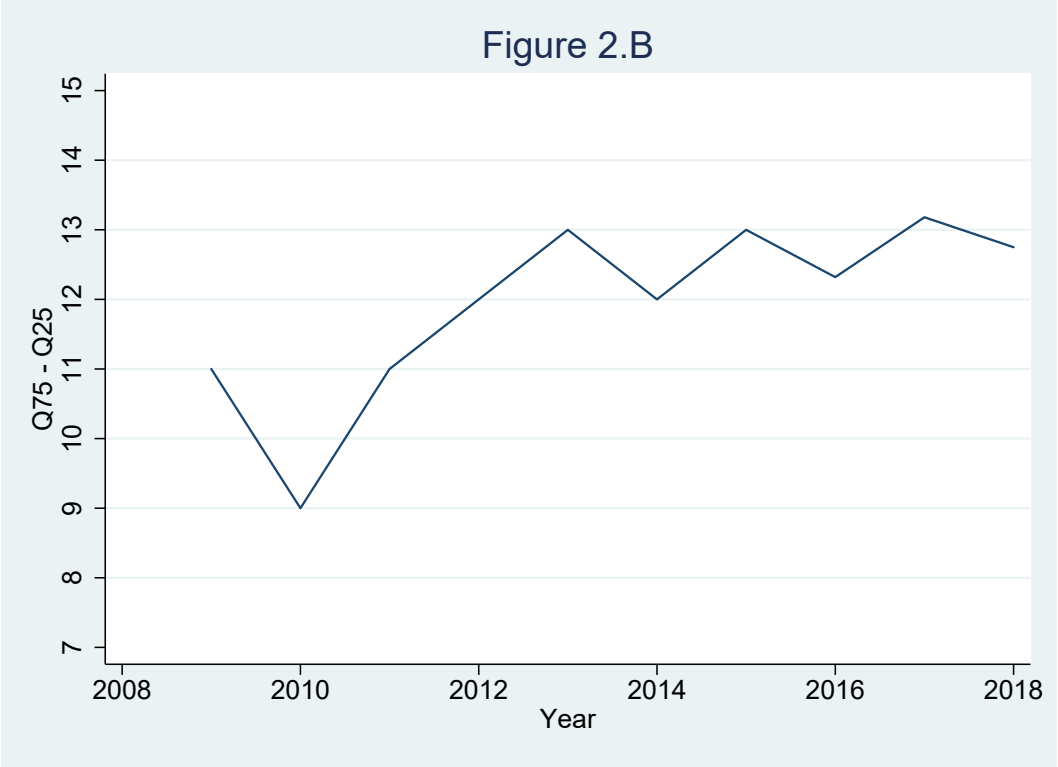


Figure 2: Figure 2.A exhibits the cross-sectional standard deviation (SD) of all firms' ESG scores. Figure 2.B demonstrates the interquartile range of the ESG scores.

Table 1: Summary Statistics

The following table presents both the summary statistics and the pair-wise correlation coefficients for variables used in the regression analysis over the period 2009-2017. Panel A shows the summary statistics for loan and lender characteristics; Panel B presents the summary statistics for borrower characteristics; Panel C contains the summary statistics for the macroeconomic environment. Finally, Panel D reports the pair-wise correlations between borrower-level covariates. Variable definitions are provided in Appendix A.

Panel A: Loan and lender characteristics

Variables	Mean (Median)	StDev	N
Loan Amount ($mil)	1361.86 (808.50)	2010.56	9852
Loan Maturity (month)	55.26 (60.00)	16.84	9852
Loan Spread (basis point)	201.41 (175.00)	118.99	9852
Relationship Length (year)	2.94 (1.00)	4.46	9852
Relationship Strength	2.56 (2.00)	2.13	9852
Lender ESG	58.27 (59.00)	3.15	9852

Panel B: Borrower characteristics

Variables	Mean (Median)	StDev	N
ESG	57.50 (56.00)	8.32	9852
E	53.88 (52.64)	12.75	9852
S	55.20 (54.00)	10.01	9852
G	66.55 (67.00)	7.55	9852
Ln(Asset)	9.43 (9.19)	1.25	9852
Market-to-Book (assets)	1.34 (1.11)	0.81	9852
Cash	0.10 (0.07)	0.10	9852
Book Leverage	0.35 (0.32)	0.19	9852
Credit Rating	12.49 (13.00)	3.30	9852

Panel C: Macroeconomic environment characteristics

Variables	Mean (Median)	StDev	N
Term Spread (bps)	187.43 (177.00)	0.58	89
Credit Spread (bps)	101.74 (99.00)	0.23	89

Table 1: Summary Statistics

Panel D: Correlation matrix

	ESG	E	S	G	Ln(Asset)	Market-to-Book	Cash	Book Leverage	Credit Rating
ESG	1.00								
E	0.86	1.00							
S	0.83	0.52	1.00						
G	0.54	0.24	0.33	1.00					
Ln(Asset)	0.38	0.42	0.28	0.13	1.00				
Market-to-Book	-0.08	-0.03	-0.07	-0.12	-0.17	1.00			
Cash	0.15	0.17	0.12	-0.01	-0.04	0.28	1.00		
Book Leverage	-0.08	-0.06	-0.09	-0.04	0.10	-0.02	-0.29	1.00	
Credit Rating	0.22	0.24	0.18	0.02	0.50	0.20	0.04	-0.28	1.00

Table 2: Unconditional Matching: Construction of a Control Group

The following table presents the regressions of the matching indicator on the corporate ESG profiles based on the sample of the subject and control firms. The subject group is defined as firms receiving a loan, while the control group is defined as firms having comparable characteristics with the subject firms but without receiving a loan. Panel A reports the descriptive statistics for the two groups. Panel B documents the matching results from the regression where Match is the dependent variable that takes the value of one if the firm receives a loan in a given year-quarter and zero otherwise. Year-quarter and industry (two-digit SIC codes) fixed effects are controlled for in the model. The standard errors are clustered by firm and year-quarter. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Subject-control group differences

	Subject Firms (A)	Control Firms (B)	Test-of-Difference (A-B)
Variables	Mean (N=275)	Mean (N=314)	t-value
ESG	55.964	54.618	1.87*
Ln(Asset)	9.210	9.167	0.43
Market-to-Book	1.322	1.247	1.44
Cash	0.119	0.129	-0.85
Book Leverage	0.318	0.313	0.44
Credit Rating	12.630	12.677	-0.17

Panel B: Matching regression analyses

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	Logit	LPM	Probit	Logit	LPM
Dep. Var. (Indicator)	Match	Match	Match	Match	Match	Match
ESG	0.014**	0.023**	0.006**	0.017**	0.028**	0.007**
	(2.24)	(2.24)	(2.21)	(2.34)	(2.34)	(2.25)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	No	No	No	Yes	Yes	Yes
N	589	589	589	589	589	589
R^2	0.009	0.009	0.012	0.012	0.012	0.016

Table 3: Unconditional Matching: Firm-level Measures of Financial Constraints

The following table reports the regressions of the likelihood of receiving a loan on the firms' ESG ratings based on the sample of potential borrowers seeking bank loans. In Panel A, I present the matching results using the sample of financially constrained firms based on the Kaplan-Zingales (KZ) index, Whited-Wu (WW) index, and Hadlock-Pierce (HP) index. Panel B repeats the analysis using the sample of constrained firms who do not issue stock. Match is the dependent variable that takes the value of one if the firm gets a loan in a given year and zero otherwise. The independent variable of interest is ESG, which measures the firm's overall sustainability performance. Year and industry (two-digit SIC codes) fixed effects are controlled for in the model. The standard errors are clustered by firm and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Regression analyses without controlling for other financing option

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	KZ Index	KZ Index	KZ Index	WW Index	WW Index	WW Index	HP Index	HP Index	HP Index
	Probit	Logit	LPM	Probit	Logit	LPM	Probit	Logit	LPM
Dep. Var. (Indicator)	Match	Match	Match	Match	Match	Match	Match	Match	Match
ESG	0.011***	0.018***	0.004***	0.030***	0.050***	0.009***	0.031***	0.052***	0.009***
	(3.40)	(3.39)	(3.34)	(5.38)	(5.30)	(4.91)	(3.89)	(3.62)	(3.32)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,534	3,534	3,539	1,488	1,488	1,530	1,218	1,218	1,241
R^2	0.062	0.062	0.082	0.104	0.103	0.124	0.145	0.143	0.166

Panel B: Regression analyses with controlling for other financing option

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	KZ Index	KZ Index	KZ Index	WW Index	WW Index	WW Index	HP Index	HP Index	HP Index
	Probit	Logit	LPM	Probit	Logit	LPM	Probit	Logit	LPM
Dep. Var. (Indicator)	Match	Match	Match	Match	Match	Match	Match	Match	Match
ESG	0.009**	0.014**	0.003**	0.024***	0.041***	0.008***	0.028***	0.046***	0.008***
	(2.45)	(2.46)	(2.42)	(3.98)	(4.00)	(3.85)	(3.22)	(3.04)	(2.82)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,208	3,208	3,213	1,131	1,131	1,170	911	911	937
R^2	0.059	0.059	0.078	0.084	0.084	0.112	0.120	0.120	0.154

Table 4: Regressions of Loan Spreads on Borrowers' ESG Profiles

The following table reports the regressions of the yield spreads on the borrowers' ESG ratings. Columns 1 to 4 provide the estimates based on the full sample. Columns 5 to 8 document the estimates based on the subsample of the low ESG banks. Columns 9 to 12 document the estimates based on the subsample of the high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG ratings. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG ratings. The dependent variable is the natural logarithm of the all-in-drawn loan spreads and the independent variable of interest is the natural logarithm of the borrower ESG ratings. The definitions of other variables are given in Appendix A. Loan characteristics include the facility amount, maturity, collateral requirements, purpose, and type. Industry (two-digit SIC codes), borrower, and lender fixed effects are controlled for in the model. The standard errors are clustered by borrower and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) All Ln(Spread)	(2) All Ln(Spread)	(3) All Ln(Spread)	(4) All Ln(Spread)	(5) Low ESG banks Ln(Spread)	(6) Low ESG banks Ln(Spread)	(7) Low ESG banks Ln(Spread)	(8) Low ESG banks Ln(Spread)	(9) High ESG banks Ln(Spread)	(10) High ESG banks Ln(Spread)	(11) High ESG banks Ln(Spread)	(12) High ESG banks Ln(Spread)
Ln(ESG)	-0.401***	-0.401***	-0.410***	-0.410***	-0.914***	-0.878***	-0.939***	-0.911***	-0.280*	-0.296*	-0.294*	-0.306*
	(-2.89)	(-2.91)	(-3.09)	(-3.14)	(-4.83)	(-4.56)	(-4.91)	(-4.68)	(-1.74)	(-1.81)	(-1.90)	(-1.95)
Relationship Length	-0.002***	-0.002***			-0.010**	-0.011***			-0.002*	-0.002		
	(-3.47)	(-3.18)			(-2.55)	(-2.67)			(-1.80)	(-1.30)		
Relationship Strength			-0.008***	-0.009***			-0.020***	-0.022***			-0.008**	-0.007**
			(-4.52)	(-4.71)			(-2.69)	(-2.68)			(-2.39)	(-2.19)
Ln(Asset)	-0.118***	-0.120***	-0.114***	-0.115***	-0.128***	-0.122**	-0.114**	-0.107**	-0.082	-0.082	-0.080	-0.079
	(-3.62)	(-3.70)	(-3.52)	(-3.56)	(-2.66)	(-2.42)	(-2.35)	(-2.10)	(-1.42)	(-1.44)	(-1.39)	(-1.39)
Market-to-Book	-0.094***	-0.094***	-0.093***	-0.092***	-0.061	-0.055	-0.060	-0.053	-0.139***	-0.143***	-0.136***	-0.140***
	(-3.23)	(-3.27)	(-3.20)	(-3.23)	(-1.51)	(-1.35)	(-1.50)	(-1.32)	(-2.88)	(-2.94)	(-2.82)	(-2.87)
Cash	0.194	0.209	0.187	0.200	-0.288	-0.248	-0.295	-0.255	0.731***	0.773***	0.728***	0.772***
	(0.83)	(0.90)	(0.81)	(0.88)	(-0.97)	(-0.85)	(-1.00)	(-0.88)	(2.63)	(2.77)	(2.62)	(2.76)
Book Leverage	0.508***	0.514***	0.511***	0.519***	0.483***	0.505***	0.511***	0.535***	0.537***	0.561***	0.550***	0.576***
	(4.42)	(4.48)	(4.47)	(4.56)	(2.78)	(2.81)	(2.91)	(2.97)	(2.79)	(2.88)	(2.85)	(2.95)
Credit Rating	-0.036***	-0.036***	-0.036***	-0.036***	-0.020**	-0.023**	-0.020**	-0.023**	-0.065***	-0.065***	-0.064***	-0.065***
	(-4.65)	(-4.69)	(-4.65)	(-4.69)	(-2.11)	(-2.30)	(-2.11)	(-2.31)	(-4.90)	(-4.83)	(-4.93)	(-4.87)
Term Spread	0.071***	0.071***	0.067***	0.065***	0.006	0.008	0.001	0.003	0.091***	0.090***	0.086***	0.085***
	(3.59)	(3.64)	(3.44)	(3.45)	(0.20)	(0.25)	(0.03)	(0.09)	(3.31)	(3.44)	(3.19)	(3.29)
Credit Spread	0.071	0.073*	0.066	0.067	-0.049	-0.031	-0.049	-0.029	0.084	0.074	0.082	0.069
	(1.59)	(1.68)	(1.49)	(1.56)	(-0.61)	(-0.39)	(-0.62)	(-0.37)	(1.32)	(1.16)	(1.29)	(1.09)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FEs	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	6889	6888	6889	6888	881	879	881	879	1658	1654	1658	1654
R^2	0.861	0.863	0.862	0.864	0.881	0.884	0.881	0.884	0.894	0.896	0.895	0.897

Table 5: Difference-in-Differences Regressions around FTSE4Good US Index Rebalances

The following table reports the DiD regressions of the loan spreads over a 48-month window around the FTSE4Good US Index rebalances. The estimates are based on the following filtering procedures: For a given firm-rebalance pair, I first require the firm included in the Index to have at least one bank loan two years both before and after the rebalance event. Then, I only choose loan origination data closest to the event to better estimate the pure effects of the shock. The dependent variable is the natural logarithm of the all-in-drawn loan spreads. Post takes the value of one for loans originated after the events, and zero for those originated before the events. Lender ESG refers to a lender's ESG profile before each loan origination. Firm (borrower) characteristics include size (log assets), market-to-book, cash, book leverage, and credit quality. Loan characteristics contain facility amount, maturity, collateral, purpose, and type. The definitions of variables are given in Appendix A. Industry (two-digit SIC codes), borrower and lender fixed effects are controlled for in the model. The standard errors are clustered by borrower and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
	Ln(Spread)	Ln(Spread)
Post	-0.374**	-0.381**
	(-2.07)	(-2.15)
Post x Lender ESG	0.008**	0.008**
	(2.35)	(2.42)
Lender ESG	-0.023***	-0.023***
	(-4.38)	(-4.37)
Clustering	Yes	Yes
Relationship Length	Yes	No
Relationship Strength	No	Yes
Firm Characteristics	Yes	Yes
Loan Characteristics	Yes	Yes
Macroeconomic Characteristics	Yes	Yes
Industry FEs	Yes	Yes
Borrower FEs	Yes	Yes
Lender FEs	Yes	Yes
N	408	403
R^2	0.976	0.978

Table 6: Regressions of Loan Spreads on a Borrower's FTSE4Good Membership

The following table reports the regressions of the yield spreads on the borrowers' FTSE4Good membership. Columns 1 to 4 document the estimates based on the subsample of the low ESG banks. Columns 5 to 8 document the estimates based on the subsample of the high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG ratings. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG ratings. The dependent variable is the natural logarithm of the all-in-drawn loan spreads, and the independent variable of interest is FTSE4Good that takes the value of one if a borrower is the Index constituent. The definitions of other variables are given in Appendix A. Loan characteristics include the facility amount, maturity, collateral requirements, purpose, and type. Industry (two-digit SIC codes), borrower, and lender fixed effects are controlled for in the model. The standard errors are clustered by borrower and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low ESG banks	Low ESG banks	Low ESG banks	Low ESG banks	High ESG banks	High ESG banks	High ESG banks	High ESG banks
	Ln(Spread)	Ln(Spread)	Ln(Spread)	Ln(Spread)	Ln(Spread)	Ln(Spread)	Ln(Spread)	Ln(Spread)
FTSE4Good (Indicator)	-0.234***	-0.235***	-0.232***	-0.233***	-0.001	-0.002	-0.002	-0.003
	(-4.01)	(-3.82)	(-3.98)	(-3.75)	(-0.02)	(-0.04)	(-0.04)	(-0.06)
Relationship Length	-0.003	-0.005			-0.001	-0.001		
	(-0.84)	(-1.50)			(-1.02)	(-1.18)		
Relationship Strength			-0.005	-0.008			-0.005*	-0.006*
			(-0.77)	(-1.17)			(-1.65)	(-1.83)
Ln(Asset)	-0.108***	-0.120***	-0.105**	-0.116***	-0.102***	-0.100***	-0.100***	-0.098***
	(-2.69)	(-3.00)	(-2.58)	(-2.85)	(-2.73)	(-2.66)	(-2.68)	(-2.61)
Market-to-Book	-0.091***	-0.088***	-0.091***	-0.088***	-0.158***	-0.159***	-0.156***	-0.157***
	(-3.06)	(-2.99)	(-3.07)	(-3.02)	(-3.91)	(-3.94)	(-3.86)	(-3.87)
Cash	0.014	-0.006	0.012	-0.008	0.772***	0.812***	0.770***	0.810***
	(0.04)	(-0.02)	(0.04)	(-0.03)	(3.66)	(3.86)	(3.67)	(3.86)
Book Leverage	0.370***	0.377***	0.373***	0.380***	0.593***	0.593***	0.597***	0.598***
	(2.65)	(2.80)	(2.66)	(2.82)	(4.56)	(4.61)	(4.57)	(4.63)
Credit Rating	-0.023***	-0.024***	-0.023***	-0.024***	-0.046***	-0.046***	-0.045***	-0.046***
	(-3.23)	(-3.39)	(-3.24)	(-3.40)	(-7.27)	(-7.27)	(-7.27)	(-7.25)
Term Spread	0.075***	0.064***	0.074***	0.064***	0.101***	0.098***	0.098***	0.094***
	(3.47)	(3.00)	(3.45)	(3.01)	(4.15)	(4.14)	(4.08)	(4.06)
Credit Spread	0.152***	0.146***	0.153***	0.148***	0.109**	0.102**	0.107**	0.099**
	(2.89)	(2.86)	(2.90)	(2.91)	(2.21)	(2.10)	(2.18)	(2.05)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FEs	No	Yes	No	Yes	No	Yes	No	Yes
N	1574	1570	1574	1570	2354	2351	2354	2351
R^2	0.869	0.873	0.869	0.873	0.894	0.896	0.894	0.896

Table 7: Changes in ESG around Loan Contracts

The following table reports the regressions of net changes in borrower ESG over different windows around loan contracts. The event windows are defined as one, two, three, and four quarters before and after each facility's start date. Columns 1 to 4 document the estimates based on the full sample. Columns 5 to 8 report regressions based on the subsample of borrowers associating with low ESG banks. Columns 9 to 12 report regressions based on the subsample of borrowers associating with high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG scores. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG scores. The dependent variable is the net changes in borrower ESG ratings, and the independent variable of interest is Post that takes the value of one for the net changes in ESG after the loan contract and zero otherwise. Borrower fixed effects are controlled for in the model. The standard errors are clustered by the borrower level. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) All ESG	(2) All ESG	(3) All ESG	(4) All ESG	(5) Low ESG banks ESG	(6) Low ESG banks ESG	(7) Low ESG banks ESG	(8) Low ESG banks ESG	(9) High ESG banks ESG	(10) High ESG banks ESG	(11) High ESG banks ESG	(12) High ESG banks ESG
Post	-0.321***	-0.346***	-0.427***	-0.551***	-0.021	-0.015	-0.069	-0.191	-0.519***	-0.564***	-0.662***	-0.787***
	(-4.13)	(-3.47)	(-3.44)	(-3.96)	(-0.21)	(-0.15)	(-0.53)	(-1.30)	(-5.66)	(-4.39)	(-4.42)	(-4.48)
Windows	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13036	13068	13068	13068	5182	5188	5188	5188	7854	7880	7880	7880
R^2	0.164	0.158	0.165	0.175	0.183	0.184	0.202	0.203	0.203	0.182	0.186	0.202

Appendix A. Variable Definition

A. Loan Characteristics (Source: Dealscan)

Collateral Requirement: Indicator that takes the value of one if the bank loan is secured by collateral, and zero otherwise

Loan Amount: Loan (facility) amount

Loan Purpose: Indicator variables for loan purpose (corporate purposes, working capital, debt repayment, takeover, backup line for commercial paper, and others)

Loan Spread: Loan spread (all-in-drawn) over LIBOR charged by a bank

Loan Type: Indicator variables for loan type (term loan, revolver line of credit, 364-day facility, and others)

Maturity: Loan maturity (number of months between facility start and end dates)

Relationship Length: The number of years since the first loan was initiated between a borrower and a lender

Relationship Strength: The number of cumulative loans initiated between a borrower and a lender

B. Firm (Borrower) Characteristics (Source: CRSP, Compustat, and Sustainalytics)

Book Leverage: Sum of long-term debt and debt in current liabilities divided by book value of total assets

Cash: Cash and short-term investments scaled by book value of total assets

Credit Rating: S&P credit rating (AAA=22, AA+=21, AA=20, etc.)

Equity Issuance: Indicator that takes the value of one if the product of 1) the split-adjusted change in shares and 2) the average of the split-adjusted stock price at the beginning and end of the fiscal year is greater than 1% of book assets, and zero otherwise

ESG: A firm's sustainability performance (the Sustainalytics ratings)

Ln(Asset): Ln(book value of total assets)

HP Index: –0.737*size + 0.043*size square – 0.040*firm age, based on Farre-Mensa and Ljungqvist (2016)

KZ Index: –1.002*cash flow + 0.283*Q + 3.319*debt – 39.368*dividends – 1.315*cash, based on Farre-Mensa and Ljungqvist (2016)

Market-to-Book: Market value of equity plus book value of debt scaled by book value of total assets

Match: Indicator that takes the value of one if the firm received a bank loan in a given year (year-quarter), and zero otherwise

WW Index: –0.091*cash flow + 0.062*dividend dummy + 0.021*long-term debt – 0.044*size + 0.102*industry sales growth - 0.035*sales growth, based on Farre-Mensa and Ljungqvist (2016)

C. Macroeconomic Variables (Source: Federal Reserve Economic Data)

Credit Spread: Difference in yields between BAA- and AAA-rated corporate bonds in the month prior to a loan origination

Term Spread: Difference in yields on 10- and 1-year treasury bonds in the month prior to a loan origination

Appendix B. Conditional Matching

The following table reports the regressions of the borrowers' ESG ratings on the lenders' ESG profiles. The dependent variable is the natural logarithm of the borrowers' ESG scores, and the independent variable of interest is the loan amount-weighted average of borrowers' ESG ratings. The definitions of other variables are given in Appendix A. Loan characteristics include the facility amount, maturity, collateral requirements, purpose, and type. Industry (two-digit SIC codes), borrower, and lender fixed effects are controlled for in the model. The standard errors are clustered by borrower and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	Ln(ESG)	Ln(ESG)	Ln(ESG)
Lender ESG	0.009***	0.005***	0.014***
	(8.93)	(9.53)	(11.08)
Ln(Asset)	0.029***	-0.004	-0.017*
	(4.86)	(-0.38)	(-1.85)
Market-to-Book	-0.006	0.007	-0.005
	(-0.93)	(0.91)	(-0.65)
Cash	0.142**	0.032	0.053
	(2.47)	(0.61)	(1.12)
Book Leverage	-0.025	0.055	0.052
	(-0.73)	(1.41)	(1.52)
Credit Rating	0.002	-0.000	0.001
	(1.00)	(-0.03)	(0.22)
Term Spread	-0.033***	-0.033***	-0.013*
	(-3.50)	(-4.69)	(-1.83)
Credit Spread	-0.035*	-0.065***	-0.038***
	(-1.87)	(-4.94)	(-2.86)
Clustering	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes
Borrower FEs	No	Yes	Yes
Lender FEs	No	No	Yes
N	6908	6889	6888
R^2	0.428	0.875	0.889

Appendix C. Regressions of Loan Spreads on ESG Sub-components

The following table reports the regressions of the yield spreads on the borrowers' ESG sub-components. Panel A documents the results based on a borrower's environmental (E) score; Panel B provides the results based on a borrower's social (S) score; Panel C reports the results based on a borrower's governance (G) score. Columns 1 to 4 provide the estimates based on the full sample. Columns 5 to 8 document the estimates based on the subsample of the low high ESG banks. Columns 9 to 12 document the estimates based on the subsample of the high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG ratings. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG ratings. The dependent variable is the natural logarithm of the all-in-drawn loan spreads and the independent variable of interest is the natural logarithm of the ESG sub-components. The definitions of other variables are given in Appendix A. Loan characteristics include the facility amount, maturity, collateral requirements, purpose, and type. Industry (two-digit SIC codes), borrower, and lender fixed effects are controlled for in the model. The standard errors are clustered by borrower and year. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Regressions of loan spreads on borrowers' environmental (E) ratings

	(1) All Ln(Spread)	(2) All Ln(Spread)	(3) All Ln(Spread)	(4) All Ln(Spread)	(5) Low ESG banks Ln(Spread)	(6) Low ESG banks Ln(Spread)	(7) Low ESG banks Ln(Spread)	(8) Low ESG banks Ln(Spread)	(9) High ESG banks Ln(Spread)	(10) High ESG banks Ln(Spread)	(11) High ESG banks Ln(Spread)	(12) High ESG banks Ln(Spread)
Ln(E)	-0.190**	-0.191**	-0.197**	-0.200***	-0.403***	-0.404***	-0.421***	-0.427***	-0.176*	-0.193*	-0.186*	-0.201**
	(-2.40)	(-2.43)	(-2.58)	(-2.65)	(-3.58)	(-3.51)	(-3.68)	(-3.64)	(-1.81)	(-1.94)	(-1.96)	(-2.09)
Relationship Length	-0.002***	-0.002***			-0.010**	-0.012***			-0.002*	-0.002		
	(-3.50)	(-3.26)			(-2.44)	(-2.82)			(-1.87)	(-1.43)		
Relationship Strength			-0.008***	-0.010***			-0.020**	-0.023***			-0.008**	-0.008**
			(-4.65)	(-4.92)			(-2.57)	(-2.82)			(-2.46)	(-2.31)
Ln(Asset)	-0.107***	-0.108***	-0.102***	-0.102***	-0.102**	-0.095*	-0.088*	-0.078	-0.067	-0.065	-0.064	-0.061
	(-3.24)	(-3.31)	(-3.12)	(-3.15)	(-2.08)	(-1.84)	(-1.77)	(-1.49)	(-1.15)	(-1.13)	(-1.10)	(-1.07)
Market-to-Book	-0.095***	-0.095***	-0.094***	-0.093***	-0.069*	-0.060	-0.069*	-0.058	-0.135***	-0.139***	-0.133***	-0.136***
	(-3.23)	(-3.28)	(-3.20)	(-3.23)	(-1.69)	(-1.46)	(-1.68)	(-1.43)	(-2.78)	(-2.82)	(-2.72)	(-2.75)
Cash	0.199	0.215	0.193	0.206	-0.268	-0.221	-0.274	-0.228	0.741***	0.784***	0.738***	0.783***
	(0.85)	(0.92)	(0.83)	(0.90)	(-0.82)	(-0.70)	(-0.84)	(-0.72)	(2.66)	(2.81)	(2.65)	(2.80)
Book Leverage	0.471***	0.477***	0.473***	0.481***	0.394**	0.425**	0.419**	0.453**	0.493**	0.515***	0.504***	0.529***
	(4.11)	(4.17)	(4.14)	(4.24)	(2.25)	(2.38)	(2.36)	(2.52)	(2.56)	(2.65)	(2.61)	(2.71)
Credit Rating	-0.036***	-0.036***	-0.035***	-0.036***	-0.021**	-0.023**	-0.021**	-0.023**	-0.066***	-0.066***	-0.065***	-0.066***
	(-4.64)	(-4.68)	(-4.64)	(-4.68)	(-2.14)	(-2.30)	(-2.13)	(-2.30)	(-5.01)	(-4.97)	(-5.05)	(-5.01)
Term Spread	0.074***	0.074***	0.070***	0.068***	0.022	0.021	0.017	0.016	0.089***	0.088***	0.085***	0.082***
	(3.91)	(3.95)	(3.75)	(3.74)	(0.70)	(0.67)	(0.53)	(0.51)	(3.36)	(3.45)	(3.22)	(3.28)
Credit Spread	0.080*	0.082*	0.075*	0.076*	-0.027	-0.010	-0.027	-0.008	0.087	0.076	0.085	0.071
	(1.81)	(1.90)	(1.71)	(1.77)	(-0.34)	(-0.13)	(-0.34)	(-0.10)	(1.40)	(1.22)	(1.36)	(1.15)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FEs	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	6876	6875	6876	6875	879	877	879	877	1658	1654	1658	1654
R^2	0.861	0.863	0.861	0.863	0.878	0.882	0.878	0.882	0.895	0.896	0.895	0.897

Appendix C. Regressions of Loan Spreads on ESG Sub-components

Panel B: Regressions of loan spreads on borrowers' social (S) ratings

	(1) All Ln(Spread)	(2) All Ln(Spread)	(3) All Ln(Spread)	(4) All Ln(Spread)	(5) Low ESG banks Ln(Spread)	(6) Low ESG banks Ln(Spread)	(7) Low ESG banks Ln(Spread)	(8) Low ESG banks Ln(Spread)	(9) High ESG banks Ln(Spread)	(10) High ESG banks Ln(Spread)	(11) High ESG banks Ln(Spread)	(12) High ESG banks Ln(Spread)
Ln(S)	-0.325***	-0.324***	-0.327***	-0.326***	-0.621***	-0.597***	-0.633***	-0.613***	-0.196*	-0.192*	-0.199**	-0.193*
	(-3.85)	(-3.89)	(-3.96)	(-4.02)	(-4.56)	(-4.22)	(-4.62)	(-4.31)	(-1.90)	(-1.87)	(-1.97)	(-1.92)
Relationship Length	-0.002***	-0.002***			-0.011***	-0.011***			-0.002*	-0.002		
	(-3.51)	(-3.18)			(-2.67)	(-2.73)			(-1.77)	(-1.28)		
Relationship Strength			-0.008***	-0.009***			-0.021***	-0.021***			-0.007**	-0.007**
			(-4.53)	(-4.70)			(-2.76)	(-2.66)			(-2.27)	(-2.08)
Ln(Asset)	-0.127***	-0.129***	-0.124***	-0.124***	-0.138***	-0.135***	-0.125**	-0.122**	-0.095	-0.095	-0.093	-0.093
	(-3.93)	(-4.01)	(-3.83)	(-3.88)	(-2.88)	(-2.70)	(-2.56)	(-2.38)	(-1.63)	(-1.65)	(-1.61)	(-1.62)
Market-to-Book	-0.092***	-0.092***	-0.091***	-0.091***	-0.056	-0.051	-0.056	-0.050	-0.140***	-0.145***	-0.138***	-0.142***
	(-3.18)	(-3.23)	(-3.15)	(-3.18)	(-1.34)	(-1.22)	(-1.33)	(-1.20)	(-2.92)	(-2.99)	(-2.87)	(-2.93)
Cash	0.189	0.205	0.183	0.196	-0.239	-0.195	-0.245	-0.200	0.699**	0.741***	0.695**	0.739***
	(0.82)	(0.89)	(0.80)	(0.86)	(-0.82)	(-0.67)	(-0.84)	(-0.70)	(2.50)	(2.64)	(2.49)	(2.63)
Book Leverage	0.530***	0.535***	0.532***	0.539***	0.462***	0.478***	0.487***	0.504***	0.562***	0.583***	0.574***	0.596***
	(4.55)	(4.61)	(4.59)	(4.67)	(2.67)	(2.69)	(2.78)	(2.82)	(2.89)	(2.97)	(2.95)	(3.03)
Credit Rating	-0.036***	-0.036***	-0.036***	-0.036***	-0.022**	-0.025**	-0.022**	-0.025**	-0.063***	-0.064***	-0.063***	-0.063***
	(-4.70)	(-4.74)	(-4.70)	(-4.74)	(-2.21)	(-2.38)	(-2.23)	(-2.41)	(-4.81)	(-4.75)	(-4.84)	(-4.78)
Term Spread	0.075***	0.075***	0.071***	0.070***	0.023	0.024	0.019	0.020	0.094***	0.094***	0.090***	0.090***
	(3.91)	(3.98)	(3.76)	(3.78)	(0.78)	(0.81)	(0.62)	(0.68)	(3.46)	(3.63)	(3.35)	(3.50)
Credit Spread	0.074*	0.077*	0.070	0.072*	-0.030	-0.014	-0.028	-0.011	0.089	0.080	0.087	0.077
	(1.67)	(1.77)	(1.59)	(1.67)	(-0.39)	(-0.19)	(-0.37)	(-0.15)	(1.38)	(1.25)	(1.36)	(1.20)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FEs	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	6876	6875	6876	6875	879	877	879	877	1658	1654	1658	1654
R^2	0.862	0.863	0.862	0.864	0.882	0.884	0.882	0.884	0.894	0.896	0.895	0.896

Appendix C. Regressions of Loan Spreads on ESG Sub-components

Panel C: Regressions of loan spreads on borrowers' governance (G) ratings

	(1) All Ln(Spread)	(2) All Ln(Spread)	(3) All Ln(Spread)	(4) All Ln(Spread)	(5) Low ESG banks Ln(Spread)	(6) Low ESG banks Ln(Spread)	(7) Low ESG banks Ln(Spread)	(8) Low ESG banks Ln(Spread)	(9) High ESG banks Ln(Spread)	(10) High ESG banks Ln(Spread)	(11) High ESG banks Ln(Spread)	(12) High ESG banks Ln(Spread)
Ln(G)	-0.023	-0.016	-0.027	-0.020	0.029	0.097	0.032	0.101	0.024	-0.015	0.011	-0.025
	(-0.18)	(-0.13)	(-0.22)	(-0.17)	(0.17)	(0.56)	(0.19)	(0.57)	(0.13)	(-0.09)	(0.06)	(-0.14)
Relationship Length	-0.002***	-0.002***			-0.010**	-0.013***			-0.002*	-0.002		
	(-3.55)	(-3.31)			(-2.45)	(-2.80)			(-1.89)	(-1.50)		
Relationship Strength			-0.008***	-0.009***			-0.018**	-0.022**			-0.007**	-0.007**
			(-4.61)	(-4.86)			(-2.34)	(-2.57)			(-2.30)	(-2.17)
Ln(Asset)	-0.119***	-0.121***	-0.116***	-0.116***	-0.131***	-0.125**	-0.121**	-0.114**	-0.093	-0.093	-0.092	-0.091
	(-3.64)	(-3.71)	(-3.54)	(-3.58)	(-2.60)	(-2.34)	(-2.39)	(-2.11)	(-1.59)	(-1.61)	(-1.58)	(-1.59)
Market-to-Book	-0.099***	-0.099***	-0.098***	-0.098***	-0.083*	-0.070	-0.084*	-0.070	-0.143***	-0.148***	-0.141***	-0.146***
	(-3.34)	(-3.38)	(-3.32)	(-3.35)	(-1.94)	(-1.64)	(-1.96)	(-1.65)	(-2.91)	(-2.99)	(-2.87)	(-2.94)
Cash	0.185	0.200	0.178	0.191	-0.311	-0.228	-0.313	-0.229	0.717**	0.764***	0.715**	0.762***
	(0.78)	(0.85)	(0.76)	(0.82)	(-0.94)	(-0.71)	(-0.95)	(-0.72)	(2.56)	(2.72)	(2.55)	(2.72)
Book Leverage	0.489***	0.494***	0.491***	0.498***	0.366*	0.380**	0.383**	0.399**	0.539***	0.564***	0.552***	0.578***
	(4.07)	(4.12)	(4.10)	(4.19)	(1.94)	(2.01)	(2.02)	(2.11)	(2.75)	(2.88)	(2.81)	(2.94)
Credit Rating	-0.036***	-0.036***	-0.036***	-0.036***	-0.027***	-0.029***	-0.027***	-0.029***	-0.063***	-0.063***	-0.063***	-0.063***
	(-4.58)	(-4.61)	(-4.57)	(-4.60)	(-2.69)	(-2.82)	(-2.71)	(-2.86)	(-4.83)	(-4.77)	(-4.86)	(-4.79)
Term Spread	0.088***	0.088***	0.084***	0.083***	0.054*	0.053*	0.052*	0.051*	0.103***	0.102***	0.100***	0.099***
	(4.80)	(4.87)	(4.65)	(4.66)	(1.86)	(1.84)	(1.76)	(1.77)	(3.94)	(4.11)	(3.84)	(3.97)
Credit Spread	0.103**	0.105**	0.099**	0.101**	0.013	0.029	0.016	0.034	0.110*	0.100	0.109*	0.096
	(2.37)	(2.48)	(2.29)	(2.38)	(0.17)	(0.38)	(0.21)	(0.45)	(1.77)	(1.61)	(1.75)	(1.56)
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FEs	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	6876	6875	6876	6875	879	877	879	877	1658	1654	1658	1654
R^2	0.860	0.862	0.860	0.862	0.874	0.878	0.874	0.878	0.894	0.896	0.894	0.896

Appendix D. Changes in ESG Sub-components around Loan Contracts

The following table reports the regressions of net changes in borrower ESG sub-components over different windows around loan contracts. The event windows are defined as one, two, three, and four quarters before and after each facility's start date. Panel A documents the results based on a borrower's environmental (E) score; Panel B provides the results based on its social (S) score; Panel C reports the results based on its corporate governance (G) score. Across the Panels, Columns 1 to 4 document the estimates based on the full sample. Columns 5 to 8 report regressions based on the subsample of borrowers associating with low ESG banks. Columns 9 to 12 report regressions based on the subsample of borrowers associating with high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG scores. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG scores. The dependent variable is the net changes in borrower ESG ratings, and the independent variable of interest is Post that takes the value of one for the net changes in ESG after the loan contract and zero otherwise. Borrower fixed effects are controlled for in the model. The standard errors are clustered by the borrower level. T-statistics are reported in parentheses. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Changes in environmental (E) components

	(1) All E	(2) All E	(3) All E	(4) All E	(5) Low ESG banks E	(6) Low ESG banks E	(7) Low ESG banks E	(8) Low ESG banks E	(9) High ESG banks E	(10) High ESG banks E	(11) High ESG banks E	(12) High ESG banks E
Post	-0.500***	-0.577***	-0.751***	-0.781***	0.050	0.045	-0.095	-0.196	-0.862***	-0.986***	-1.182***	-1.165***
	(-4.15)	(-3.57)	(-3.74)	(-3.67)	(0.38)	(0.27)	(-0.45)	(-0.83)	(-5.65)	(-4.73)	(-4.65)	(-4.24)
Windows	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13024	13056	13056	13056	5174	5180	5180	5180	7850	7876	7876	7876
R^2	0.152	0.153	0.162	0.175	0.186	0.170	0.185	0.182	0.190	0.185	0.188	0.205

Appendix D. Changes in ESG Sub-components around Loan Contracts

Panel B: Changes in social (S) components

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All	All	All	All	Low ESG banks	Low ESG banks	Low ESG banks	Low ESG banks	High ESG banks	High ESG banks	High ESG banks	High ESG banks
	S	S	S	S	S	S	S	S	S	S	S	S
Post	-0.272**	-0.254*	-0.318*	-0.560***	-0.074	-0.006	-0.061	-0.251	-0.402***	-0.417**	-0.487**	-0.763***
	(-2.45)	(-1.83)	(-1.85)	(-2.82)	(-0.59)	(-0.04)	(-0.33)	(-1.15)	(-2.87)	(-2.48)	(-2.36)	(-3.17)
Windows	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13024	13056	13056	13056	5174	5180	5180	5180	7850	7876	7876	7876
R^2	0.167	0.169	0.176	0.178	0.198	0.235	0.240	0.234	0.194	0.178	0.187	0.196

Panel C: Changes in corporate governance (G) components

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All	All	All	All	Low ESG banks	Low ESG banks	Low ESG banks	Low ESG banks	High ESG banks	High ESG banks	High ESG banks	High ESG banks
	G	G	G	G	G	G	G	G	G	G	G	G
Post	-0.010	-0.061	-0.015	-0.113	0.063	-0.039	0.037	0.038	-0.058	-0.076	-0.050	-0.212
	(-0.10)	(-0.46)	(-0.10)	(-0.68)	(0.49)	(-0.27)	(0.22)	(0.20)	(-0.49)	(-0.43)	(-0.24)	(-0.97)
Windows	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$	$\pm 1qtr$	$\pm 2qtr$	$\pm 3qtr$	$\pm 4qtr$
Clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	13024	13056	13056	13056	5174	5180	5180	5180	7850	7876	7876	7876
R^2	0.179	0.168	0.164	0.163	0.216	0.215	0.203	0.203	0.195	0.170	0.175	0.175

Appendix E. Changes in Overall ESG around Loan Contracts

The following table reports the average changes in ESG over different windows around loan contracts. The event windows are defined as one, two, three, and four quarters before and after each facility's start date. Panel A documents the results based on the full sample. Panel B reports the statistics based on the subsample of borrowers associating with low ESG banks. Panel C reports the statistics based on the subsample of borrowers associating with high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG scores. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG scores. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Changes in ESG based on the full sample

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.3628	0.0419	0.3209***	9.35
N	6518	6518		
q=2	0.4513	0.1054	0.3459***	7.32
N	6534	6534		
q=3	0.5668	0.1402	0.4266***	7.69
N	6534	6534		
q=4	0.7665	0.2159	0.5506***	8.69
N	6534	6534		

Appendix E. Changes in Overall ESG around Loan Contracts

Panel B: Changes in ESG based on the subsample of borrowers associating with low ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.1777	0.1567	0.021	0.44
N	2591	2591		
q=2	0.2741	0.2589	0.0152	0.23
N	2594	2594		
q=3	0.3934	0.324	0.0694	0.87
N	2594	2594		
q=4	0.638	0.4469	0.1911**	2.12
N	2594	2594		

Panel C: Changes in ESG based on the subsample of borrowers associating with high ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.4849	-0.0339	0.5188***	10.96
N	3927	3927		
q=2	0.568	0.0044	0.5636***	8.61
N	3940	3940		
q=3	0.6811	0.0193	0.6618***	8.78
N	3940	3940		
q=4	0.8512	0.0638	0.7873***	9.1
N	3940	3940		

Appendix F. Changes in ESG Sub-components around Loan Contracts

The following table reports the average changes in ESG sub-components over different windows around loan contracts. The event windows are defined as one, two, three, and four quarters before and after each facility's start date. Panels A to C document the results based on the environmental (E) components. Panels D to F report the statistics based on the social (S) components. Panels G to I report the statistics based on the corporate governance (G) components. Panels A, D, and G document the results based on the full sample. Panels B, E, and H report the statistics based on the subsample of borrowers associating with low ESG banks. Panels C, F, and I report the statistics based on the subsample of borrowers associating with high ESG banks. Low ESG banks are defined as those in the lower quintile of the weighted average of their borrowers' ESG scores. High ESG banks are defined as those in the upper quintile of the weighted average of their borrowers' ESG scores. The symbols *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Changes in E components based on the full sample

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.6658	0.1658	0.5***	8.83
N	6512	6512		
q=2	0.7848	0.2077	0.5771***	7.46
N	6528	6528		
q=3	0.985	0.2341	0.7509***	8.4
N	6528	6528		
q=4	1.2347	0.4541	0.7805***	7.76
N	6528	6528		

Appendix F. Changes in ESG Sub-components around Loan Contracts

Panel B: Changes in E based on the subsample of borrowers associating with low ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.2808	0.3305	-0.0497	-0.63
N	2587	2587		
q=2	0.4129	0.4582	-0.0453	-0.42
N	2590	2590		
q=3	0.7378	0.6427	0.0951	0.73
N	2590	2590		
q=4	1.074	0.8781	0.1959	1.36
N	2590	2590		

Panel C: Changes in E based on the subsample of borrowers associating with high ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.9196	0.0573	0.8623***	11.05
N	3925	3925		
q=2	1.0295	0.043	0.9865***	9.27
N	3938	3938		
q=3	1.1476	-0.0346	1.1822***	9.80
N	3938	3938		
q=4	1.3403	0.1753	1.1650***	8.49
N	3938	3938		

Appendix F. Changes in ESG Sub-components around Loan Contracts

Panel D: Changes in S components based on the full sample

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.2203	-0.0512	0.2715***	5.95
N	6512	6512		
q=2	0.3364	0.0826	0.2538***	3.98
N	6528	6528		
q=3	0.4516	0.1339	0.3176***	4.15
N	6528	6528		
q=4	0.7227	0.1628	0.5599***	6.35
N	6528	6528		

Panel E: Changes in S based on the subsample of borrowers associating with low ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.0672	-0.0070	0.0742	1.19
N	2587	2587		
q=2	0.1114	0.1053	0.0061	0.07
N	2590	2590		
q=3	0.1282	0.0675	0.0606	0.55
N	2590	2590		
q=4	0.4176	0.1667	0.2509**	1.96
N	2590	2590		

Panel F: Changes in S based on the subsample of borrowers associating with high ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.3213	-0.0803	0.4016***	6.32
N	3925	3925		
q=2	0.4844	0.0677	0.4167***	4.79
N	3938	3938		
q=3	0.6642	0.1776	0.4866***	4.70
N	3938	3938		
q=4	0.9233	0.1602	0.7631***	6.38
N	3938	3938		

Appendix F. Changes in ESG Sub-components around Loan Contracts

Panel G: Changes in G components based on the full sample

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.0928	0.0831	0.0097	0.23
N	6512	6512		
q=2	0.1509	0.0896	0.0613	1.11
N	6528	6528		
q=3	0.1530	0.1380	0.0150	0.23
N	6528	6528		
q=4	0.1947	0.0815	0.1133	1.51
N	6528	6528		

Panel H: Changes in G based on the subsample of borrowers associating with low ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.1284	0.1914	-0.0630	-0.99
N	2587	2587		
q=2	0.2515	0.2125	0.0390	0.46
N	2590	2590		
q=3	0.2559	0.2934	-0.0375	-0.38
N	2590	2590		
q=4	0.2617	0.2993	-0.0376	-0.34
N	2590	2590		

Panel I: Changes in G based on the subsample of borrowers associating with high ESG banks

	Before [t-q, t)	After (t, t+q]	Mean-Diff	*t*-stat
q=1	0.0693	0.0117	0.0576	1.05
N	3925	3925		
q=2	0.0847	0.0087	0.0760	1.04
N	3938	3938		
q=3	0.0854	0.0358	0.0495	0.56
N	3938	3938		
q=4	0.1507	-0.0618	0.2125**	2.11
N	3938	3938		