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Environmental Incidents and Sustainability Pricing Provisions

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Environmental Incidents and Sustainability Pricing Provisions*

Abstract

We investigate whether lenders employ sustainability pricing provisions to manage borrowers' environmental risk. Using unexpected negative environmental incidents of borrowers as exogenous shocks that reveal information on environmental risk, we find that lenders manage borrowers' environmental risk by conventional tools such as imposing higher interest rates, utilizing financial and net worth covenants, showing reluctance to refinance, and demanding increased collateral. In contrast, the inclusion of sustainability pricing provisions in loan agreements for high environmental risk borrowers is reduced by 11 percentage points. Our study suggests that sustainability pricing provisions may not primarily serve as risk management tools but rather as instruments to attract demand from institutional investors and facilitate secondary market transactions.

Keywords: bank monitoring, environmental risk, institutional investors, sustainability pricing provisions

JEL classification: G21, G28, K21

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1 Introduction

Since 2017, there has been a significant increase in the use of sustainability pricing provisions in loan contracts. The total issuance volume of these loans has rapidly risen from over $2 billion in 2017 to more than $480 billion by the end of 2022. This trend has sparked a heated debate on whether sustainability pricing provisions can play a role in promoting environmental sustainability. However, the landscape shifted significantly in 2023, marked by escalating regulatory scrutiny and concerns over the susceptibility of these light sustainability pricing provisions to be exploited for green washing purposes. As a result, the market for such loans experienced a substantial downturn, with issuance volumes plummeting by 36%, dropping from $480 billion in 2022 to $310 billion in 2023.[1]

Sustainability pricing provisions are contractual agreements included in loan contracts that impose specific environmental performance standards and obligations on borrowers. These conditions often relate to carbon emission targets or alignment with the Paris Agreement. Failing to meet these standards, lenders could charge borrowers higher interest rates or reduce credit supply. In contrast, upon achieving these targets, lenders could increase credit supply or reduce interest rates for these borrowers. However, skeptics argue that these provisions may merely serve as window dressing, allowing institutions to portray a perception of environmental responsibility without inducing substantial impact on the transition.

[Insert Figure 1]

In this paper, we exploit the negative environmental incidents as shocks that reveal borrowers' environmental risk in the United States (U.S.) between 2017 and 2022, and investigate if lenders employ sustainability pricing provisions to monitor borrowers with poor environmental records. In addition, we compare the use of sustainability pricing provisions to conventional loan pricing, financial, and net-worth covenants to understand whether sustainability pricing provisions are used for risk management or greenwashing

[1] "Loans linked to ESG face overhaul by under-pressure banks", Reuters (2023)

purposes. Finally, we explore the underlying mechanism of why lenders employ sustainability pricing provisions in loan contracts, specifically investigating whether such provisions are strategically used to attract institutional investors.

To measure the borrowers' environmental risks, we collect information on negative environmental incidents from Reprisk. Previous studies have underscored the challenges in empirically quantifying environmental risk. In a recent study, Edmans (2023) underscores that the absence of standardized and transparent Environmental, Social, and Governance (ESG) metrics can exacerbate greenwashing practices. Datasets commonly utilized by investors and creditors to assess firms' environmental risk are frequently based on self-reported carbon emissions or information disclosed at annual general meetings. These sources, however, are prone to selection bias, as firms with environmentally conscious practices may be more inclined to disclose their emissions data. Moreover, firm activities such as the disposal of hazardous chemicals and the pollution of water and land resources can significantly harm the environment. To address these issues, we employ RepRisk data on negative environmental incidents. Reprisk data collects information from over 100,000 media, stakeholder, and third-party reports daily to identify negative ESG practices within firms. A notable benefit of leveraging RepRisk Environmental Incident data is that it reduces the concerns related to greenwashing bias, attributed to its reliance on external negative news coverage (Berger et al., 2020). This database is unique in its ability to detect and categorize instances of misleading ESG communication by firms. Our analysis is focused on environmental incidents, correlating with the sustainability pricing provisions of syndicated loans in our dataset, dependent upon the environmental conduct of the borrowing firms. During our research period, approximately 22% of the borrowers in our study have experienced at least one negative environmental incident.

Our findings indicate that lenders are 11 percentage points (p.p.) less inclined to employ sustainability pricing provisions in the loan contract when a borrower has a negative environmental incident in the previous year. In contrast, within a year of a borrower's

negative environmental incident, lenders charge higher interest rates (18%), are 18 p.p. more likely to impose net worth and financial covenants, and 7 p.p. more likely to demand additional collateral.

The reluctance of lenders to implement sustainability pricing provisions for borrowers with environmental risks motivates us to investigate the underlying motives for these decisions. There has been evidence that the popularity of Sustainability Linked Loans is partly driven by the robust demand from institutional investors. We examine whether sustainability pricing provisions are employed as a strategy to attract institutional investors, thereby enabling banks to offload these loans from their balance sheets to third party loan purchasers. We follow Becker and Ivashina (2016) to measure institutional participation in the loan syndication if hedge funds, private equity funds, mutual funds, and pension funds are participants in the loan contracts. Our research unveils novel evidence indicating an 16 p.p. increase in the probability of incorporating sustainability pricing provisions in loan contracts when at least one institutional investor partakes in the loan syndication. This trend is mirrored when utilizing term B loans as a proxy for institutional investor demand, as these loans are predominantly sold to institutional investors in securitization markets (Gallo and Park, 2022). Specifically, the inclusion of sustainability pricing provisions is 4 p.p. more likely when the loan issued to a borrower with a negative environmental covenant is a term B loan. Moreover, our findings reveal that when institutional investors participated in loans that are originated to borrowers with a record of negative environmental incidents, these loans tend to have lower interest rates, less collateral requirements, and less likely to have net worth and financial covenants.

Finally, we document heterogeneous effects across lenders in our sample. Green banks and banks with long-term relationships with borrowers are less likely to include sustainability pricing provisions in loan contracts after the borrower experiences a negative environmental incident. Non-bank lenders known to be active in secondary markets for loan sales are

more likely to use sustainability pricing provisions in contracts with high environmental risk borrowers.

We rule out that our findings are driven by alternative explanations. First, we show that it is the borrowers' environmental risk that leads to changes in the use of sustainability pricing provisions rather than social or governance risks. Our findings remain intact when we control for borrowers' financial constraints and credit risk. Alternative methodologies such as the use of propensity score matching do not change our findings. We also show that bank specific characteristics cannot solely explain the use of sustainability pricing provisions.

Our results are important for three reasons. First, we provide direct evidence that sustainability pricing provisions at their current forms do not serve as risk management tools. Lenders are less likely to use them to penalize borrowers with poor environmental records. Instead, when environmental risks are material, lenders resort to traditional pricing and monitoring tools such as raising interest rates, demanding collateral, and including financial and net worth covenants. Second, our results provide insights into the debate on the design of regulations that aim to boost sustainable finance. For example, since 2021, the European Central Bank has accepted sustainability-linked bonds (SLBs) as eligible collateral for Eurosystem credit operations and monetary policy purchases. Given that the sustainability pricing provisions designed for SLBs are similar to those of sustainability-linked loans, we argue that these covenants may serve to create an image of holding sustainable assets for lenders without improvement on the borrowers' sustainable performance.

Third, since having sustainability pricing provisions in loan contracts can attract institutional investors even when borrowers in the preceding year have negative environmental incidents, our finding flags the greenwashing motives of institutional investors as it appears they may be acquiring loans from companies with subpar environmental track records, despite their declarations of investing in green assets.

Our paper relates to several strands of literature. First, we contribute to the growing literature on how sustainability-linked financial instruments affect firms' ESG performance.

These studies often focus on two main instruments: SLBs, and sustainability linked loans (SLLs). For example, Flammer (2021) shows that investors react positively on news related to issuance of green bonds and that firms that issued green bonds are more likely to see a decline in carbon emissions. Kölbel and Lambillon (2022) find that issuers of SLBs enjoy paying lower coupons without reaching the sustainability targets. Auzepy et al. (2022) shows that the use of SLL is only weakly linked to the sustainability performance of firms and it does not lead to an improvement in borrowers' ESG practices. Barbalau and Zeni (2022) illustrate that sustainability-linked debt securities have lower credit rating, higher yields and are issued by more emissions intensive firms. On the use of SLLs, Loumioti and Serafeim (2022) show that loans with sustainability pricing provisions have lower interest rates. They also document an important phenomenon that firms with high ESG risk are less likely to include granular key performing indicators on sustainability such as a reduction in carbon emissions or improvement in working conditions. These firms however are more likely to include aggregate sustainability targets in the loan contracts such as improvement in ESG scores. Our definition of loans with sustainability pricing provisions differs than SLLs in the sense that we only consider loans with pricing provisions based on borrowers' future sustainability performance whereas SLLs could contain loans for sustainability purposes but do not contain any sustainability pricing provisions. We contribute to this strand of literature by documenting how lenders influence their use of sustainability pricing provisions for high environmental risk borrowers. We further show that lenders use sustainability pricing provisions to attract institutional investors in participating in the syndication rather than serving as monitoring tools for environment performance of borrowers.

Second, we contribute to the literature on how banks account for the firms' environmental risk in their lending decisions. Recent evidence suggests that banks incorporate environmental risk into their loan pricing. Firms with higher carbon emissions or fossil fuel reserves pay higher interest rates, while firms that disclose environmental information receive more favorable terms (Chava, 2014; Degryse et al., 2021; Delis et al., 2021). Moreover,

a paucity of studies show banks respond to information that conveys signals about borrowers' climate change risk by reducing credit supply, charging higher interest rates, or securitizing loans (Chava, 2014; Delis et al., 2019a; Anginer et al., 2021; Mueller and Sfrappini, 2021; Müller et al., 2022; Kacperczyk and Peydró, 2021a). Mueller and Sfrappini (2021) show that banks lend more to companies that are likely to benefit from the introduction of environmental regulations, while Kacperczyk and Peydró (2021b) find that companies with high carbon emissions receive less funding after banks commit to sustainable lending. Ivanov et al. (2021) show that carbon pricing policies lead high-emission firms not only to face higher interest rates but also to shorter loan maturities and lower access to bank loans. Houston and Shan (2022) show that banks can significantly influence firms' ESG policies through partnering with borrowers who have similar ESG ratings. In contrast to these papers, we focus on the use of sustainability pricing provisions in loan contracts and compare them with traditional risk pricing and monitoring tools. Our paper also distinguishes itself from other papers by assessing the impact of non-bank institutional lenders on how banks price and monitor borrowers' environmental risk.

Third, we contribute to the literature on the determinant of performance pricing. Theoretically, when studying the design of pricing contingencies in debt contracts, Aghion et al. (1994) find that specific performance contracts can reduce renegotiation costs between creditors and debtors when future performance of debtors are hard to verify. The implication of their theory for our paper is that given environmental risk is hard to measure and may change unpredictably in the future, lenders could use sustainability pricing provisions to manage the risk. Manso et al. (2010) find that consistent with the pecking-order theory, performance pricing provisions in debt contracts can be used as an inexpensive screening device. Firms who choose loans with performance pricing provisions are more likely to improve their credit ratings compared to firms who choose fixed rate loans. Empirically, previous studies show that contingent pricing provisions are more popular when lenders find it hard to determine borrowers' risk level (Asquith et al., 2005) and during periods characterized

by transitory uncertainty (Kim and Nguyen, 2023). Adam and Streitz (2016) show that performance sensitive debt reduce hold-up problem in long term lending relationships because they limit the discretion of the lender in these circumstances. By pre-determining the rate adjustments if the borrower's performance changes, performance sensitive debt avoids debt renegotiations under uncertainty about borrowers' future performance. Building upon this strand of literature, our study suggests that sustainability pricing provisions have potentials to be an effective tool in managing borrowers' environmental risk. However, empirically, sustainability contingent pricing provisions at its current forms do not serve this purpose.

Finally, we contribute to the literature on how market participants react to negative ESG news. Previous studies often focus on equity holders' perspectives. For example, Krüger (2015) shows that investors respond strongly and negatively to negative news on firms' corporate social responsibilities (CSR). However, they react weakly and negatively to positive CSR events. Ilhan et al. (2021) document a significantly positive association between climate-conscious institutional ownership and better firm-level climate risk disclosure. Using mutual fund data, Hartzmark and Sussman (2019) document a large net outflows for funds being categorized as low sustainability. Fewer studies focus on how banks respond to negative ESG news of their borrowers. Hrazdil et al. (2023) show that banks originate loans with shorter maturities, demand more collateral and require more covenant restrictions if their borrowers experience a negative ESG incident. Our study differs from these papers and show how lenders strategically do not include sustainability pricing provisions in loan contracts with borrowers who experience adverse climate incidents in the previous year.

2 Data, Sample, and Descriptive Statistics

2.1 Data and Sample

Loan-level data: Our main data source is from the Thomson Reuters LPC's DealScan which provides information on the syndicated loan market. It provides detailed loan-level

information such as lender and borrower names, date of origination, loan amount, maturity and spread. We obtain all loan facilities issued to US firms between 2017 and 2022. We keep only loan facilities that are term loans given that we do not know how much of the loan amount that borrowers receive at the origination date for revolving loans. A term loan facility is a loan facility for a specified amount, fixed repayment schedule and maturity, and is usually fully funded at origination. Following Ivashina (2009), we identify the lead banks for US deals [2] Dealscan also provides information on loan spreads (interest rates over London Interbank Offered Rate (LIBOR)), covenant, loan purposes (i.e. general corporate purposes, or for M&A, or for leverage buyouts), and loan type (Term A, B, C, D, and others) at origination.

We obtain information on sustainability pricing provisions by doing textual analysis on the tranche and/or deal remarks that the data provide. These tranche or deal remarks are free-text fields that is sourced from regulatory filings and bank submissions. These remarks help us to identify reports of the contract feature which contains pricing conditions that can be adjusted depending on the borrowers' future sustainable performance. We search for tranches that have "green" or "sustainability-linked" "reduction of carbon emissions" or "Sustainability-linked pricing adjustment" in their Tranche Remark to classify them as loans with sustainability pricing provisions. These tranche remarks also contain additional information or comments about loan purpose, structure, pricing, fees, covenants, or other relevant details. For example, A loan facility from Lender A to Borrower B has the following in its tranche remark as part of the contract feature: *"Pricing: Margin adjustment may apply based on co.'s achievement of sustainability-linked targets related to its greenhouse gas emissions" or "Pricing: CSA = 10bp. Upon achieving the sustainability-linked targets, facility pricing may be adjusted".* We obtain 541 sustainability-linked loans (SLLs) and 58,953 that are not SLLs in our sample period. We further identify loans with sustainability

[2]The lead bank who conducts due diligence, handles all the payments, and monitors the loan can be from one of the following titles: administrative agent, agent, arranger, bookrunner, lead arranger, lead bank, or lead manager.

pricing provisions as SLLs with a pricing condition tied to future sustainability performance of borrowers. We have 344 loan contracts with sustainability pricing provisions in our sample versus 59,150 that do not have sustainability pricing provisions. During the period, we see that most of all the sustainability pricing provisions in our sample are related to future environmental performance of borrowers.

We are also able to observe the involvement of institutional investors in each syndication. Following Becker and Ivashina (2016), we classify a syndicated loan that has an institutional investor if any of the participants is a hedge fund, a private equity fund, a mutual fund, or a pension fund. We also use an alternative measurement for the participation of institutional investors – whether the loan is a term B loan given that all term B loans are structured to be sold to institutional investors in securitization markets. The second approach measures not only capture the direct participation of institutional investors in primary markets but also the involvement of institutional investors in secondary markets for loan sales.

ESG incidents data: We obtain firm-year level data on negative environmental risk incidents from RepRisk between 2017 and 2022. The purpose of the dataset is to systematically identify and assess material ESG risks of both public and private firms. RepRisk analyzes information from public sources and stakeholders, but intentionally excludes company self disclosures. The dataset captures any companies exposed to ESG risks, regardless of the company's size, sector, country of operations, or whether the company is listed or non-listed. RepRisk's core research scope includes 28 ESG categories. These issues drive the entire research process, and every risk incident in RepRisk is linked to at least one of these issues. The issues were selected and defined in accordance with the key international standards related to ESG and business conduct (e.g., World Bank Group Environmental, Health, and Safety Guidelines, IFC Performance Standards, the Equator Principles, OECD Guidelines for Multinational Enterprises, ILO Conventions, etc.)

For the purpose of our study, we focus exclusively on environmental risk incidents. Incidents specific to our borrowers during our research period can be classified into five

categories: (1) incidents related to greenhouse gas (GHG) emissions and climate change, (2) incidents related to local pollution, (3) incidents related to impacts on landscapes, ecosystems, and biodiversity, (4) incidents related to overuse and wasting of resources, and (5) incidents related to waste issues. We provide some examples of negative environmental incidents from the RepRisk covered in our sample in Appendix A1. One notable example was the oil spill scandal of Royal Dutch Shell in Nigeria in 2018 which is estimated to cause tens of millions of dollars in damages.

Borrower-level data: We obtain information for the characteristics of US borrowers from the Worldscope database. Worldscope is a database that provides financial data for mostly public companies worldwide. The data includes information on income statements, balance sheets, cash flows, ratios, segments, ownership, etc. We track the borrower characteristics in our sample through the company name across time, such as, total assets, sales, debt ratio, interest expense etc.

Lender-level data: We obtain information for the characteristics of lenders from the Orbis Bank Focus database. Merging bank level data into our sample allows us to control for the characteristics of the lenders in our sample, such as total assets and capital ratios.

2.2 Descriptive Statistics

Table 1 presents summary statistics for the variables used in our analysis from 2017 to 2022. Merging all main data sources resulting in the final sample of 6,047 loans given to 608 borrowers. Figure 1 shows the increase in the use of sustainability pricing provisions in our sample period. Figure 2 shows the distribution of sustainability pricing provisions across industries.

[Insert Table 1]

We classify two main ways that banks manage environmental risk of borrowers: the sustainability pricing provisions, and the traditional risk pricing and monitoring tools. 3.3%

of our loans have sustainability pricing provisions in the contracts, with a standard deviation of 0.179. Under the traditional risk pricing and monitoring tools, we have the loan spreads, financial and networth covenants, loan collateral and loan refinancing. Loan spreads are the difference between interest rates in basis points over the LIBOR. Covenant is an indicator variable that equals one if the loan facility has a financial covenant or a networth covenant. Collateral is an indicator variable that equals one if the loan facility is secured. Loan refinancing is an indicator variable that equals one if the loan has a refinancing option, that is, e.g. of existing debt. We report the mean log of loan spread to be 5.206, with a standard deviation of 0.552. 37.3% of our loans have at least one financial or networth covenant. 40.8% of the loans are secured by collateral and 58.7% of the loans are refinanced.

For the main variable of interest, negative environment incidence, we define as an indicator variable that equals one for negative environmental risk events. 21.6% of our borrowers reports to have a negative environmental incident within the same year that they obtained a syndicated loan. 17% of our borrowers experience a negative environmental incident one year before the origination of the loan.

[Insert Table 2]

We also show the descriptive statistics of the split sample in Table 2. Panel A of Table 2 represents the treated group which are borrowers that has a negative environment risk incidence. Panel B of Table 2 represents the control group.

3 Empirical strategy

3.1 Staggered Difference-in-differences designs

First, to investigate whether banks use sustainability pricing provisions to monitor borrowers with negative environmental risk incidences, we estimate the following LPM model at the loan level

$$\begin{aligned} \mathrm{Y}_{i,l,f,t} =& \beta_0 + \beta_1 \text{Environmental incidence}_{f,t-1} + \gamma_1 F_{f,t} + \gamma_2 L_{i,t} + \zeta_f + \zeta_l + \zeta_t \\ &+ \varepsilon_{i,l,f,t} \end{aligned} \tag{1}$$

where $\mathrm{Y}_{i,l,f,t}$ represents the distinct attributes of bank monitoring/risk pricing tools used (loan i by lender l to borrower f at time t): (1) sustainability pricing provisions, (2) loan spreads, (3) loan covenants, (4) loan collateral and (5) loan refinancing. Environmental incidence$_{f,t-1}$ is a dummy variable indicating whether borrower f experienced a negative environmental risk incidence at time t-1. $F_{f,t}$ is a vector of borrower characteristics. $L_{i,t}$ is a vector of loan characteristics. We include ζ_f, ζ_l, and ζ_t which are borrower, lender and year fixed effects respectively. This controls for time trends, time-invariant borrower and loan characteristics that might systematically affect the outcome variable. $\varepsilon_{i,l,f,t}$ is the error term. Finally, we cluster the standard errors at the level of the lenders.

The borrower controls include the natural logarithm of total assets, interest expenses, sales and debts. Loan controls include natural logarithm of loan size, maturity, and number of lenders. Both sets of controls are described in Table A1 and also provides a detailed explanation of how we constructed the variables. The main coefficient of interest is β_1 which identifies whether lenders are more or less likely to use sustainability pricing provisions, change interest rates, include financial/networth covenants, demand collateral, or decide to refinance.

Next, we explore further in the motivation of lenders to using sustainability pricing provisions and examine if they include these pricing conditions in loan contracts to satisfy the demand of institutional investors. We estimate the following LPM equation:

$$\begin{aligned} \mathrm{Y}_{i,l,f,t} =& \beta_0 + \beta_1 \text{E-incidence}_{f,t-1} + \beta_2 \text{Institutional Investors}_{i,t} + \beta_3 \text{E-incidence}_{f,t-1} \times \\ & \text{Institutional Investors}_{i,t} + \zeta_f + \zeta_t + \zeta_l + \varepsilon_{i,l,f,t} \end{aligned} \tag{2}$$

We measure the involvement of institutional investors by identifying if the loan is (1) a Term B loan and (2) has at least 1 non-bank institution as a participant in the loan syndicate.[3] All other variables stay unchanged as in Equation 1

3.2 Parallel trends

Critical to our identification strategy is the exogeneity of changes in environmental risk of borrowers with respect to lenders' decisions in using sustainability pricing provisions, loan pricing, requiring collateral, using covenants, and refinancing. The concern here is that firms experiencing environmental incidents may be riskier than other firms. Thus, they receive harsher loan terms even without any negative environmental incidents taking place. We argue that since lenders cannot precisely predict when and how severe environmental incidents happened to their borrowers, the shocks (arguably endogenous) to their borrowers serve as credible exogenous shocks to banks. Nevertheless, we examine whether parallel trends in our data are absent using the normalized difference approach by Imbens and Wooldridge (2009).

Specifically, for loans to firms with negative environmental incidents to serve as a valid counterfactual in our setup, there must be no divergence in loan characteristics in the absence of treatment. To this end, we aggregate all dependent variables to the borrower level and test if loans issued to the treated and control firms were comparable prior to the time of the environmental incidents.

Table 3 shows normalized differences between loans given to the treated and control firms. Normalized differences are calculated as averages by treatment status scaled by the square root of the sum of the variances. This approach has an advantage over the t-test as it is a scale-free measure of differences in distributions and is not dependent on the sample size (Imbens and Wooldridge, 2009). An absolute normalized difference smaller than 0.25 indicates that there is no significant difference in the evolution of characteristics between treated and control groups.

[3]Non-bank institutions include hedge funds, private equity funds, mutual funds, pension funds and endowments, insurance companies, and finance companies.

Throughout the table, it is evident that the use of sustainability pricing provisions is comparable between treated and control borrowers before the negative environmental incidents took place, as the normalized difference is 0.098 (much smaller than the 0.25 rule of thumb). Furthermore, the loan margin, covenant, collateral, and refinancing are sufficiently similar between the treatment and control groups in the absence of treatment.

[Insert Table 3]

Similarly, considering bank characteristics, we do not find any statistically significant difference in the level of bank capital that provide lending to treated and control firms. Bank size shows a weakly significant difference, with banks providing loans to treated firms being slightly smaller than banks providing loans to control firms.

4 Main Results

4.1 Environment incidence and the use of sustainability pricing provisions

Table 4 reports the results from estimating equation 1. In column 1, we observe that Environmental incidence$_{f,t-1}$ has a negative coefficient of -0.1132 and is significant at 1%. This implies that on average, the probability of having sustainability pricing provisions decreases by 11.32 percentage points when a borrower experiences a negative environmental risk incident the previous year. This suggests that lenders do not want to impose sustainability pricing provisions for high environmental risk borrowers. These findings are inline with Aleszczyk et al. (2022) who shows there is no greater pricing adjustments of SLLs for higher ESG risk borrowers. Kim et al. (2022) document how the spreads of SLLs at issuance are no different from those of non-ESG loans.

[Insert Table 4]

In column 2 to 5, we examined the effect of borrowers' environmental risk on the traditional risk pricing and monitoring tools. We find that lenders make use of these tools in contrasting manners. Particularly, banks tend to tighten these conditions after learning about borrowers' environmental risk. The coefficient on loan spreads is positive (0.1807) and significant at 1%, indicating that lenders charge 18% higher in loan spreads for borrowers with past negative environmental incidents, reflecting increased perceived risk.

We also find that banks are 18.47 p.p. more likely to include financial or networth covenants for high environmental risk borrowers compared to low environmental risk borrowers. Similarly, lenders are also 7.4 p.p. more likely to demand collateral after observing their borrowers having a negative environmental incident. A negative coefficient of loan refinancing (-0.0182) indicates that such firms find it more difficult to refinance their loans. However, this effect is not statistically significant.

Our findings show that lenders do not use sustainability pricing provisions to manage environmental risk of borrowers. Rather, they are more likely to use these conditions for low risk borrowers. This suggests a green washing motive of lenders and is in line with the findings of Carrizosa and Ghosh (2022) who examines the relevance of sustainability-linked features in bank lending and found some evidence consistent with green washing motives of creditors. Kim et al. (2022) also show that ESG scores of borrowers tend to deteriorate after the issuance of low-transparency SLLs.

4.2 Do lenders use sustainability pricing provisions to attract institutional investors?

[Insert Table 5]

Table 5 shows the estimation results of Equation 2, we show that banks are more likely to impose sustainability pricing provisions when there is at least one institutional investor participated in the syndicate or the loan is a term B loan. In column 1, the positive

coefficient of the interaction term 0.0366 shows that on average, the inclusion of Term B loans increase the probability of having sustainability pricing provisions by 3.66 p.p. with high-risk borrowers. On the traditional risk pricing and monitoring measures, our study shows that Term B loans decrease the loan pricing by 5.81 p.p. for high-risk borrowers. For loan covenant, the negative interaction term -0.1047 suggests that Term B loans decrease the likelihood of loan covenants by 10.47 p.p. for borrowers with higher environmental risk incidence. The significant negative interaction term -0.1319 implies that Term B loans decrease loan collateral requirements by 13.19 p.p. Term B loans also increases the loan refinancing opportunities by 24.09 p.p.

Alternatively, Table 6 show that when at least one institutional investor act as a participant in the syndicate, lenders are more likely to include a sustainability pricing provisions to attract these investors. However, as these loans become more liquid and will not be held in lenders' balance sheets, we find that lenders are less likely to use traditional risk pricing and monitoring tools to penalize borrowers. Our findings are inline with several studies which suggest that loan sales to institutional investors can weaken banks' incentives to monitor (Choi and Kim, 2021; Wang and Xia, 2014).

[Insert Table 6]

4.3 Heterogeneous effects across lender characteristics

4.4 Non-banks as lead arrangers

In this section, we explore the heterogeneity in our findings across the characteristics of the lenders. First, we examine the case where a non-bank institution is a lead arranger, that is, an underwriter firm that facilitates and leads a group of investors in a syndicated loan for major financing and usually takes the largest part itself. Lim et al. (2014) show how non-bank institutional lenders play a significant role in the syndicated loan market, affecting both the pricing and the composition of the syndicate. In particular, they are more likely than banks

to choose participants that help to reduce potentially higher information asymmetries, charge higher spreads and potentially benefit from looser regulatory requirements (Grupp, 2015). In our sample, we have 314 loan transactions where non-bank institutional investors act solely as lead arrangers while 14,106 loan transactions are associated with either a traditional bank or an investment bank as lead arrangers. These non-bank institutions comprise mostly of finance companies, private equity and mutual funds. The result of this estimation reveals the differential effect of these institutions compared to traditional banks, when a borrower has an environmental risk incidence.

[Insert Table 7]

In column 1 of 7, we found evidence that the likelihood of including sustainability pricing provisions increases when institutional investors act as a lead arranger in a loan syndicate. The positive coefficient of the interaction term (0.2050) shows that on average, non-bank institutional lenders increase the probability of having sustainability pricing provisions in their loan contracts by 21 p.p. with high-risk borrowers. This result collaborates with the ongoing discussion on the increasing role of non-banks in green lending as institutional investors continue to demand compensation for their environmental risk exposure. In column 2, the positive coefficient (0.3443) indicates that non-bank institutional lenders increase their loan margin by 34 p.p. This result is statistically significant and shows that non-bank lenders charge higher interest rates to compensate for increased risks. On the other hand, we found evidence that there is a decrease in the probability of having loan covenants and loan collateral when non-bank institutional lenders act as the lead arrangers. This could align with literature indicating that non-banks are often more flexible and willing to accept lower collateral levels, less stringent requirements due to their different risk management approaches (Aldasoro et al., 2023). There is also an evidence of an increase in loan refinancing probability when non-bank lenders act as a lead arranger. This can be attributed to the institutions' substantial financing capacity as there are more willing to refinance loans associated with higher risks.

4.5 Relationship lending

Secondly, we examine the role of relationship lending. Some studies have shown how relationship lending plays a significant role in shaping the structure and dynamics of the loan market. Relationship lending can influence loan pricing (Zhang et al., 2023); lending terms (Banerjee et al., 2021; Li et al., 2019); information production (Huang et al., 2018); and mitigation of information asymmetry (Li, 2017).

Following Berger and Udell (1995), we define relationship lending as the process where the borrower has at least two loans in the last five years with a parent lender.

[Insert Table 8]

Our result show that banks are less likely to impose sustainability pricing provisions on firms with which there have a relationship lending when there is an environmental risk incidence. The negative coefficient in column 1 indicates a decrease in the likelihood of having sustainability pricing provisions by 3.1 p.p. for borrowers with a negative environmental risk incidence. Relationship lending could influence the structure and enforcement of sustainability pricing provisions. For example, lenders might be more willing to relax the requirements of sustainability pricing provisions for long-standing clients. On the other hand, we do not find a clear evidence that the banks adopt the traditional risk pricing and monitoring tools for the borrowers with relationship lending. In particular, there is no evidence that banks charge higher spreads or more likely to include loan covenants.

4.6 How do green banks react?

One possible question is to see whether green banks manage environmental risk differently compared to non-green banks after a negative environmental incidence. Prior studies emphasize the influence of green banks' preferences on credit supply and loan pricing for brown borrowers (Degryse et al., 2023; Ehlers et al., 2022; Delis et al., 2019b). Understanding whether green banks react differently to a shock to a firms' environmental risk can shed

light on whether they are genuinely committed to the transitional shift or they merely use environmental awareness as a means to project a socially responsible image.

[Insert Table 9]

We test this question by partitioning our sample based on the lenders who are a signatory to the UN Environment Programme Finance Initiative (UNEP FI) on Principles for Responsible Banking and Sustainable Insurance or Responsible Investment for the finance service company. Specifically, we consider a lender to have green preferences if these lenders are a signatory to the UNEP FI and 0 if there are not. Table 9 present the outcome results of this bank-level analysis. We find that green lenders are more lenient in using sustainability pricing provisions for high risk borrowers. Column 2 to 5 of Table 9 show that green lenders are not significantly different than other lenders in the way they price and monitor environment risk through the use of covenants, collateral requirements and refinancing decisions. This result partly support the findings that although some sustainability-linked loans are designed to provide incentives to borrowers to improve their sustainability performance, there is largely some evidence of greenwashing concerns.

[Insert Table 10]

4.7 The role of bank capitalization and size

In this section, we consider whether banks' capitalization and size affect how they manage environmental risk. Larger banks often have a more diversified portfolio, which can reduce the impact of a single borrower's default and as such, are better protected from losses related to borrowers' environmental risk. Hence, these banks may be even less concerned than other banks about environmental risk of borrowers. On the other hand, larger banks, especially publicly traded banks, may face greater reputational risk and this can be more prudent in risk management practises. We split the sample into large and small banks. Large banks is an indicator variable that equals one if the banks total assets is above the median banks'

total assets in the sample. The result shows that larger banks are not different compared to smaller banks in the use of sustainability pricing provisions, risk pricing, demand in collateral, or refinance decisions.

We also consider the role of bank capitalization. We measure bank capitalisation as the natural logarithm of the banks' total capital. Highly capitalised banks might prioritize long-term environmental considerations over immediate financial stability, especially when dealing with borrowers with high environmental risk. High capital is an indicator variable that equals one if the banks total capital is above the median banks' total capital within the sample. The result shows that high capitalised banks are less likely to include loan covenants compared to low capitalised banks for high environmental risk borrowers. There is no evidence that highly capitalised banks are more likely to include sustainability pricing provisions in their loan contracts compared to the low capitalised banks.

5 Robustness checks

5.1 Environmental vs Social and Governance Risk incidents

One natural question about our findings is whether what we find is specific to environmental risk of borrowers or just a reflection of ESG risks in general. We address this concern by examining whether the use of sustainability pricing provisions varies when borrowers experience negative social or governance incidents the previous year.

[Insert Table 11]

Table 11 shows the estimate for equation 1 where we use S and G incidents instead of E incidents. We find that while lenders also raise interest rates, demand more collateral, more likely to include financial and networth covenants and less likely to refinance the borrowers, the effects of S and G incidents on the use of sustainability pricing provisions are statistically insignificant and the magnitudes of these effects are close to 0. Thus, sustainability pricing

provisions are instruments that are sensitive to borrowers' environmental risk rather than social or governance risk.

In addition, after controlling for S and G incidents of borrowers in Table 12, there is no variation on our main findings on how borrowers' environmental risk incidents affect the use of sustainability pricing provisions and other traditional risk pricing and monitoring tools.

[Insert Table 12]

5.2 Borrowers' credit risk

Next, one may argue that borrowers who experience negative environmental risk incidents may be high credit borrowers and thus, what we capture may not be specific for environmental risk. To alleviate this concern, we calculate borrowers' leverage ratios, current ratios, solvency ratios, and profitability ratios and include these characteristics in the regressions. Our findings remain intact despite adjustments for such risks, meaning the alterations in lender behavior observed in our study are not attributable to the credit risk of borrowers.

[Insert Table 13]

5.3 Alternative measurements

One of the main criticisms that many papers in the ESG literature face is the divergence of ESG data across different data vendors. To confirm that our results are not driven by the use of Reprisk data, we alter our E incident variable with other popular measurements in the literature for firms' environmental risk.

First, we use a dummy variable that equals 1 if a firm increases their carbon emissions the year before, and 0 otherwise. Second, we consider high environmental risk firms who do not set any carbon emission reduction target the year before. In both cases, our main findings remain unchanged.

[Insert Table 14]

5.4 Methodological robustness checks

Finally, as one may argue that borrowers who experience negative environmental incidents are too different from borrowers who do not. Thus, borrowers with no environmental incidents may not serve as a valid counterfactual. In response to the critique, we employ a propensity score matching to ensure that the characteristics of borrowers — namely size, leverage, and profitability are statistically comparable between the treated and control groups. Table 15 show that alternative matching methodology does not change our findings.

[Insert Table 15]

6 Conclusion

In this paper, we provide direct empirical evidence on whether lenders use sustainability pricing provisions to manage environmental risk monitors of their borrowers using data from US syndicated loans. We find that banks are less inclined to employ sustainability pricing provisions in the loan contract when a borrower has a negative environmental incident in the previous year. In contrast, lenders resort to traditional risk pricing and monitoring tools to manage environmental risk of borrowers. Additional findings show that lenders use sustainability pricing provisions to cater to institutional investors' demand. The results of this study cast doubt on the effectiveness of sustainability pricing provisions as a means to foster sustainable practices, challenging the commonly held assumptions regarding their intended objectives.

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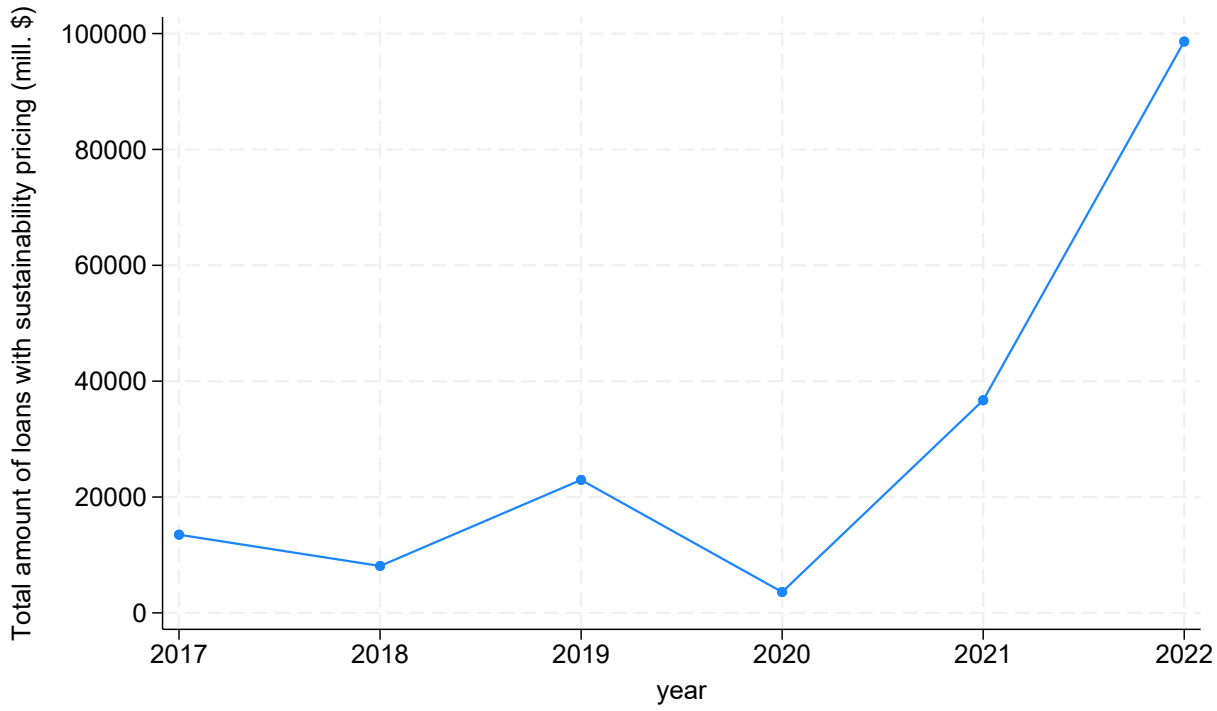
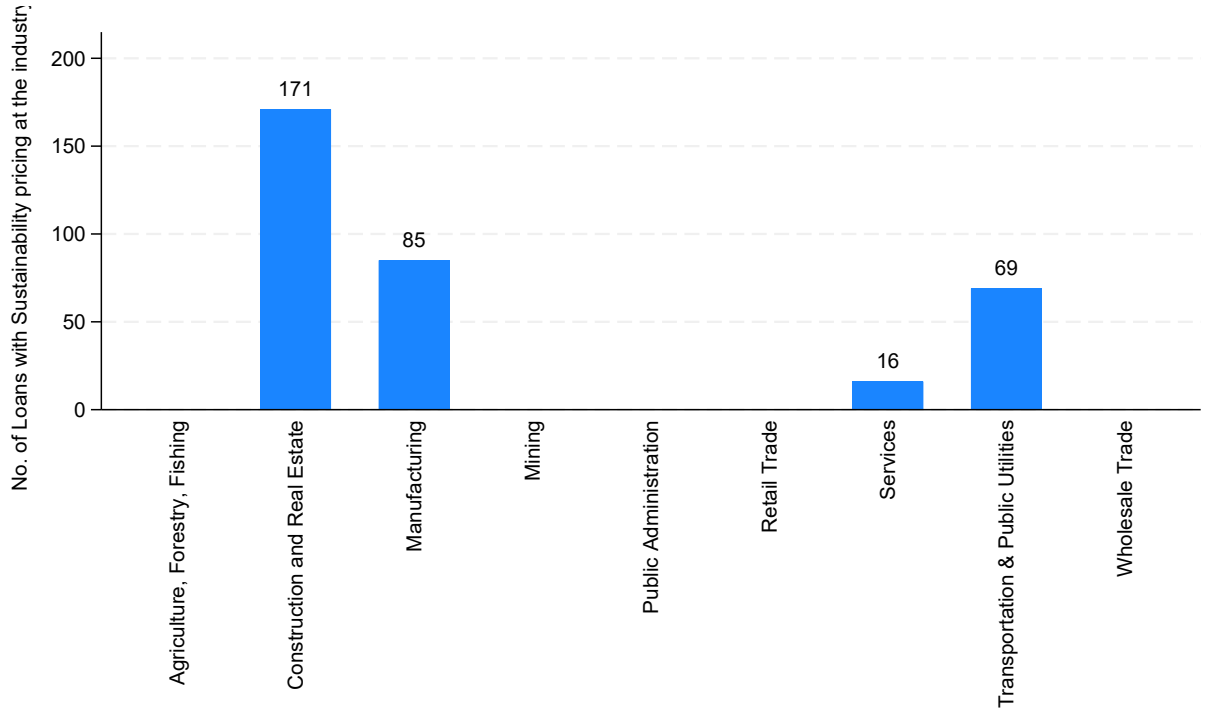
Figure 1: sustainability pricing provisions (2017-2022)



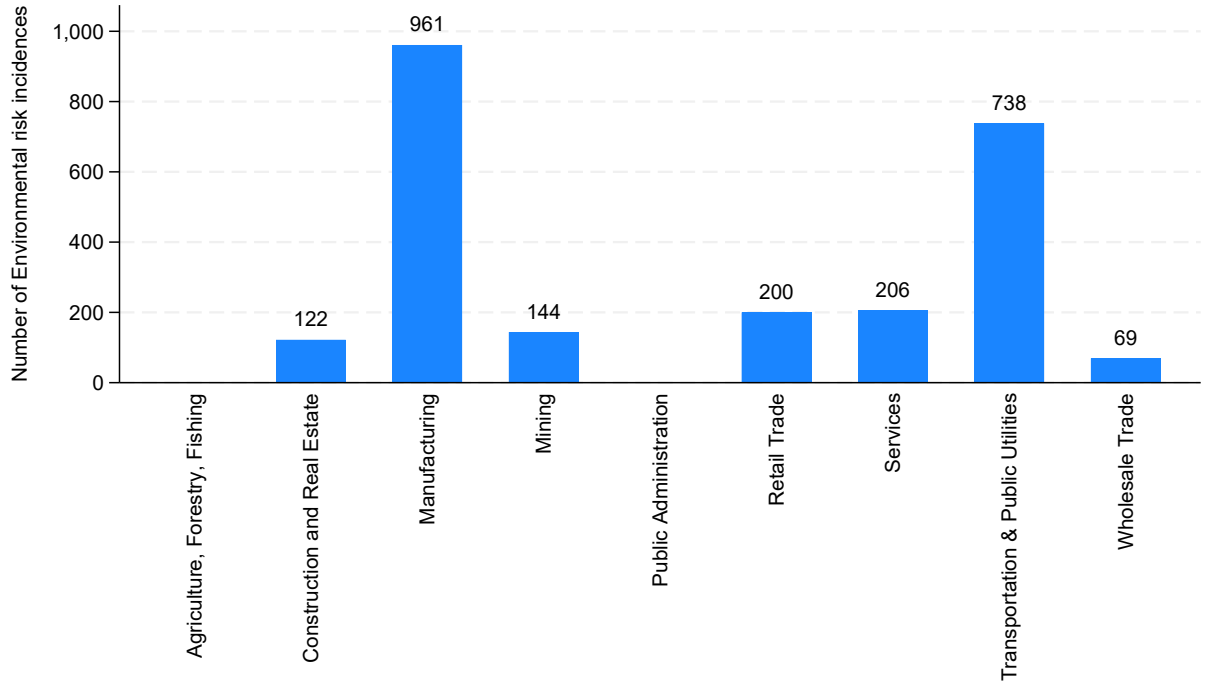
Source: Authors' compilation (2023).
Notes: These are loan facilities with a pricing mechanism based on a specified sustainability-linked target.

Figure 2: Sustainability pricing provisions at the industry level (2017-2022)



Source: Authors' Calculation.
Notes: This represents the industry classification of environmental performance pricing of borrowers in our sample.

Figure 3: Environment risk incidence at the industry level (2017-2022)



Source: Authors' Calculation.
Notes: This represents the industry classification of environmental risk incidence of borrowers in our sample.

Table 1: Summary statistics (Full sample)

Variable	Mean	Std. Dev.	Min.	Max.	N
Dependent variables					
Sustainability pricing provisions	0.033	0.179	0	1	6,047
Ln(loan margin)	5.206	0.552	2.708	7.131	6,047
Loan covenant	0.373	0.484	0	1	6,047
Loan collateral	0.408	0.491	0	1	6,047
Loan refinancing	0.587	0.492	0	1	6,047
Risk incidence indicators					
Environment incidence	0.216	0.411	0	1	6,047
E incidence$_{t-1}$	0.168	0.374	0	1	6,047
S incidence$_{t-1}$	0.255	0.436	0	1	6,047
G incidence$_{t-1}$	0.242	0.428	0	1	6,047
Emission increase	0.07	0.255	0	1	1,900
Emission target	0.026	0.159	0	1	1,900
Firm variables					
Ln(assets)	22.695	1.566	10.127	25.722	6,047
Ln(interest expense)	18.412	1.839	-4.605	21.032	6,047
Ln(sales)	21.834	2.47	-4.605	24.772	6,047
Ln(debt)	21.557	2.311	-4.605	24.322	6,047
Leverage ratio	1.417	4.069	-16.296	20.361	4,889
Current ratio	1.614	1.12	0	18.173	4,889
Solvency ratio	0.104	0.214	-4.059	2.225	4,889
ROA	-2.025	113.792	-1852.922	73.857	4,889
Loan information					
Ln(Loan size)	6.307	1.064	0.916	10.127	6,047
Ln(Loan maturity)	3.883	0.614	1.099	4.787	6,047
Ln(Num. of lenders)	2.299	0.672	0	3.555	6,047
Term B	0.434	0.496	0	1	6,047
Non-bank Lenders	0.004	0.063	0	1	6,047
Relationship lending	0.581	0.493	0	1	6,047
Institutional Investor	0.026	0.159	0	1	6,047
Green lenders	0.376	0.484	0	1	6,047
Bank variables					
Large banks	0.51	0.5	0	1	3,564
High capital	0.394	0.489	0	1	3,563

Notes: This table reports summary statistics of all variables used in the paper. It spans between 2017-2022. (see Table A1 for variable description). All the variables are winsorized at 1th and 99th percentile.

Table 2: Summary statistics of main variables (Split Sample)

Panel A: Treated group					
Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Dependent variables					
Sustainability pricing provisions	0.009	0.095	0	1	1,305
Ln(loan margin)	5.032	0.587	3.912	7.069	1,305
Loan covenant	0.413	0.493	0	1	1,305
Loan collateral	0.316	0.465	0	1	1,305
Loan refinancing	0.486	0.5	0	1	1,305
Firm variables					
Ln(assets)	23.735	1.234	20.134	25.722	1,305
Ln(interest expense)	19.461	1.192	15.754	21.032	1,305
Ln(sales)	22.976	1.111	18.891	24.772	1,305
Ln(debt)	22.69	1.226	19.232	24.322	1,305
Loan information					
Ln(loan size)	6.806	1.068	2.996	10.127	1,305
Ln(loan maturity)	3.579	0.737	1.099	4.5	1,305
Ln(Num. of lenders)	2.442	0.721	0	3.526	1,305
Panel B: Control group					
Dependent variables					
Sustainability pricing provisions	0.04	0.195	0	1	4,742
Ln(loan margin)	5.253	0.532	2.708	7.131	4,742
Loan covenant	0.362	0.481	0	1	4,742
Loan collateral	0.433	0.496	0	1	4,742
Loan refinancing	0.615	0.487	0	1	4,742
Firm variables					
Ln(assets)	22.409	1.527	10.127	25.722	4,742
Ln(interest expense)	18.123	1.88	-4.605	21.032	4,742
Ln(sales)	21.519	2.643	-4.605	24.772	4,742
Ln(debt)	21.246	2.439	-4.605	24.322	4,742
Loan information					
Ln(loan size)	6.17	1.021	0.916	9.457	4,742
Ln(loan maturity)	3.967	0.547	1.792	4.787	4,742
Ln(Num. of lenders)	2.26	0.652	0	3.555	4,742

Notes: This table reports summary statistics for both the treated and control group. The treated groups are firms with environmental risk incidence in a given year while the control group are firms without an environmental risk incidence for a given year. It spans between 2017-2022. All the variables are winsorised at 1th and 99th percentile.

Table 3: Parallel Trend Tests

	Treated		Control		
	Mean	SD	Mean	SD	Difference
Sustainability pricing provisions	0.043	0.206	0.019	0.137	0.098
Loan margin	206.694	154.386	243.984	154.636	-0.171
Loan covenant	0.391	0.493	0.334	0.472	0.084
Loan collateral	0.370	0.488	0.449	0.498	-0.114
Loan refinancing	0.543	0.504	0.684	0.465	-0.204
Ln(Bank assets)	26.411	1.398	26.033	1.507	0.184
Ln(Bank capital)	-1.743	0.670	-1.629	0.735	-0.114

Notes: This table shows whether the characteristics of loans given to firms with negative environmental risk incidence are significantly different from loans given to firms without environmental risk incidence in the absence of the treatment. The table also compares average bank size and capital ratio of all banks that provides loans to firms with negative environmental risk incidence and banks that did not in the absence of treatment. Difference represents normalised difference. Imbens and Wooldridge (2009) suggests that a normalised difference of more than 0.25 shows a significant difference between treated and control group.

Table 4: The effect of negative environmental incidents on lenders' environmental risk management

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1132***	0.1807***	0.1847***	0.0742**	-0.0182
	(0.0193)	(0.0213)	(0.0296)	(0.0316)	(0.0440)
Ln(assets)	-0.0889***	-0.1519***	0.0126	0.3276***	-0.1928***
	(0.0183)	(0.0409)	(0.0544)	(0.0416)	(0.0731)
Ln(interest expense)	0.0248***	0.1742***	0.0148	-0.0282	0.0800*
	(0.0062)	(0.0232)	(0.0341)	(0.0283)	(0.0482)
Ln(sales)	0.0804***	0.0492	-0.0645	-0.1508***	0.1595**
	(0.0196)	(0.0534)	(0.0685)	(0.0331)	(0.0741)
Ln(debt)	0.0010	0.0166***	0.0091	-0.0074	0.0041
	(0.0008)	(0.0047)	(0.0098)	(0.0080)	(0.0138)
Ln(loan size)	-0.0045	0.0285***	-0.0214**	0.0714***	-0.0370***
	(0.0044)	(0.0077)	(0.0084)	(0.0063)	(0.0098)
Ln(loan maturity)	-0.0071	0.1321***	-0.0293	0.0600***	0.1342***
	(0.0056)	(0.0142)	(0.0182)	(0.0083)	(0.0185)
Ln(No lenders)	0.0214***	-0.0226	0.1335***	-0.0808***	0.1111***
	(0.0055)	(0.0232)	(0.0190)	(0.0223)	(0.0234)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7500	0.9287	0.8053	0.9206	0.6762
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 1. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 5: Does banks monitoring diminishes through the ease of securitization measured by Term B loan

	(1) Sustainability pricing provisions	(2) Ln(loan margin)	(3) Loan covenant	(4) Loan collateral	(5) Loan refinancing
E incidence$_{t-1}$	-0.1264***	0.2148***	0.2358***	0.1396***	-0.1082*
	(0.0230)	(0.0215)	(0.0371)	(0.0390)	(0.0566)
Term B	0.0097*	0.1160***	0.1060***	0.1439***	0.0325
	(0.0052)	(0.0126)	(0.0157)	(0.0114)	(0.0241)
E incidence$_{t-1}$ ×Term B	0.0366***	-0.0581**	-0.1047**	-0.1319***	0.2409***
	(0.0119)	(0.0286)	(0.0502)	(0.0240)	(0.0550)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7507	0.9312	0.8080	0.9254	0.6794
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 2. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. Term B is a dummy variable where 1 are loan facility with a Term B type, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 6: Institutional Investors and Sustainability Pricing Provisions

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1154***	0.1716***	0.1853***	0.0737**	-0.0356
	(0.0192)	(0.0210)	(0.0301)	(0.0322)	(0.0425)
Institutional Investor	-0.0073	-0.2642***	-0.2949***	-0.0508*	-0.4074***
	(0.0082)	(0.0769)	(0.0730)	(0.0289)	(0.0855)
E incidence$_{t-1}$ ×Institutional Investor	0.1593***	-0.1053	-1.0311***	-0.1205**	0.1223
	(0.0308)	(0.1110)	(0.1058)	(0.0511)	(0.1055)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7501	0.9298	0.8079	0.9207	0.6791
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 2. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. Institutional Investor is a dummy variable where 1 are loan facility if at least one institutional investor acts as a participant in the lending syndicate, 0 otherwise. Institutional investors include hedge funds, private equity funds, mutual funds, pension funds and endowments, insurance companies, and finance companies. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 7: When non-bank lenders act as lead arrangers

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1146***	0.1759***	0.1856***	0.0753**	-0.0212
	(0.0195)	(0.0207)	(0.0298)	(0.0318)	(0.0444)
Non-bank lenders	0.0362**	0.6852***	0.2474***	0.6754***	-0.9224***
	(0.0170)	(0.0595)	(0.0836)	(0.2029)	(0.1333)
E incidence$_{t-1}$ ×Non-bank lenders	0.2050***	0.3443***	-0.3278***	-0.6472***	1.1520***
	(0.0321)	(0.0865)	(0.1132)	(0.2046)	(0.1602)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7501	0.9296	0.8054	0.9213	0.6775
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 1. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. We measure non-bank lenders as a dummy variable where one represents loan facility in which the lead arranger is allocated to a non-bank institutions. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 8: The role of lending relationship

	(1) Sustainability pricing provisions	(2) Ln(loan margin)	(3) Loan covenant	(4) Loan collateral	(5) Loan refinancing
E incidence$_{t-1}$	-0.0937***	0.1913***	0.2061***	0.0262	0.0610
	(0.0197)	(0.0254)	(0.0362)	(0.0244)	(0.0417)
Relationship lending	0.0255***	0.0060	-0.0179	-0.0375***	-0.0001
	(0.0074)	(0.0155)	(0.0223)	(0.0127)	(0.0214)
E incidence$_{t-1}$ ×Relationship lending	-0.0310***	-0.0212	-0.0594	0.0904***	-0.1835***
	(0.0110)	(0.0238)	(0.0397)	(0.0274)	(0.0434)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7509	0.9288	0.8058	0.9211	0.6784
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 1. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. We measure relationship lending as a dummy variable where the borrower has at least two loans within the last five years with the lender. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 9: Do green banks behave differently?

	(1) Sustainability pricing provisions	(2) Ln(loan margin)	(3) Loan covenant	(4) Loan collateral	(5) Loan refinancing
E incidence$_{t-1}$	-0.1087***	0.1844***	0.1784***	0.0708**	-0.0076
	(0.0194)	(0.0221)	(0.0308)	(0.0317)	(0.0444)
E incidence$_{t-1}$ ×Green lenders	-0.0102*	-0.0082	0.0139	0.0076	-0.0235
	(0.0055)	(0.0106)	(0.0158)	(0.0117)	(0.0210)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7501	0.9287	0.8053	0.9206	0.6762
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 1. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. Green lenders are measured as a dummy variable that takes value of 1 if the lead arranger is a signatory to the UNEP FI, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 10: The role of bank capital and size

Panel A: Bank Size					
	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1140***	0.2080***	0.1900***	0.1279**	-0.1099*
	(0.0234)	(0.0285)	(0.0317)	(0.0532)	(0.0589)
Large banks	0.0021	0.0082	-0.0086	0.0130*	0.0067
	(0.0038)	(0.0080)	(0.0089)	(0.0073)	(0.0097)
E incidence$_{t-1}$ × Large banks	0.0040	-0.0219	0.0175	-0.0232	-0.0177
	(0.0053)	(0.0204)	(0.0208)	(0.0145)	(0.0357)
Observations	3,521	3,521	3,521	3,521	3,521
R-Squared	0.7368	0.9254	0.8035	0.9185	0.6811
Panel B: Bank Capital					
E incidence$_{t-1}$	-0.1111***	0.2083***	0.2172***	0.1118**	-0.1110*
	(0.0227)	(0.0352)	(0.0379)	(0.0481)	(0.0584)
High capital	-0.0007	0.0085	0.0078	-0.0056	0.0010
	(0.0039)	(0.0061)	(0.0114)	(0.0073)	(0.0127)
E incidence$_{t-1}$ × High capital	-0.0017	-0.0292	-0.0470*	0.0126	-0.0194
	(0.0060)	(0.0190)	(0.0282)	(0.0161)	(0.0388)
Observations	3,520	3,520	3,520	3,520	3,520
R-Squared	0.7367	0.9254	0.8036	0.9184	0.6811
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	511	511	511	511	511

Notes: This table shows estimation results for Equation 1. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. Bank size is measured as the banks' total assets and bank capital is measured as the banks' total capital. Large banks is an indicator variable for whether a bank has a total asset above the median of the sample's distribution. High capital is an indicator variable for whether a bank has a total capital above the median of the sample's distribution. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 11: Environmental vs Social and Governance Risk Incidents

Panel A: Environmental risk incidence					
	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.0447**	0.2328***	-0.0144	-0.0681**	0.1429
	(0.0202)	(0.0801)	(0.0650)	(0.0292)	(0.1170)
Observations	4,144	4,144	4,144	4,144	4,144
R-Squared	0.7887	0.9270	0.8348	0.9388	0.6953
Number of Borrowers	449	449	449	449	449
Panel B: Social risk incidence					
S incidence$_{t-1}$	0.0022	0.2628***	-0.7304***	-0.1262	0.0039
	(0.0144)	(0.0620)	(0.1027)	(0.0806)	(0.1566)
Observations	4,310	4,310	4,310	4,310	4,310
R-Squared	0.7889	0.9284	0.8284	0.9382	0.6968
Number of Borrowers	465	465	465	465	465
Panel C: Governance risk incidence					
G incidence$_{t-1}$	0.0054	-0.2430***	-0.3414***	-0.1222***	0.3263***
	(0.0102)	(0.0484)	(0.0608)	(0.0466)	(0.0795)
Observations	4,429	4,429	4,429	4,429	4,429
R-Squared	0.7640	0.9284	0.8356	0.9343	0.7007
Number of Borrowers	471	471	471	471	471
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender

Notes: This table shows estimation results for Equation 1 using G incidents and S incidents as treatment variables instead of E incident. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. S incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative social incident the year before, 0 otherwise. G incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative governance incident the year before, 0 otherwise. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 12: The influence of Social and Governance risk incidences

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.0766***	0.1689***	0.1716***	0.0084	-0.0008
	(0.0126)	(0.0259)	(0.0524)	(0.0241)	(0.0434)
S incidence$_{t-1}$	-0.0476***	0.0369	0.1116**	0.0655*	0.0193
	(0.0100)	(0.0278)	(0.0508)	(0.0344)	(0.0535)
G incidence$_{t-1}$	-0.0303***	-0.0261	-0.1472***	0.0879***	-0.0846**
	(0.0092)	(0.0257)	(0.0363)	(0.0300)	(0.0419)
Observations	6,047	6,047	6,047	6,047	6,047
R-Squared	0.7513	0.9288	0.8070	0.9214	0.6766
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	608	608	608	608	608

Notes: This table shows estimation results for Equation 1 controlling for G incidents and S incidents in the regressions. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. S incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative social incident the year before, 0 otherwise. G incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative governance incident the year before, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 13: The influence of borrower credit risk

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1124***	0.1988***	0.2346***	0.0744**	-0.0067
	(0.0200)	(0.0225)	(0.0335)	(0.0301)	(0.0529)
Leverage ratio	-0.0027**	0.0053	0.0018	0.0098***	0.0132**
	(0.0011)	(0.0033)	(0.0066)	(0.0031)	(0.0061)
Current ratio	-0.0124**	0.1028***	0.0576*	0.1233***	-0.0474
	(0.0048)	(0.0176)	(0.0327)	(0.0192)	(0.0302)
Solvency ratio	-0.0212***	0.0732*	-0.3773***	0.0589*	-0.0715
	(0.0061)	(0.0442)	(0.0517)	(0.0315)	(0.0819)
ROA	-0.0002	-0.0060***	-0.0160***	-0.0067***	0.0087**
	(0.0004)	(0.0018)	(0.0031)	(0.0021)	(0.0039)
Observations	4,889	4,889	4,889	4,889	4,889
R-Squared	0.4612	0.9344	0.8287	0.9223	0.6770
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	502	502	502	502	502

Notes: This table shows estimation results for Equation 1 controlling for borrowers' credit risk such as leverage ratio, current ratio, solvency ratio and ROA. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 14: Alternative definitions of Environmental risk incidence

Panel A:	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
Emission increase	-0.0792***	0.2036***	-0.0682	0.1016***	0.0295
	(0.0166)	(0.0342)	(0.0416)	(0.0244)	(0.0538)
Observations	1,900	1,900	1,900	1,900	1,900
R-Squared	0.4669	0.9391	0.8329	0.9301	0.6844
Panel B:					
Emission target	-0.0406	0.1658***	0.1407	0.2049***	-0.5310***
	(0.0245)	(0.0412)	(0.1246)	(0.0396)	(0.1010)
Observations	1,900	1,900	1,900	1,900	1,900
R-Squared	0.4608	0.9360	0.8331	0.9303	0.6924
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	148	148	148	148	148

Notes: This table shows estimation results for Equation 1 using alternative measurements for environmental risk. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Table 15: Baseline regression with Matched Observations

	(1)	(2)	(3)	(4)	(5)
	Sustainability pricing provisions	Ln(loan margin)	Loan covenant	Loan collateral	Loan refinancing
E incidence$_{t-1}$	-0.1158***	0.2450***	0.1980***	0.1612***	-0.1248**
	(0.0297)	(0.0295)	(0.0410)	(0.0333)	(0.0603)
Ln(assets)	-0.4779***	-0.4487***	-0.0229	0.0584	-0.5799***
	(0.0619)	(0.0707)	(0.1246)	(0.0596)	(0.1729)
Ln(interest expense)	0.0110	0.2335***	-0.0834	0.0251	0.4764***
	(0.0396)	(0.0452)	(0.0797)	(0.0275)	(0.0895)
Ln(sales)	0.3017***	0.0839	0.0438	-0.0868***	-0.0951
	(0.0486)	(0.0568)	(0.0535)	(0.0311)	(0.0967)
Ln(debt)	0.3390***	0.2235***	0.1424	0.2314***	-0.2509*
	(0.0645)	(0.0586)	(0.0966)	(0.0722)	(0.1301)
Ln(loan size)	-0.0102	0.0268**	-0.0400***	0.0429***	-0.0189
	(0.0065)	(0.0111)	(0.0106)	(0.0087)	(0.0130)
Ln(Loan maturity)	-0.0140*	0.1544***	0.0067	0.0428***	0.1696***
	(0.0078)	(0.0234)	(0.0140)	(0.0064)	(0.0328)
Ln(No lenders)	-0.0032	0.0706**	0.0837***	0.0099	0.0496
	(0.0195)	(0.0285)	(0.0285)	(0.0240)	(0.0385)
Observations	5,040	5,040	5,040	5,040	5,040
R-Squared	0.6126	0.9287	0.8444	0.9347	0.6991
Borrower FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Clustering	Lender	Lender	Lender	Lender	Lender
Number of Borrowers	478	478	478	478	478

Notes: This table shows estimation results for Equation 1 using a propensity score matching approach. The number of matched observation is 5,040 where 1,010 observation belong to the treated group and 4,030 belong to the control group. E incidence$_{t-1}$ is a dummy variable that equals 1 if borrower f experienced a negative environmental incident the year before, 0 otherwise. We include also the firm and loan variables in the model. All the variables are winsorised at 1th and 99th percentile. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are clustered at the lender level.

Appendix

Figure A1: Example of a Negative Environment Incidence

Source: EPA.

Notes: On 01-June-2014, Zep Inc have a sharp negative environmental incidence.

Figure A2: Another example of a Negative Environment Incidence

Source: Reuters.

Notes: On 01-August-2018, Royal Dutch Shell experiences a sharp rise in the number of oil spills.

Table A1: Variable description

Variable	Definition	Source
Dependent variable		
Sustainability pricing provisions	An indicator that takes a value of one if loan facilities have information linked to Sustainability in banks' tranche remark with a pricing mechanism based on a specified ESG-targets, zero otherwise.	DealScan
Ln(Loan margin)	Natural logarithm of loan spread (all-in-drawn) over LIBOR	DealScan
Loan covenants	An indicator that takes a value of one if the loan contracts have covenants which are clauses included to protect the interests of the lender and the borrower.	DealScan
Loan collateral	An indicator that takes a value of one if the loan is secured by a collateral and zero otherwise.	DealScan
Loan refinancing	An indicator that takes a value of one if the loan involves refinancing of existing debt and zero otherwise.	DealScan
Risk incidence variables		
Environment incidence	An indicator that takes a value of one for negative environmental risk events	RepRisk
E incidence$_{t-1}$	One-year lagged period of negative environmental risk events	RepRisk
S incidence$_{t-1}$	One-year lagged period of negative social risk events	RepRisk
G incidence$_{t-1}$	One-year lagged period of negative governance risk events	RepRisk
Emission increase	An indicator variable where borrowers whose emission (scope 1 and 2) have increased relative to the past year	CDP
Emission target	An indicator variable with borrowers without any emission target in the current year	CDP
Borrower characteristics		
Ln(Assets)	Naural logarithm of total assets (Bil. USD)	Worldscope
Ln(Interest expense)	Natural logarithm of ratio of interest expense relative to its total debt	Worldscope
Ln(Sales)	Natural logarithm of firm sales (Bil. USD)	Worldscope
Ln(Debt)	Natural logarithm of the ratio of how much debt a firm has relative to its total assets.	Worldscope
Leverage ratio	The ratio of a firms' total debt to total equity	Worldscope
Current ratio	The firms' current ratio	Worldscope
Solvency ratio	The ratio of cash flow generated by a firm to its total liabilities	Worldscope
ROA	Return on a firm's total assets	Worldscope
Loan characteristics		
Ln(Loan size)	Natural logarithm of Loan (facility) amount (Bil. USD)	DealScan
Ln(Loan maturity)	Natural logarithm of number of months between facility start and end dates	DealScan
Ln(No. of lenders)	Natural logarithm of the number of lenders that participated in the loan deal	DealScan
Term B	An indicator variable where one are loan facility with a Term B type	DealScan
Non-bank lenders	An indicator variable where one are loan facility in which the lead arranger is allocated to a non-bank institutions	DealScan
Relationship lending	An indicator variable where the borrower has at least two loans within the last five years with the lender	DealScan
Institutional Investor	An indicator variable where one are loan facility which comprise of at least one institutional investor that acts as a participant in the lending syndicate	DealScan
Green lenders	An indicator variable that takes the value of one if the lead arranger is a signatory to the UNEP FI	DealScan
Bank characteristics		
Large banks	An indicator variable for whether a bank has a total asset above the median of the sample's distribution	Bank Orbis
High capital	An indicator variable for whether a bank has a total capital above the median of the sample's distribution	Bank Orbis

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