

ESG Lending

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Abstract

Sustainable lending has flourished amid widespread issuance of sustainability-linked loans (SLLs) with spreads contingent on borrower ESG performance. These loans are issued between reputable firms and banks with superior ESG profiles that face greater stakeholder scrutiny, mostly as revolving credit facilities through banking relationships. SLLs vary widely in the transparency of publicly available information on sustainability related contract details. Consistent with greenwashing concerns, borrower ESG scores deteriorate after the issuance of low-transparency SLLs. Stock markets exhibit vigilance against potential greenwashing, responding positively to issuance announcements only for high-transparency SLLs. Our findings highlight the importance of transparency in ESG-contingent financing.

Keywords: ESG, Bank Lending, Sustainability-Linked Loans (SLLs), Greenwashing, Sustainable Finance, Green Loans, ESG-Contingent Financing

JEL Classifications: G21, G32, M14

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ESG Lending

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Abstract

Sustainable lending has flourished amid widespread issuance of *sustainability-linked loans (SLLs)* with spreads contingent on borrower ESG performance. These loans are issued between reputable firms and banks with superior ESG profiles that face greater stakeholder scrutiny, mostly as revolving credit facilities through banking relationships. SLLs vary widely in the transparency of publicly available information on sustainability related contract details. Consistent with greenwashing concerns, borrower ESG scores deteriorate after the issuance of low-transparency SLLs. Stock markets exhibit vigilance against potential greenwashing, responding positively to issuance announcements only for high-transparency SLLs. Our findings highlight the importance of transparency in ESG-contingent financing.

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1 Introduction

A growing debate among market participants and policymakers aims at understanding how investors influence corporate environmental, social, and governance (ESG) policies. Much of the literature on this issue focuses on public capital markets, extensively weighing the implications of sustainable investment strategies based on either the exclusion of brown assets or direct shareholder ESG engagement. Surprisingly, much less is understood about the role of privately negotiated bank loan contracts in sustainable financing, despite their importance as the primary source of corporate debt financing around the world. While recent studies highlight that banks increasingly exclude brown borrowers in their loan issuance decisions, little is known about how banks may directly engage or monitor the ESG practices of their borrowers.¹ As a potential avenue for such creditor ESG engagement and monitoring, sustainability-linked loans (SLLs) have become the predominant source of ESG-contingent financing for firms over the past decade. However, the widespread use of these loans has also raised questions regarding greenwashing in this market due to concerns about the transparency and stringency of ESG-contingent loan terms. In this paper, we provide the first comprehensive analysis of ESG-contingent lending around the world and its effectiveness in incentivizing corporate commitment to sustainability.

We study ESG loans, which refer to general purpose loans whose terms are contractually tied to ESG performance (i.e., “sustainability-linked loans”) or use-of-proceeds based loans that exclusively finance environmental and social projects (i.e., “green loans”). Using Refinitiv DealScan data over the sample period from January 2016 to September 2021, we document that ESG lending activity around the world has grown exponentially—from \$6 billion to \$322 billion—becoming an important segment of the global loan market and sustainable debt market.² This growth is driven by the proliferation of general purpose

¹See [Kacperczyk and Peydró \(2022\)](#), [Houston and Shan \(2022\)](#), and [Ivanov, Kruttli, and Watugala \(2022\)](#) for such exclusion-based sustainable lending practices.

²In 2021, ESG lending constituted 12% of global bank lending (based on DealScan), and a third of all sustainable debt issuance (see *Bloomberg*, “Incentivizing change with sustainability-linked loans,” June 20, 2022).

sustainability-linked loans rather than use-of-proceeds based green loans, in sharp contrast to the growth of ESG bonds mostly driven by use-of-proceeds based green bonds (see [Flammer, 2021](#)).³ SLLs are currently the most important source of ESG-contingent debt financing accessible to firms in a broader set of industries beyond utilities, where green loan and bond financing remain concentrated.⁴

Why do borrowers and lenders increasingly engage in sustainability-linked loan contracts? Amid rising investor demand for corporate ESG commitments (see [Krueger, Sautner, and Starks, 2020](#); [Ilhan, Krueger, Sautner, and Starks, 2022](#)), SLLs may have evolved as performance pricing contracts that allow borrowers capable of maintaining high ESG standards to *credibly* signal their ESG commitments to investors and stakeholders. Lenders with the expertise to coordinate SLL contracts and monitor borrowers’ actions may have natural incentives to incorporate ESG performance contingencies into loan pricing if good ESG practices provide protection against downside risks (see [Albuquerque, Koskinen, Yang, and Zhang, 2020](#); [Stroebel and Wurgler, 2021](#); [Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2022](#)), or if banks face regulatory pressure to improve the ESG profiles of their loan portfolios.⁵

However, firms and banks may also engage in sustainability-linked lending for “*greenwashing*” purposes, where the ESG-contingent contract terms are neither stringent nor fully disclosed to the general public, but written merely to showcase an *empty* emphasis on ESG to stakeholders. We examine these possibilities and provide evidence suggesting that borrowers and lenders facing greater stakeholder demand self-select into ESG loan contracts. However, as we elaborate later, our findings justify concerns about greenwashing practices and the lack of transparent disclosures regarding ESG contingencies in these loan contracts.

³For example, 90% of ESG lending activity in 2021 alone, or \$289 billion, consisted of SLLs, dwarfing the cumulative issuance of sustainability-linked bonds to date (i.e., \$144 billion, see [Kölbel and Lambillon, 2022](#)).

⁴Utilities account for 17% of the aggregate issuance amount of SLLs, in comparison to 59% and 32% of green loan and bond issuance, respectively.

⁵This conjecture is supported by the fact that ESG lending has grown in lockstep with heightened societal and regulatory pressure to combat climate change. For example, several central banks have implemented or explored the possibility of mandatory climate stress testing exams (e.g., Bank of England, European Central Bank, The U.S. Federal Reserve (see [Jung, Engle, and Berner, 2022](#))). The growth in ESG lending also coincides with an increase in national commitments to reduce carbon emissions, as illustrated in Figure [A.1](#).

In the first part of our paper, we examine how ESG loans and their lending syndicates are structured, and how borrowers and lenders select into the ESG lending market. Conducting detailed analyses at the loan level, we find that sustainability-linked loans are larger than non-ESG loans (i.e., average deal size of \$937.2 million vs. \$520.8 million), and are typically issued to larger, safer, and publicly listed borrowers. Our findings suggest that large and economically important firms that face greater public scrutiny have stronger incentives to signal ESG-friendly practices by obtaining SLLs. The results, however, do not support an alternative argument that banks under regulatory pressure may push small and financially constrained firms to accept sustainability-linked loan terms as a last resort to access capital.

In matched sample analysis controlling for borrower and deal characteristics, we further find that sustainability-linked loans are structured mainly as revolving credit facilities that are more likely to be tightly monitored by lenders (see [Berger and Udell, 1995](#); [Berlin, Nini, and Yu, 2020](#)). These loans are also more likely to be syndicated by relationship banks. On one hand, the two features could facilitate effective contracting around ESG commitments by setting contingencies that can be monitored, enforced, and renegotiated with ease. On the other hand, these facts may imply that banks and borrowers with pre-existing relationships can conveniently relabel revolving credit lines as SLLs, in the spirit of greenwashing, as these general purpose loans do not need to be tied to specific green projects.

Motivated by recent studies that document a premium for green assets (see [Bolton and Kacperczyk, 2021](#); [Pastor, Stambaugh, and Taylor, 2022](#)), we also examine whether such a greenium exists in SLLs by studying loan spreads at issuance. Our evidence suggests that SLLs are not issued with a greenium. Controlling for loan and borrower characteristics, we find that the spreads at issuance for SLLs are no different from those for non-ESG loans.

These characteristics of SLLs sharply contrast with those of green loans, which unlike SLLs are explicitly tied to sustainable use-of-proceeds. Green loans are no larger than non-green loans, issued mostly to non-investment-grade privately held borrowers, less likely to be originated by relationship banks, and are issued at a lower spread.

Our findings raise the question of whether sustainability-linked loans are effective in incentivizing borrowers to adopt sustainable corporate policies. In the second part of our empirical analysis, we investigate this issue by examining whether SLL issuance is related to subsequent changes in borrowers’ ESG profiles. This is an important question given discussions in the literature on whether ESG investing changes firm behavior (see [Gibson, Glossner, Krueger, Matos, and Steffen, 2022](#); [Edmans, Levit, and Schneemeier, 2022](#); [Heath, Macciocchi, Michaely, and Ringgenberg, 2023](#)). To understand the effectiveness of ESG lending as a tool for creditor ESG engagement and monitoring, we examine borrowers’ ex ante ESG profiles and ex post ESG performance. Using ESG performance information obtained from Refinitiv’s Asset4 database, we find significant and positive associations between the likelihood of ESG lending and the ESG scores of both borrowers and lenders ex ante, indicating potential selections in ESG lending among firms with better capabilities of making ESG commitments *prior* to loan issuance. In contrast to these commitments, we find within-borrower ex post deterioration in ESG scores *after* sustainability-linked loan issuance. To alleviate concerns about the inconsistency across raters on broad ESG scores (see [Berg, Kölbel, and Rigobon, 2022](#)), we also use more sharply defined ESG performance measures, such as emissions, and find robust results.

Next, we conduct several additional analyses to help disentangle whether the observed ex post deterioration in borrower ESG performance is indicative of greenwashing. A critical concern among practitioners and the general public about sustainability-linked loans is that the sustainability targets and the associated loan pricing grids are not required to be publicly disclosed for these private contracts, making it difficult to verify the validity of ESG loan labels.⁶ Consequently, firms could engage in greenwashing by setting unambitious targets and/or negligible penalties for failing to meet the targets (i.e., so called “*empty*” ESG labels), while not sharing these contractual details with the public. For instance, borrowers with high ESG scores may time the issuance of SLLs with targets they have already met,

⁶See *Bloomberg*, “Wall Street’s ESG loans charge corporate America little for missed goals,” September 8, 2021; *Bloomberg*, “Ethical label is hard to verify in secretive world of ESG loans,” June 22, 2021.

such that borrowers can afford to ease on their ESG initiatives without incurring higher costs of capital. Banks with strong business relationships with these borrowers may also willingly help them obtain SLLs without disclosing contractual details to the public. To test for such greenwashing possibilities, we relate the post-issuance ESG performance to the credibility of the borrowers' ESG commitments, inferred from the availability of publicly disclosed information regarding the ESG contingent features in the loan contracts.

Specifically, we parse through loan disclosures provided by Refinitiv and supplement them with a manual search of media releases and corporate reports. Using this information, we classify SLLs that do not publicly disclose information about their sustainability-related contract details as “low-transparency loans” and those that do as “high-transparency loans”. The two groups are similar in observable borrower characteristics prior to loan issuance.

Based on this classification, we first document that publicly disclosed information regarding the contractual details of SLLs is generally scarce. We then find that the ex post deterioration in borrower ESG performance is concentrated among *low*-transparency SLLs, validating greenwashing concerns raised by practitioners and the general public. As conjectured above, these loans are unlikely to have effective sustainability related contract terms that incentivize firms to improve their ESG profiles. Consistent with this conjecture, we find that borrowers of high-transparency SLLs continue to maintain their superior ESG scores ex post, in contrast to borrowers of low-transparency SLLs.

Finally, we examine how stock market investors perceive the issuance of SLLs. In an event study analysis, we find that stock prices react positively only to public announcements of high-transparency SLL issuance. On the other hand, we find negative and statistically insignificant stock price reactions to the issuance of low-transparency SLLs. These results are consistent with stock investors valuing commitments to sustainability (see [Hartzmark and Sussman, 2019](#)), and highlight investor vigilance against potential greenwashing practices.

Overall, our results are consistent with large borrowers and global lenders, who face pressure from stakeholders, signaling their ESG commitments through explicit ESG-contingent

loan contracting but not always following through with their commitments. These findings justify concerns raised by the media and practitioners about greenwashing in SLLs. Our findings also suggest that public transparency and investor vigilance regarding the contractual details of SLLs are key to the development of this emerging market as an effective source of financing that enables lenders and borrowers to credibly commit to ESG-friendly policies.

Our study contributes to the nascent literature on how ESG concerns are reflected in corporate debt markets. By focusing on privately negotiated corporate syndicated loans, we complement recent work on green bonds (see [Flammer, 2021](#); [Tang and Zhang, 2020](#); [Zerbib, 2019](#); [Baker, Bergstresser, Serafeim, and Wurgler, 2022](#)) and the role of ESG risks in publicly traded corporate bonds (see [Seltzer, Starks, and Zhu, 2022](#); [Hyunh and Xia, 2021](#); [Duan, Li, and Wen, 2022](#)). In particular, a key distinction of our paper in relation to the literature on green bonds is that we document the widespread use of “general purpose” loans that are designed to incentivize firms across industries to improve their overall sustainability profiles rather than achieve narrower objectives that are tied to specific green projects. This departure from use-of-proceeds-based ESG contracting helps democratize ESG-contingent financing. In contrast, the market for green bonds, which are issued for specific purposes and earmarked for green projects, is inevitably limited to a narrower set of industries.

Recent research on syndicated loan markets has focused on the role of ESG profiles of borrowers and lenders in lending relationships (see [Kacperczyk and Peydró, 2022](#); [Houston and Shan, 2022](#); [Shin, 2021](#)). Other studies have examined the relationship between ESG risks and bank loan pricing (see [Ivanov et al., 2022](#); [Correa, He, Herpfer, and Lel, 2021](#); [Anginer, Hrazdil, Li, and Zhang, 2021](#)). For the first time in the literature, we directly examine how bank loans are structured to explicitly contract around and mitigate ESG-related risks.

While existing studies in this area highlight the exclusionary lending decisions by banks for unsustainable borrowers, they do not link those decisions to explicit ESG-contingent contracting or to subsequent changes in borrower ESG policies. Our study contributes to the literature by measuring the public transparency regarding the contractual details of

sustainability-linked loans to identify SLLs that are likely to reflect greenwashing incentives. We show that borrowers of such loans perform worse in their ESG scores after the loans are issued. In this regard, our results contrast with *unconditional* statements made by subsequent studies in the literature about the effects of SLL issuance.⁷

Our findings also contribute to the literature on ESG engagement and monitoring, which has largely focused on the role of institutional investors and activist shareholders (see Hoepner et al., 2022; Barko, Cremers, and Renneboog, 2022; Dimson, Karakas, and Li, 2015). Banks, much like institutional investors in equity markets, are uniquely positioned to effectively monitor firms’ progress on ESG considerations (see Gustafson, Ivanov, and Meisenzahl, 2021). However, banks are distinct from other public market investors, because they maintain close private relationships with borrowers. It is possible that some banks and borrowers may engage in greenwashing practices, reflecting conflicts of interest in signaling ESG commitments. We show that greenwashing is a valid concern in the ESG lending market, especially when the contractual details are unavailable to the public. However, our results also demonstrate that transparent public disclosures regarding ESG-related contract terms can alleviate greenwashing concerns among investors.

More broadly, our study contributes to the burgeoning literature on how investors and firms respond to ESG related risks.⁸ Our paper fills an important gap in understanding how lenders and firms might internalize ESG risks by contracting explicitly on ESG-related issues in the vast bank lending market. Overall, our findings contribute to a more holistic understanding of sustainable financing arrangements in both public and private capital markets.

⁷See Carrizosa and Ghosh (2022), Caskey and Chang (2022), Du, Harford, and Shin (2022), Dursun-de Neef, Ongena, and Tsonkova (2022), and Loumiotis and Serafeim (2022).

⁸For more studies in this area, see Albuquerque, Koskinen, and Zhang (2019), Azar, Duro, Kadach, and Ormazabal (2021), Bartram, Hou, and Kim (2022), Bellon (2021a,b), Cao, Titman, Zhan, and Zhang (2022), Ding, Levine, Lin, and Xie (2020), Döttling and Kim (2022), Dyck, Lins, Roth, and Wagner (2019), Gibson, Krueger, and Mitali (2021), Humphrey, Kogan, Sagi, and Starks (2021), Lins, Servaes, and Tamayo (2017), Naaraayanan, Sachdeva, and Sharma (2021), Oehmke and Opp (2022), Pastor, Stambaugh, and Taylor (2021), Pedersen, Fitzgibbons, and Pomorski (2021).

2 Institutional Details on ESG Lending

There are broadly two types of ESG loans: *sustainability-linked loans (SLLs)* and *green loans*. SLLs are general purpose loans where loan pricing terms are tied to the ESG performance of the borrowing firm. These loans are also called *ESG-linked loans*. The loan spreads on these loans are pegged explicitly to key performance indicators (KPIs) incorporating sustainability goals. These KPIs may be ESG scores assigned to borrowers by external rating agencies (e.g., Sustainalytics) or specific measures such as greenhouse gas (GHG) emissions or employee health and safety performance. The proceeds from sustainability-linked loans can be used to fund general operations without being tied to green projects. On the other hand, green loans, analogous to green bonds, are loans where the proceeds are earmarked to exclusively finance environmental and climate-friendly projects (e.g., renewable energy, biodiversity conservation, sustainable water).

2.1 Sustainability-Linked Loans (SLLs)

The sustainability-linked loan market has grown rapidly since 2017, when the first loan of this kind was issued. To understand how these newly introduced instruments work, consider the general purpose loan obtained by Crown Holdings Inc. (NYSE: CCK). The loan was originated in 2019 by a syndicate of lenders, with BNP Paribas as the sustainability agent overseeing and enforcing the ESG-contingent loan terms. The sustainability-related KPI in the loan agreement is a “sustainability rating” assigned by Sustainalytics, a leading independent ESG ratings provider (later acquired by Morninstar, Inc.), and the interest rate charged by the lender decreases (increases) when Crown’s sustainability rating is higher (lower). An excerpt from the loan agreement details this arrangement, as shown below.

“Sustainability Rating” means the “Management Score” in respect of environment, social, and governance factors (the ESG score), as calculated and assigned to Crown Holdings from time to time by Sustainalytics B.V. and published in the

most recently released ESG Score report thereof ... “Sustainability Rating Adjustment” means, with respect to the applicable Spread, an adjustment as follows:

(i) At any time the most recently published Sustainability Rating is 45 or higher (subject to clause (ii) below), the Spread will be reduced by 0.025%...

(ii) At any time the most recently published Sustainability Rating is 50 or higher... the Spread will be reduced by 0.05%...

(iii) At any time the most recently published Sustainability Rating is lower than 30 (subject to clause (iv) below), the Spread will be increased by 0.025%...

(iv) At any time the most recently published Sustainability Rating is 25 or lower, the Spread will be increased by 0.05%...

This contract exhibits a one-notch interest rate change of 2.5 basis points based on sustainability performance. To put this in context, one can compare this spread change to the spread change in credit rating-based performance pricing contracts. For example, HP Inc. borrowed through a revolving credit facility in 2020 where the spread was set to increase by 12.5 basis points if its S&P credit rating was downgraded from A- to BBB+, a downgrade of one notch. Hence, the economic magnitude of the sustainability-linked spread change in this example contract is modest, echoing practitioner concerns of the effectiveness of SLLs in facilitating tangible improvements in corporate ESG profiles.

SLLs also give borrowers and lenders the flexibility to tailor KPIs around various ESG objectives other than third-party ESG ratings. For example, Johnson Controls International plc (NYSE: JCI) entered into a loan contract in 2019 where ING Capital LLC acted as the sustainability structuring agent. The loan pricing terms were tied to meeting targets regarding employee safety and greenhouse gas (GHG) emissions by 2025. The loan contract identified three KPIs related to these objectives, as follows.

- KPI#1: *Total recordable incident rate (TRIR)* – a measure of the health and safety performance of Johnson Control’s operations.

- KPI#2: *GHG savings* – reduction in greenhouse gas emissions achieved by the company by implementing energy efficiency and renewable energy customer projects.
- KPI#3: *GHG intensity target* – the company’s GHG emissions scaled by revenues.

These examples highlight unique features of sustainability-linked loans that allow borrowers and lenders to engage in ESG-contingent contracting with flexibility in terms of both the purpose of the loan and commitments to specific sustainability objectives. These are marked departures from the conventionally available instruments for green financing, for example, use-of-proceeds-based green bonds where the capital raised could be used only for specific sustainable projects.

However, such contractual details are not always disclosed to the general public, as we later highlight in our results. Although representatives from leading financial institutions have developed a standard framework for selecting and publicly disclosing KPIs in SLLs as part of the Sustainability Linked Loan Principles (SLLPs), these principles are recommended guidelines to be voluntarily applied by market participants on a deal-by-deal basis depending on the underlying characteristics of the transaction.⁹ In short, while SLLs enable issuers to contract around a wide range of ESG issues, the market for these loans remains largely unregulated in terms of the criteria they must satisfy to set them apart from other syndicated loans.

2.2 Green Loans

While the green bond market has grown rapidly in the past decade (see [Flammer, 2021](#); [Tang and Zhang, 2020](#); [Zerbib, 2019](#); [Baker et al., 2022](#)), a similar use-of-proceeds-based green financing market has also developed in the loan market. Green loans, unlike SLLs, are loans that fund specific projects with *explicit* sustainable features.

For example, Spanish pulp mills operator Ence Energia (BME:ENC) announced a EUR 66 million green loan financing deal in 2018 to fund part of the construction of a new 46 MW

⁹For more details on the Sustainability-Linked Loan Principles, see <https://www.lsta.org/content/sustainability-linked-loan-principles-sllp>.

biomass power plant in Puertollano, central Spain, that was scheduled to become operational in 2020. The plant is designed to use mainly agroforestry residues from the surrounding area as fuel, making it a green project financed specifically by the loan. The green loan has a seven-year maturity. Banco Santander SA is the green agent for the loan facility.

In short, the growth of ESG lending has opened the door to general purpose debt tied to the borrower’s ESG performance on a wide variety of measures and to green project finance lending that complements the market for green bonds. Using an international and comprehensive sample of loan-level data, we provide a comprehensive examination of the ESG lending market and its implications for corporate ESG performance for the first time in the literature. While we focus primarily on sustainability-linked loans, we also examine green loans because they serve as useful comparisons to better understand SLLs and present a complete picture of the global ESG lending space.

3 Data and Sample

In this section, we briefly summarize our data and aggregate patterns in ESG lending activity. Our loan-level data come from Refinitiv DealScan. For all loans in the database, DealScan assigns two market segment flags corresponding to the definitions above: “Environmental, Social & Governance/Sustainable Linked” and “Green Loan.” Refinitiv DealScan uses information from loan agreements, public media releases, and discussions with lenders and borrowers to confirm these loan features. Using the DealScan market segment table, we classify a loan facility as a sustainability-linked or green loan. We identify 1,127 SLLs and 1,228 green loans that raised \$662 billion and \$191 billion in total, respectively, over the sample period from 2016 to 2021 (as of September).¹⁰ In all of our analyses, continuous variables are winsorized at the 1% and 99% levels.

¹⁰While we rely on DealScan because it provides the most comprehensive source of data on the contractual terms of loans, we cross-check the sample coverage with two additional sources, Bloomberg and Refinitiv Eikon, and confirm that they largely overlap with or are subsumed by DealScan.

[Insert Table 1 here]

[Insert Figure 1 here]

Table 1 and Figure 1 describe the time-series of sustainability-linked and green loan issuance. Global ESG lending activity totaled \$853 billion during the sample period, growing from less than 1% of global syndicated loan issuance (or \$6 billion) in 2016 to more than 12% (or \$322 billion) in 2021 as of September. Most of this lending consisted of SLLs, which amounted to \$662 billion in total (\$289 billion in 2021), outweighing the amount of green loans each year. SLL issuance grew even more substantially after 2020 when the global economy and financial markets were disrupted by the COVID-19 pandemic. The green loan market, which raised a total of \$191 billion over our sample period, also grew rapidly from \$6 billion in 2016 to \$33 billion in 2021 as of September.

[Insert Table 2 here]

Table 2 reports the distribution of sustainability-linked and green loans over the sample period across the Fama–French 17 industries of borrowers. The industry distribution of SLL issuance is broad, in contrast to the concentration of use-of-proceeds–based green loan issuance within the utilities industry. Fifty-nine percent of green loan issuance is concentrated in the utilities industry, similar to what has been documented for green bonds by [Flammer \(2021\)](#). In contrast, only 17% of SLLs are issued to firms in the utilities industry. In fact, we find that the industrial distribution of SLLs is comparable to that of loans in the DealScan database in general. The widespread use of SLLs is consistent with the fact that the proceeds from these loans can be used for general purposes rather than for specific projects while the loan terms can be tied to a broad range of ESG objectives.

[Insert Table 3 here]

[Insert Figure 2 here]

[Insert Figure 3 here]

In Table 3, we report the breakdown of ESG lending activity by the borrower’s country of incorporation. Notably, we find that the bulk of sustainability-linked loans are issued to borrowers in the U.S. and Western European countries, in terms of aggregate proceeds. This suggests that SLL issuance is prevalent where stakeholders demand that firms incorporate ESG considerations into their corporate policies. In Figures 2 (time-series by region) and 3 (series of heat maps), we graphically summarize the evolution of this cross-country distribution over our sample period. These figures illustrate that SLLs started to emerge around 2017 mainly across Western Europe, but have spread rapidly to other parts of the world. Since 2020, SLL issuance has grown more than threefold in the U.S., making it the largest issuer of SLLs in 2021.¹¹ While green loans have also propagated broadly around the world, they have done so with less concentration in Western economies and in smaller magnitudes.

We corroborate this geographical distribution by investigating cross-country determinants of ESG lending (see more details in Section A.1 of the Internet Appendix). We find that countries with civil law origins exhibit significantly more SLL issuance activity than common law countries, consistent with Liang and Renneboog (2017) who document that civil law countries are more likely to support stakeholder-oriented economies and facilitate private contracts that induce commitments to such values. In contrast, we find no evidence that legal origins matter for the development of green loan markets. For both sustainability-linked and green loans, however, we find that robust private credit markets foster the development of ESG lending markets, consistent with the importance of institutions for innovations in financial markets. Last, we find that sustainability-linked and green loans both flourish under stricter environmental regulations, consistent with the idea that these loans arise as lenders and borrowers respond to heightened stakeholder pressure.

In short, the overall ESG loan market and sustainability-linked loans in particular have grown rapidly in the past several years, spreading globally across diverse industries in stakeholder-oriented economies with well-developed credit markets.

¹¹Consistent with issuers responding to heightened stakeholder pressure, ESG lending has increased sharply in the U.S. after its renewed commitment to reduce carbon emissions following the 2020 presidential election.

4 Empirical Results

Given the widespread growth of ESG lending, it is important to understand the incentives of borrowers and lenders who participate in this market. On one hand, borrowers may aim to credibly signal their commitment to ESG issues, while lenders may supply ESG loans in response to pressure from regulators and stakeholders to improve the ESG profiles of their loan portfolios. However, borrowers and lenders may also issue ESG loans to showcase an empty emphasis on ESG to their stakeholders as a form of greenwashing. To investigate these possibilities, we first examine the structure of ESG loans and the lending syndicates, as well as the pricing of these loans. We then study whether ESG loan issuance is associated with subsequent changes in borrower ESG performance, and how stock market investors respond to loan issuance announcements.

4.1 Borrower and Lender Reputations and ESG Loan Structure

Borrower and Loan Characteristics

To gain insights into the incentives of borrowers for issuing ESG loans, we start our analysis by examining borrower and loan characteristics. In Table 4, we report unconditional and matched-sample comparisons of these characteristics between sustainability-linked or green loans and control loans without ESG-contingent features.

[Insert Table 4 here]

Panel A reports the unconditional comparisons. The control group contains non-ESG loans issued during our sample period from 2016 to 2021 (as of September), excluding loans issued in countries with no ESG lending activity during this period. We find that sustainability-linked loan borrowers are significantly larger than non-ESG borrowers as measured by their sales as of the time of deal closure (i.e., average of \$10.8 billion vs. \$6.6 billion). SLL borrowers are also more likely to be publicly listed than non-ESG borrowers (i.e., 52% vs. 21%). Correspondingly, the average SLL facility is substantially larger than

non-ESG loan facilities (i.e., \$533.3 million vs. \$245.5 million), and is more likely to be rated investment grade and less likely to be a leveraged loan.¹² These facts contradict a “constraint argument” according to which firms borrow on ESG-contingent terms to alleviate borrowing constraints. In contrast, our results indicate that SLL borrowers are *less* likely to be credit constrained than other borrowers. As large publicly listed firms tend to face greater scrutiny from stakeholders regarding the social responsibility of their businesses, they may have stronger incentives to *signal* their commitments to sustainable practices by engaging in sustainability-linked borrowing.¹³

However, these signals may not always be credible. We find that SLL facilities are substantially more likely to be revolving credit facilities than the loans in the control sample (i.e., 55% vs. 37%). Revolving credit facilities, unlike term loans, are typically held by relationship lenders. On one hand, this may facilitate effective contracting and monitoring by informed banks with long-lasting business relationships with borrowers (see [Berger and Udell, 1995](#); [Berlin et al., 2020](#)). On the other hand, banks and borrowers with pre-existing relationships may conveniently relabel revolving credit lines as SLLs, in the spirit of greenwashing.

Unlike SLL borrowers, green loan borrowers tend to be smaller in terms of sales and less likely to be publicly listed than control loan borrowers. Correspondingly, green loan facilities are smaller in issuance amount and less likely to be investment grade than control loan facilities. Green loans are also less likely to be issued as revolving credit facilities than control loans, indicating that they are less likely to be relationship-driven.

In Panel B of Table 4, we conduct a matched sample analysis to confirm our findings regarding the package composition of ESG loans. Since the package structure of loans could systematically vary with deal size and other borrower characteristics, we match each sustainability-linked or green loan package to a control non-ESG loan package issued in the same year and country as the ESG loan. We also match on the borrower’s industry and

¹²While SLLs have marginally shorter maturities, this difference is not robust when we control for other loan characteristics. See Table A.2 in the Internet Appendix for a multivariate regression analysis.

¹³Ninety percent of the SLL borrowers in our sample are among the top 10% in terms of market capitalization in their respective countries of domicile, indicating that these firms are “national champions”.

listing status (privately held or publicly listed). Finally, we retain the control loan package closest in deal size to the ESG loan package. Our matched sample contains 694 (625) sustainability-linked (green) loan packages and 734 (641) matched packages.¹⁴

We find that sustainability-linked (green) loan packages are almost exclusively comprised of sustainability-linked (green) loan facilities (i.e., 97% and 96%, respectively). Consistent with the findings from the unconditional analysis, our results show that SLLs are significantly more likely to consist of revolving credit facilities than term loans. We also confirm that green loan packages are mostly comprised of term loans.

Lending Syndicate Structure

Next, we explore the syndicate structure of sustainability-linked and green loans and provide insights into the incentives of the lenders participating in the ESG lending market. Since lending syndicates are determined at the loan facility level, we conduct a matched analysis at the facility level. Specifically, we match each SLL or green loan facility to a non-ESG control loan facility based on country, industry, year, borrower public/private status, and closest facility size. For each facility, we identify all lead arrangers in the syndicate following [Cai, Eisdam, Saunders, and Steffen \(2018\)](#) and [Houston, Lee, and Suntheim \(2018\)](#). We group these lead arrangers according to characteristics relevant to their incentives to engage in ESG lending, and examine the composition of loan syndicates with respect to these lender attributes.

First, we classify lead arrangers with prior ESG lending experience as *ESG-experienced lenders*. Banks with an appetite for ESG loan deals may accumulate ESG lending experience as serial ESG lenders, becoming more equipped with the expertise to syndicate and coordinate these loans. Second, we group prominent global banks in the top 5% of lenders in terms of total lending activity over the trailing five years prior to loan issuance as *reputable lenders*. Large global banks may have stronger incentives to engage in ESG lending as they are likely to face greater stakeholder demands and tighter regulatory scrutiny. In addition, loans from

¹⁴We retain a few *one-to-many* matches when multiple control packages have the same closest deal size.

reputable banks can provide certification for borrowers (see [James, 1987](#)), helping them signal their ESG commitments. Third, we classify lead arrangers from outside the borrower’s country of incorporation as *foreign lenders*. Institutional and cultural frictions are important impediments to global banking (see [Carey and Nini, 2007](#); [Giannetti and Laeven, 2012](#)). However, the demand for ESG loans by borrowers and lenders may outweigh such frictions, enabling cross-border deals in this market. Finally, we designate lead banks as *relationship lenders* if they had served as lead arrangers in any deal issued to the borrower during the past five years. As we posit earlier, lending relationships may on one hand facilitate effecting ESG-contingent contracting, but could also foster mutually beneficial greenwashing arrangements.

[Insert Table 5 here]

We report our results in Table 5. Both SLLs and green loans are syndicated by significantly larger groups of lenders than non-ESG loans. This is consistent with greater demand from lenders and their stakeholders to co-lead such deals. SLLs and green loans also have more ESG-experienced lenders, reputable lenders, and foreign lenders in their syndicates. In other words, SLLs and green loans alike have larger syndicate sizes and tend to attract reputable global banks seeking and procuring repeated business in ESG loan origination.

Importantly, Table 5 shows that relationship lending plays a distinctively critical role in SLL issuance. Fifty-nine percent of all SLL lead arrangers have previous lending relationships with borrowers, in comparison to 52% of non-ESG matched loans. In sharp contrast, only 16% of green loan lead arrangers are relationship lenders, in comparison to 34% of nongreen matched loans. The importance of lending relationships permeates all other lender categories: There are significantly more relationship ESG-experienced lenders, relationship reputable lenders, and relationship foreign lenders in the syndicates of SLLs, whereas the opposite is true for green loans. This is also consistent with our earlier finding that SLLs are more likely to be structured as revolving credit facilities, which are typically relationship based.

A potential interpretation of these findings could be that lending relationships facilitate more effective tailoring and monitoring of ESG commitments specific to the borrower. An-

other possible interpretation could be that it is substantially easier for banks to label the revolving credit lines of their existing relationship borrowers’ as SLLs when they renew or roll over these general purpose loans that are not tied to specific green projects (i.e., green-washing). We further delineate these possibilities in our analysis of ESG performance around ESG loan issuance in Section 4.2.¹⁵

ESG Loan Pricing

In light of recent studies that document a premium for green assets (see Bolton and Kacperczyk, 2021; Pastor et al., 2022), we further examine whether banks price sustainability-linked loans and green loans differently from other, comparable loans. To investigate whether such a greenium exists in ESG loans, we follow Berg, Saunders, Steffen, and Streitz (2017) and examine differences in all-in-spread-drawn (AISD) between ESG and non-ESG loans. We control for borrower country-by-industry-by-issuance year fixed effects, loan characteristics such as facility amount, maturity, security and loan type, as well as borrower characteristics such as rating and public listing status. We perform separate analyses for SLLs and green loans.

[Insert Table 6 here]

The results are reported in Table 6. SLLs do not seem to be priced differently from non-ESG loans at issuance. While ESG loans pay 133 basis points less than non-ESG loans from the same country and industry issued in the same year (see Column 1), the discount largely disappears when we control for firm and loan characteristics. This suggests that borrowers do not enjoy pricing benefits at issuance from obtaining SLLs.

On the other hand, green loans are issued at a lower spread. Our most stringent specification, which controls for loan and borrower characteristics, suggests that green loans have AISDs that are 48 basis points lower than those of comparable nongreen loans. As these are use-of-proceeds loans and do not have ESG-related performance pricing, our results suggest that creditors are clearly willing to reduce spreads for green loans. This is in contrast to

¹⁵We also reconfirm our univariate findings in multivariate regressions, reported in Table A.2.

Flammer (2021), who finds no difference in spreads for green and nongreen bonds, and is consistent with a greenium that is documented in the literature for other asset classes.

4.2 Transparency and Real Effects of ESG Lending

Our results thus far show that prominent borrowers and lenders engage in ESG lending, potentially because they face greater scrutiny from stakeholders. However, these findings do not delineate whether these arrangements reflect genuine ESG commitments or an empty emphasis to placate stakeholders. In this section, we examine the effectiveness of SLLs as a device for creditor ESG engagement and monitoring in the context of their real effects on borrower ESG performance. We further relate the post-issuance ESG performance of borrowers to the credibility of their ESG commitments inferred from the availability of publicly verifiable information regarding the ESG contingent features of the SLL contracts.

On one hand, if SLLs were effective in incentivizing borrowers to adopt ESG-friendly corporate policies, the issuance of these loans would lead to improvements in borrower ESG profiles or encourage borrowers with good ESG profiles to maintain this performance. On the other hand, if SLLs were ineffective in this regard, their issuance would not result in better ESG performance. To the contrary, borrowers may exhibit worse ESG performance after obtaining SLLs if the sustainability-linked contract terms were set unambitiously and/or the loans were issued when the KPI targets were already satisfied (see Bloomberg article quoted in footnote 6, p.4). If the latter were the case, borrowers and lenders would choose not to disclose details regarding the SLL contract terms to the general public.

Publicly Disclosed Information on KPIs in Sustainability-Linked Loans

To gauge the credibility of ESG commitments signified by the issuance of sustainability-linked loans, investors and other stakeholders must rely on information regarding the contractual details (e.g., what the specific KPIs are, how they are tied to the loan terms, etc.). The Sustainability-Linked Loan Principles (SLLP), developed by representatives from leading fi-

financial institutions, provide guidelines to borrowers regarding disclosures and reports that should be made available to lenders. However, in the absence of regulations or public disclosure requirements in the emerging ESG lending market, this information is voluntarily and selectively disclosed by borrowers and lenders to the public. It is then possible for SLL issuers to set unambitious KPI targets and/or minuscule penalty terms for failing to meet the targets, and decide not to disclose these sustainability-related contract details to the public. Without information about these contract terms, it is difficult for stakeholders to verify the validity of ESG loan labels. The lack of detail or transparency of such disclosures is skeptically viewed by many market participants as an indication of greenwashing. It is therefore important to examine the extent and quality of publicly disclosed information on the KPIs set in SLLs.

We classify sustainability-linked loans for which we do not find any public information about their KPI metrics or how they are tied to loan spreads as “low-transparency” loans. On the other hand, “high-transparency” loans have publicly available information indicating that the loan spreads are linked to some measurable metric of ESG performance (e.g., CO2 emissions per tonne of transported cargo per nautical mile, percent of woman in workforce, Sustainalytics score). While it is not straightforward to collect all publicly available information regarding loan contract details in the absence of a standardized reporting system, we fully utilize the information that can be obtained through Refinitiv DealScan. Refinitiv exploits a vast array of public information sources, such as company business reports, earnings calls, media releases, and direct interactions with lenders and borrowers. We read through all information provided by Refinitiv pertaining to the ESG-related KPIs and pricing grids of SLLs. We further supplement them with an extensive manual search of media releases and corporate sustainability reports to classify SLLs according to the availability of publicly accessible information regarding KPI metrics or how they are tied to loan spreads.

Table 7 summarizes the statistics on how extensively SLL issuers publicly disclose the contractual details regarding the KPIs and/or their linkages to loan spreads. Strikingly, roughly half of the SLLs in our sample are classified as low-transparency loans (i.e., 510 low-

transparency loans out of 1,127 loans). Between high-transparency and low-transparency loans, we find no significant difference in the characteristics of borrowers (e.g., pre-issuance sales, ESG scores, or legal origins of their countries of domicile).

[Insert Table 7 here]

Among high-transparency loans that disclose specific KPIs, the vast majority, 85%, tie their loan spreads to an environmental KPI (e.g., greenhouse gas emissions). 32% use both environmental and social KPIs (e.g., emissions, labor safety, workforce diversity). 21% of these loans disclose that the KPI is based on a third-party ESG rating (e.g., MSCI rating or Sustainalytics ESG score). Interestingly, firms asymmetrically disclose the rewards and penalties to be applied to loan spreads conditional on ESG performance. 22% of high-transparency loans disclose the spread rewards conditional on meeting ESG performance targets, whereas only 13% disclose the penalties should borrowers miss their targets.

These findings highlight that the availability of publicly disclosed information about the sustainability-related contract terms in SLLs is generally low and that there is considerable heterogeneity in the amount of contractual detail disclosed. We next explore this heterogeneity in our ESG performance analysis to delineate potential incentives in SLL contracting.

Sustainability-Linked Loan Issuance and ESG Performance

An important question to ask to narrow down the plausible interpretations of ESG lending is whether borrowers and lenders previously committed to ESG issues are more likely to engage in ESG-contingent loan contracting and whether such explicit and contractual commitments impact their ESG performance ex post.

In this section, we investigate this issue using firm-level ESG scores from the Refinitiv Asset4 database. The database provides an overall ESG percentile rank score, as well as cross-sectional percentile rank scores for the E (environmental) and S (social) subcategories that constitute the overall score, for a large set of publicly listed firms around the world. After manually matching our loan sample with the Asset4 database on borrower and lender

company names, we retain 689 sustainability-linked and matched non-ESG loans associated with 424 borrowers and 273 lenders.¹⁶ Our analysis of this sample is reported in Table 8.¹⁷

[Insert Table 8 here]

We begin by examining whether borrowers and lenders previously committed to ESG issues, as measured by their Asset4 ESG scores in the year prior to loan issuance, are more likely to engage in ESG-contingent loan contracting. We conduct univariate comparisons of ex ante ESG profiles between SLLs and non-ESG loans for both borrowers and lenders, where the lender ESG score is measured as the average score of all lead arrangers in the loan syndicate. The results are reported in Panel A of Table 8. We find that both borrowers and lenders of SLLs have significantly higher ex ante ESG scores than those of matched non-ESG loans. This is consistent with our earlier finding that large and reputable firms that face greater scrutiny from stakeholders regarding their ESG practices tend to issue SLLs. Our results are also consistent with recent findings that borrowers and lenders with similarly high ESG ratings tend to form lending relationships, akin to the exclusion of brown borrowers by responsible lenders (see [Kacperczyk and Peydró, 2022](#); [Houston and Shan, 2022](#); [Hauptmann, 2017](#)).

Next, we examine whether these contractual commitment devices are associated with better ex post ESG performance. If the sustainability related contract terms of SLLs incentivize firms to improve their ESG-friendly practices, one would expect the superior ex ante ESG profiles to further improve or at a minimum be sustained after SLL issuance. On the other hand, a deterioration of ESG performance ex post would indicate that SLLs are not effective in promoting good ESG performance. Instead, this could be indicative of potential greenwashing incentives in SLL issuance, where the sustainability-related contract terms are not binding enough to bring about real changes in the borrowing firms' sustainability profiles

¹⁶Our matched sample covers 70% and 63% of publicly listed borrowers and lenders in our original sample, which is comparable to the matching yield of green bond issuers (70%) in the analysis of [Flammer \(2021\)](#).

¹⁷We focus on sustainability-linked loans in this analysis, as green loan borrowers tend to be small and privately held firms that are generally not covered in ESG performance databases. Given that we will examine how ex post borrower ESG performance is related to the availability of publicly disclosed information about ESG-contingent loan pricing and KPIs, it is natural to focus exclusively on SLLs as such contractual features are only defined for these loans.

and/or the loans are endogenously issued when the borrowers' ESG profiles are safely above the contractual KPI targets. We investigate the effects of SLL issuance on future borrower ESG performance by estimating the following panel regression on a sample consisting of SLL borrowers and matched control loan borrowers for which Asset4 ESG scores are available.

$$\begin{aligned}
ESG\ Score_{i,t} = & \alpha + \beta_1 \cdot ESG\ Borrower_i \times PostLoanIssuance_{i,t} \\
& + \beta_2 \cdot ESG\ Borrower_i + \beta_3 \cdot PostLoanIssuance_{i,t} \\
& + \mathbf{I}(Firm) + \mathbf{I}(Country \times Industry \times Year) + \epsilon_{i,t}
\end{aligned} \tag{1}$$

The dependent variable is a measure of borrower ESG score. $PostLoanIssuance_{i,t}$ is an indicator variable that is equal to one for years after loan issuance, and zero otherwise. We retain the time series of Asset4 ESG scores over the $[-3,+3]$ event window around loan issuance. $ESG\ Borrower_i$ is a cross-sectional dummy indicating whether the borrower obtains a sustainability-linked loan at any time during our sample period. We further include firm and country-by-industry-by-year fixed effects. The coefficient, β_1 , captures a quasi difference-in-differences estimator that tests whether ESG borrowers experience differential changes in their ESG scores after obtaining SLLs compared to the matched control group. To be included in the sample, we require at least one year of Asset4 ESG score in each of the pre- and post-issuance periods. Our final firm-year panel dataset consists of 1,268 borrower-year observations.¹⁸

In Panel B of Table 8, the regressions are run on the full matched sample of borrowers. The dependent variable is the overall ESG score in columns (1) and (2), the ES score (i.e., average of the environmental and social scores) in columns (3) and (4), and the E score (i.e., environmental score) in columns (5) and (6). To mitigate concerns about the subjective nature and inconsistency of some third-party ESG scores (see [Berg, Fabisik, and Sautner](#),

¹⁸Since loan issuance is staggered, our difference-in-differences estimates may be biased due to time-varying treatment effects (see [Goodman-Bacon, 2021](#); [Baker, Larcker, and Wang, 2022](#)). The fact that control borrowers in this test never issue SLLs (i.e., never treated controls) mitigates this concern. Nonetheless, we confirm that our results are robust to estimating stacked difference-in-differences within treatment cohorts. We report these results in Table A.3 of the Internet Appendix.

2021; Berg et al., 2022; Tang, Yan, and Yao, 2022), we focus on the *emission* reduction score in columns (7) and (8), which is more narrowly and objectively measured.

The signs on the coefficients for $ESG\ Borrower_i \times PostLoanIssuance_{i,t}$ are negative in all specifications. Much of the difference in ESG performance between ESG and non-ESG loan borrowers is explained by their pre-issuance level difference. The coefficients on $ESG\ Borrower_i$ in columns (1), (3), (5), and (7) show that on average ESG borrowers have 7.62, 8.09, 6.67, and 10.12 higher ESG, ES, E, and emission scores, respectively, than non-ESG borrowers, consistent with the univariate results reported in Panel A. However, the negative relationship between ESG lending and borrower ESG performance becomes economically and statistically significant after we include firm fixed effects, which subsume $ESG\ Borrower_i$, in columns (2), (4), (6), and (8). Within firms, all ESG performance metrics deteriorate after sustainability-linked loan issuance. The magnitude of the decline in ESG scores of ESG borrowers relative to the scores of non-ESG borrowers ranges from 3.0 to 6.4 points, which is economically meaningful and corresponds to half of the pre-issuance level differences between ESG and non-ESG borrowers.

We also inspect pre-issuance parallel trends in ESG scores between ESG borrowers and matched non-ESG borrowers. We replace the $PostLoanIssuance_{i,t}$ indicator variable in equation 1 with yearly dummy variables for the years -2 to $+3$ (i.e., year -3 is the omitted year category). We plot the coefficients on the interaction terms between $ESG\ Borrower_i$ and the yearly dummy variables in Figure 4. The results clearly illustrate parallel trends in the ESG scores of SLL and matched control borrowers prior to loan issuance. The subsequent deterioration in ESG scores of SLL borrowers relative to their matched counterparts is statistically significant in years $+2$ and $+3$ (i.e., two- and three- years post loan issuance).

Given that the results contradict the hypothesis that SLLs improve borrower ESG performance, we further explore whether the ex post within-firm deterioration in ESG performance is consistent with greenwashing incentives in SLL issuance. To investigate this possibility, we exploit the cross-sectional heterogeneity across SLLs in the amount of publicly disclosed

information on how the loan terms are tied to specific KPIs. As conjectured earlier, borrowers are more likely to withhold information about the contract details when the KPI targets are subpar and/or when the penalties on loan spreads for missing the targets are minuscule. If this were the case, firms would effectively be engaging in greenwashing by issuing these “empty label” SLLs at times when their ESG profiles are safely above the lax contractual KPI targets. We posit that the ex-post deterioration in ESG performance would be concentrated among borrowers that issue such low-transparency SLLs.

In Table 9, we run quasi difference-in-differences regressions on subsamples consisting of borrowers obtaining low-transparency or high-transparency loans and their matched non-ESG counterparts. The results paint an interesting picture. High-transparency SLLs are not associated with post-issuance decline in borrower ESG scores. Such borrowers continue to maintain their superior ESG scores. On the other hand, consistent with a greenwashing hypothesis, we find a sharp deterioration in ESG performance following the issuance of *low-transparency* SLLs. The magnitude of the relative decline in ESG scores for this group of borrowers is both economically and statistically significant, with coefficients on the interaction term of 4.92 and 6.53 based on ESG scores and ES scores as the dependent variable, respectively.

Overall, these results are consistent with the notion that large borrowers with high ESG scores seek to signal their commitment to sustainability by obtaining SLLs from reputable global lenders who themselves seek ESG lending business under stakeholder pressure. However, SLL issuance without transparent and public disclosure on the sustainability-related contract terms has no positive impact ex post on borrower ESG performance. In fact, *low-transparency* SLL issuance is followed by within-borrower deterioration in ESG performance, raising concerns about greenwashing. In contrast, there is no deterioration in ESG scores following the issuance of *high-transparency* loans, suggesting greater commitments to high ESG standards among such borrowers.¹⁹

¹⁹In untabulated analysis, we also find qualitatively consistent results based on ESG performance data from Sustainalytics. The Sustainalytics database accessible through WRDS extends only up to 2019,

Stock Market Reactions around ESG Loan Issuance

In this section, we examine how stock markets respond to public announcements of SLL issuance. On the one hand, given that investors value ESG commitments (see [Flammer, 2021](#); [Albuquerque et al., 2020](#); [Ding et al., 2020](#); [Hartzmark and Sussman, 2019](#)), one should expect a positive market reaction to SLL issuance. On the other hand, investors need to be vigilant to indications of greenwashing. To investigate whether investors value the ESG initiatives of firms while being mindful of misleading or hollow claims by firms about their ESG commitments, we examine whether loan announcement returns vary depending on how opaque the loan’s sustainability-linked contractual details are in the public domain.

[Insert Table 10 here]

Table 10 reports the average cumulative abnormal stock returns (CARs) of borrowers around public announcements of sustainability-linked loan issuance. The sample consists of 412 SLL issuance events for which announcement dates can be identified through Factiva news search and borrowers are publicly listed.²⁰ CARs are computed from a market model using the MSCI All Country World Equity Index as the benchmark. We report average CARs for subsamples of high-transparency (N=264) and low-transparency (N=148) SLLs and report the difference of means between the two subsamples. Standard errors of the average CARs are clustered at the borrower level.

The event study indicates that the average CAR is positive for high-transparency SLLs but negligible or negative for low-transparency loans. The difference in CARs between high-transparency and low-transparency loans is also sizable. This result qualitatively holds for a

limiting coverage of participants in the ESG lending market that has grown substantially afterwards.

²⁰As detailed in Table 10, we choose SLL announcement dates from Factiva searches of keywords (“ESG” or “environmental” or “social” or “governance” or “sustainability” or “green”) and (“credit” or “loan” or “borrow”). We retain news dates that correspond to the period between 6 months before and 2 months after the facility start date in DealScan (see [Maskara and Mullineaux, 2011](#)). We manually narrow down these search results based on borrower company names and the content of the news articles. We finally select announcement dates as the news dates of the earliest articles where the reported loan terms (e.g., loan facility amount, maturity) match those recorded in DealScan or the earliest news date reporting the issuance of a sustainability loan if detailed loan terms are not reported.

variety of daily event windows (i.e., $[-5, 10]$, $[-1, 10]$, $[-1, 3]$, $[1, 3]$, and $[1, 10]$), with varying statistical significance. The CARs in other intervals outside the event windows are small and insignificant, nor is there any difference between the two groups of loans, indicating that the results are not due to spurious trends around the loan announcement dates.

Overall, our results are consistent with those of previous studies on investor ESG preference but also highlight that investors are vigilant against potential greenwashing practices. Consistent with our findings regarding post-issuance borrower ESG performance, stock market reactions suggest that investors welcome SLL issuance, but only when there is enough informational detail about the sustainability-linked aspect of the loan contract (i.e., the nature of the associated KPIs and their link to the loan terms) in the public domain.

5 Discussion

Our findings in the previous sections are consistent with the idea that firms and banks respond to heightened stakeholder demand for ESG-conscious practices. ESG lending provides a contractual mechanism to potentially ensure that the borrowing firm commits to societally acceptable standards. However, our evidence suggests that some firms may exploit the fact that this market does not require borrowers and lenders to fully disclose the details of their private loan contracts to engage in a form of greenwashing. Given that the ESG performance of borrowers deteriorates after they issue low-transparency loans, and that markets respond negatively to such loan issuances, an open question is how greenwashing benefits these firms and banks in the long run.

One possibility is that the lack of public information regarding the contractual details of SLLs prevents some stakeholders and investors from fully and correctly identifying greenwashing, leading them to incorrectly approve of hollow corporate commitments. If markets are not fully able to spot greenwashing, borrowers may have an incentive to engage in this behavior to pool with truly committed firms, while lenders may be complicit with borrow-

ers to maintain long-term business relationships with them. It is also possible that despite the possibility of greenwashing, some stakeholders are content with the apparent labeling of ESG loans as a commitment signal. For example, some ESG-committed institutions may knowingly invest in greenwashing firms, consistent with recent concerns raised by the SEC regarding ESG funds.²¹ Given this lack of full awareness in the rapidly evolving market environment, it is also possible that greenwashing firms may not yet be cognizant of the market’s increasing vigilance toward such practices.

While many of these possibilities open the door to future research as the ESG lending market evolves, our evidence suggests that increased regulatory scrutiny to ensure the transparent disclosure of contractual terms related to sustainability-linked pricing grids and the formulation and monitoring of KPIs is an essential step for this market to serve as an effective and central platform of ESG-contingent financing.

6 Conclusion

In this paper, we provide the first comprehensive analysis of the ESG lending market, which has grown exponentially within the past six years. Sustainability-linked loans are general purpose loans with loan terms that are contractually tied to the borrower’s ESG performance, which have opened a potential avenue for creditor ESG engagement and monitoring. This unique feature of SLLs sets them apart from project-specific green bonds, a debt instrument that has received relatively more attention from academics and practitioners in recent years. Contracts similar to green bonds have developed in the lending market as well, namely, green loans, whose proceeds are specifically earmarked for use in designated green projects.

We show that the growth of ESG lending has been driven primarily by the rise of SLLs, which have become one of the most important segments in the global sustainable debt market. Consistent with the general purpose nature of SLLs, they are relatively widespread across a variety of industries in comparison to use-of-proceeds-based green loans. SLLs

²¹See *Barrons*, “SEC’s Gensler is targeting greenwashing of ESG funds”, March 1, 2022.

have propagated globally, particularly across Western countries with stakeholder-oriented economies and well-developed credit markets.

We find that borrowers and lenders that face greater scrutiny from stakeholders, and therefore have greater incentives to signal good ESG practices, are more likely to participate in the sustainability-linked loan market. These loans are generally issued to large publicly listed borrowers by large syndicates comprised of reputable global banks. SLLs tend to be structured as revolving credit facilities and are distinctly likely to be originated by banks with whom borrowers have previous lending relationships. However, SLLs are not priced any differently from non-ESG loans at issuance. In contrast, green loans are typically smaller term loans issued to privately held firms and charge lower spreads at issuance. These facts raise the question of whether SLLs are effective in incentivizing borrower ESG commitment.

While borrowers and lenders who have superior ESG profiles *ex ante* are more likely to self-select into ESG loan contracts, we find no evidence that the issuance of such loans positively affects borrowers' ESG performance *ex post*. In contrast, we find that borrower ESG scores deteriorate after SLL issuance, particularly when the quality of publicly disclosed information regarding the contractual details of the ESG-related KPI is poor. This result suggests potential greenwashing practices in the emergent but rapidly growing SLL market. Consistent with investor vigilance to such practices, we find that stock markets react positively to public announcements of SLL issuance only when the quality of KPI disclosure is high.

Overall, our paper makes a significant contribution to the growing literature that explores how investors and firms incorporate stakeholder values into their financing agreements. Through our novel findings, we shed light on how the vast global syndicated loan market has developed contractual mechanisms to address ESG-related concerns among borrowers and lenders. While our research highlights the importance of such contracts, we also raise concerns about their transparency and effectiveness in facilitating real and positive improvements in corporate ESG policies. Given the increasing regulatory scrutiny and societal emphasis on corporate ESG performance by various stakeholders around the world, our

findings hold important implications for global banking and sustainable corporate finance.

Appendix

Variable definitions

Variable	Definition	Data Source
All-in-spread drawn (AISD, %)	Loan spread over LIBOR.	DealScan
ESG	Dummy variable that takes a value of one if the loan is sustainability-linked or green, and zero otherwise.	DealScan
Log(FacilityAmount)	The natural logarithm of the facility amount in \$ million.	DealScan
Log(Maturity)	The natural logarithm of the maturity in months.	DealScan
Secured	Dummy variable for whether loan is secured	DealScan
Term Loan A	Dummy variable for whether the loan is a term loan A	DealScan
Revolver	An indicator variable equal to one if the facility type is one of the following: “364-Day Facility”, “Revolver/Line<1 Yr.”, “Revolver/Line>= 1 Yr.”, “Revolver/Term Loan”, “Demand Loan”, or “Limited Line”.	DealScan
Leveraged Loan	Dummy variable for whether the loan is a leveraged loan	DealScan
Publicly Listed	Dummy variable for whether the borrower is publicly listed	DealScan
ESG Score	Overall ESG percentile rank score of a firm in a given year	Asset4
ES Score	Average of E (Environmental) and S (Social) percentile rank scores of a firm in a given year	Asset4
E Score	Environmental performance percentile rank score of a firm in a given year	Asset4
Emission Score	Percentile rank score reflecting the firm’s efforts and effectiveness in reducing environmental emissions	Asset4
ESG Borrower	A cross-sectional dummy variable equal to one if the borrower is issued a sustainability-linked loan at any time throughout the entire sample period.	DealScan
PostLoanIssuance	An indicator variable equal to one for years after the loan issuance year, and zero otherwise.	DealScan

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Figure 1. Sustainability-linked and green loan issuance over time

This figure illustrates the annual issuance of sustainability-linked and green loans during the sample period from 2016 to September 2021. The samples consists of 1,127 sustainability-linked and 1,228 green loan facilities from Refinitiv DealScan (DealScan, hereafter). In each bar, the dark and light areas indicate sustainability-linked and green loan issuance amounts as a fraction of all loans, respectively (left y-axis). The dashed line indicates the total issuance amount of sustainability-linked and green loans combined (right y-axis).

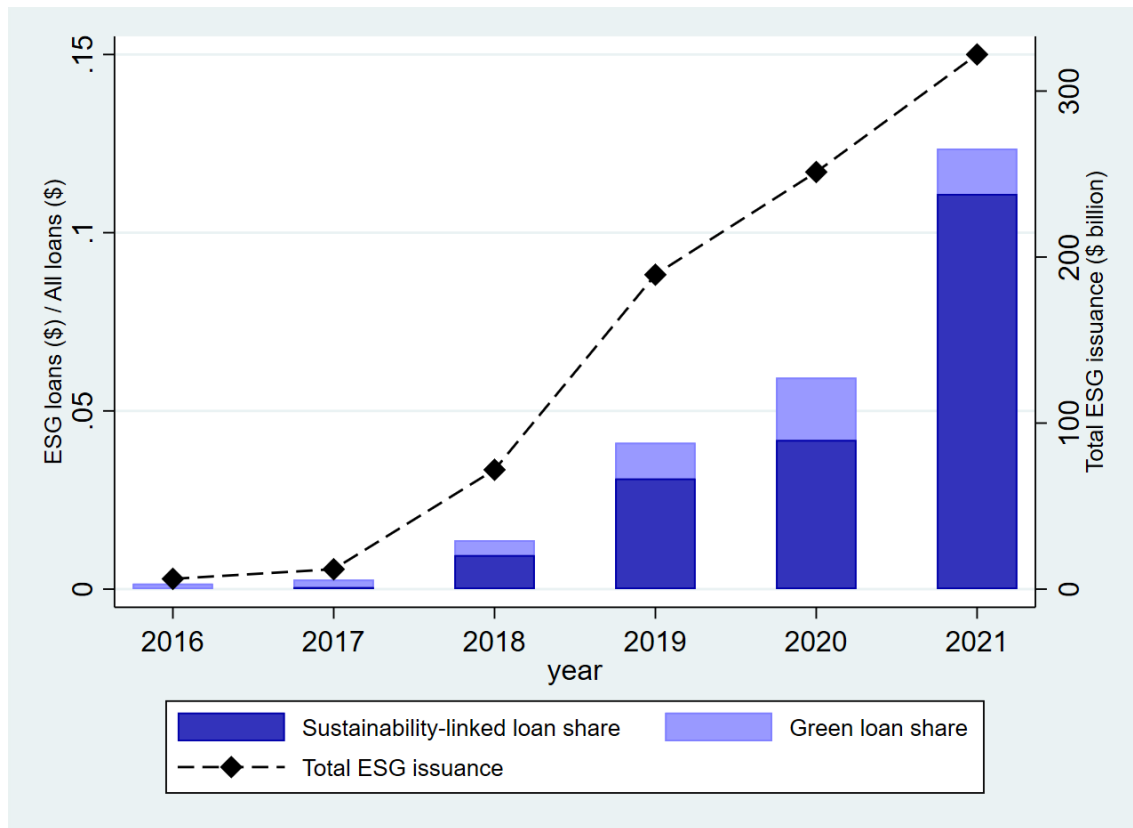


Figure 2. Annual issuance of sustainability-linked and green loans by region

This figure presents the annual issuance amounts of sustainability-linked and green loans by region from 2016 to September 2021. The sample consists of 1,127 sustainability-linked and 1,228 green loan facilities in DealScan. For each year, the dark, medium, and light blue bars indicate the total issuance amounts of sustainability-linked and green loan facilities issued in Europe, North America, and the rest of the world, respectively.

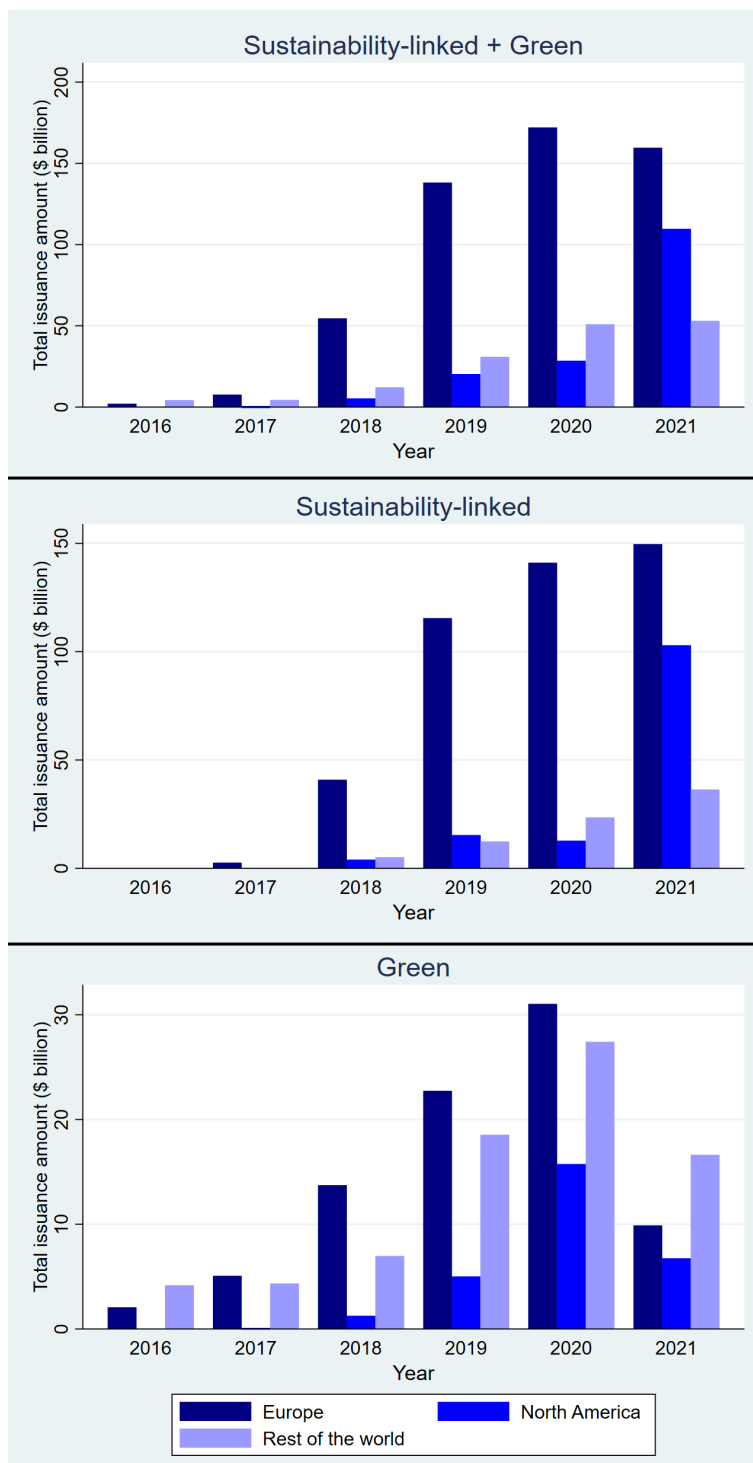
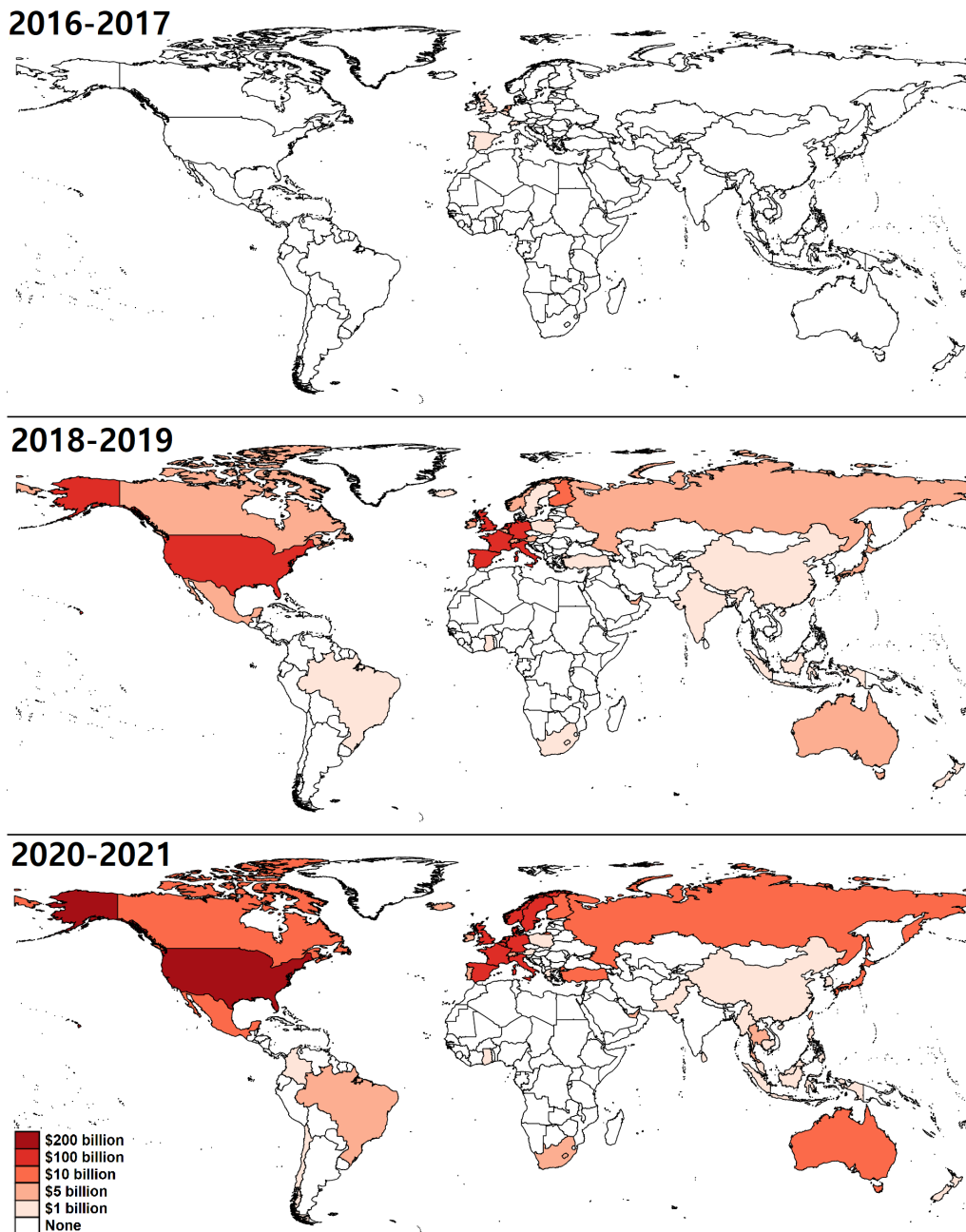


Figure 3. Evolution of ESG lending around the world

This figure presents cross-country heat maps of annual sustainability-linked (Panel A) and green (Panel B) loan issuance around the world from 2016 to September 2021. The samples consist of 1,127 sustainability-linked and 1,228 green loan facilities in DealScan. The color density indicates the magnitude of issuance amount during each two-year period: Lightest (none), light (up to \$1 billion), medium (up to \$5 billion), dark (up to \$10 billion), and darkest (up to \$100 billion). The issuance amount in 2021 is re-scaled by 12/9 due to data availability up to September in 2021. The two-year periods are noted in the top left corner of each map.

Panel A: Sustainability-linked loans

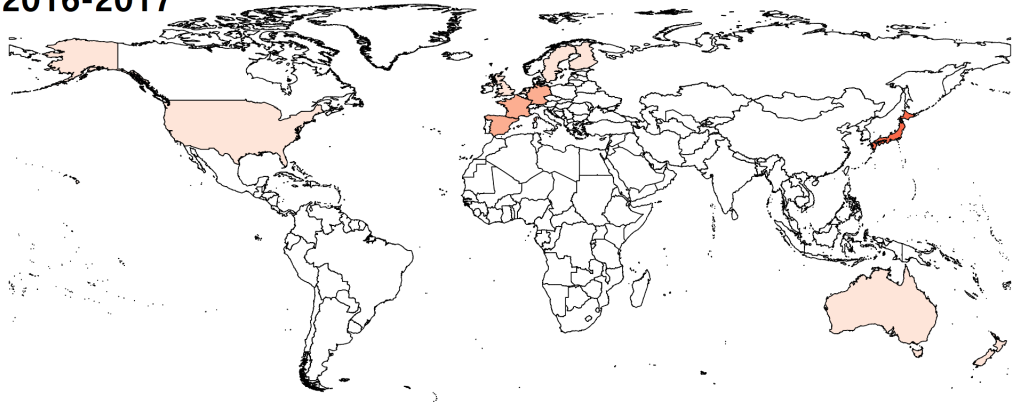


(continued)

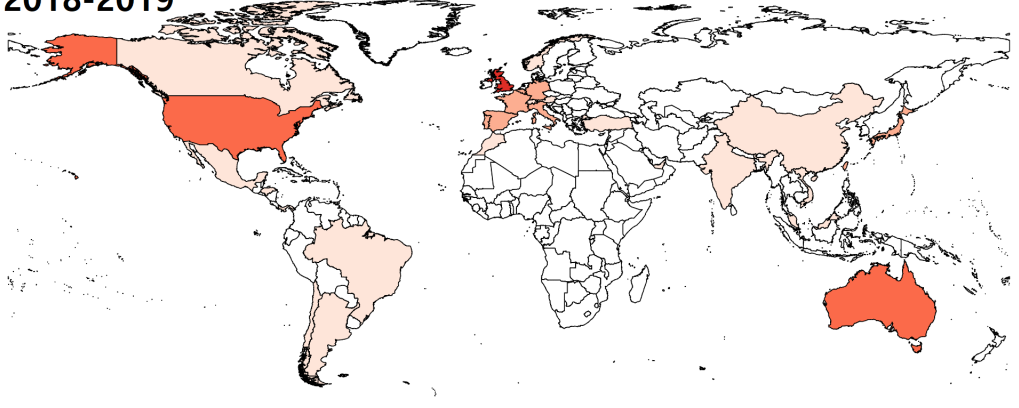
Figure 3. Evolution of ESG lending around the world (continued)

Panel B: Green loans

2016-2017



2018-2019



2020-2021

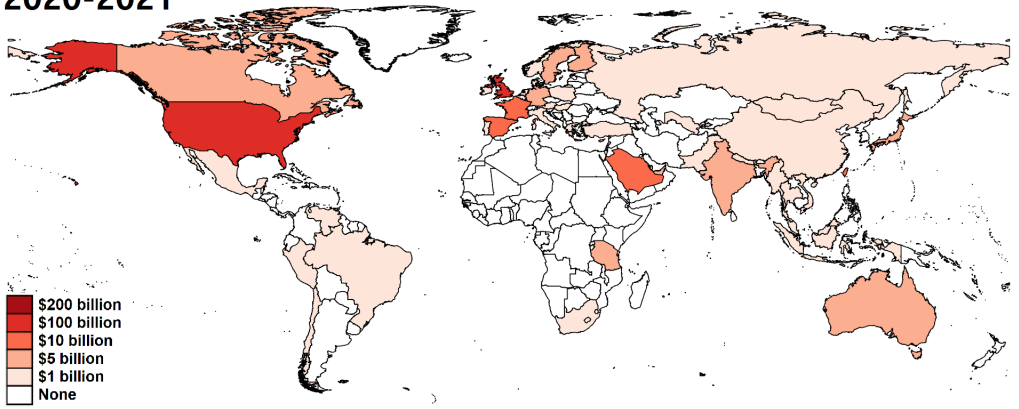


Figure 4. ESG score dynamics around loan issuance

This figure plots results from replacing the $PostLoanIssuance_{i,t}$ indicator variable in the difference-in-differences regression specification in equation 1 with yearly dummy variables for the years -2 to $+3$ relative to the loan issuance year (i.e., year -3 is the omitted year category). The figure plots the coefficients on the interaction terms between $ESG\ Borrower_i$ and the yearly dummy variables.

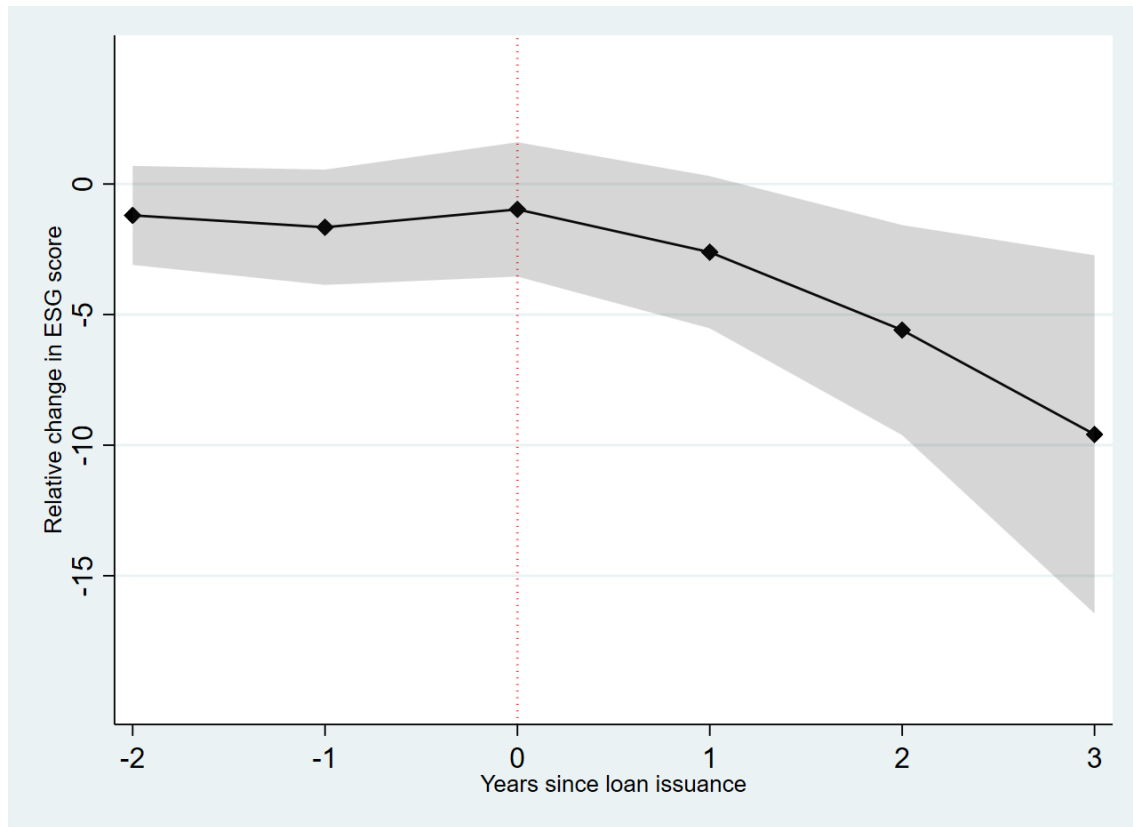


Table 1. ESG lending over time

This table reports the total issuance amount and the number of sustainability-linked and green loan facilities issued from 2016 to September 2021. The sample consists of 1,127 SLLs and 1,228 green loans obtained from DealScan. In 2021, the numbers are reported up to September.

Year	SLLs + Green loans		SLLs		Green loans	
	\$ billion	# facility	\$ billion	# facility	\$ billion	# facility
2016	6.23	105			6.23	105
2017	12.02	106	2.56	5	9.46	101
2018	71.93	196	50.00	66	21.93	130
2019	189.38	513	143.10	250	46.28	263
2020	251.39	848	177.21	372	74.18	476
2021 (up to Sep)	322.18	587	288.92	434	33.26	153
Total	853.13	2,355	661.79	1,127	191.34	1,228

Table 2. ESG lending by industry

This table reports the total issuance amount and the number of sustainability-linked and green loan facilities issued in each borrower industry, defined using Fama-French 17 industry classifications. The sample consists of 1,127 SLs and 1,228 green loans issued from 2016 to September 2021. % to total is the ratio of the issuance amount in each industry to the issuance amount across the entire sample. Loan data are obtained from DealScan.

Industry	SLs + Green loans				SLs				Green loans			
	\$ billion	% to total	# facility		\$ billion	% to total	# facility		\$ billion	% to total	# facility	
Utilities	224.59	26.33	894		112.17	16.95	117		112.42	58.75	777	
Banks, Insurance Companies, and Other Financials	171.34	20.08	486		130.69	19.75	255		40.65	21.24	231	
Other	139.23	16.32	333		125.76	19.00	245		13.47	7.04	88	
Oil and Petroleum Products	51.77	6.07	41		50.16	7.58	29		1.61	0.84	12	
Machinery and Business Equipment	50.55	5.93	104		45.59	6.89	76		4.96	2.59	28	
Food	44.05	5.16	109		42.76	6.46	100		1.29	0.67	9	
Transportation	40.6	4.76	108		34.32	5.19	68		6.28	3.28	40	
Construction and Construction Materials	29.16	3.42	70		21.34	3.22	52		7.82	4.09	18	
Retail Stores	23.98	2.81	45		23.62	3.57	37		0.36	0.19	8	
Drugs, Soap, Perfumes, Tobacco	17.06	2.00	18		17.06	2.58	18					
Chemicals	16.89	1.98	35		16.7	2.52	34		0.19	0.10	1	
Automobiles	12.85	1.51	33		10.99	1.66	22		1.86	0.97	11	
Steel Works Etc	11.95	1.40	20		11.93	1.80	19		0.02	0.01	1	
Consumer Durables	7.66	0.90	17		7.66	1.16	17					
Mining and Minerals	5.77	0.68	15		5.36	0.81	11		0.41	0.21	4	
Fabricated Products	4.27	0.50	10		4.27	0.65	10					
Textiles, Apparel & Footwear	1.41	0.17	17		1.41	0.21	17					
Total	853.13	100.00	2,355		661.79	100.00	1,127		191.34	100.00	1,228	

Table 3. ESG lending by country

This table reports the total issuance amount and the number of sustainability-linked and green loan facilities by borrowers' country of incorporation. The sample consists of 1,127 SLLs and 1,228 green loans issued from 2016 to September 2021. Data are obtained from DealScan.

Sustainability-linked + Green loans			Sustainability-linked loans			Green loans		
Country	# facility	\$ billion	Country	# facility	\$ billion	Country	# facility	\$ billion
United States	286	145.75	United States	104	118.91	United Kingdom	90	27.56
France	156	97.34	France	104	85.02	United States	182	26.84
United Kingdom	173	79.08	Spain	189	58.13	Japan	249	15.18
Spain	293	73.29	Italy	59	56.98	Spain	104	15.16
Italy	106	62.54	United Kingdom	83	51.52	Singapore	67	12.80
Germany	125	53.16	Germany	86	46.68	France	52	12.32
Netherlands	63	47.10	Netherlands	48	45.86	Australia	66	11.50
Singapore	128	35.23	Singapore	61	22.43	Taiwan	33	9.90
Japan	293	25.15	Sweden	23	20.35	Hong Kong	37	7.55
Sweden	49	24.14	Belgium	14	16.83	Germany	39	6.48
Australia	106	19.39	Norway	13	13.55	Italy	47	5.56
Belgium	27	18.84	Denmark	4	10.20	Saudi Arabia	4	4.44
Hong Kong	67	14.42	Finland	24	9.98	United Arab Emirates	12	3.84
Norway	19	14.08	Japan	44	9.97	Sweden	26	3.79
Taiwan	44	11.78	Luxembourg	9	8.83	India	30	3.76
Finland	32	11.77	Mexico	8	8.18	Portugal	6	2.90
Denmark	6	10.31	Australia	40	7.89	Canada	17	2.51
Luxembourg	20	10.27	Ireland	6	7.80	Belgium	13	2.01
Canada	29	10.11	Canada	12	7.60	Finland	8	1.79
Mexico	11	8.78	Hong Kong	30	6.87	Tanzania	4	1.64
Ireland	9	8.54	Russian Federation	18	6.40	Luxembourg	11	1.44
United Arab Emirates	17	7.78	Turkey	23	6.22	Netherlands	15	1.24
Turkey	26	6.68	Switzerland	12	5.52	China	6	1.04
Russian Federation	19	6.53	United Arab Emirates	5	3.94	Chile	11	0.94
Switzerland	13	5.67	Brazil	6	3.13	Vietnam	15	0.91
India	32	4.76	Austria	16	2.65	Ireland	3	0.74
Portugal	16	4.62	Taiwan	11	1.88	Mexico	3	0.60
Saudi Arabia	4	4.44	Portugal	10	1.72	Cyprus	1	0.54
Brazil	19	3.57	Iceland	4	1.54	Norway	6	0.53
Austria	21	3.00	Cyprus	2	1.48	Hungary	1	0.50
Cyprus	3	2.02	Thailand	8	1.48	Indonesia	1	0.50
Thailand	13	1.81	Cayman Islands	1	1.25	Argentina	5	0.47
China	11	1.78	Indonesia	4	1.16	Turkey	3	0.46
Indonesia	5	1.66	Bermuda	6	1.02	Brazil	13	0.44
Tanzania	4	1.64	India	2	1.00	Austria	5	0.35
Iceland	4	1.54	South Africa	2	0.94	Qatar	2	0.34
Cayman Islands	1	1.25	Malaysia	7	0.91	Thailand	5	0.33
Pakistan	3	1.10	Pakistan	2	0.80	Myanmar	2	0.31
South Africa	3	1.09	Mauritius	1	0.75	Pakistan	1	0.30
Chile	13	1.08	China	5	0.74	Peru	6	0.23
Others	86	10.04	Others	21	3.68	Others	27	1.60
Total	2,355	853.13	Total	1,127	661.79	Total	1,228	191.34

Table 4. ESG loan characteristics

This table presents univariate comparisons of ESG loans (sustainability-linked or green) and non-ESG loans. In Panel A, we report unconditional comparisons. We exclude from our sample loans issued in countries with no ESG lending activity during our sample period. Control facilities are newly issued loans that do not convert to ESG loans and comprise loan packages exclusively consisting of non-ESG facilities. The sample consists of 1,122 sustainability-linked (1,227 green) facilities and 71,436 (86,485) non-ESG control facilities. Panel A reports the number of sustainability-linked, green, and control packages and facilities (i.e., # package and # facility), the average sales of borrowers in each facility group at the time of closing of the loan deal (i.e., Sales at close (\$ million)), the fraction of publicly listed borrowers in each facility group (i.e., Public firms), the average deal size of each facility group (i.e., Deal size (\$ million)), the average dollar amount of facilities in each group (i.e., Facility amount (\$ million)), the average maturity of facilities in each group (i.e., Maturity (months)), the fraction of term loan A facilities (i.e., Term loan A), the fraction of institutional term loans (i.e., Institutional term loan), the fraction of revolving credit facilities (i.e., Revolver), the fraction of leveraged loan facilities (i.e., Leveraged), the fraction of investment grade facilities (i.e., Investment grade), and the mean differences between sustainability-linked (green) facilities and non-ESG (non-green) control facilities as well as their associated p-values (i.e., Mean difference and P-value). In Panel B, we match each sustainability-linked or green loan package to control packages that (1) are issued in the same country, industry, and year, (2) are issued to borrowers with the same public-private status, and (3) have the closest deal size. The matched sample consists of 694 sustainability-linked (625 green) packages and 734 (641) non-ESG packages in the control group. For this matched set of loan packages, Panel B reports the number of packages in each group (i.e., # package), the average sales of borrowers in each deal group at the time of deal closing (i.e., Sales at close (\$ million)), the average deal size of each group (i.e., Deal size (\$ million)), the fraction of ESG loans (sustainability-linked or green) within the package, the fraction of revolving credit facilities within the package, the fraction of term loan A facilities within the package, the fraction of packages that are comprised entirely of term loans (i.e., Only term loan A), entirely of revolving credit facilities (i.e., Only revolver), of both term loans and revolvers (i.e., Term loan A + Revolver), or of facilities other than term loans or revolvers (i.e., Others). Where applicable, we further report differences between sustainability-linked (green) and control packages as well as their p-values (i.e., Mean difference and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Unconditional comparisons								
	Sustainability-linked loans				Green loans			
	SLL	Control	Mean difference	P-value	Green	Control	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# package	756	40,394			637	48,376		
# facility	1,122	71,436			1,227	86,485		
<i>Borrowers</i>								
Sales at close (\$ million)	10,835.23	6,569.47	4,265.76***	0.00	5,124.67	6,444.38	-1,319.71*	0.06
Public firm	0.52	0.21	0.31***	0.00	0.10	0.21	-0.11***	0.00
<i>Loan size and maturity</i>								
Deal size (\$ million)	937.15	520.81	416.34***	0.00	536.44	513.70	22.74	0.34
Facility amount (\$ million)	533.29	245.47	287.82***	0.00	155.17	241.71	-86.55***	0.00
Maturity (months)	54.61	60.79	-6.18***	0.00	106.81	61.19	45.62***	0.00
<i>Facility type</i>								
Term loan A	0.27	0.42	-0.15***	0.00	0.54	0.43	0.11***	0.00
Institutional term loan	0.04	0.09	-0.05***	0.00	0.00	0.08	-0.08***	0.00
Revolver	0.55	0.37	0.18***	0.00	0.18	0.36	-0.18***	0.00
<i>Credit quality</i>								
Leveraged	0.12	0.29	-0.18***	0.00	0.02	0.29	-0.27***	0.00
Investment grade	0.48	0.12	0.36***	0.00	0.06	0.12	-0.06***	0.00

(continued)

Table 4. ESG loan characteristics (continued)

Panel B: Package-level matching by deal size, country, industry, year, and public-private status								
	Sustainability-linked loans				Green loans			
	SLL	Matched	Mean difference	P-value	Green	Matched	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# Package	694	734			625	641		
Sales at close (\$ million)	10,735.44	7,423.42	3,312.03***	0.01	4,982.91	3,621.73	1,361.18	0.25
Deal size (\$ million)	854.85	743.43	111.42**	0.05	322.70	312.84	9.86	0.69
Fraction of ESG loan within package	0.97	0.00			0.96	0.00		
Fraction of revolver	0.62	0.41	0.21***	0.00	0.20	0.34	-0.14***	0.00
Fraction of term loan A	0.24	0.35	-0.11***	0.00	0.57	0.45	0.12***	0.00
Packages composed of								
Only term loan A	15.71%	23.98%			43.04%	33.70%		
Only revolver	54.03%	31.47%			14.88%	25.43%		
Term loan A + Revolver	12.97%	15.80%			12.96%	16.07%		
Others	17.29%	28.75%			29.12%	24.80%		

Table 5. Structure of ESG loan syndicates

This table documents the syndicate structure of sustainability-linked and green loans, in comparison to the syndicate structure of control non-ESG loans matched on country, industry, year, borrower public-private status, and facility size. For each group, the table reports the average number of lead arrangers in the loan syndicate (i.e., # lead arranger). The table further breaks down the lead arrangers into various categories, reporting the average number of lenders belonging to each category along with the corresponding share within the syndicate (in brackets). The categories include lenders who are lenders with prior ESG lending history (i.e., ESG-experienced lender), who are in the top 5% of lenders in terms of total lending amount over the previous five years from loan issuance (i.e., Reputable lender), who are from countries that are not the borrower's country of incorporation (i.e., Foreign lender), who have prior lending relationships with the borrowers over the previous five years (i.e., Relationship lender), who are relationship ESG-experienced lenders, relationship reputable lenders, or relationship foreign lenders. The table also reports the differences between sustainability-linked (or green) facilities and their matched counterparts, along with the associated p-values (i.e., Mean difference and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	Sustainability-linked loans				Green loans			
	SLL	Matched	Mean difference	P-value	Green	Matched	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# lead arranger	5.57	3.99	1.58***	0.00	4.68	2.78	1.90***	0.00
ESG-experienced lender	5.37 [0.96]	3.56 [0.87]	1.81*** 0.09***	0.00 0.00	4.29 [0.90]	2.19 [0.75]	2.10*** 0.15***	0.00 0.00
Reputable lender	4.93 [0.87]	3.32 [0.80]	1.61*** 0.07***	0.00 0.00	3.74 [0.80]	2.06 [0.71]	1.68*** 0.09***	0.00 0.00
Foreign lender	3.56 [0.50]	2.05 [0.40]	1.52*** 0.11***	0.00 0.00	3.34 [0.56]	1.35 [0.39]	1.99*** 0.17***	0.00 0.00
Relationship lender	3.61 [0.59]	2.28 [0.52]	1.33*** 0.07***	0.00 0.00	0.70 [0.16]	0.98 [0.34]	-0.28*** -0.17***	0.00 0.00
Relationship ESG-experienced lender	3.51 [0.58]	2.13 [0.48]	1.38*** 0.10***	0.00 0.00	0.62 [0.15]	0.80 [0.26]	-0.18*** -0.12***	0.01 0.00
Relationship reputable lender	3.28 [0.53]	2.04 [0.46]	1.24*** 0.07***	0.00 0.00	0.63 [0.15]	0.80 [0.27]	-0.18*** -0.12***	0.01 0.00
Relationship foreign lender	2.22 [0.28]	1.12 [0.19]	1.10*** 0.09***	0.00 0.00	0.45 [0.09]	0.39 [0.10]	0.06 -0.01	0.22 0.27
Number of facilities	1,035	1,352			1,208	1,526		

Table 6. ESG loan pricing

In this table, we report results from cross-sectional regressions of all-in-spread-drawn (AISD) on loan characteristics, in the spirit of [Berg et al. \(2017\)](#). The dependent variable $AISD_{i,j}$ is the spread over LIBOR for loan facility j issued by borrower i . $ESG_{i,j}$ is a dummy variable that takes a value of one if the loan is sustainability-linked or green, and zero otherwise. We perform separate analysis for sustainability-linked and green loans. Control variables include log facility amount, log maturity, dummy variable for whether the loan is secured, dummy variables for whether the loan is a term loan A or a revolver, dummy variable for whether the loan is a leveraged loan, and a dummy variable for whether the borrower is publicly listed. We also control for country-by-industry-by-year fixed effects. Standard errors are adjusted for clustering at the firm level. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	Dependent variable: All-in-spread drawn (AISD, %)			
	Sustainability-linked loans		Green loans	
	(1)	(2)	(3)	(4)
ESG	-1.327*** (0.101)	-0.046 (0.099)	-0.444** (0.191)	-0.476*** (0.124)
Log(FacilityAmount)		-0.306*** (0.009)		-0.309*** (0.009)
Log(Maturity)		0.127*** (0.026)		0.123*** (0.024)
Secured		0.791*** (0.034)		0.790*** (0.031)
Term Loan A		0.-0.052 (0.036)		-0.103*** (0.034)
Revolver		-0.866*** (0.029)		-0.921*** (0.027)
Leveraged Loan		1.123*** (0.033)		1.135*** (0.030)
Publicly Listed		-0.361*** (0.035)		-0.370*** (0.032)
Country $\times$ Industry $\times$ Year FE	Y	Y	Y	Y
N	23,664	23,664	28,714	28,714
Adj. R ²	0.119	0.500	0.114	0.493

Table 7. Disclosure quality of sustainability-linked loan terms

This table reports the disclosure quality of contractual terms across sustainability-linked loans, based on information available in the market segment, performance pricing remark, deal remark, tranche remark, and loan purpose remark fields in the Refinitiv DealScan database, supplemented with a manual search of media releases and corporate sustainability reports. We classify SLLs that are not associated with any publicly verifiable information about their KPI metrics or how they are tied to loan terms as “low-transparency” loans. On the other hand, “high-transparency” loans have publicly available information indicating that the loan terms are linked to some metric of ESG performance. For each group, we report the number of loan facilities, as well as the average borrower’s sales when the loan was originated, the borrower’s Asset4 ESG score prior to the loan issuance, and the fraction of loans that are obtained by borrowers domiciled in civil law countries. Among high-transparency loans that list specific KPIs in the loan contract descriptions, we also report the fraction of loans that use environmental KPIs or both environmental and social KPIs, the fraction of loans that disclose the use of a third party ESG rating as the KPI, and the fraction of loans that report the reward (penalty) on the loan spread conditional on good (poor) ESG performance.

	High-transparency loans	Low-transparency loans	Difference (p-value)
# facility	617	510	
<i>Borrower attributes</i>			
Sales at close (\$ billion)	12.03	10.01	0.25
Ex ante ESG score	64.56	62.23	0.16
Civil law	0.67	0.66	0.86
<i>Disclosed contract features</i>			
Environmental KPI	0.85	-	
Environmental/Social KPI	0.32	-	
Third party ESG rating	0.21	-	
Reward on loan spread	0.22	-	
Penalty on loan spread	0.13	-	

Table 8. ESG lending and corporate ESG performance

This table analyzes corporate ESG performance around ESG lending. The sample consists of 689 loan facilities comprised of sustainability-linked loans and non-ESG facilities issued to borrowers who are matched to the Asset4 database. Panel A reports univariate comparisons of ex ante borrower/lender ESG profiles between sustainability-linked and non-ESG facilities, measured by Asset4 ESG scores in the year prior to loan issuance. Lender ESG score is the average score of all lead arrangers in the syndicate of the loan. Panel B reports results from quasi difference-in-differences panel regressions of borrower Asset4 ESG scores on a firm-invariant indicator variable equal to one if the borrower obtains a sustainability-linked loan during the full sample period and zero otherwise (i.e., ESG Borrower), an indicator variable equal to one for years after the loan issuance year and zero otherwise (i.e., PostLoanIssuance), as well as their interaction term (i.e., ESG Borrower $\times$ PostLoanIssuance). We retain the time series of Asset4 ESG scores over the [-3,+3] event window around loan issuance and require at least one year of Asset4 ESG score in each of the pre- and post-issuance periods. The samples consist of 1,268 borrower-year observations where the borrowers are in the intersection of DealScan and Asset4. Four dependent variables are used: The first dependent variable is the overall ESG score of the borrower in a given year. The second dependent variable is the ES (Environment and social) score, which is defined as the average of the environmental and social scores reported in Asset4. The third dependent variable is the E (Environment) score, which is further broken down into the emission score reflecting the firm's efforts to reduce environmental emissions (Emission). The regressions are run on the full matched sample of borrowers. Firm and country-by-industry-by-year fixed effects are included. Firm clustered standard errors are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Ex ante ESG profiles									
	Borrower				Lender				
	ESG Loan	Control	Diff	t-statistic	ESG Loan	Control	Diff	t-statistic	
Ex Ante ESG Score	63.73	55.28	8.45***	6.10	78.47	76.57	1.90***	3.31	
N	393	296			393	296			
Panel B: Ex post ESG performance									
Dependent variable:	ESG score			ES score			Emission score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
ESG Borrower $\times$ PostLoanIssuance	-0.373 (1.745)	-2.988** (1.242)	-1.261 (1.947)	-3.357** (1.406)	-0.893 (2.288)	-3.677** (1.630)	-4.217 (2.825)	-6.365*** (2.328)	
ESG Borrower	7.619*** (2.247)		8.088*** (2.581)		6.671** (3.013)		10.122*** (3.216)		
PostLoanIssuance	3.845 (3.363)	2.250* (1.162)	3.795 (3.643)	1.468 (1.314)	0.444 (4.070)	1.065 (1.410)	7.845* (4.730)	3.758* (2.223)	
Firm FE	N	Y	N	Y	N	Y	Y	Y	
Country $\times$ Industry $\times$ Year FE	Y	Y	Y	Y	Y	Y	Y	Y	
N	1268	1267	1268	1267	1268	1267	1268	1267	
Adj. R ²	0.269	0.891	0.283	0.896	0.258	0.885	0.286	0.816	

Table 9. Public contractual transparency and corporate ESG performance

This table analyzes corporate ESG performance around the issuance of low- and high-transparency SLLs. The sample consists of 689 loan facilities comprised of SLLs and non-ESG facilities issued to borrowers who are matched to the Asset4 database. The table reports results from quasi difference-in-differences panel regressions of borrower Asset4 ESG scores on a firm-invariant indicator variable equal to one if the borrower obtains a sustainability-linked loan during the full sample period and zero otherwise (i.e., ESG Borrower), an indicator variable equal to one for years after the loan issuance year and zero otherwise (i.e., PostLoanIssuance), as well as their interaction term (i.e., ESG Borrower $\times$ PostLoanIssuance). We retain the time series of Asset4 ESG scores over the [-3,+3] event window around loan issuance and require at least one year of Asset4 ESG score in each of the pre- and post-issuance periods. The dependent variable is either the overall ESG score of the borrower in a given year, or the ES (Environment and social) score, which is defined as the average of the environmental and social scores reported in Asset4. The regressions are run on subsamples consisting of borrowers obtaining SLLs with low or high publicly available information regarding key performance indicators (KPIs) and their matched non-ESG counterparts. Firm and country-by-industry-by-year fixed effects are included. Firm clustered standard errors are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	High-transparency loans		Low-transparency loans	
	ESG score (1)	ES score (2)	ESG score (3)	ES score (4)
ESG Borrower $\times$ PostLoanIssuance	-1.211 (1.518)	-0.977 (1.714)	-4.916** (1.916)	-6.525*** (2.159)
PostLoanIssuance	0.838 (1.874)	-0.114 (1.768)	4.843** (2.189)	4.525 (2.773)
Firm FE	Y	Y	Y	Y
Country $\times$ Industry $\times$ Year FE	Y	Y	Y	Y
N	659	659	626	626
Adj. R ²	0.890	0.896	0.880	0.881

Table 10. Borrower stock returns around loan announcements

This table reports average cumulative abnormal stock returns (CARs) of borrowers for different time windows around public announcements of sustainability-linked loan issuance. The sample consists of 412 SLL issuance events for which loan announcement dates can be identified through Factiva news search and borrowers have publicly traded stock. We choose SLL announcement dates from Factiva searches of keywords (“ESG” or “environmental” or “social” or “governance” or “sustainability” or “green”) and (“credit” or “loan” or “borrow”). We retain news dates that correspond to between 6 months before and 2 months after the facility start date in DealScan (see [Maskara and Mullineaux, 2011](#)). We manually narrow down these search results based on borrower company names and the content of the news articles. We finally select announcement dates as the news dates of articles where the reported loan terms (e.g., loan facility amount, maturity) match those recorded in DealScan, or the earliest news date reporting the issuance of a sustainability loan if detailed loan terms are not reported. CARs are computed from a market model using the MSCI All Country World Equity Index as the market benchmark. We report average CARs around different event windows for subsamples of high-transparency (N=264) or low-transparency (N=148) SLLs, and report the difference of means between the two subsamples as well as the associated P-values. Standard errors of the average CARs are adjusted for clustering at the borrower level. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Event window	High-transparency loans (N=264)		Low-transparency loans (N=148)		Difference	P-value
	CAR (%)	Std. Err.	CAR (%)	Std. Err.		
[-10, -6]	-0.148	0.234	-0.246	0.524	0.098	0.865
[-10, -2]	-0.286	0.342	0.127	0.846	-0.413	0.651
[-5, 10]	0.680	0.515	-0.436	1.104	1.116	0.361
[-1, 10]	0.818*	0.482	-0.809	0.776	1.627*	0.076
[-1, 3]	0.281	0.252	-0.340	0.440	0.621	0.222
[1, 3]	0.615***	0.214	-0.069	0.282	0.684*	0.055
[1, 10]	1.152**	0.447	-0.538	0.621	1.690**	0.026
[11, 20]	0.300	0.311	0.664	1.894	-0.364	0.850

Internet Appendix

for “ESG Lending”

A.1 Cross-Country Determinants of ESG Lending

We systematically corroborate the geographical distribution of the ESG lending market reported in Section 3 by investigating cross-country determinants of ESG lending. To avoid confounding differences in general banking sector activities across countries, we compute the abnormal sustainability-linked (green) loan share at the country level by taking the difference between the country’s aggregate sustainability-linked (green) loan issuance over our sample period as a fraction of worldwide sustainability-linked (green) loan issuance and the country’s non-ESG loan issuance as a fraction of worldwide non-ESG loan issuance. The variable captures the intensity of sustainability-linked (green) loan issuance in a country in excess of the country’s normal lending activity during our sample period.

To explain abnormal loan shares, we conduct a cross-sectional analysis in the spirit of Djankov, McLiesh, and Shleifer (2007), where we consider institutional differences across countries such as legal origins, private credit provision, the strength of creditor rights, and stringency of environmental regulation. Private credit provision is obtained from World Bank Open Data. We adopt the data on common law origin status and the creditor rights index from Djankov et al. (2007). Following Ben-David, Jang, Kleimeier, and Viehs (2021), we collect information on the stringency of environmental regulation from the World Economic Forum. The regression is a cross-sectional model with one observation for each country. All explanatory variables are as of the most recent year available before our sample period.

[Insert Table A.1 here]

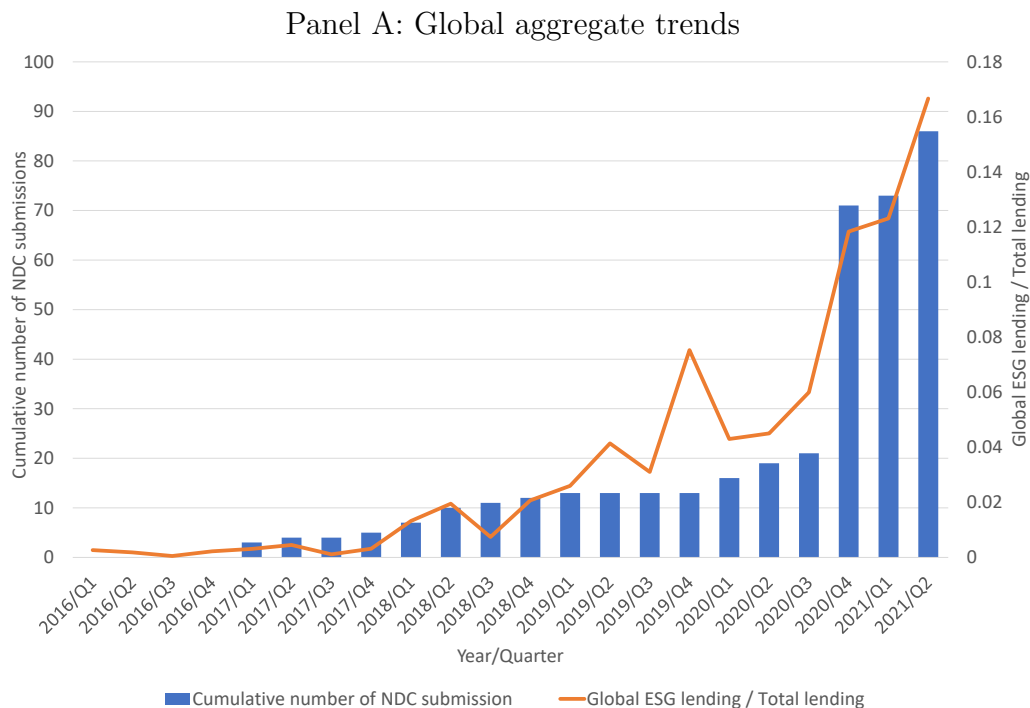
We find that countries with common law origins exhibit significantly less sustainability-linked loan issuance activity than civil law countries, consistent with Liang and Renneboog (2017) who document that civil law countries are more likely to support stakeholder-oriented economies and facilitate private contracts that induce commitments to such values. In contrast, we find no evidence that legal origins matter for the development of green loan markets, which are primarily project financing deals that are less indicative of a commitment

to broader ESG agendas. For both sustainability-linked and green loans, however, we find that robust private credit markets are essential for the development of rich ESG lending markets. This is consistent with the notion that well-developed credit markets with effective institutions to support them foster innovations in financial markets. Last, we find that sustainability-linked and green loans both flourish under stricter environmental regulations, consistent with the idea that these loans arise as lenders and borrowers respond to heightened stakeholder pressure.

A.2 Additional Figures and Tables

Figure A.1. Nationally Determined Contributions (NDCs) and ESG lending

Panel A plots global aggregate trends in the outstanding number of Nationally Determined Contributions (NDC) by countries to the United Nations Framework Convention on Climate Change (UNFCCC) and global ESG lending volume as a fraction of total lending after 2016. Panel B plots average country level ESG lending as a fraction of total lending in the five quarters before and after their NDC submissions.



Panel B: Average country level ESG lending around NDC submissions

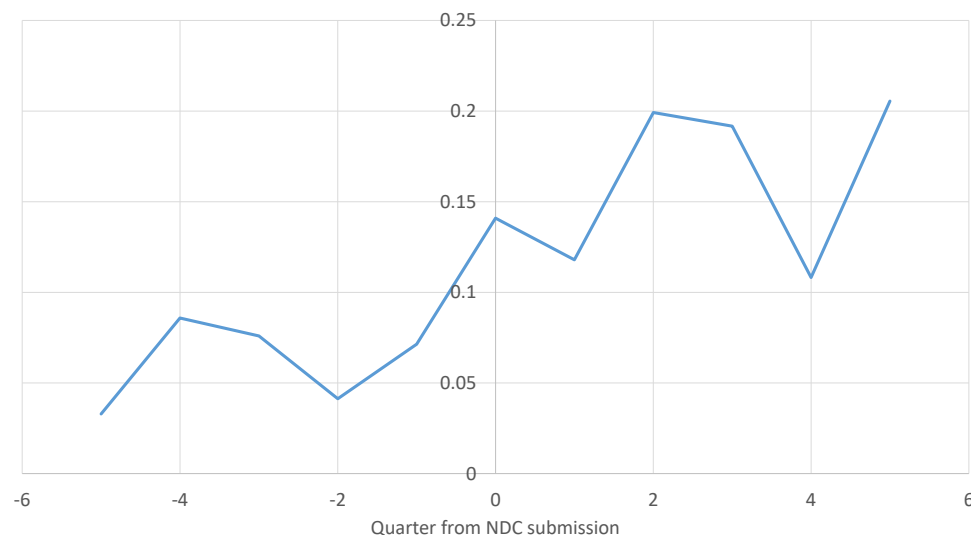


Table A.1. Cross-country determinants of ESG lending activity

This table reports country-level regressions of excess ESG lending activity on various country characteristics. The dependent variable “abnormal sustainability-linked (green) loan shares” is the difference between the country’s aggregate sustainability-linked (green) loan issuance as a fraction of the sample period as a fraction of worldwide sustainability-linked (green) loan issuance, and the country’s non-ESG loan issuance as a fraction of worldwide non-ESG loan issuance. Common law is an indicator variable equal to one if the country’s legal system is of English-origin, and zero otherwise. Private credit is domestic credit to the private sector, normalized as a percentage of the country’s GDP. Creditor right index is an integer ranging from 0 to 4, which counts how many of the following creditor protections the country has: (1) no automatic stay on assets; (2) secured creditors first paid; (3) restrictions for going into reorganization; (4) management does not stay in reorganization. We obtain the creditor right index as of 2002 from [Djankov et al., 2007](#). Stringency of environmental regulation ranges from 1 (very lax) to 7 (very stringent), and is obtained from the World Economic Forum. The regressions are cross-sectional models with one observation for each country. All continuous variables are winsorized at the 1% and 99% levels. Robust standard errors are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	(1)	Abnormal sustainability-linked loan share	(4)	(5)	Abnormal green loan share	(8)
Common law	-0.384** (0.184)			0.082 (0.219)		
Private credit		0.739** (0.351)			0.867** (0.372)	
Creditor right index			0.044 (0.102)		0.127 (0.114)	
Stringency of environmental regulation			0.243* (0.146)			0.307** (0.132)
N	176	158	134	176	158	138
R ²	0.018	0.049	0.001	0.001	0.084	0.011

Table A.2. Multivariate regressions: Determinants of ESG lending

This table reports estimates from cross-sectional ordinary least squares (OLS) regressions at the loan facility level. The sample consists of 1,122 (1,227) sustainability-linked (green) loan facilities and 71,436 (86,485) matched non-ESG (non-green) loan facilities. We regress an indicator variable for whether the loan facility is a sustainability-linked (Panel A) or green (Panel B) loan, on explanatory variables including the natural logarithm of one plus the dollar amount issued in the loan facility (i.e., $\text{Log}(\text{FacilityAmount})$), the natural logarithm of one plus the loan facility's maturity in months (i.e., $\text{Log}(\text{Maturity})$), a dummy variable indicating whether the loan facility is a revolving credit facility (i.e., Revolver), the natural logarithm of the number of lead arrangers in the loan syndicate (i.e., $\text{Log}(\# \text{LeadArranger})$), and the ratio of the number of relationship lenders to the total number of lead arrangers in the syndicate (i.e., $\text{RelationshipLender}$). Country-by-industry-by-year fixed effects are included in every regression, where industry grouping is based on the Fama-French 17 industry classifications. Country-by-industry clustered standard errors are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	I(Sustainability-linked loan)				I(Green loan)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{Log}(\text{FacilityAmount})$	0.005*** (0.001)	0.005*** (0.001)	0.004*** (0.001)	0.003*** (0.001)	-0.000 (0.001)	0.000 (0.001)	-0.001 (0.000)	-0.000 (0.000)
$\text{Log}(\text{Maturity})$	0.002* (0.001)	0.002* (0.001)	0.002* (0.001)	0.004*** (0.001)	0.007** (0.003)	0.007*** (0.003)	0.004** (0.002)	0.004** (0.002)
Revolver	0.016*** (0.003)	0.015*** (0.003)	0.014*** (0.003)	0.012*** (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
$\text{Log}(\# \text{LeadArranger})$	0.004** (0.002)	0.005*** (0.002)	0.004** (0.002)	0.003* (0.002)	0.007** (0.003)	0.008*** (0.003)	0.008*** (0.003)	0.007** (0.003)
$\text{RelationshipLender}$	0.010*** (0.002)	0.009*** (0.002)	0.008*** (0.002)	0.004** (0.002)	-0.011** (0.005)	-0.010** (0.005)	-0.007*** (0.003)	-0.007*** (0.002)
Country FE	Y				Y			
Industry FE	Y				Y			
Year FE	Y				Y			
Country $\times$ Year FE		Y				Y		
Industry $\times$ Year FE		Y				Y		
Country $\times$ Industry $\times$ Year FE			Y				Y	
Country $\times$ Industry $\times$ Year $\times$ Public FE				Y				Y
N	72,558	72,554	72,161	71,787	87,712	87,705	87,225	86,772
Adjusted R ²	0.060	0.104	0.196	0.319	0.073	0.106	0.216	0.237

Table A.3. Robustness: Stacked difference-in-differences regressions

This table analyzes corporate ESG performance around ESG lending. The sample consists of 689 loan facilities comprised of sustainability-linked loans and non-ESG facilities issued to borrowers who are matched to the Asset4 database. The table reports results from stacked (i.e., within treatment cohort) quasi difference-in-differences panel regressions of borrower Asset4 ESG scores on the interaction term between a firm-invariant indicator variable equal to one if the borrower obtains a sustainability-linked loan during the full sample period and zero otherwise (i.e., ESG Borrower), and an indicator variable equal to one for years after the loan issuance year and zero otherwise (i.e., PostLoanIssuance). We retain the time series of Asset4 ESG scores over the [-3,+3] event window around loan issuance and require at least one year of Asset4 ESG score in each of the pre- and post-issuance periods. The samples consist of 2,402 borrower-year observations where the borrowers are in the intersection of DealScan and Asset4. The dependent variable is either the overall ESG score of the borrower in a given year, or the ES (Environment and social) score, which is defined as the average of the environmental and social scores reported in Asset4. In columns (1) and (2), the regressions are run on the full matched sample of borrowers. In columns (3) and (4), the regressions are run on subsamples consisting of borrowers obtaining high-transparency SLLs and their matched non-ESG counterparts. In columns (5) and (6), the regressions are run on subsamples consisting of borrowers obtaining low-transparency SLLs and their matched non-ESG counterparts. Firm-by-stack and country-by-industry-by-year-by-stack fixed effects are included. Firm-by-stack clustered standard errors are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	Full matched sample		High-transparency loans		Low-transparency loans	
	ESG score (1)	ES score (2)	ESG score (3)	ES score (4)	ESG score (5)	ES score (6)
ESG Borrower $\times$ PostLoanIssuance	-2.890** (1.125)	-3.164** (1.265)	-1.292 (1.466)	-0.860 (1.661)	-4.668*** (1.727)	-6.259*** (1.921)
Firm $\times$ Stack FE	Y	Y	Y	Y	Y	Y
Country $\times$ Industry $\times$ Year $\times$ Stack FE	Y	Y	Y	Y	Y	Y
N	2,402	2,402	1,241	1,241	1,086	1,086
Adj. R ²	0.897	0.907	0.906	0.911	0.876	0.889

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