

Does ESG reporting impact the cost of debt? Evidence from mandatory disclosures around the world

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Abstract

The integration of environmental, social, and governance (ESG) information in firms' decisions is becoming increasingly important. In this paper, we use the staggered implementation of mandatory ESG reporting around the world to examine how ESG reporting affects the cost of bond financing. We find that mandatory ESG disclosures decrease bond yield spreads by reducing information asymmetry and catering to institutional investors' preferences for ESG disclosure. In addition, we uncover a pivotal role for bank relationships in helping firms enjoy more favorable terms. Thus, our results suggest that mandatory ESG reporting helps firms reduce the cost of debt financing.

Keywords: ESG reporting; Bond spread; Information asymmetry; Clientele effects; Bank relationship

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1 Introduction

Environmental, social, and governance (ESG) considerations have become increasingly important for businesses around the world due to growing globalization and social advocacy efforts. Recently, there has been a great deal of interest in the consequences of mandatory ESG disclosure for firms' financial outcomes (see, for example, [Gibbons 2024](#), [Krueger et al. 2024](#)). However, as mentioned by [Christensen et al. \(2021\)](#), little attention has been devoted to the pricing of public debt, i.e., corporate bond spreads. This paper fills this gap in the literature by investigating how ESG disclosure mandates affect the cost of bond financing around the world. Importantly, there are several potential channels through which ESG mandates might affect bond spreads. We conceptually group them into information asymmetry, investor preferences, and previous bank relationships, and we empirically test their relevance in the global bond markets.

The literature on ESG disclosures recognizes that the consequences of reporting are often difficult to establish because there is no commonly accepted measurement framework of what constitutes good ESG practices ([Downar et al. 2021](#)). In addition, voluntary disclosures are often affected by self-selection and endogeneity problems ([Manchiraju & Rajgopal 2017](#)). In response to these concerns, several countries have implemented mandatory ESG disclosure regulations to force firms to provide ESG information, either in traditional financial documents or in specialized standalone reports. These regulations increase the transparency of firms regarding ESG information and thereby increase corporate responsibility and accountability ([Krueger et al. 2024](#)). For researchers, the upshot is that mandatory ESG disclosure rules can

be considered as “shocks” to the supply of ESG information because they enable firms to better assess ESG issues, which can lead to hiring specialized staff for the development of environmental and sustainable strategies.

Despite an increasing amount of research on mandatory ESG disclosures, the evidence regarding their association with tangible positive outcomes for firms remains largely inconclusive. For instance, [Downar et al. \(2021\)](#) use a carbon disclosure in the United Kingdom to show that ESG reporting mandates can reduce pollution with no adverse effect on financial performance. On the contrary, [Chen et al. \(2018\)](#) find that an ESG disclosure mandate in China generated positive environmental externalities at the expense of shareholders. Therefore, focusing on one single ESG reporting mandate may limit the external validity of the findings.

Against this backdrop, several recent studies use international samples to analyze the consequences of the staggered adoption of ESG reporting around the world. Specifically, [Gibbons \(2024\)](#) shows that Environmental and Social (E&S) policies lead to an increased reliance on external equity and innovative output, because E&S reporting attracts long-term investors. [Krueger et al. \(2024\)](#) find a positive effect of ESG disclosure mandates on firm-level stock liquidity, due to reduced information asymmetry. Moreover, [Wang \(2023\)](#) documents that ESG disclosure regulations create transmission effects through bank lending networks: banks increase their ESG monitoring of borrowers following the implementation of the disclosure mandate. Therefore, while ESG disclosures seem to affect a wide range of outcomes, the exact channel through which ESG regulations affect firms is not entirely clear.

In this study, we propose a novel analysis of the effect of mandatory disclosures

on the cost of obtaining external finance from the bond market. We hypothesize that ESG disclosure mandates should affect firms' cost of capital, as long as they affect expected risk or return. Theoretically, ESG disclosure mandates may decrease firms' exposure to long-term risks or improve profit levels. However, ESG disclosure mandates could also adversely affect financial performance, as they may force firms to deviate from profit-maximizing behavior.¹ Whether ESG reporting mandates are beneficial or detrimental to firms' financing costs is therefore an empirical question. To our knowledge, no other study investigates the causal impact of ESG reporting on the cost of debt financing.

To answer our research questions, we focus our analysis on corporate bonds, rather than equities, motivated by the following considerations. First, although equity and bonds are both contingent claims on the same future returns, bond prices offer simpler forward-looking functions of cash flows that accrue to the holder than do equity prices. It is therefore more straightforward to consider the external finance premium for bonds than for equities because corporate credit spreads offer a direct measure of credit risk and consequently borrowing costs (Kaviani et al. 2020). Second, Eckbo et al. (2007) report that bond offerings occur three times more frequently than equity offerings and that the average bond offering is three times larger than the average equity offering. Third, as Christensen et al. (2021) note, although several studies analyze how ESG *activities* and climate risk affect debt markets (see e.g., Sharfman

¹This argument is at the core of the recent anti-ESG movement. For instance, Texas lawmakers have banned public pension funds from using ESG criteria in investment decisions, arguing that ESG activities could decrease financial returns. See <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/texas-anti-esg-bill-moves-forward-as-state-pension-fund-warns-of-6b-loss-75178957>

& Fernando 2008, Chava 2014, Ginglinger & Moreau 2023), the impact of ESG reporting mandates on the cost of debt is relatively understudied.

Our analysis is based on a unique and rich sample of corporate bonds issued worldwide. To measure credit spreads, firm-level accounting ratios, and country-level regulatory shocks to ESG disclosure, we use four complementary data sources: Bloomberg, Worldscope, World Bank, and the list of ESG reporting mandates compiled by Krueger et al. (2024) from “Carrots & Sticks”. Specifically, we use quarterly panel data between 2004Q1 and 2023Q4 to analyze how bond-level credit spreads respond to the introduction of mandatory ESG policies. We study how well a shock to ESG reporting helps firms achieve lower spreads during the post-shock period and thus provide new evidence on how corporate bond spreads respond to ESG mandates around the world. In further tests, we augment the dataset with information on investors’ holdings from the WRDS LSEG database and syndicated loan-level data from Thomson Reuters LPC DealScan.

Empirically, we carry out a staggered difference-in-differences analysis to estimate how the policy shift affects the cost of obtaining bond financing. We divide firms into two groups: treated and control. The treated group includes firms operating in economies that enacted mandatory disclosures. The control group includes firms in economies that do not introduce ESG mandates. The identifying assumption for this research design is that treated and control groups behave similarly in the absence of the policy change.²

²Gibbons (2024) uses a wide range of country-level variables to assess whether the adoption of ESG reporting mandates is correlated with country-level trends. He does not find any country-level variable significantly predicting the adoption of such mandates, thereby giving credit to our identifying assumption.

The next step of our analysis identifies the channels at work. We conjecture that mandatory ESG disclosure affects the cost of obtaining external financing from the bond market through three possible channels: (1) it could improve the information provided to investors to gauge firms' risk, thereby improving information quality and reducing the cost of financing (the information-asymmetry channel), (2) it could attract investors who have ESG preferences, therefore reducing the cost of financing (the clientele channel), and (3) it could enhance the benefits of monitoring via establishing bank relationships (the bank-relationship channel). To validate our hypotheses, we conduct four tests.

First, we explore whether bond spreads between treated and control firms differ in the post-mandatory disclosure period. We show that after the initiation of the mandates, on average, the bond spread declines by 0.49 percentage points for firms operating in countries that have enacted the disclosure regulations. Second, we examine how ESG mandates improve the cost of raising finance from the bond markets. Consistent with our predictions, we find that financially constrained firms benefit the most. This result is consistent with an operational information-asymmetry channel. Third, we show that the negative relation between mandates and bond spreads is concentrated in firms with low ex ante institutional ownership, lending support to the clientele channel. Finally, we document that the effect is most negative for firms that have established bank relationships, which is consistent with the view that banks provide adequate monitoring for investors. Thus, our results provide support for the bank-relationship channel.

Our paper contributes to three strands of literature. First, we add new evidence

to the emerging body of work studying the real effects of mandatory ESG disclosure. Previous research finds mixed evidence for the role of reporting mandates in firm performance (Chen et al. 2018, Wang 2023, Gibbons 2024, Krueger et al. 2024). Our contribution to this literature is to analyze the role of ESG mandates in firms' cost of borrowing from the bond markets. In addition, we uncover the channels through which firms achieve a reduction in borrowing costs.

Second, we examine the extent to which ESG disclosure reduces information asymmetry between lenders and borrowers or generates clientele effects with implications for the cost of bond financing. Krueger (2015) and Krueger et al. (2024) show that ESG disclosure regulations meaningfully reduce adverse selection and have positive capital market effects. Gibbons (2024) demonstrates that E&S disclosure can have material effects driven mainly by a clientele effect irrespective of the information environment. Our results support both views and document the potency of both channels in the international bond markets.

Finally, our analysis relates to the scant literature that examines the interaction between relationship lending and bond spreads. Existing studies show that bank relationship is systematically related to bond spreads (Ma et al. 2019, Aoki 2021). Our work departs from these studies by investigating the role played by bank relationships following ESG mandatory disclosures. We analyze how firms that build relationships with banks take advantage of monitoring and achieve lower bond spreads. Focusing on relationship and transactional borrowers allows us, therefore, to provide a sharper analysis of the effects of ESG disclosures on the cost of bond financing.

The remainder of this paper is structured as follows. In Section 2, provide the

background of the literature and develop the research hypotheses. In Section 3, we present the data for our empirical analysis along with summary statistics. In Section 4, we show the econometric modeling strategy. In Section 5, we report the econometric results and we subject the models to various robustness tests and, finally, in Section 6, we provide concluding remarks.

2 Related literature and hypothesis development

2.1 Mandatory disclosures and the cost of borrowing

Recent decades have seen an increase in ESG disclosures for both financial and non-financial firms (Wang 2023). Much of the literature largely focuses on ESG reporting in voluntary settings.³ These studies generally explore the factors influencing voluntary ESG reporting decisions, revealing that firms disclose their ESG activities to signal future financial performance, improve the ESG information environment, and reduce their cost of capital (Tsang et al. 2023).

However, voluntary changes in ESG disclosure are plagued by self-selection issues. For instance, the decision to engage and report in ESG activities could be driven by firms' private cost-benefit evaluations, often unobservable, making it difficult to disentangle their effects on the cost of capital (Gibbons 2024, Dang et al. 2024). In addition, institutional investors often find ESG data of limited usefulness in their investment decision-making. Specifically, they complain about the availability, consistency, and quality of firm-level ESG disclosures, arguing that current reports are

³See Christensen et al. (2021) for a detailed review on the key determinants of voluntary CSR reporting.

insufficient to make informed investment decisions (Ilhan et al. 2023, Krueger et al. 2024). Therefore, attention has shifted to the adoption of national mandatory disclosure regulations, which require listed firms to provide standardized and detailed disclosures covering environmental, social, and governance matters.

Empirical evaluation of the association between ESG disclosure regulations and reporting quality has been the subject of a nascent line of research. By compiling a cross-country dataset with regulatory shocks to E&S disclosure, Gibbons (2024) documents that reporting E&S information relates to increased investment from institutional owners and has material effects on firms' investment and financing decisions. The author's results show that E&S disclosure regulations increase disclosure quality, alleviating information frictions between shareholders and managers, hence having material effects on investors and firm decision-making. In addition, Krueger et al. (2024) generate a novel and comprehensive dataset of mandatory ESG disclosures around the world to analyze the stock liquidity effects of such disclosure requirements. Their key result is that mandatory ESG disclosure has beneficial capital market effects by improving stock liquidity.

Although these studies find that ESG disclosure mandates create transmission effects on firms' financial performance and stock liquidity, it is also important to understand how investors react to climate risk and ESG changes, as well as how they assess the effects of disclosure on the cost of financing.⁴ Seltzer et al. (2019) argue that regulation is an important channel through which climate and other types of environmental risk are embedded in security prices. The authors find lower credit rat-

⁴There is also a line of work on environmentally sensitive lending and the cost implications for borrowers (Chava 2014, Degryse et al. 2023, Laeven & Popov 2023).

ings (and higher yield spreads) for low-environmental-score firms and high-emission firms, especially if they operate in U.S. states where environmental regulations are more stringently enforced. Moving to the equity market, [ElGhoul et al. \(2011\)](#) find that corporate social responsibility allows firms to obtain cheaper equity financing. [Dang et al. \(2024\)](#) use a global dataset and show a substantial reduction in the cost of equity by an average of 50 basis points due to ESG disclosure mandates.

An important component in firms' choice of alternative modes of finance is the corporate bond market. The cost of obtaining external financing from the bond market, often referred to as the external finance premium, is typically approximated by the spread between risky and risk-free debt ([Campbell & Taksler 2003](#)). This premium is inversely related to firms' net worth, and to macroeconomic conditions, resulting in countercyclical fluctuations in the cost of external financing ([Bernanke et al. 1999](#)). The attention so far how of ESG disclosures affect stock performance stands in sharp contrast to the scant evidence about bond financing. However, enhanced ESG disclosure strengthens firms' relationships with various stakeholders, improving monitoring mechanisms and reducing agency costs. This, in turn, leads to lower credit risk and ultimately reduces borrowing costs ([Diamond & Verrecchia 1991](#), [Houston & Shan 2021](#)).⁵ In summary, we argue that, following the disclosure, investors are likely to reward firms that operate in countries with mandatory disclosures compared to firms headquartered in countries without such mandates. Based on this discussion, we define the first testable hypothesis as follows:

⁵In addition, several studies also show that CSR *activities* reduce firm risk (see, e.g., [Bae et al. 2011](#), [Attig et al. 2013](#), [Albuquerque et al. 2019](#)).

Hypothesis 1: Firms in countries with ESG mandatory disclosures face lower bond spreads than firms in countries without such disclosures.

2.2 The information-asymmetry channel

We conjecture that ESG disclosure could affect the cost of obtaining external financing from the bond market through different channels. With respect to the information channel, a large amount of literature (see e.g., [Christensen et al. 2017](#), [Chen et al. 2018](#), [Jouvenot & Krueger 2020](#), [Rauter 2022](#), [Fiechter & Lehmann 2022](#)) suggests that disclosure regulations impose public pressure on firms, inducing them to improve their related performance. ESG information helps investors simplify the assessment of ESG risk, particularly those with explicit ESG preferences, allowing them to identify firms aligned with their criteria ([Christensen et al. 2021](#)).

Substantial theoretical and empirical evidence provides evidence that various segments of the institutional investor population employ differing investment strategies regarding ESG risks, including climate risks (see, for example, [Dyck et al. 2019](#), [Ilhan et al. 2023](#), [Pástor et al. 2021](#), [Goldstein et al. 2024](#)). From a theoretical capital structure perspective, the pecking-order theory ([Myers & Majluf 1984](#)) suggests that information asymmetry negatively affects both debt and equity offering prices. However, because equity holders are the residual claimants, they are comparatively more affected by information asymmetry, compared to debt holders. As a consequence, a reduction in information asymmetry should increase bond prices, but comparatively less so than equity prices.

[Krueger et al. \(2024\)](#) note that reducing information asymmetry and increasing

ESG disclosure mitigates adverse selection and improves market liquidity. In turn, more liquid markets reduce the costs of issue for firms, and they lower the cost of entering and exiting the market for investors. Moreover, [Roy et al. \(2022\)](#) find that mandated CSR (corporate social responsibility) firms experience greater stock market liquidity and CSR spending compared to non-CSR firms. These effects arise as mandatory CSR expenditures reduce information asymmetry. Finally, firm value increases following individual mandatory disclosure regulations ([Ioannou & Serafeim 2017](#)), primarily due to a reduction in information asymmetry. **Having said that, in the setting of ESG ratings supplied by relevant agencies, higher disclosure would be associated with higher disagreement** ([Christensen et al. 2022](#)).

Obtaining and disclosing ESG achievements is very relevant to the cost of financing. [Cheng et al. \(2014\)](#) suggest that firms with strong ESG performance experience fewer capital constraints due to reduced agency problems and lower information asymmetry. [Goss & Roberts \(2011\)](#) find that firms engaging in positive ESG activities experience borrowing costs that are 7 to 18 basis points (bps) lower than those with negative ESG practices. Moreover, [Asimakopoulos et al. \(2023\)](#) show that ESG ratings help firms mitigate the asymmetric information gap, lower their leverage, and restructure their debt. Based on the above discussion, we argue that mandatory ESG disclosure could improve the information firms provide to investors to gauge firms' risk, thereby improving information quality and reducing the cost of financing. Hence, we stipulate our second testable hypothesis as follows:

Hypothesis 2A: The effect of the mandatory ESG disclosure on bond spreads

is stronger for firms associated with high information asymmetry.

We expect that ex-ante information asymmetries will reinforce the negative association between mandatory ESG disclosure and the cost of debt. However, this aggregate effect may mask some heterogeneity: while beneficial to most firms, the reduction in information asymmetry may prove costly to some specific sectors. For example, [Grewal et al. \(2019\)](#) find a negative market reaction to the announcement of a European non-financial disclosure regulation, and that firms with weak non-financial performance drive this aggregate effect. [Verrecchia \(1983\)](#) theoretically shows that non-disclosure is optimal when the underlying information is bad or insufficiently good to compensate for the cost of disclosing. Non-disclosure therefore leaves room for uncertainty about whether withheld information is negative. Thus, firms operating in sectors with structurally low ESG performance can be negatively affected by mandatory ESG disclosure, as the average firm will be forced to disclose “bad” information. The literature provides some indirect evidence in favor of this view: it is well-known that developing countries tend to specialize in highly polluting sectors ([Jayachandran 2022](#)), and mandatory ESG disclosure indeed negatively affected financial performance in India ([Aswani 2022](#)) and China ([Chen et al. 2018](#)). Consequently, we formulate our next hypothesis as follows:

Hypothesis 2B: The effect of the mandatory ESG disclosure on bond spreads is weaker for firms operating in sectors with poor ESG performance.

2.3 The clientele channel

The literature establishes the role of investor preferences in financial decisions. Going back to [Miller & Modigliani \(1961\)](#), dividend clienteles could form based on investor characteristics. Other studies focus on the differences in investment preferences among different investors, proposing explanations for possible demographic characteristics such as age and income clienteles or retail dividend clienteles ([Graham & Kumar 2006](#), [Chen et al. 2019](#)). More recently, there is evidence that institutional investors consider aspects of firms' ESG profiles when making investment (e.g., [Ilhan et al. 2023](#)) and portfolio decisions ([Starks et al. 2023](#)).

For instance, investment from particular groups of institutional investors with lower portfolio turnover, can motivate managers to enhance investments in innovation ([Aghion et al. 2013](#)). Similarly, previous research demonstrates that investors with preferences for environmental and social (E&S) factors influence firms' E&S policies ([Dyck et al. 2019](#)). In fact, investors prefer different CSR activities ([Fama & French 2007](#), [Friedman & Heinle 2016](#)). [Christensen et al. \(2021\)](#) highlight this mechanism, noting that these preferences give rise to investor clientele or shareholder base effects, which can affect firms' CSR activities.⁶

Therefore, disclosing ESG information is likely to attract investors who have a stronger desire for ESG. That is, the information contained in the disclosure may not be financially material to to assess firms' financial risks or to monitor managers,

⁶However, the empirical evidence of a direct link between institutional ownership and ESG performance remains mixed. [Starks et al. \(2023\)](#) find that institutionals prefer high-ESG stocks because of a different evaluation of what ESG implies for long-term returns and a better ability to profit in the long run.

but it may be material to those with non-financial objectives (Gibbons 2024). In fact, regarding the clientele channel, Gibbons (2024) argues that E&S disclosure has significant real effects on firms' real decisions by attracting investment from institutional investors who have E&S preferences and longer-term investment horizons. Therefore, if the E&S disclosure mandates attract a subset of institutional investors with specific preferences for E&S information, then the material effects on the firm could occur solely through a clientele effect rather than a change in information leading to an overall decrease in information asymmetry and adverse selection costs for investors.

Our study is motivated by this literature and examines whether institutional investors experience lower bond spreads following the mandates. We postulate that ESG reporting mandates should attract investments from institutional investors. The influx of institutional investors may be more pronounced when firms start from a low initial level of institutional ownership. Consequently, we anticipate that the effect of ESG mandates is stronger for firms with a low level of institutional ownership in the pre-mandate period. Our next hypothesis is as follows.

Hypothesis 3: The effect of the mandatory disclosure is stronger for firms with low institutional ownership in the pre-mandate period.

2.4 The bank-relationship channel

A possible explanation for the reduction in bond spreads after the mandate is related to the existence of previous bank relationships. That is, ESG mandates may influence

bond spreads indirectly through bank relationships. Bank-firm relationship lending facilitates screening and monitoring because the bank accumulates inter temporal firm-specific information from repeated interactions with the firm, which adds value (Diamond 1984, Allen 1990, Winton 1995). Relationship lending is a key mechanism to mitigate moral-hazard and adverse-selection problems in loan contracting (Boot 2000). The recurrent interactions inherent in lending relationships enable the lender to acquire soft information, thereby alleviating informational asymmetries.⁷ Moreover, a number of studies show a decline in collateral requirements as the lending relationship progresses (Berger & Udell 1995, Degryse et al. 2021). There is also literature that examines how relationship banking affects the transmission of monetary policy shocks. Because relationship banking reduces information asymmetry, the increase in the credit premium due to a monetary policy shock is likely to be lower for relationship-firms than for transactional-firms. So, the former may be less susceptible to monetary policy shocks than the latter (Bhardwaj et al. 2022).

In the context of the bond markets, one view holds that banks generate benefits for bondholders, because they utilize proprietary information that bondholders do not possess for monitoring borrowers (Shleifer & Vishny 1997). This indicates that bond investors demand lower risk premiums for bonds issued by firms that maintain bank relationships (Ma et al. 2019, Aoki 2021). We argue that the negative association between bank relationships and bond spreads is more potent after the mandate because firms take advantage of their relationship status. In other words, firms are disciplined by bank monitoring, which leads to better implementation and

⁷Degryse et al. (2009) provide a detailed review on the importance of relationship lending in stabilizing credit fluctuations and offering liquidity insurance to firms.

reporting ability about their ESG activities. Hence, although ESG mandates may reduce firm risk and consequently, the cost of borrowing, this effect strengthens once firms establish bank relationships. Following this discussion, we formulate our next hypothesis.

Hypothesis 4: The negative association between ESG mandatory disclosures and bond spreads is more potent for relationship borrowers.

3 Data and descriptive statistics

To test the hypotheses, we first collect bond information from the Datastream Worldscope database. This database contains information about the yields, issue dates, denomination, duration, currency, and maturity of the bonds we measure. We focus on all corporate bonds issued around the world over the period 2004Q1 to 2023Q4. We collect accounting data from the Datastream Worldscope database. Matching the bonds with the accounting data is feasible using BUPCECD (Bond Ultimate Parent Company Datastream Equity Code) codes. We also hand-match firms in the two datasets using company names following a process that is common in the literature to merge firms with transaction-level data (e.g., [Almeida et al. 2017](#), [Acharya et al. 2018](#), [Mizen et al. 2021](#)).⁸

We gather ESG disclosure factors, stock market information, and country-level macroeconomic variables from Bloomberg. To mitigate potential selection bias, our

⁸In the online appendix [Table A1](#), we formally define all variables in the empirical analysis and provide the data sources.

analysis includes additional countries that do not enact ESG disclosure mandates, serving as control countries. We collect macroeconomic and environmental data at the country level from the World Bank. In addition, we collect information on investor preferences from Institutional Holdings (Type 2) from WRDS LSEG. We augment our dataset with loan-level data from the Thomson Reuters LPC DealScan database. DealScan contains data on bilateral and syndicated loans to firms worldwide, including loan amounts, interest rates, and non-price loan characteristics such as maturity and covenants, starting from 1988. It also contains information about the members of the syndicate, the lead bank, the share of each bank in the syndicate, and the borrower.

Following normal selection criteria used in the literature, we exclude companies that do not have complete records on our explanatory variables and firm-quarters with negative sales. In addition, we drop firms with less than \$10 million in total assets and those operating in the financial or utility sectors. Finally, we require firms to have at least three observations before the mandatory disclosure regulation. To control for the potential influence of outliers, we winsorize the regression variables at the 1% and 99% levels. Our combined sample contains data for 24,052 bonds issued by 2,774 firms that traded between 2004Q1 and 2023Q4 across 57 countries.

We follow [Krueger et al. \(2024\)](#) to determine the effective years of mandatory ESG disclosure at the country level.⁹ The dataset includes information about the effective

⁹The dataset compiled by [Krueger et al. \(2024\)](#) is primarily sourced from the Carrots and Sticks project, the Global Reporting Initiative (GRI), and the Sustainable Stock Exchanges (SSE). To ensure that we do not omit ESG information, we search online for additional mandatory ESG disclosures. We report the year the mandatory disclosure is introduced in [Table A2](#) in the online appendix.

years, implementation mechanisms, and approaches of mandatory ESG disclosure regulations from 33 countries around the world. To ensure that we do not omit ESG information, we search online for additional mandatory ESG disclosures.

Table 1 provides preliminary analysis of our sample. The bond spread ranges from 0.6% in the lower quartile of the distribution to 2.4% in the upper quartile, with an average of 1.9%. Moreover, 27.3% of the firm-years receive operate in a country that enacts a mandatory ESG disclosure. With respect to firm-level characteristics, the average firm has a ratio of tangible assets to total assets of 31.8%, a leverage ratio of 13.98%, and a cash-to-assets ratio of 8.2%. Firms in the sample spend an average of 1.5% of assets on R&D, and the average dividend to assets is 2%. Comparable to what can be found in the literature (e.g., [Calomiris et al. \(2022\)](#)), our sample mostly consists of very large firms, with an average size of USD 29.5 billion. Finally, the average firm has a Tobin’s Q of 1.36 and an ESG score of 62.8 in the 0-100 range.

4 Empirical strategy

4.1 Baseline model

We first estimate how bond spreads change around mandatory ESG disclosures. To do so, we employ a staggered difference-in-difference approach using the mandatory ESG disclosure regulations as exogenous shocks. The merits of our staggered difference-in-difference design in research problems such as ours is well established in the related literature ([Gibbons 2024](#), [Krueger et al. 2024](#)). Specifically, it mitigates potential bias from omitted confounding variables by incorporating fixed effects and

enables issuing firms to transition between control and treated groups at different time points. We estimate how the mandatory ESG disclosure regulations affect the spread of corporate bonds issued by firms operating in countries where ESG disclosure is mandatory, and we compare them to their counterparts in countries where ESG disclosure is not mandatory over the same period. Our baseline model is the following:

$$Y_{f,b,c,t} = \alpha + \beta_1 \text{Mandatory ESG Discl.}_{f,c,t} + \delta X_{f,c,t-1} + FE + \varepsilon_{f,b,c,t} \quad (1)$$

where f indexes firm, b indexes bond, c indexes country, and t indexes time. $Y_{f,b,c,t}$ is the bond spread, measured as the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency (see, for instance, [Campbell & Taksler 2003](#), [Kaviani et al. 2020](#), [Caramichael & Rapp 2024](#)). *Mandatory ESG Discl.* $_{f,c,t}$ is a dummy variable that takes the value of 1 if the firm is headquartered in a country that adopts a mandatory environmental, social, or governance law; otherwise, it takes the value of 0. Hence, firms in countries with mandatory disclosure belong to the treatment group, and the remaining firms belong to the control group. The coefficient of interest in [Equation 1](#) is β_1 , which measures the difference in bond spreads between treated and control firms in the post-mandatory disclosure period.

To estimate the effect of mandatory ESG disclosure, $X_{f,c,t-1}$ is a vector that contains firm- and country-level control variables that capture financial, risk and aggregate economic development characteristics, which could affect firms' cost of debt capital as previous empirical literature suggests regarding on the determinants

of credit spread and capital structure (see, for instance, [Campbell & Taksler 2003](#), [Helwege et al. 2014](#), [Kaviani et al. 2020](#), [Asimakopoulos et al. 2023](#)). All variables are lagged by one year to mitigate potential endogeneity concerns. Specifically, we employ the following firm-specific characteristics: size, return on assets (ROA), collateral, leverage, cash, dividends, Tobin’s Q, R&D, and ESG score.¹⁰ Country-level controls include GDP and its growth as well as rule of law, unemployment, political stability, corruption, environmental performance, tax, renewable energy, and government efficiency.

The model includes additional controls as follows: firm fixed effects to account for unobserved firm heterogeneity, time fixed effects to account for macroeconomic trends, and bond fixed effects to control for bond-specific omitted factors. In some specifications we include time×industry fixed effects to control for time-varying industry characteristics. We double-cluster the standard errors, $\epsilon_{f,b,c,t}$, at the bond quarter level to account for potential serial correlation in the error terms.

Our identification strategy relies on the assumption that, in the period before the introduction of mandates, bond spreads do not differ systematically across treated and control firms (parallel-trends assumption). To address this issue, we provide a simple visual account of the evolution of firms’ bond spreads around the introduction of a disclosure mandate. Specifically, as in [Autor \(2003\)](#) we plot the series of coefficients and corresponding 95% confidence intervals from estimating regressions analogous to [Equation 1](#), in which we replace *Mandatory ESG Discl.*_{*f,c,t*} with a sequence of time dummies spanning our entire estimation period. These dummy

¹⁰To facilitate measurement, all variables are converted into U.S. dollars.

variables take a value of 1 in the respective year and a value of 0 for all other quarters. We group together years that are three or more years before ($t \leq -3$) or after ($t \geq +3$) the introduction of a mandate. Figure 1 shows a continuous drop in the bond spreads after the mandate.¹¹ The plot shows no evidence of anticipation, meaning that treated and control firms do not experience significant changes in their bonds spreads in the pre-policy period.

4.2 Potential mechanisms for the link between bond spreads and mandatory disclosures

Our baseline analysis aims to establish an association between the cost of issuing bonds and the introduction of ESG mandates. In this subsection, we examine three potential channels that might explain this relationship: the information channel, the clientele-catering channel, and the relationship-lending channel.

In order to examine whether, following the mandatory disclosure, bond spreads differ for firms that are associated with the higher and lower degrees of information asymmetry, we augment Equation 1 with a variable that captures financial constraint. Our model is:

$$Y_{f,b,c,t} = \alpha + \beta_1 \text{Mandatory ESG Discl.}_{f,c,t} \times \text{Unrated/Junk}_{f,t} + \beta_2 \text{Mandatory ESG Discl.}_{f,c,t} + \delta X_{f,c,t-1} + FE + \varepsilon_{f,b,c,t} \quad (2)$$

where *Unrated/Junk*_{f,t} is a dummy variable that takes the value of 1 for firms

¹¹We report the output of the parallel trends test in Table A3 in the online appendix.

that have debt outstanding but no bond rating or ratings are below the investment-grade threshold, and 0 otherwise. [Campello & Chen \(2010\)](#) and [Campello et al. \(2010\)](#) use similar approaches to define financial constraints using credit ratings. The sign and significance of the interaction term will reveal whether firms more (less) likely to be financially constrained face differential spreads in the post-mandate period. To support H2A, we should observe negative and significant coefficients for both β_1 and β_2 . This would imply that bond spreads and mandatory disclosures are negatively related, but more so for firms that suffer from greater information asymmetry.

In addition, to further test whether mandatory ESG reporting reduces levels of information asymmetry, we also estimate the following equation:

$$Y_{f,b,c,t} = \alpha + \beta_1 \text{Mandatory ESG Discl.}_{f,c,t} \times \text{SectorPoorESGPerf}_{f,t} + \beta_2 \text{Mandatory ESG Discl.}_{f,c,t} + \delta X_{f,c,t-1} + FE + \varepsilon_{f,b,c,t} \quad (3)$$

where *SectorPoorESGPerf_{f,t}* is a dummy variable equal to one for firms belonging to sectors with structurally low ESG performance (using sectors with high emissions and hard-to-reduce emissions, alternatively). If ESG reporting mandates decrease the level of information asymmetry, and that effect is less beneficial to firms that cannot “hide” their poor ESG performance anymore, we expect β_1 to be positive and β_2 to be negative. In such case, H2B would be validated.

At the next stage we assess whether a clientele effect exists (i.e., if some investors’

taste for ESG information of some investors may influences the relationship between ESG reporting mandates and bond spreads). We estimate the following equation:

$$Y_{f,b,c,t} = \alpha + \beta_1 \text{Mandatory ESG Discl.}_{f,c,t} \times \text{LowIO/LowIOCountry}_f + \beta_2 \text{Mandatory ESG Discl.}_{f,c,t} + \delta X_{f,c,t-1} + FE + \varepsilon_{f,b,c,t} \quad (4)$$

where *LowIO/LowIOCountry_f* is a dummy variable that equals 1 for firms with equity institutional ownership in the bottom quartile for any of the four quarters preceding the ESG mandate implementation, and 0 otherwise. Quartiles are defined within each quarter for *Low IO*, and within each quarter-country for *Low IO Country*. We build on [Gibbons \(2024\)](#), who argues that firms with low institutional ownership prior to the ESG reporting mandates are more affected by clientele effects, as their initially low institutional ownership leaves room for a larger influx of institutional owners post-mandate.¹² To support H3, we expect to observe negative and significant coefficients for both β_1 and β_2 . In other words, mandatory disclosures should exert a negative impact on the cost of borrowing from the bond markets, especially for firms that are more prone to larger clientele effects.

Finally, we take into account the differential effect of relationship lending on bond

¹²We use equity institutional ownership, as we do not have access to bond ownership data.

spreads in the post-mandate period. Formally, we test the following model:

$$Y_{f,b,c,t} = \alpha + \beta_1 \text{Mandatory ESG Discl.}_{f,c,t} \times \text{Rel Bor}_{f,t} + \beta_2 \text{Mandatory ESG Discl.}_{f,c,t} + \beta_3 \text{Rel Bor}_{f,t} + \delta X_{f,c,t-1} + FE + \varepsilon_{f,b,c,t} \quad (5)$$

where *Rel Bor* is a measure of relationship strength that equals 1 if a bank lends to the same borrower in the five years before the present loan, and zero otherwise (Bharath et al. 2009). The main coefficient of interest is β_1 , which captures whether relationship borrowers pay higher or lower spreads than transactional borrowers after the mandate. To support H4, we should observe negative coefficients for both β_1 and β_2 . This implies that bond spreads and ESG mandatory disclosures are negatively related, but more so for relationship borrowers.

5 Results

5.1 Mandatory disclosure and bond spreads

We start our investigation with a basic model of bond spread determination. Table 2 shows the results of estimating Equation 1. We test the first hypothesis, which states that firms operating in countries that have introduced ESG mandates, are more likely to command lower spreads. The estimation results in the subsequent columns include different fixed effects that strengthen our identification. We report coefficient estimates and *t*-statistics, with standard errors clustered by bond and quarter. The general finding is that ESG disclosures negatively and significantly

affect bond spreads, both statistically and economically.

The coefficient on mandatory disclosure reflects whether treated firms enjoy more (negative) or less (positive) favorable terms on bond spreads. The impact of mandatory ESG disclosure is substantial on bond spreads, as demonstrated by the negative coefficient on the *Mandatory ESG Discl.*_{*f,c,t*} term in column 1. That is, following the disclosure, firms face lower bond spreads compared to those that do not operate in counties that enact mandatory disclosures. The finding shows qualitatively and quantitatively significant effects. Based on the estimates in column 1, treated firms' bond spreads decrease by 0.49% after the policy change. In the following columns of [Table 2](#), we rerun the same regressions and find that the main results persist, if not becoming larger in magnitude, even after controlling for firm-level characteristics, bond, industry and time-varying shocks that could affect firms differently in the treated and control groups. Our findings provide strong support for H1 and are valuable in light of previous studies, that show firms with higher environmental scores command lower rates on their bank loans ([Chava 2014](#)) and lower bond spreads ([Seltzer et al. 2019](#)). We document that firms that issue bonds after ESG mandates are more likely to face lower risks, and this is mirrored in their cost of bond financing.

Judging from the signs of the estimated coefficients on the control variables, we find that an increase in firm size, profitability, collateral, cash holdings or Tobin's Q, which are signs of strong balance sheets, reduce the cost of bond financing. In addition, higher ESG scores attract higher spreads, which is consistent with the notion that ESG activities may be a symptom of agency costs.

To sum up, the baseline specifications suggest that bond spreads decrease with the introduction of ESG mandates. We point out, however, that the baseline model may ignore important heterogeneities. In the next subsections, we test the robustness of our main findings and delve deeper into the channels through which mandatory disclosure of ESG could affect the cost of obtaining external funding from the bond markets.

5.1.1 Robustness tests

In [Table 3](#), we present four additional robustness tests for the results in [Table 2](#). We first remove the U.S. and Japan from the sample because these countries dominate the bond data and their markets may be fundamentally different from the remaining economies. In column 1 we report the regressions with a smaller sample after dropping the U.S. and Japan. In column 2, to avoid concerns regarding the role of various macro-economic indicators, we add various country-level control variables. Next, we restrict the sample of firms within treatment countries to a window around the introduction of the disclosure. Specifically, in column 3 we use five years prior to and five years following the effective year of mandatory ESG disclosure. This approach mitigates the impact of confounding factors over an extended window. For countries in the control group, we adopt the full sample window. In column 4, we repeat this exercise using three years before and after the introduction of the disclosure. Our findings are robust to all the above modifications. In addition, in [Table A4](#), we show that our results are also robust when using other combinations of fixed effects, namely country and quarter fixed effects (columns 1 and 2), country, industry, and

quarter fixed effects (columns 3 and 4), and firm and quarter fixed effects (columns 5 and 6). In [Table A5](#), we also find that our results hold after excluding smaller firms, which should mitigate the concerns about illiquid corporate bonds of small firms that may pollute our findings.

Recent research shows that traditional two-way fixed effect models can lead to biased estimation results. Therefore, in [Table 4](#), we rely on several methods that have been designed to address such potential estimation issues. In columns 1 to 3, we use three different estimators proposed by [De Chaisemartin & d’Haultfoeuille \(2020\)](#). In columns 4 and 5, we use the estimators built by [Callaway & Sant’Anna \(2021\)](#) and [Borusyak et al. \(2024\)](#), respectively. Across our specifications, we confirm the negative and significant association between mandatory ESG disclosure and bond spreads. These corrected estimators indicate that mandatory ESG disclosure decreases bond spreads by 0.17 to 0.37%. Furthermore, [Table A6](#) in the online appendix shows that our results also hold when using a stacked difference-in-differences design.

In order to alleviate further any concerns about our identification strategy and provide an extra layer of robustness on our main findings, we repeat our main exercise with a different method: the Causal Forest (CF) ([Athey 2016](#), [Wager & Athey 2018](#)). CF is a nonparametric, machine-learning, causal inference method based on one of the most popular machine-learning algorithms, the Random Forest. In CF the dataset is split so that the difference across splits is maximized between the outcome and the treatment variable. The main difference between the CF and the staggered DiD approach, applied in the previous section, is that the former can identify which

subgroups experience different treatment effects, while DiD provides the average treatment effect across the whole population. In other words, in our setting, the CF estimates the conditional average treatment effect of each firm under study and the related confidence interval, while the staggered DiD estimates the average treatment effect of the whole group. Thus, CF provides a detailed view on how heterogeneity varies within our bonds. In addition, CF can handle large complex datasets better and identify itself the most relevant factors, unlike staggered DiD, which relies on pre selected specifications. [Figure 2](#) plots the conditional average effect of all bonds under study and the red vertical line plots the average treatment effect. The average treatment effect is negative and close to the one obtained by the DiD.

5.2 The information asymmetry channel

We now turn to our H2, relating ESG disclosures to asymmetric information. The results of estimating [Equation 2](#) are in columns 1 and 2 of [Table 5](#), while the results pertaining to [Equation 3](#) are in columns 3 to 5.

Each column of the table corresponds to one of the alternative indicators that underlies the characterization of information asymmetry. Column 1 presents the results exploring firms without a credit rating (*Unrated*), while column 2 explores firms with sub investment-grade ratings (*Junk*).¹³ In both models we interact the dummy variables for financial constraints (*Unrated*, *Junk*) with the mandatory disclosure variable (*Mandatory ESG Discl.*) to gauge the change in bond spreads for

¹³We use these variables as it is well-established in the literature that information asymmetries are higher for unrated and low-rating firms (see, for instance, [Odders-White & Ready 2006](#), [Sufi 2007](#)).

different groups of firms in the post-mandate period.

According to the results reported in column 1, the coefficient on mandatory disclosures is negative and highly significant. Following the mandates, firms experience a reduction in their bond spreads by 0.55 percentage points. When we observe the interaction term between mandates and unrated firms (*Mandatory ESG Discl.* \times *Unrated*), it is negative and significant at the 10% level. Hence, the reduction in bond spreads is 1.28 percentage points larger for unrated firms. To further corroborate our findings, we use a different indicator of financing constraints, namely whether firms' bond ratings are categorized as junk (or below investment grade). Column 2 shows, once again, that the effect of mandates on the cost of borrowing in the bond markets remains negative and statically significant. Importantly, the effect is amplified for firms with low-quality credit ratings.

In summary, we document that firms' bond spreads have a different response to ESG mandates, when considering the degree of asymmetric information, as measured by credit ratings. These results support hypothesis 2A because firms that suffer from higher information asymmetry benefit the most from the introduction of the mandates. In other words, unrated firms or those that achieve below-investment-grade ratings, lack transparency and availability of public information that can influence the cost of borrowing. For these firms, revelation of ESG information is more important compared to counterparts that have track records and do not experience difficulties accessing external financing.

Next, we test whether the effect of mandatory ESG disclosure is different when disclosure is likely to reveal a poor underlying environmental performance. In column

3, we rely on [Ilhan et al. \(2021\)](#) to identify the five industries that pollute the most. We find that the effect of mandatory ESG disclosure on the cost of debt is significantly weaker for firms in the most polluting industries. We also document a weaker effect of mandatory ESG disclosure on the cost of debt for firms in sectors where polluting emissions are hard to reduce (columns 4 and 5).¹⁴ Overall, these tests indicate that mandatory ESG disclosure is relatively more costly in sectors where the underlying environmental performance is structurally low. These findings are consistent with hypothesis 2B.

5.3 The clientele channel

In this sub section, we focus on how institutional investors' preferences for ESG information could affect the relationship between mandatory ESG disclosures and the cost of bond financing. If institutional investors have a preference for firms with more nonfinancial disclosure, they may be prone to invest in securities affected by ESG disclosure mandates. This inflow of institutional investors should be larger for securities with a low ex-ante level of institutional ownership ([Gibbons 2024](#)). Therefore, we distinguish firms that have higher (lower) ex-ante levels of institutional

¹⁴As there is no commonly accepted definition of hard-to-abate sectors, we propose two alternatives measures. Our variable *Hard – to – Abate* defines the hard-to-abate sectors as the following SIC codes: 2869, 3241, 3312, 4412, 4512, 4952, and 4953. Our variable *Hard – to – Abate(altern.)* defines the hard-to-abate sectors as the following SIC codes: 2869, 3241, 3312, 4011, 4111, 4131, 4412, 4512, 4789, 4911, 4922, 4931, 4952, and 4953. To identify these sectors, we rely on reports from the International Energy Agency (<https://www.iea.org/reports/energy-technology-perspectives-2020>) and the United Nations Environment Programme (<https://www.unep.org/resources/report/global-waste-management-outlook>). These reports mention chemicals, steel, cement, transportation, electric services, natural gas, and waste management as hard-to-abate sectors. In unreported tests, we verify that our results also hold when defining the hard-to-abate sectors as the following two-digit SIC codes: 28, 32, 33, 40, 41, 44, 45, 47, and 49.

ownership. We expect that the effect of ESG reporting mandates on bond spreads should be magnified for firms with lower institutional ownership prior to the mandate.

In [Table 6](#), we present the estimates of [Equation 4](#). To begin with column 1, we focus on the sign and significance of the double-interaction term (*Mandatory ESG Discl.* \times *Low IO*). We find that firms with equity institutional ownership in the bottom quartile of the distribution in the pre-mandate period face a stronger reduction in spreads after the ESG mandate implementation. In other words, the negative and significant coefficient shows that this group of firms reduces its bond spreads by 0.32 percentage points after the introduction of the mandate. In column 2 of [Table 6](#), we check the robustness of this finding by generating another dummy variable, which takes the value of 1 for firms that have equity institutional ownership in the bottom quartile for any of the four quarters preceding the ESG mandate implementation, and 0 otherwise. Here, quartiles are defined within each country-quarter, instead of within each quarter as in column 1. We observe qualitatively and quantitatively similar results. Furthermore, in [Table A7](#), we find that the effect of the ESG mandates is stronger when firms improve their ESG rating (column 1), and weaker when firms have an ESG rating in the bottom quartile (column 2).

Overall, these results lend support to H3.

5.4 The bank-relationship channel

The effects uncovered in the previous two sub sections are in line with operating channels for the reduction of bond spreads after the mandate. However, banks are also likely to play a role in determining bond spreads. Therefore, it is reasonable to

assume that firms with bank relationships have an advantage in commanding lower spreads because banks perform an effective monitoring function, which is beneficial to bondholders. To this end, we investigate how firms' access to the syndicated loan market affects the link between the cost of borrowing from the bond market and ESG disclosure.

We estimate [Equation 5](#) and report the results in [Table 7](#). In column 1, we find a statistically significant and negative coefficient on the mandatory disclosure (*Mandatory ESG Discl.*) variable. That is, treated firms reduce their spreads after the introduction of the mandate. Importantly, the double-interaction term (*Mandatory ESG Discl. × Rel Bor*) shows a statistically significant and negative coefficient. In other words, the effect of the disclosures strengthens for relationship borrowers, who benefit from more stringent bank monitoring. The results show qualitatively and quantitatively significant effects. In the remaining specifications reported in columns 2 to 4, we find that the main results persist even after defining the relationship borrowers in different ways.¹⁵ We conclude that our findings provide strong support for H4 and the bank relationship channel.

6 Conclusion

ESG reporting may affect firms' risk and return levels, which in turn can influence firms' cost of capital. However, whether ESG reporting increases or decreases financing costs is theoretically unclear, as arguments can be made in both directions.

¹⁵To alleviate any concerns that relationship borrowers might also be financially constrained firms, we re-estimate the model after removing firms with unrated bonds. The results are in [Table A8](#) and show that our main findings are robust to this modification.

In this study, we leverage the staggered implementation of ESG reporting mandates to analyze whether ESG disclosure influences firms' cost of capital. Using a large international sample of corporate bonds, we find that ESG disclosure helps firms decrease their cost of financing. Importantly, our results hold after controlling for ESG ratings and various country-level characteristics that could have confounded the effect. Our findings suggest that both a reduction in information asymmetry and clientele effect (i.e., a preference among some investors for securities with ESG attributes) drive the results. The effects are also stronger for firms with preexisting bank lending relationships.

Overall, our study provides valuable information to regulators and policymakers considering the implementation of an ESG reporting mandate in their jurisdiction. Compared to relying on voluntary ESG disclosure or a unique ESG reporting mandate, we believe that our empirical design provides more comprehensive and generalizable insights. However, as with any empirical study, our results may to some extent depend on our sample period. Notably, the clientele effect may weaken in the future, as the world faces a growing anti-ESG movement and several large investors tone down their ESG preferences.

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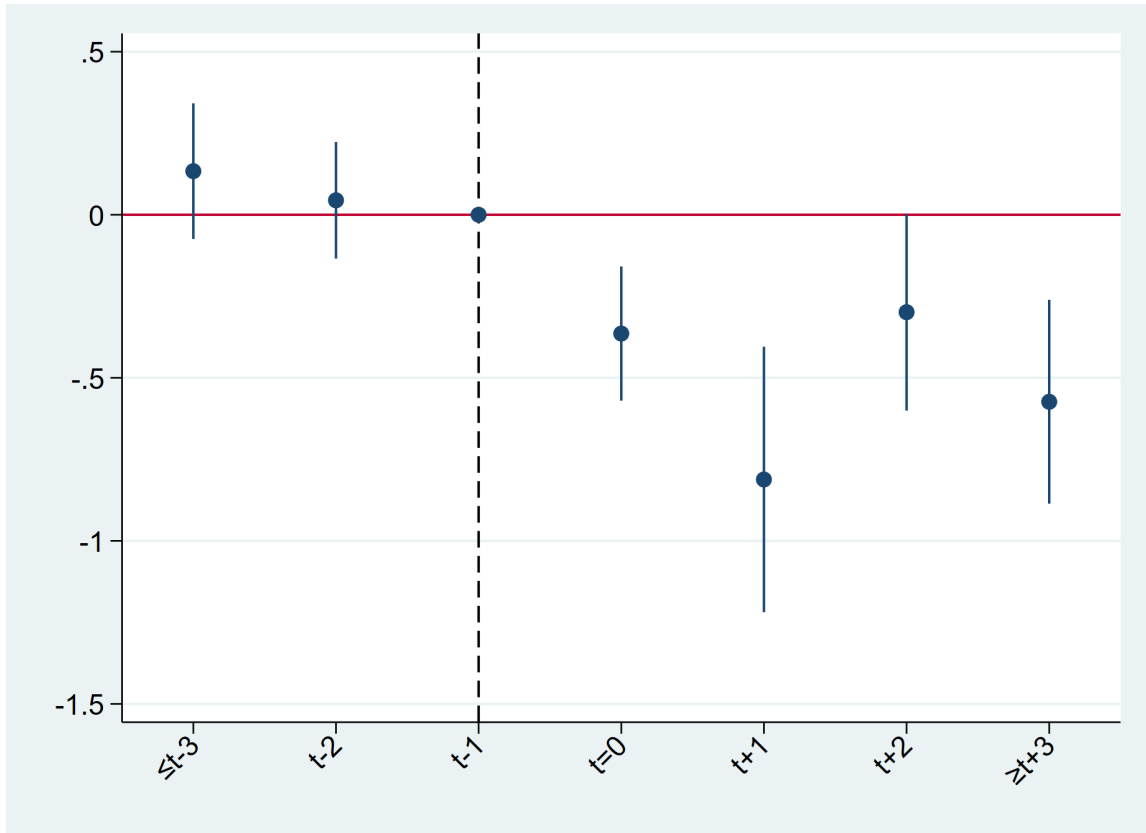
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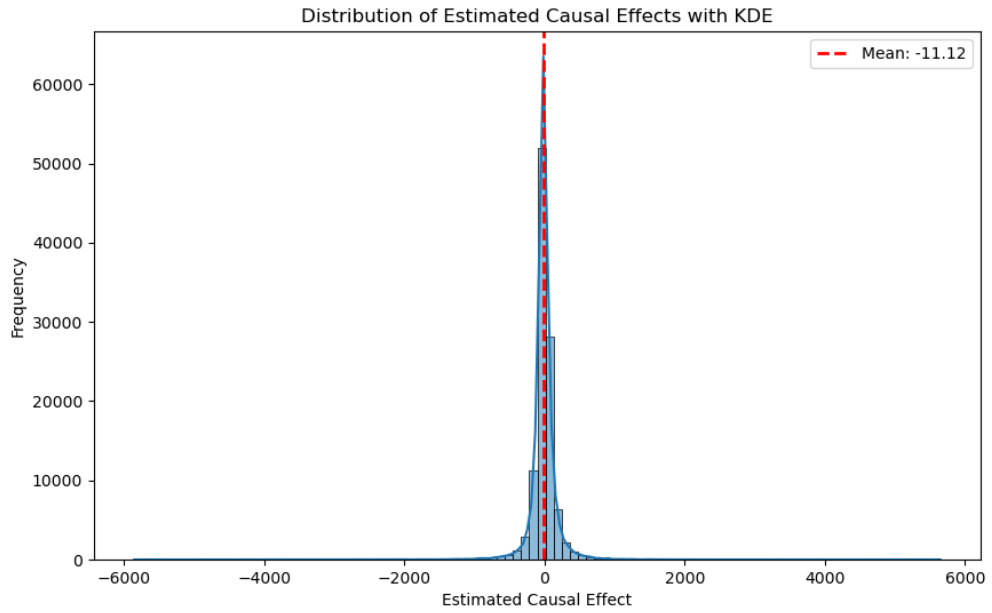
A Figures and tables

Figure 1: Mandatory ESG disclosure and bond spreads: Parallel trends



This Figure illustrates event time effects of mandatory ESG disclosure on bond spreads. The lower and upper bounds of the box correspond to the 25th and 75th percentiles, respectively, while the median is indicated by the line within the box.

Figure 2: The conditional average effect



This Figure illustrates the distribution of the estimated causal effects from Causal Forest with kernel density estimation (KDE).

Table 1: Summary Statistics

	N	Mean	St.D.	P25	Median	P75
<i>A. Bond-specific variable</i>						
Bond Spread (%)	373,402	2.098	5.435	0.606	1.319	2.367
<i>B. Firm-specific variables</i>						
Mandatory ESG Discl.	373,402	0.270	0.444	0.000	0.000	1.000
Firm Size	373,402	17.200	1.457	16.240	17.247	18.199
ROA	373,402	0.037	0.067	0.012	0.035	0.066
Tangible	373,402	0.320	0.233	0.119	0.280	0.459
Leverage	373,402	1.392	3.009	0.572	1.043	1.837
Cash Holding	373,402	0.081	0.071	0.029	0.062	0.112
Dividend	373,402	0.021	0.022	0.005	0.014	0.028
Tobin's Q	373,402	1.372	1.071	0.723	0.995	1.601
R&D	373,402	0.015	0.027	0.000	0.002	0.016
ESG Score	373,402	4.032	0.546	3.917	4.235	4.376
<i>C. Country-specific variables</i>						
GDP	428,712	10.614	0.675	10.487	10.901	10.996
GDP Growth	428,712	1.535	2.897	0.93	1.6	2.46
Rule of Law	353,599	1.329	0.570	1.36	1.51	1.61
Unemployment	416,990	5.087	2.008	3.65	4.55	6.17
Political Stability	353,599	0.421	0.499	0.03	0.42	0.85
Corruption Control	428,712	1.124	0.627	1.02	1.29	1.46
Environmental Performance	417,533	15.504	14.756	5.25	5.7	24.72
Tax	348,219	13.204	4.701	10.34	11.44	13.22
Renewable Energy	303,227	12.18	9.277	8.45	10.12	12.6
Government Efficiency	353,599	1.365	0.428	1.34	1.47	1.57

Notes: This Table provides basic descriptive statistics. Panel A reports summary statistics for the bond-specific variables. Panel B reports summary statistics for the firm-specific variables. Panel C reports summary statistics for the country-specific variables. The sample consists of bond-quarter observations from 55 countries between 2004Q1 and 2023Q4. See [Table A1](#) in the online appendix for precise definitions of all the variables.

Table 2: Mandatory ESG Disclosure and Bond Spreads

	<i>Bond Spread_t</i> (%)		
	(1)	(2)	(3)
<i>Mandatory ESG Discl._t</i>	-0.490*** (-4.038)	-0.574*** (-4.600)	-0.615*** (-4.752)
<i>Firm Size_{t-1}</i>	—	-0.973*** (-6.426)	-1.030*** (-6.702)
<i>ROA_{t-1}</i>	—	-7.297*** (-7.676)	-6.317*** (-7.162)
<i>Tangible_{t-1}</i>	—	-0.048 (-0.066)	-0.239 (-0.339)
<i>Leverage_{t-1}</i>	—	-0.010 (-1.016)	-0.015 (-1.362)
<i>Cash Holding_{t-1}</i>	—	-3.024*** (-3.937)	-2.441*** (-3.650)
<i>Dividend_{t-1}</i>	—	-5.066** (-2.303)	-5.506** (-2.267)
<i>Tobin's Q_{t-1}</i>	—	-0.230*** (-3.331)	-0.190*** (-2.725)
<i>R&D_{t-1}</i>	—	-0.900 (-0.278)	-1.752 (-0.564)
<i>ESG Score_{t-1}</i>	—	0.538*** (3.179)	0.418** (2.560)
Constant	2.227*** (68.505)	17.795*** (6.797)	19.221*** (7.212)
Bond FEs	Yes	Yes	Yes
Firm FEs	Yes	Yes	No
Quarter FEs	Yes	Yes	No
Industry-Quarter FEs	No	No	Yes
Observations	372,641	372,641	372,355
Adjusted R-squared	0.637	0.651	0.692

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Mandatory ESG Discl* equals 1 if the firm is headquartered in a country that adopted a mandatory environmental, social or governance law, and 0 otherwise. All independent variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *,** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Mandatory ESG Disclosure and Bond Spreads–Robustness tests

	<i>Bond Spread_t</i> (%)			
	H1			
	(1)	(2)	(3)	(4)
<i>Mandatory ESG Discl._t</i>	-0.511*** (-4.251)	-0.629*** (-4.123)	-0.596*** (-4.865)	-0.480*** (-4.839)
<i>Firm Size_{t-1}</i>	-2.089*** (-7.161)	-1.055*** (-6.044)	-0.908*** (-5.562)	-0.906*** (-5.460)
<i>ROA_{t-1}</i>	-11.558*** (-7.798)	-6.483*** (-4.752)	-7.082*** (-7.447)	-7.214*** (-7.383)
<i>Tangible_{t-1}</i>	-2.811*** (-2.631)	0.438 (0.404)	0.273 (0.332)	0.420 (0.501)
<i>Leverage_{t-1}</i>	0.000 (0.000)	-0.015 (-1.075)	0.004 (0.316)	0.002 (0.186)
<i>Cash Holding_{t-1}</i>	-9.923*** (-8.497)	-0.695 (-1.019)	-3.066*** (-3.553)	-3.152*** (-3.521)
<i>Dividend_{t-1}</i>	-0.943 (-0.553)	-6.578** (-2.081)	-6.423** (-2.300)	-7.162** (-2.337)
<i>Tobin's Q_{t-1}</i>	-0.043 (-0.448)	-0.336*** (-3.068)	-0.244*** (-3.723)	-0.236*** (-3.538)
<i>R&D_{t-1}</i>	-27.975*** (-4.740)	-2.487 (-0.652)	0.115 (0.035)	0.354 (0.103)
<i>ESG Score_{t-1}</i>	0.534*** (2.789)	0.689*** (2.970)	0.662*** (3.261)	0.690*** (3.241)
Constant	38.554*** (7.766)	47.930** (2.488)	15.918*** (5.817)	15.744*** (5.646)
Sample	Excl. US & JP	Full	[-5, 5]	[-3, 3]
Country-level Controls	No	Yes	No	No
Bond FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Quarter FEs	Yes	Yes	Yes	Yes
Observations	154,401	221,453	297,970	285,938
Adjusted R-squared	0.717	0.667	0.696	0.694

Notes: This Table presents robustness tests for the estimation results of the specification in column 2 of [Table 2](#). The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Mandatory ESG Discl* equals 1 if the firm is headquartered in a country that adopted a mandatory environmental, social or governance law, and 0 otherwise. Column 1 excludes firms headquartered in the US and Japan. Column 2 includes country-level control variables. Columns 3 and 4 present results using a 5-year and a 3-year window around the ESG disclosure, respectively. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *,** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Mandatory ESG Disclosure and Bond Spreads—Alternative estimators

	<i>Bond Spread_t</i> (%)				
	H1				
		DCDH		CSA	BJS
	(1)	(2)	(3)	(4)	(5)
<i>Mandatory ESG Discl._t</i>	-0.322*** (-5.911)	-0.165*** (-3.338)	-0.253*** (-8.402)	-0.368*** (-2.784)	-0.301** (-1.999)

Notes: This Table presents the impact of mandatory ESG disclosure on bond spreads, using alternative estimators. Columns 1 to 3 rely on the estimators of [De Chaisemartin & d’Haultfoeuille \(2020\)](#). Columns 1 and 2 use the static estimator. Column 1 reports the average slope. Column 2 reports the weighted average slope. Column 3 reports the dynamic estimator. Columns 4 and 5 report the average treatment effect on the treated for all groups across all periods. Column 4 uses the estimator of [Callaway & Sant’Anna \(2021\)](#). Column 5 uses the estimator of [Borusyak et al. \(2024\)](#). Control variables and fixed effects are the same as those of [Table 2](#), column 2. All control variables are lagged by one year. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5: The Information Asymmetry Channel

	<i>Bond Spread_t</i> (%)				
	H2A		H2B		
	(1)	(2)	(3)	(4)	(5)
<i>Mandatory ESG Discl._t</i>	-0.550*** (-4.45)	-0.547*** (-4.33)	-0.624*** (-4.921)	-0.630*** (-4.999)	-0.626*** (-4.950)
<i>Mandatory ESG Discl._t × Unrated_{f,t}</i>	-1.287* (-1.96)	—	—	—	—
<i>Mandatory ESG Discl._t × Junk_{f,t}</i>	—	-0.572* (-1.67)	—	—	—
<i>Mandatory ESG Discl._t × High Polluter</i>	—	—	0.479** (2.100)	—	—
<i>Mandatory ESG Discl._t × Hard – to – Abate</i>	—	—	—	0.471** (2.067)	—
<i>Mandatory ESG Discl._t × Hard – to – Abate (altern.)</i>	—	—	—	—	0.416* (1.914)
Constant	17.797*** (6.80)	17.802*** (6.80)	17.81*** (6.801)	17.82*** (6.801)	17.82*** (6.800)
Control Variables	Yes	Yes	Yes	Yes	Yes
Bond Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	372,641	372,641	372,641	372,641	372,641
Adjusted R-squared	0.689	0.689	0.690	0.690	0.690

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. Columns 1 and 2 test hypothesis 2A. Columns 3 to 5 test hypothesis 2B. *Unrated* is a dummy variable, which takes value 1 for firms that have debt outstanding but without a bond rating, and 0 otherwise. *Junk Bond* is a dummy variable, which takes the value 1 for firms with bonds whose ratings are below the investment grade threshold, and 0 otherwise. *High Polluter* is a dummy variable equal to one if the firm belongs to one of the five most polluting sectors, as reported in Ilhan et al. (2021), and zero otherwise. *Hard – to – Abate* and *Hard – to – Abate(altern.)* are dummy variables equal to one if the firm belongs to specific sectors, zero otherwise. Control variables are the same as those of Table 2, column 2. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in parentheses. Standard errors are clustered at the bond and quarter level. The *, **, and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: The Clientele Channel

	<i>Bond Spread_t</i> (%)	
	H3	
	(1)	(2)
<i>Mandatory ESG Discl._t</i>	-0.423** (-2.545)	-0.496*** (-3.530)
<i>Mandatory ESG Discl._t × (Low IO)</i>	-0.325** (-2.087)	—
<i>Mandatory ESG Discl._t × (Low IO country)</i>	—	-0.336** (-2.432)
<i>Firm Size_{t-1}</i>	-0.972*** (-6.422)	-0.972*** (-6.425)
<i>ROA_{t-1}</i>	-7.294*** (-7.673)	-7.293*** (-7.670)
<i>Tangible_{t-1}</i>	-0.0491 (-0.0682)	-0.0562 (-0.0779)
<i>Leverage_{t-1}</i>	-0.0102 (-1.018)	-0.0101 (-1.012)
<i>Cash Holding_{t-1}</i>	-3.017*** (-3.925)	-3.027*** (-3.943)
<i>Dividend_{t-1}</i>	-5.114** (-2.321)	-5.079** (-2.310)
<i>Tobin's Q_{t-1}</i>	-0.231*** (-3.337)	-0.230*** (-3.332)
<i>R&D_{t-1}</i>	-0.868 (-0.267)	-0.934 (-0.287)
<i>ESG Score_{t-1}</i>	0.538*** (3.181)	0.537*** (3.177)
Constant	17.75*** (6.783)	17.78*** (6.794)
Bond FEs	Yes	Yes
Firm FEs	Yes	Yes
Quarter FEs	Yes	Yes
Observations	372,641	372,641
Adjusted R-squared	0.690	0.690

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Low IO* is a dummy variable, which takes value 1 for firms that have equity institutional ownership in the bottom quartile for any of the four quarters preceding the ESG mandate implementation, and 0 otherwise. Quartiles are defined within each quarter. *Low IO country* is a dummy variable, which takes value 1 for firms that have equity institutional ownership in the bottom quartile for any of the four quarters preceding the ESG mandate implementation, and 0 otherwise. Quartiles are defined within each country-quarter. Control variables are the same as those of Table 2, column 2. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7: The Bank-Relationship Channel

	<i>Bond Spread_t</i> (%)			
	H4			
	(1)	(2)	(3)	(4)
<i>Mandatory ESG Discl._t</i>	-0.426*** (-3.204)	-0.426*** (-3.203)	-0.431*** (-3.200)	-0.431*** (-3.201)
REL Bor (5y)	0.741*** (-2.069)	—	—	—
<i>Mandatory ESG Discl._t × REL Bor(5y)</i>	-0.711** (-2.146)	—	—	—
REL Bor (10y)	—	0.718** (2.637)	—	—
<i>Mandatory ESG Discl._t × REL Bor(10y)</i>	—	-0.691** (-2.078)	—	—
Num. of REL (5y)	—	—	0.491*** (2.962)	—
<i>Mandatory ESG Discl._t × Num. REL(5y)</i>	—	—	-0.511*** (-2.794)	—
Num. of REL (10y)	—	—	—	0.469*** (2.939)
<i>Mandatory ESG Discl._t × Num. REL(10y)</i>	—	—	—	-0.490*** (-2.760)
Control Variables	Yes	Yes	Yes	Yes
Bond FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	115,786	115,786	115,786	115,786
Adjusted R-squared	0.655	0.655	0.655	0.655

Notes: This Table presents OLS regressions to investigate the impact of related lending on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. Control variables are the same as those of Table 2, column 2. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Online appendix

Table A1: Variable Definitions and Sources

<i>A. Dependent variable and main explanatory variable</i>		
Bond Spread	The difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency expressed in percentage.	Worldscope
Mandatory ESG Disclosure	A dummy variable that is equal to 1 from the first year in which a country introduced mandatory ESG disclosure, and 0 otherwise.	Kruger et al. (2024)
<i>B. Control variables</i>		
Firm Size	The natural logarithm of a firm's total assets, in thousands of USD.	Worldscope
ROA	The ratio of net income divided by total assets, both in the reporting currency.	Worldscope
Tangible	The ratio of property, plant, and equipment divided by total assets, both in the reporting currency.	Worldscope
Leverage	The ratio of total debt divided by common equity, calculated as the sum of long-term debt and short-term debt divided by common equity, all in the reporting currency.	Worldscope
Cash Holding	The ratio of cash and cash equivalents divided by total assets, both in the reporting currency.	Worldscope
Dividend	The ratio of the total common and preferred dividends paid to shareholders divided by total assets, both in the reporting currency.	Worldscope
Tobin's Q	The ratio of market value divided by total assets, both in the reporting currency. The market value of a firm is calculated as the sum of market capitalization and total debt.	Worldscope
R&D	The ratio of research and development costs divided by total assets, both in the reporting currency. Missing values of R&D are replaced with zero.	Worldscope
ESG Score	The natural logarithm of ESG score. The ESG score is calculated as the average of Refinitiv's Environment Pillar Score and Refinitiv's Social Pillar Score.	Worldscope
Unrated	A dummy variable that is equal to 1 for firms that have outstanding debt but without a bond rating.	Worldscope & Bloomberg

Junk	A dummy variable that is equal to 1 for firms whose ratings are below the investment grade threshold, and 0 otherwise.	Worldscope & Bloomberg
High Polluter	A dummy variable that is equal to 1 for firms belonging to one of the five most polluting sectors according to Ilhan et al. (2021) , and 0 otherwise. High-pollution sectors are defined using the following SIC codes: 32, 33, 44, 45, and 49.	Worldscope
Hard-to-Abate	A dummy variable that is equal to 1 for firms belonging to hard-to-abate sectors, and 0 otherwise. Hard-to-abate sectors are defined using the following SIC codes: 2869, 3241, 3312, 4412, 4512, 4952 & 4953.	Worldscope
Hard-to-Abate (altern.)	A dummy variable that is equal to 1 for firms belonging to hard-to-abate sectors, and 0 otherwise. Hard-to-abate sectors are defined using the following SIC codes: 2869, 3241, 3312, 4011, 4111, 4131, 4412, 4512, 4789, 4911, 4922, 4931, 4952, & 4953.	Worldscope
Low IO	A dummy variable that is equal to 1 for firms that have equity institutional ownership in the bottom quartile for any of the four quarters preceding the ESG mandate implementation, and 0 otherwise. Equity institutional ownership is defined as the ratio of shares held by institutional investors divided by the total numbers of outstanding shares.	Authors' own calculations based on Institutional Holdings (Type 2) from WRDS LSEG
REL Bor (5y)	A dummy variable that is equal to 1 for firms that borrow from the same bank in the last five years before the present loan, and 0 otherwise.	DealScan
REL Bor (10y)	A dummy variable that is equal to 1 for firms that borrow from the same bank in the last ten years before the present loan, and 0 otherwise.	DealScan
Num. REL Bor (5y)	The number of years (five) firms that borrow from the same bank.	DealScan
Num. Rel Bor (10y)	The number of years (ten) firms that borrow from the same bank.	DealScan
<i>C. Country-level variables</i>		
GDP	GDP per capita calculated as the gross domestic product divided by mid-year population count.	World Bank/OECD

GDP Growth	The annual percentage change in gross domestic product divided by mid-year population count.	World Bank/OECD
Rule of Law	Perceptions of the extent to which agents have confidence in and abide by the rules of society and the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank
Unemployment	The share of the labor force that is without work but available for and seeking employment	World Bank/ International Labour Organization
Political Stability	Perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. This measure gives the country's score in terms of an aggregate indicator.	World Bank
Corruption Control	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank
Environment Performance	The total metric tons of carbon dioxide emissions from the burning of fossil fuels and the manufacture of cement per capita.	World Bank/ Carbon Dioxide Information Analysis Center
Tax	Compulsory transfers to the central government for public purposes scaled by annual gross domestic product.	World Bank/ International Monetary Fund/ OECD
Renewable Energy	The share of energy consumed in the country from sources that do not produce carbon dioxide during generation (including nuclear).	World Bank
Government Efficiency	The sum of the squared seat shares of all parties in the government.	World Bank/ Inter-American Development Bank

Table A2: Mandatory ESG Disclosure by Country/Region and Year

Country/Region	ESG disclosure year
Argentina	2008
Australia	2003
Austria	2016
Belgium	2009
Canada	2004
Chile	2015
China	2008
Cyprus	2016
Denmark	2016
Finland	2016
France	2001
Germany	2016
Greece	2006
Hong Kong	2015
Hungary	2016
India	2015
Indonesia	2012
Ireland	2016
Italy	2016
Malaysia	2007
Netherlands	2016
Norway	2013
Peru	2005
Philippines	2011
Poland	2016
Portugal	2010
Romania	2016
Singapore	2016
South Africa	2010
Spain	2012
Sweden	2016
Taiwan (China)	2019
Turkey	2014
United Kingdom	2013

Notes: This Table presents the countries that introduced mandatory ESG disclosure and the respective year of introduction.

Table A3: Parallel Trends Test

	<i>Bond Spread_t</i> (%) (1)
T-3 and Before	0.134 (1.280)
T-2	0.044 (0.494)
T	-0.364*** (-3.525)
T+1	-0.812*** (-3.970)
T+2	-0.299* (-1.971)
T+3 and After	-0.574*** (-3.653)
<i>Firm Size_{t-1}</i>	-0.975*** (-6.427)
<i>ROA_{t-1}</i>	-7.308*** (-7.682)
<i>Tangible_{t-1}</i>	-0.033 (-0.046)
<i>Leverage_{t-1}</i>	-0.010 (-1.009)
<i>Cash Holding_{t-1}</i>	-3.004*** (-3.915)
<i>Dividend_{t-1}</i>	-5.027** (-2.277)
<i>Tobin's Q_{t-1}</i>	-0.232*** (-3.347)
<i>R&D_{t-1}</i>	-0.946 (-0.293)
<i>ESG Score_{t-1}</i>	0.533*** (3.157)
Constant	17.741*** (6.797)
Bond FEs	Yes
Firm FEs	Yes
Quarter FEs	Yes
Observations	372,641
Adjusted R-squared	0.690

Notes: This Table presents the estimates of a parallel trend test as shown in figure 1. Robust t-statistics are in the parentheses. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A4: Mandatory ESG Disclosure and Bond Spreads - Robustness tests with alternative fixed effects

	<i>Bond Spread_t(%)</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Mandatory ESG Discl._t</i>	-0.475*** (-2.897)	-0.448** (-2.625)	-0.534*** (-2.899)	-0.463** (-2.518)	-0.473** (-2.484)	-0.452** (-2.422)
<i>Firm Size_{t-1}</i>		-0.437*** (-9.669)		-0.409*** (-7.230)		-0.886*** (-5.375)
<i>ROA_{t-1}</i>		-12.77*** (-11.17)		-12.84*** (-10.31)		-9.302*** (-8.575)
<i>Tangible_{t-1}</i>		0.363 (0.862)		0.784** (2.352)		0.331 (0.534)
<i>Leverage_{t-1}</i>		0.0252 (1.647)		0.0323** (2.212)		-0.0186* (-1.707)
<i>Cash Holding_{t-1}</i>		-2.377*** (-2.813)		-3.310*** (-4.357)		-5.174*** (-4.835)
<i>Dividend_{t-1}</i>		10.27*** (7.210)		6.812*** (4.386)		-6.044*** (-3.104)
<i>Tobin's Q_{t-1}</i>		-0.501*** (-7.041)		-0.347*** (-4.193)		-0.190*** (-2.892)
<i>R&D_{t-1}</i>		-14.68*** (-8.855)		-14.59*** (-7.987)		-1.292 (-0.434)
<i>ESG Score_{t-1}</i>		-0.378*** (-3.683)		-0.409*** (-3.655)		0.799*** (5.209)
Constant	2.226*** (42.84)	12.47*** (15.02)	2.242*** (39.72)	11.90*** (13.36)	2.225*** (39.71)	15.34*** (5.249)
Country FE	Yes	Yes	Yes	Yes		
Firm FE	No	No	No	No	Yes	Yes
Industry FE	No	No	Yes	Yes		
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	373,402	373,402	373,402	373,402	373,371	373,371
Adjusted R-squared	0.097	0.165	0.139	0.192	0.504	0.514

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Mandatory ESG Discl* equals 1 if the firm is headquartered in a country that adopted a mandatory environmental, social or governance law, and 0 otherwise. All independent variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in parentheses. Standard errors are clustered at the bond and quarter level. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A5: Mandatory ESG Disclosure and Bond Spreads - Excluding smaller firms

	<i>Bond Spread_t</i> (%)		
	Above 1 USD billion (1)	Above 5 USD billion (2)	Above 10 USD billion (3)
<i>Mandatory ESG Discl._t</i>	-0.520*** (-4.156)	-0.451*** (-4.232)	-0.371*** (-4.646)
<i>Firm Size_{t-1}</i>	-0.692*** (-5.352)	-0.516*** (-4.659)	-0.243** (-2.424)
<i>ROA_{t-1}</i>	-7.109*** (-7.760)	-7.154*** (-7.934)	-7.584*** (-7.192)
<i>Tangible_{t-1}</i>	0.618 (1.000)	0.719 (1.273)	0.433 (0.885)
<i>Leverage_{t-1}</i>	-0.00801 (-0.784)	-0.0109 (-0.891)	-0.00305 (-0.310)
<i>Cash Holding_{t-1}</i>	-2.599*** (-3.550)	-3.044*** (-3.730)	-3.777*** (-4.273)
<i>Dividend_{t-1}</i>	-5.318** (-2.448)	-5.164** (-2.574)	-2.806 (-1.607)
<i>Tobin's Q_{t-1}</i>	-0.135** (-2.153)	0.0342 (0.605)	0.122** (2.078)
<i>R&D_{t-1}</i>	-0.282 (-0.101)	-2.085 (-0.843)	-1.923 (-0.816)
<i>ESG Score_{t-1}</i>	0.542*** (3.308)	0.406** (2.405)	0.0880 (0.927)
Constant	12.49*** (5.701)	9.792*** (5.266)	6.237*** (3.266)
Bond FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
Observations	367,620	332,397	291,849
Adjusted R-squared	0.685	0.695	0.702

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads, after excluding smaller firms. Column 1 excludes firms with a book value of assets less than USD 1 billion, Column 2 excludes those with less than USD 5 billion, and Column 3 excludes firms with less than USD 10 billion. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Mandatory ESG Discl* equals 1 if the firm is headquartered in a country that adopted a mandatory environmental, social or governance law, and 0 otherwise. All independent variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A6: Stacked Difference-in-Differences

	<i>Bond Spread_t</i> (%)		
	(1)	(2)	(3)
<i>Mandatory ESG Discl._t</i>	-0.353*** (-4.048)	-0.560*** (-4.753)	-0.500*** (-5.129)
Window	[-4Q, 4Q]	[-8Q, 8Q]	[-12Q, 12Q]
Control Variables	Yes	Yes	Yes
Cohort-Bond FEs	Yes	Yes	Yes
Cohort-Quarter FE	Yes	Yes	Yes
Observations	109,732	222,741	342,450
Adjusted R-squared	0.863	0.727	0.722

Notes: This Table presents the impact of mandatory ESG disclosure on bond spreads, using stacked regressions. Columns 1, 2 and 3 present results using a 4-quarter window around the ESG disclosure mandate; an 8-quarter window around the ESG disclosure mandate, and a 12-quarter window around the ESG disclosure mandate, respectively. Control variables are the same as those of [Table 2](#), column 2. All control variables are lagged by one year. All columns include cohort-bond fixed effects and cohort-quarter fixed effects. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A7: The Clientele Channel-Robustness Tests

	<i>Bond Spread_t</i> (%)	
	H3	
	(1)	(2)
<i>Mandatory ESG Discl._t</i>	-0.499*** (-4.080)	-0.619*** (-4.852)
<i>Mandatory ESG Discl._t</i> × <i>Var ESG Score(Current vs. Pre – treatment)_t</i>	-0.640** (-2.418)	—
<i>Mandatory ESG Discl._t</i> × <i>Low ESG Score_{t-1}</i>	—	0.470*** (3.335)
<i>Firm Size_{t-1}</i>	-0.974*** (-6.435)	-0.975*** (-6.440)
<i>ROA_{t-1}</i>	-7.292*** (-7.667)	-7.300*** (-7.675)
<i>Tangible_{t-1}</i>	-0.0471 (-0.0653)	-0.0547 (-0.0758)
<i>Leverage_{t-1}</i>	-0.0103 (-1.029)	-0.00989 (-0.992)
<i>Cash Holding_{t-1}</i>	-3.021*** (-3.933)	-3.028*** (-3.935)
<i>Dividend_{t-1}</i>	-5.069** (-2.303)	-5.079** (-2.312)
<i>Tobin's Q_{t-1}</i>	-0.232*** (-3.356)	-0.228*** (-3.302)
<i>R&D_{t-1}</i>	-0.829 (-0.257)	-0.876 (-0.271)
<i>ESG Score_{t-1}</i>	0.556*** (3.200)	0.606*** (3.497)
Constant	17.72*** (6.761)	17.54*** (6.760)
Bond FEs	Yes	Yes
Firm FEs	Yes	Yes
Quarter FEs	Yes	Yes
Observations	372,641	372,641
Adjusted R-squared	0.690	0.690

Notes: This Table presents OLS regressions to investigate the impact of mandatory ESG disclosure on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. *Var ESG Score(Current vs. Pre – treatment)* represents the difference between the current value of *ESG Score* and its average value pre-treatment. *Low ESG Score* is a dummy variable if the value of *ESG Score* (lagged by one year) is below the 25th percentile, zero otherwise. Percentiles are defined within each year. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *,** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A8: The Bank-Relationship Channel-Robustness Tests

	<i>Bond Spread_t(%)</i>			
	(1)	(2)	(3)	(4)
<i>Mandatory ESG Discl._t</i>	-0.411*** (-3.169)	-0.410*** (-3.168)	-0.416*** (-3.167)	-0.415*** (-3.168)
REL Bor (5y)	0.778*** (2.667)	—	—	—
<i>Mandatory ESG Discl._t × REL Bor(5y)</i>	-0.755** (-2.146)	—	—	—
REL Bor (10y)	—	0.754*** (2.653)	—	—
<i>Mandatory ESG Discl._t × REL Bor(10y)</i>	—	-0.733** (-2.154)	—	—
Num. of REL (5y)	—	—	0.520*** (2.856)	—
<i>Mandatory ESG Discl._t × Num. REL(5y)</i>	—	—	-0.543*** (-2.764)	—
Num. of REL (10y)	—	—	—	0.469*** (2.832)
<i>Mandatory ESG Discl._t × Num. REL(10y)</i>	—	—	—	-0.519*** (-2.731)
Control Variables	Yes	Yes	Yes	Yes
Bond FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	115,223	115,223	115,223	115,223
Adjusted R-squared	0.655	0.655	0.655	0.655

Notes: This Table presents OLS regressions to investigate the impact of related lending on bond spreads. The dependent variable is the difference between the yield to maturity of a corporate bond and that of a government bond with the same maturity and currency, expressed in percentage. Control variables are the same as those of Table 2, column 2. All control variables are lagged by one year. We include fixed effects as noted in the lower part of the table to control for different levels of unobserved heterogeneity. Robust t-statistics are in the parentheses. Standard errors are clustered at the bond and quarter level. The *, ** and *** marks denote the statistical significance at the 10%, 5%, and 1% levels, respectively.