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ESG Lending

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Abstract

Firms increasingly borrow via sustainability-linked loans (SLLs), contractually tying spreads to their ESG performance. SLLs vary widely in transparency of disclosure regarding sustainability-related contract details and tend to be issued to borrowers with superior ESG profiles. While high-transparency SLL borrowers maintain this performance, low-transparency SLL borrowers exhibit significantly deteriorating ESG performance after issuance. Both highand low-transparency borrowers pay substantial fees to obtain SLLs. The results are consistent with high-transparency borrowers using SLLs to "certify" their preexisting ESG commitments, but low-transparency borrowers "greenwashing" with empty SLL labels. Evidence on drawdowns, renegotiations, and stock market reactions further supports these interpretations.

Keywords: Bank Lending, ESG, ESG Lending, Greenwashing, Sustainability-Linked

JEL Classification: G21, G32, M14

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ESG Lending

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April 3, 2025

Abstract

Firms increasingly borrow via sustainability-linked loans (SLLs), contractually tying spreads to their ESG performance. SLLs vary widely in transparency of disclosure regarding sustainability-related contract details and tend to be issued to borrowers with superior ESG profiles. While high-transparency SLL borrowers maintain this performance, low-transparency SLL borrowers exhibit significantly deteriorating ESG performance after issuance. Both high- and low-transparency borrowers pay substantial fees to obtain SLLs. The results are consistent with high-transparency borrowers using SLLs to "certify" their preexisting ESG commitments, but low-transparency borrowers "greenwashing" with empty SLL labels. Evidence on drawdowns, renegotiations, and stock market reactions further supports these interpretations.

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1 Introduction

There is significant debate over how effectively investors influence corporate environmental, social, and governance (ESG) policies (see Gibson et al., 2022; Edmans et al., 2024; Heath et al., 2023). Although much of the literature on this issue focuses on public capital markets, 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 investigate banks' loan issuance decisions to green and brown firms, little is known about how banks may directly engage or monitor the ESG practices of their borrowers (see Houston and Shan, 2022; Ivanov et al., 2024; Giannetti et al., 2024; Kacperczyk and Peydró, 2022).

As a potential avenue for such creditor ESG engagement and monitoring, sustainability-linked loans (SLLs) have become a predominant source of ESG-contingent financing for firms over the past decade. SLLs are general-purpose loans with lending terms contractually tied to a borrower's ESG performance. These loans are distinct from green loans or green bonds, whose use-of-proceeds are restricted to financing environmental and social projects. The widespread use of SLLs has, however, raised concerns about greenwashing, particularly regarding the transparency and stringency of ESG-contingent loan terms. In this paper we provide the first comprehensive analysis of sustainability-linked lending around the world and its effectiveness at incentivizing corporate commitment to sustainability.

Using LSEG Loan Connector's DealScan data over the sample period from 2016 to 2021, we first provide a comprehensive characterization of the global SLL market. We document that the proliferation of general-purpose SLLs, rather than use-of-proceeds–based green loans, has driven most of the exponential growth in global ESG lending activity—from less than $10 billion to over $700 billion.[1] This contrasts with the growth of public ESG debt markets, which are driven mostly by use-of-proceed–based green bonds (see Flammer, 2021).

[1] In 2021, ESG lending constituted 12.7% 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).

SLLs are the leading source of ESG-contingent borrowing for firms beyond the utility sector, where green loans and bonds remain concentrated.[2] This trend may be explained by borrowers' reputational incentives to obtain SLLs amid rising investor demand for corporate ESG commitments (see Krueger et al., 2020; Ilhan et al., 2023). The trend may also be explained by banks, who may have incentives to incorporate ESG performance contingencies into loan pricing if doing so provides protection against downside risks (see Albuquerque et al., 2020; Stroebel and Wurgler, 2021; Hoepner et al., 2024). Banks could also face regulatory pressure to improve the ESG profiles of their loan portfolios.[3]

A key concern raised by investors and external stakeholders amid the growth of these private loan contracts is the lack of public disclosure of sustainability targets and the associated loan-pricing grids. This makes it difficult to verify the validity of SLL labels and may create perverse incentives for SLL issuance.[4] Consistent with these concerns, we document that publicly disclosed information regarding the contractual details of SLLs is generally scarce. According to our classification based on several sources of information, around 37% of all SLLs in our sample are categorized as "low-transparency" SLLs that do not publicly disclose measurable key performance indicators (KPIs) or how they are linked to loan terms.[5] Our analysis also suggests that borrowers are willing to pay high costs to obtain SLL labels—up to 18 basis points higher than for a matched sample of conventional loans—primarily due to loan service fees and charges rather than loan spreads. The higher costs of SLLs suggest that borrower demand may play an important role in the growth of the SLL market.

Against this backdrop, we develop several testable hypotheses regarding the underlying

[2]Utilities account for 14% of the aggregate issuance amount of SLLs, in comparison with 56% and 32% of green loan and bond issuance, respectively.

[3]This 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 Acharya et al., 2023)). The growth in ESG lending also coincides with an increase in national commitments to reduce carbon emissions, as illustrated in Figure IA.2.

[4]See *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.

[5]In Section 4 we provide further details regarding our classification of SLLs according to the transparency of their contract details.

incentives of borrowers to demand SLL issuance. The first hypothesis posits that SLLs have evolved as effective "*incentive contracts*," offering economically attractive (or punitive) financial rewards (or penalties) for borrowers who meet (or miss) ESG targets. Borrowers with genuine sustainability objectives may seek such contracts that incentivize them to improve their ESG profiles. Our second hypothesis is that SLLs serve as "*certification*" devices for borrowers who aim to make their *preexisting* ESG commitments more credible to stakeholders by obtaining bank certification of their sustainability efforts. Finally, SLLs may be a means of "*greenwashing*," where ESG-contingent contract terms are neither stringent nor fully disclosed to the public but are designed to showcase an *empty* emphasis on ESG to stakeholders. Under this hypothesis, the SLL label could crowd out costly efforts to genuinely improve ESG performance, as the label satisfies naïve stakeholders or investors who may themselves engage in greenwashing. This could ultimately lead to poorer ESG performance after SLL issuance.

Our main empirical analyses aim to delineate these hypotheses and assess the effectiveness of SLLs as contractual tools for creditor ESG engagement and monitoring. To this end, we test whether SLL issuance is followed by improved borrower ESG performance and whether these relationships depend on the transparency of the sustainability-linked contract terms of SLLs. We obtain information on firms' ESG performance from LSEG/Refinitiv's ESG database. For borrowers of both high- and low-transparency SLLs, we find significant and positive associations between the likelihood of sustainability-linked lending and the ex-ante ESG scores of borrowers, indicating potential selection among firms with better capabilities of making ESG commitments *prior* to loan issuance. However, we find no evidence of within-borrower ex-post improvement in ESG scores *after* SLL issuance for either group. Importantly, we find that the issuance of "low-transparency" loans are followed by a significant deterioration of ESG performance, whereas the "high-transparency" group continues to maintain its superior ESG profile without further improvement.

These results are robust to various fixed effects specifications and to identifying control

firms via propensity score matching as in Flammer (2021). The results also hold after estimating cohort-time specific treatment effects using clean control firms that never issue SLLs in stacked DID specifications saturated with cohort-interacted year and firm fixed effects. This approach addresses biases due to time-varying treatment effects in staggered DIDs.(see Goodman-Bacon, 2021; Baker et al., 2022). To alleviate concerns about the inconsistency in ESG scores across rating agencies (see Berg et al., 2022), we also use more sharply defined ESG performance measures, such as emission intensities obtained from S&P Trucost, and find robust results. We further complement these tests with novel econometric techniques that aim to minimize confounding differences between treated and control units (see Li et al., 2018; Bartram et al., 2022; Abadie et al., 2010) and obtain largely consistent results.

To corroborate these results, we also provide evidence on the ex-post utilization of SLLs and the frequency of renegotiation of their contract terms. This analysis focuses on revolving credit lines, which comprise the majority of SLLs. We find that borrowers of low-transparency SLL revolvers are significantly less likely to draw down their lines of credit than their matched control firms. In contrast, high-transparency SLL borrowers show no difference in credit line utilization relative to control firms. Since low-transparency borrowers are significantly less likely to draw on their revolving credit facilities, they neither benefit from nor face penalties associated with ESG-contingent pricing. This finding indicates that empty SLL labeling is more pervasive among low-transparency borrowers than among high-transparency borrowers.

We further examine the likelihood of loan renegotiations. We find that high-transparency SLLs are less likely to be renegotiated when borrowers improve their ESG performance more substantially. This is consistent with high-transparency borrowers standing to enjoy meaningful ESG-contingent loan spread reductions upon meeting KPI targets, lessening the need for borrowers to renegotiate the loan contract terms with lenders. In contrast, low-transparency SLLs show no relationship between improvements in borrower ESG per-

formance and renegotiation tendencies. This is consistent with the idea that sustainability-linked contract terms of low-transparency SLLs carry little weight for borrowers.

Finally, we examine how stock markets respond to public announcements of SLL issuances. In event studies, we find that stock prices react more positively to high-transparency SLL issuances than to low-transparency SLL issuances. These results are consistent with stock investors valuing commitments to sustainability (see Hartzmark and Sussman, 2019; Bolton and Kacperczyk, 2021; Pastor et al., 2022), and highlight investor vigilance against greenwashing practices among low-transparency borrowers. This suggests that public capital markets may be effective at mitigating conflicts inherent in privately negotiated loan contracts that could impact external stakeholders.

Overall, our results are consistent with the idea that high-transparency borrowers derive *certification* benefits from SLLs, while low-transparency borrowers indulge in *greenwashing*. The results are unlikely to be consistent with the use of SLLs as genuine *incentive contracts*, given that borrowers do not significantly improve their ESG performance after obtaining these loans. High-transparency SLL issuers continue to maintain their superior ex-ante sustainability profiles after obtaining SLLs. By transparently disclosing SLL contract details, they credibly signal their ESG commitments to the public. In contrast, low-transparency SLL issuers exhibit deteriorating ESG performance post-issuance while keeping contract details hidden from external stakeholders. These findings are consistent with concerns raised by the media and market practitioners about potential greenwashing in the SLL market. In summary, our findings underscore the importance of transparency around SLL contracts for the development of this emerging market as an effective source of ESG-contingent financing.

Our study contributes to the 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 et al., 2022) and the role of ESG risks in publicly traded corporate bonds (see Seltzer

et al., 2023; Hyunh and Xia, 2021; Duan et al., 2025). We document the widespread use of *general-purpose* loans that are designed to incentivize firms across industries to incorporate sustainability targets in loan contracts. 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 advances in the banking literature have highlighted the role of ESG profiles in lending relationships (see Kacperczyk and Peydró, 2022; Houston and Shan, 2022; Shin, 2024), the relationship between ESG risks and bank loan pricing (see Ivanov et al., 2024; Correa et al., 2023; Anginer et al., 2021), and greenwashing concerns over bank ESG commitments (see Giannetti et al., 2024). We are among the first to directly study how bank loans are structured to explicitly contract around ESG-related risks. While existing studies focus on extensive margin lending decisions based on ESG considerations, few examine contingent loan contract terms linked to subsequent changes in borrowers' ESG performance. Our study contributes to the literature by measuring the public transparency of loan contract details to delineate the incentives of borrowers in this rapidly growing ESG lending sector.

A number of ongoing studies examine the contract features of SLLs. Carrizosa and Ghosh (2023) use SEC filings by publicly traded U.S. firms to analyze the role of reporting and audit requirements in shaping performance incentives in SLL contracts. Aleszczyk et al. (2024) find that SLLs typically include immaterial KPIs and weak targets that are not related to a borrower's risk. Caskey and Chang (2022) develop a theoretical model in which firms are more likely to disclose ESG information when misreporting costs are high. They find empirical support for this in the context of SLLs. While these studies focus on SLL contract term choices, we focus on the transparency of public disclosures of SLL contract terms. We manually parse publicly available information about SLL contracts from multiple sources and relate this transparency to borrowers' post-issuance ESG performance. None of the studies mentioned above focuses on this analysis.

Other studies examine the ESG performance of borrowers after SLL issuance in other settings. Dursun-de Neef et al. (2023) study SLLs and green loans originated by European firms and find that borrower ESG performance improves following SLL issuance. In contrast, Du et al. (2024) find that ESG performance does not improve after SLL issuance. They document a supply-side incentive whereby lenders attract higher deposits after SLL issuance. Auzepy et al. (2023) document that SLL borrowers do not improve their ESG performance after issuing SLLs with identifiable KPIs, consistent with our finding for the subsample of high-transparency SLL borrowers that publicly disclose information about their KPIs. In contrast to these unconditional examinations, we study not only how the transparency of public disclosures around SLL contract terms relates to ESG performance and stock market reactions, but also other loan dynamics such as pricing at issuance, borrowers' usage of loan proceeds, and renegotiation of contract terms prior to maturity. Our well-defined hypotheses and nuanced findings conditioned on disclosure transparency, as well as our comprehensive and global sample, help reconcile the apparent contradictions across extant studies.

Our study is also related 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., 2024; Barko et al., 2022; Dimson et al., 2015). Banks, much like institutional investors in equity markets, are uniquely positioned to effectively monitor firms' progress on ESG considerations (see Gustafson et al., 2021). However, banks are distinct from other public market investors because they maintain close private relationships with borrowers. Some banks and borrowers may engage in greenwashing practices, reflecting potential conflicts of interest in signaling ESG commitments. We show that greenwashing is indeed a valid concern in ESG lending, 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.

Finally, our study contributes to the burgeoning literature on how investors and firms

respond to ESG-related risks.[6] Our paper fills an important gap in our understanding of how effectively lenders and firms might internalize ESG risks by contracting explicitly on ESG-related issues in the vast bank lending market. In this regard, our findings contribute to a more holistic understanding of sustainable financing arrangements in both public and private capital markets.

2 Institutional Details

Sustainability-linked loans (SLLs) are general-purpose loans where loan pricing terms are tied to a borrowing firm's ESG performance. The loan spreads on these loans are pegged explicitly to KPIs that incorporate 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 SLLs can be used to fund general operations without being tied to green or social projects.

The SLL 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 acting 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).[7] 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 with the spread

[6] For more studies in this area, see Albuquerque et al. (2019), Azar et al. (2021), Bartram et al. (2022), Bellon (2024a,b), Cao et al. (2023), Ding et al. (2020), Döttling and Kim (2024), Dyck et al. (2019), Gibson et al. (2021), Humphrey et al. (2023), Lins et al. (2017), Naaraayanan et al. (2021), Oehmke and Opp (2025), Pastor et al. (2021), Pedersen et al. (2021).

[7] An excerpt from the loan agreement detailing this arrangement is shown in Section A.2 of the Appendix.

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 over 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 for three KPIs regarding employee safety and GHG emissions by 2025.[8]

These examples highlight unique features of SLLs that allow borrowers and lenders to engage in ESG-contingent contracting with flexibility in terms of both the purpose of a loan and commitments to specific sustainability objectives. These are marked departures from 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 a 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.

[8]The three KPIs related to these objectives are shown in greater detail in Section A.2 of the Appendix.

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

While the primary focus of our study is on SLLs, it is worth noting that use-of-proceeds–based green loans, analogous to green bonds, have also developed in the syndicated loan market. As is the case with green bonds, the proceeds from these loans are earmarked to exclusively finance environmental and climate-friendly projects with *explicit* sustainable features (e.g., renewable energy, biodiversity conservation, sustainable water). Unlike green bonds, which have grown rapidly in the past decade (see Flammer, 2021; Tang and Zhang, 2020; Zerbib, 2019; Baker et al., 2022), the growth of green loans has been modest relative to that of SLLs. We examine green loans in the Internet Appendix Section IA.1 to present a complete picture of the global ESG lending space.

In short, the growth of sustainability-linked lending has opened the door to general-purpose debt tied to a borrower's ESG performance on a wide variety of measures. Using an international and comprehensive sample of loan-level data, we provide a thorough examination of this ESG lending market and its implications for corporate ESG performance for the first time in the literature.

3 Hypothesis Development

Throughout the paper, we consider several hypotheses about the incentives of borrowers and lenders underlying sustainability-linked lending. These hypotheses generate testable predictions about the relationship between high- or low-transparency SLL issuance and borrower ESG performance as well as the pricing of these SLLs at issuance. We describe each of these hypotheses and their predictions below. We refer to them later when interpreting our results.

The first hypothesis is an "*incentive contract*" hypothesis, which posits that SLLs serve as a mechanism to incentivize borrowers to change their behavior by providing significant spread reductions (or increases) for meeting (or missing) meaningful KPI targets related to their ESG performance. Borrowers who are committed to genuine sustainability objectives may have an appetite for such performance-pricing contracts that incentivize them to improve

their ESG profiles. This hypothesis predicts that the sustainability-linked pricing component of the loan contract should be economically significant and that the borrower's ESG performance should improve after the issuance of an SLL relative to that of a control firm.

The second hypothesis is a "*certification*" hypothesis, whereby firms that have already achieved good ESG performance seek SLLs as an external certification device to make their preexisting ESG commitments more visible and credible to stakeholders. As such, SLL borrowers would exhibit better ESG profiles than non-issuers prior to SLL issuance, and those profiles are unlikely to deteriorate afterwards. Under this hypothesis, borrowers would also have the incentive to transparently disclose their SLL contract terms to the public to make the certification more credible. Lenders would charge higher spreads and fees at issuance for SLLs than for conventional loans, as borrowers derive utility from obtaining certification through these loans and lenders invest additional resources in monitoring and certifying ESG performance. Given the accreditation role of these loans, SLLs would be issued by reputable lenders, whose reputation make these certification efforts more valuable (see Puri, 1996).

The third hypothesis posits that SLLs may facilitate "*greenwashing,*" where the SLL label substitutes for genuine and costly efforts to improve ESG performance. Under this hypothesis, the label alone is sufficient to appease naïve stakeholders or satisfy the needs of investors who may themselves also be engaging in greenwashing. In such cases, ESG-contingent contract terms are neither stringent nor fully disclosed to the public; instead, the SLL labels are crafted primarily to project a superficial commitment to ESG principles. These firms have no genuine intention of enhancing their sustainability profiles but seek to placate certain stakeholders for whom the symbolic label is sufficient. Crucially, since the SLL label substitutes for real efforts to improve ESG performance, this hypothesis predicts that the borrower's ESG performance is likely to decline after obtaining an SLL, relative to a control firm. Similar to the certification hypothesis, borrowers derive value from obtaining SLLs and would thus be willing to accept higher spreads and fees at issuance.

The above hypotheses focus on borrower incentives that may drive their demand for SLLs. We could also consider a "*supply effect*" hypothesis, which posits that borrowers are indifferent to obtaining a sustainability-linked or conventional loan but are induced by banks to accept sustainability-linked terms. This may be partly due to the lender's ESG preference or its objective to mitigate the downside risk exposure of its loans (see Hoepner et al., 2024). Under this hypothesis, banks would need to offer attractive spreads and fees at issuance for the terms to be accepted by borrowers, or borrowers are likely to be financially constrained with limited bargaining power relative to lenders. Rejecting this hypothesis does not necessarily imply the absence of supply-side incentives but simply that supply effects *alone* may not have led to the growth of the SLL market.

4 Data and Sample

4.1 Sustainability-linked loan (SLL) data

In the following, we briefly summarize our data and the patterns in sustainability-linked lending activity. Our loan-level data come from LSEG Loan Connector's DealScan database. For all loans in the database, DealScan assigns a market-segment flag corresponding to "Environmental, Social & Governance/Sustainable Linked" loans, based on 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 loan.[10] We identify 1,831 SLLs that raised $989 billion in total over the sample period from 2016 to 2021.[11] In all of our analyses, continuous variables are winsorized at the 1% and 99% levels.

[10] Similarly, DealScan assigns a market-segment flag for "Green Loan," which we also use when summarizing time trends and industry patterns in ESG lending broadly.

[11] We also identify 1,529 green loans that raised $244 billion in total over the same time period. While 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 LSEG/Refinitiv Eikon, and confirm that they largely overlap with or are subsumed by DealScan.

4.2 Transparency of SLLs

To gauge the credibility of ESG commitments signified by the issuance of an SLL, investors and stakeholders must rely on information regarding its contractual details (e.g., what the specific KPIs are, how they are tied to the loan terms, etc.). Despite industry disclosure guidelines (i.e., SLLP), this information is voluntarily and selectively disclosed to the public by borrowers and lenders in the absence of regulations or public disclosure requirements in the emerging SLL market. It is then possible for SLL issuers to set unambitious KPI targets and/or minuscule penalty terms for failing to meet the targets and not reveal these details to the public. The lack of detail or transparency of such disclosures makes it difficult for stakeholders to verify the validity of SLL labels and is viewed skeptically by many market participants as an indication of greenwashing. It is therefore important to examine the transparency of publicly disclosed information on the KPIs set in SLLs.

We classify our sample of SLLs as "high-transparency" or "low-transparency" loans. Our approach is to first classify SLLs 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. The remaining SLLs are then classified as "high-transparency" loans, which have publicly available information indicating that the loan spreads are linked to some measurable metric of ESG performance (e.g., CO_2 emissions per tonne of transported cargo per nautical mile, the percentage of women in the workforce, Sustainalytics score, etc).

To locate and collect publicly available information on the contractual details of privately negotiated SLLs in the absence of a standardized reporting system for these loans, we adopt a multipronged strategy. That is, we manually collect all available information regarding these details from four data sources: (i) The deal and facility comment and pricing grid sections of LSEG Loan Connector's DealScan database, (ii) public media coverage of SLL issuances, including media releases by either the borrower or banks, (iii) annual business reports issued by SLL borrowers, (iv) and ESG/sustainability reports issued by SLL

borrowers. Based on information collected from these data sources, we record whether there is any publicly available information on which measurable environmental or social KPIs determine the spread of the loan. We then define an SLL as "high-transparency" if it has such information and, conversely, define it as "low-transparency" if it does not.[12] Additional details and examples of our algorithm for classifying SLLs based on disclosure transparency are provided in Section A.3 of the Appendix.

4.3 Sample overview

In this section we provide an overview of the sustainability-linked lending market and the characteristics of its participants. Figure 1 illustrates the rapid rise of SLLs during the past several years. Global ESG lending activity, SLLs and green loans combined, totaled $1.2 trillion during the sample period, growing from less than 1% of global syndicated loan issuance (i.e., $4 billion) in 2016 to more than 12% (i.e., $707 billion) in 2021. Most of this lending consisted of SLLs, which amounted to $989 billion in total. While SLLs were disproportionately low-transparency in the first few years of their existence, high-transparency loans started to represent a larger share of the market in 2019. Since then, both high- and low-transparency SLLs have grown proportionally. Figure 2 reports the breakdown of sustainability-linked lending activity by the borrower's region of incorporation. The bulk of SLLs are issued to borrowers in North America and Europe. First emerging in Europe, SLLs have spread rapidly to other parts of the world, growing almost ninefold (threefold) in North America (rest of the world) between 2020 and 2021. The aggregate mix of high- and low-transparency SLLs is quite stable across regions, with low-transparency SLLs constituting around one-third of the entire market in terms of issuance amounts.[13]

[12] We document the availability of other contractual details, such as a KPI's target value that triggers a loan spread reduction or increase, the quantity of the loan spread reduction or increase contingent on meeting or missing a KPI target, or whether the KPI is based on a third-party rating metric in our sample overview.

[13] See Figure IA.3 in the Internet Appendix for the mix of high- and low-transparency SLLs by region. In the Internet Appendix, we also provide a country-level breakdown (see Table IA.3), a visualization of the temporal growth of the market across countries in a series of heat maps (see Figure IA.4), and an analysis of cross-country determinants of ESG lending as shares of conventional syndicated lending (see Table IA.4).

[Insert Figure 1 here]

[Insert Figure 2 here]

Figure 3 highlights the widespread use of SLLs across the Fama–French 17 industries of borrowers over our sample period. 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-six percent of green loan issuance is concentrated in the utilities industry, much like what has been documented for green bonds by Flammer (2021). In contrast, only 14% of SLLs are issued to firms in the utilities industry. In fact, we find that the industry distribution of SLLs is broadly similar to that of loans in the overall DealScan database. 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 Figure 3 here]

In Table 1 we report unconditional (Panel A) and matched-sample (Panel B) comparisons of loan and borrower characteristics between SLLs and control loans without ESG-related features. The control group contains conventional loans without sustainability-linked or green features issued during our sample period from 2016 to 2021, excluding loans issued in countries with no SLL or green loan issuance activity during this period. Unconditionally, we find that SLL borrowers are significantly larger than control borrowers as measured by sales as of the time of deal closure (i.e., average of $9.2 billion vs. $6.3 billion), and are more likely to be publicly listed (i.e., 47% vs. 21%). Correspondingly, the average SLL facility is substantially larger than control loan facilities (i.e., $494.6 million vs. $254.3 million) and is more likely to be rated investment grade and less likely to be a leveraged loan.[14] These facts indicate that SLL borrowers are more likely to be visible firms under greater scrutiny

[14]While SLLs have marginally shorter maturities, this difference is not robust when we control for other loan characteristics. See Table IA.5 in the Internet Appendix for a multivariate regression analysis.

from stakeholders and less likely to be credit constrained than other borrowers.[15]

[Insert Table 1 here]

Table 1 also shows that SLL facilities are substantially more likely to be revolving credit facilities than control loans (i.e., 53% vs. 38%). This pattern is also robust to restricting the sample to SLLs and control loan packages that are exactly matched on the year and country of issuance as well as the borrower's industry and listing status, and most closely matched on deal size (see Panel B). In the second and third columns of Table 1, we also document similar patterns regardless of whether SLLs are classified as high- or low-transparency contracts. Revolving credit facilities, unlike term loans, are typically held by relationship lenders, which naturally calls into question their role in sustainability-linked lending.

In Table 2, we explore this and other aspects of the syndicate structure of SLLs and provide insights into the role of SLL lenders. Since lending syndicates are determined at the loan facility level, we account for differences across loans by matching each SLL 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 et al. (2018) and Houston et al. (2018). We first document that SLLs are syndicated by significantly larger groups of lenders (5.24) than control loans (3.94). Among these larger groups of banks, *relationship lenders*, defined as banks that had served as lead arrangers in a previous deal issued to the borrower during the past five years, play an important role in SLL issuance. Sixty percent of all lead arrangers on the average SLL syndicate have previous lending relationships with borrowers, in comparison to 51% for control loans. SLLs also have larger shares of *ESG-experienced lenders* (i.e., banks who had issued ESG loans before), *reputable lenders* (i.e., banks that had been in the top 5% of total lending activity over the trailing five years), and *foreign lenders* (i.e., lenders domiciled outside the borrower's country) in their syndicates. The importance of lending relationships perme-

[15] Ninety 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."

ates all other lender categories: There are significantly more relationship ESG-experienced lenders, relationship reputable lenders, and relationship foreign lenders in the syndicates of SLLs.[16] These patterns are robust for both high- and low-transparency SLLs.

[Insert Table 2 here]

The results underscore the importance of expertise and reputation in a lender's ability to provide certification for borrowers through SLLs (see James, 1987). These results also suggest that this rapidly expanding loan market has the potential to overcome institutional and cultural frictions in global banking (see Carey and Nini, 2007; Giannetti and Laeven, 2012), facilitating cross-border SLL deals. More importantly, our findings highlight the role of banking relationships in SLLs, which may facilitate effective incentive contracting and monitoring by informed banks with long-standing relationships with borrowers (see Berger and Udell, 1995; Berlin et al., 2020). On the other hand, banks and borrowers with preexisting relationships may conveniently relabel revolving credit lines as SLLs, in the spirit of greenwashing.[17]

Table 3 summarizes how transparently SLL issuers publicly disclose contractual details regarding KPIs and/or their linkages to loan spreads. Strikingly, roughly 37% of the SLLs in our sample are classified as low-transparency loans (i.e., 681 low-transparency loans out of 1,831 loans). Between high- and low-transparency loans, we find no significant differences in borrower characteristics, such as pre-issuance sales, ESG scores, or legal origins of their countries of domicile. Among high-transparency loans that disclose specific KPIs, the vast majority, 93%, tie their loan spreads to an environmental KPI (e.g., GHG emissions). Fifty-six percent use both environmental and social KPIs (e.g., emissions, labor safety, workforce diversity). Twenty-nine percent of these loans disclose that a given 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 condi-

[16] This contrasts with green loans, which are not driven by relationship banking. In fact, green loan syndicates consist of fewer relationship lenders than control loan syndicates (see Table IA.2 in the Internet Appendix).

[17] We also reconfirm our univariate findings in multivariate regressions, reported in Table IA.5.

tional on ESG performance. Twenty-two percent of high-transparency loans disclose spread rewards conditional on meeting ESG performance targets, whereas only 15% disclose the penalties borrowers incur for missing their targets. These findings highlight that the availability of publicly disclosed information about 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 that might drive SLL contracting.

[Insert Table 3 here]

So far, our preliminary results are consistent with large, visible firms under greater scrutiny from stakeholders using SLLs for *certification* or less-credible *greenwashing* purposes. They are less aligned with a *supply effect* hypothesis, where firms with little bargaining power are induced by banks to reluctantly accept ESG-contingent terms. We further delineate these possibilities in subsequent sections.

5 Main Results

5.1 SLL issuance and borrower ESG performance

We now turn to our main empirical analysis, starting with an examination of borrower ESG performance before and after SLL issuance. This allows us to assess 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 borrowers' post-issuance ESG performance to the credibility of their ESG commitments as inferred from the availability of publicly verifiable information regarding the ESG-contingent features of SLL contracts.

Panel OLS regressions

We investigate this issue using firm-year level ESG scores from LSEG/Refinitiv's ESG database. The database provides overall ESG percentile rank scores for a large set of publicly listed firms around the world. After manually linking this database with our SLL issuer sample on borrower company names, we retain 313 high-transparency and 138 low-transparency SLL issuers along with 20,232 control firms that never issued SLLs during our sample period. We restrict control firms to those domiciled in countries that are also home to SLL issuers in our sample. The time period for this analysis runs from 2014 (three years before the first SLL issuance) to 2022 (the most recent year for which we have ESG score data). For this sample consisting of SLL borrowers and control firms, we begin with the following panel regression to examine whether SLL issuance is associated with better borrower ESG performance:

$$\begin{aligned} ESG\ score_{i,t} = \alpha + \beta_1 \cdot SLL\ borrower_i \times PostIssuance_{i,t} \\ + \beta_2 \cdot SLL\ borrower_i + \gamma \cdot X_{i,t-1} + FE + \epsilon_{i,t} \end{aligned} \tag{1}$$

The dependent variable is the borrower's ESG score.[18] $PostIssuance_{i,t}$ is an indicator variable that equals one for years after SLL issuance and zero otherwise. For control firms that never issue SLLs, this variable is set to zero. $SLL\ borrower_i$ is a cross-sectional dummy indicating whether a borrower obtains an SLL at any time during our sample period. $X_{i,t-1}$ is a vector of lagged firm characteristics such as size, leverage, ROA, and Tobin's Q. We vary our specifications with various combinations of firm, year, country-by-year, or industry-by-year fixed effects. The coefficient, β_1, captures a quasi difference-in-differences (DID) estimator that tests whether SLL borrowers experience differential changes in their ESG scores after obtaining SLLs, compared to control firms.

Table 4 presents results from this regression. We perform the analysis for the pooled full sample (columns 1 to 3), and also separately for high- and low-transparency SLL bor-

[18] In an untabulated analysis, we confirm that the results are robust to log-transforming ESG scores.

rowers (columns 4 to 9). The coefficient on $SLL\ borrower_i$ is positive and significant in all specifications without firm fixed effects, highlighting the selection into SLL contracting by borrowers with superior ESG profiles prior to issuance. However, the coefficient on the interaction term, $SLL\ borrower_i \times PostIssuance_{i,t}$, is negative and significant in the first three columns, showing that SLL issuance is followed by deteriorating borrower ESG scores. The remaining regressions reveal that this result is driven by low-transparency SLL borrowers. The coefficient on the interaction term is small and statistically insignificant for high-transparency SLL borrowers, indicating that these borrowers continue to maintain their superior ESG scores, although their scores do not improve significantly after SLL issuance. In contrast, low-transparency borrowers experience significant deterioration in their ESG scores after SLL issuance. The magnitude of the decline in the ESG scores of low-transparency SLL borrowers relative to the scores of control firms ranges from 2.5 to 3 points, which is economically meaningful and corresponds to roughly 30% of the pre-issuance level differences between SLL borrowers and control firms. These results are robust to varying fixed effect configurations, with the most stringent specifications controlling for all time-invariant firm-level attributes as well as any time-varying factor at the country or industry level.[19]

[Insert Table 4 here]

These results are consistent with the notion that low-transparency borrowers withhold information about sustainability-linked contract terms and rely on SLLs as empty labels rather than making genuine efforts to maintain or improve their ESG performance. The behavior of these firms supports our *greenwashing* hypothesis. On the other hand, the behavior of high-transparency borrowers, who not only disclose more details about the SLL contract terms but also maintain their superior ESG performance after issuance, is more consistent with SLLs being used as *certification* of preexisting ESG commitments. Finally, these results are not consistent with the *incentive contracts* hypothesis that predicts improvement in ESG

[19] In an untabulated analysis, we confirm that our results are robust to less stringent fixed effect configurations (e.g., country, industry, and year fixed effects, but no firm fixed effects).

performance.

Stacked DID regressions on matched sample cohorts

Next, we account for several econometric issues with the simple OLS regressions above, such as differences in firm characteristics between SLL issuers and control firms and biases arising from time-varying treatment effects in staggered DID settings (see Goodman-Bacon, 2021; Baker et al., 2022). First, we construct a matched sample consisting of SLL issuers and control firms that are similar along several observable attributes. Specifically, we follow Flammer (2021) and match each SLL borrower to a never-SLL borrower control firm in the same country and industry with the closest propensity score as of the year before SLL issuance. The propensity scores are computed from a logistic regression of SLL borrower status on firm size, leverage, ROA, Tobin's Q, ESG score, and the year-on-year growth in these variables. As noted by Flammer (2021), matching on country, industry, and year ensures that SLL issuers and control firms faced similar macroeconomic conditions prior to SLL issuance. Size and leverage help control for differences in access to capital markets between SLL issuers and control firms. ROA and Tobin's Q are used to address the possibility that SLL issuers were simply more profitable or had better investment opportunities than control firms prior to issuance. Including ESG scores ensures that SLL issuers and control firms had similar ESG performance prior to issuance. Importantly, controlling for the year-on-year growth of these variables helps ensure that their trends were also similar prior to issuance.

After identifying a matching control firm for each SLL borrower, we then stack SLL borrowers and control firms within each matching cohort over the years –3 to +3 with respect to the SLL issuance year (or pseudo-issuance year for the control firm). Table 5 shows that SLL issuers and control firms included in this matched sample are similar along the matching covariates prior to the issuance year, ensuring that the quality of matching is high. This covariate balancing holds for both high- and low-transparency SLL issuers and their respective matched counterparts.

[Insert Table 5 here]

In Table 6 we report results based on this matched sample, where we estimate Equation 1 in stacked DID regressions with firm and year fixed effects interacted with matching cohort effects. This specification identifies the treatment effects of SLL issuances within treatment cohorts (i.e., makes comparisons between each treated and matched firm in the same matching pair over the years –3 to +3), alleviating concerns about staggered issuance events. Column 1 shows that ESG scores improve after the issuance of high-transparency SLLs. The coefficient on $SLL\ borrower_i \times PostIssuance_{i,t}$ is positive and statistically significant at the 5% level. Albeit, this improvement is not robust to alternative, more objective measures we employ below. In sharp contrast, column 2 reports that ESG scores significantly deteriorate after the issuance of low-transparency SLLs, as evidenced by the negative and statistically significant point estimate of -1.764 for $SLL\ borrower_i \times PostIssuance_{i,t}$.

[Insert Table 6 here]

These results are corroborated in Figure 4, where we inspect pre-issuance parallel trends and post-issuance dynamics by replacing the $PostIssuance_{i,t}$ dummy in Equation 1 with yearly dummy variables indicating years –2 to +3, where an SLL is issued between –1 and 0.[20] For high- and low-transparency SLL issuers and their matched counterparts, we plot coefficients on the interaction terms between $SLL\ borrower_i$ and the yearly dummies. The figures clearly illustrate parallel trends in the ESG scores of high- or low-transparency SLL borrowers and their respective matched control firms prior to loan issuance. The subsequent improvement (deterioration) in ESG scores of high-transparency (low-transparency) SLL borrowers relative to their matched counterparts is also clearly visible and statistically significant.[21]

[Insert Figure 4 here]

[20] Year –3 is the omitted year category.

[21] In Figure IA.5 of the Internet Appendix, we further disaggregate the year-on-year event-time dynamics, plotting them separately for SLL borrowers and matched control firms in each of the high- and low-transparency groups.

To mitigate concerns about the subjective nature and inconsistency of some third-party ESG scores (see Berg et al., 2021, 2022; Tang et al., 2022), we also consider alternative, more objective measures of ESG performance. Given that the vast majority of observable KPIs in SLLs are environmental metrics (as shown in Table 3), we consider alternative measures of environmental performance.[22] In columns 3 and 4 of Table 6, we use a more narrowly defined *emission score*, also from LSEG/Refinitiv's ESG database. A higher emission score indicates that a firm is making greater efforts to reduce environmental emissions. In columns 5 and 6 we use the logarithm of direct GHG emission intensity, obtained from S&P Trucost Environmental. *Direct emission intensity* is defined as GHG emissions from sources that are owned or controlled by a company divided by the company's revenue. Unlike results based on composite ESG scores, we find that high-transparency borrowers experience no differential changes in emission scores or direct emission intensities after SLL issuance. On the other hand, consistent with the previous results, low-transparency borrowers experience a significant decline (increase) in their emission scores (direct emission intensities). These results are consistent with those from simple, pooled OLS regressions reported earlier in Table 4.

Overlap-weighted regressions and synthetic control methods

We further address concerns about confounding differences between SLL borrowers and control firms using a number of relatively new econometric techniques that are novel to the finance literature. One approach is a novel "overlap-weighting" approach (see Li et al., 2018; Bartram et al., 2022), where we use estimated propensity scores based on firm characteristics including size, leverage, ROA, and Tobin's Q, but as a weighting mechanism for the entire sample rather than to restrict the sample to close matches. This approach generates a synthetic sample with similar distributions of all firm-level covariates across SLL borrowers and control firms. Figure 5 and Panel A of Table 7 demonstrate the effectiveness of this balancing approach by plotting the distribution of covariates for SLL borrowers and control

[22]For low-transparency SLLs, we do not observe the KPIs used in the contractual terms.

firms, before and after imposing the overlap weights. The distributions of the firm characteristics are sufficiently balanced after imposing the weights, with 0% bias in means as defined by Rosenbaum and Rubin (1985). In Panel B of Table 7 we report results from estimating Equation 1 using this synthetically balanced sample. We find that high-transparency borrowers do not exhibit significant changes in their ESG scores after obtaining SLLs, whereas low-transparency borrowers exhibit significant deterioration in their ESG scores compared to their respective control groups.

[Insert Figure 5 here]

[Insert Table 7 here]

Another approach is a "synthetic control method" (see Abadie et al., 2010; Acemoglu et al., 2016), where the weighted average of control firms forms a synthetic control for an SLL borrower. Since we implement this method on multiple treated units, we use the generalized synthetic control method proposed by Xu (2017), in which the weights for control units are determined by estimating a fixed effects model with factors that minimize the Euclidean distance between the treated group's pre-treatment outcomes and the estimated counterfactuals. These optimal weights are then used to construct post-treatment counterfactuals as weighted combinations of control units. The differences in ESG scores between each SLL borrower and its synthetic counterfactual are used to estimate the average treatment effect on the treated (i.e., SLL borrowers), or ATT. Figure 6 plots the ATT dynamics separately for high- and low-transparency groups, where the 95% confidence intervals are based on standard errors estimated using the nonparametric bootstrapping method for the synthetic control estimator. Again, we find no treatment effect (i.e., no effect of SLL issuance on ESG scores) for high-transparency SLL borrowers but a significant negative treatment effect for low-transparency SLL borrowers.

[Insert Figure 6 here]

Overall, our findings in this section suggest that borrowers engaging in SLL contract-

ing are driven by two predominant incentives. Some borrowers aim to *certify* their ESG commitments to stakeholders. They seek SLLs as an external certification and signaling device to make their preexisting ESG commitments more visible and credible to stakeholders. Hence, these firms are inclined to disclose more of the sustainability-linked contract terms to the public. Their ESG profiles are superior to those of other firms prior to SLL issuance, although they do not necessarily exhibit further improvements afterwards. However, many other borrowers withhold such information from the public. Although the ESG profiles of these low-transparency borrowers appear good prior to issuance, their ESG profiles deteriorate substantially after SLL issuance. For these firms, the SLL labels appear to crowd out genuine improvements in ESG performance. These empty labels point to potential *greenwashing*. These findings are robust to multiple specifications and several alternative measures of ESG performance.

5.2 Borrowers or lenders: Who pays for SLL issuance?

Our results so far suggest that borrowers derive utility from obtaining SLLs, which may imply higher borrowing costs compared to conventional loans. In contrast, the *supply effect* hypothesis predicts lower borrowing costs. To investigate this hypothesis, we test whether SLLs are associated with higher or lower loan spreads and fees at issuance relative to non-ESG loans with comparable characteristics. We control for a borrower's country of domicile and industry, the year of loan issuance, loan type, loan facility amount, loan maturity, whether a loan is secured, whether a loan is a leveraged loan, whether a borrower is publicly listed, and whether a borrower is rated.

The results are reported in Table 8. We perform separate analyses for high- and low-transparency loans in Panels A and B, respectively. In column 1, we utilize the full sample of loans for which all-in spread drawn (AISD) data are available. In columns 2 and 3, we restrict the sample to loans that have data on both AISD and loan fees. In columns 4 and 5, we further match each SLL facility to a non-ESG control loan facility based on country, in-

dustry, year, borrower public/private status, and closest facility size. In columns 1, 2, and 4, we follow Berg et al. (2017) and examine differences in AISD between SLLs and conventional loans. Across all three columns of Panels A and B, we find that SLLs are not issued with higher or lower spreads, indicating that banks do not view SLL borrowers as particularly safer or riskier than other comparable firms. This also suggests that borrowers do not enjoy pricing benefits at issuance from obtaining SLLs, although they would enjoy a modest discount if they achieved KPI targets in subsequent years pursuant to the performance-pricing feature of SLLs (e.g., 5 basis points at most in the example presented in Section 2).

[Insert Table 8 here]

However, once we account for various fees and charges associated with issuing loans, the total cost of borrowing (TCB) is significantly greater for SLLs. In columns 3 and 5, we follow the methodology of Berg et al. (2016) to calculate the TCB, which incorporates all fees associated with loans. We find that high-transparency (low-transparency) SLLs cost 8 to 13 (16 to 18) basis points more than control loans. This suggests that lenders charge higher fees for SLLs, likely due to additional administrative and monitoring costs associated with the sustainability features of the loan contracts. The fact that large and safe SLL borrowers are willing to pay substantially more for SLLs suggests that they derive utility from obtaining SLL labels, consistent with the *certification* value sought by high-transparency borrowers or the strategic benefits of *greenwashing* pursued by low-transparency borrowers. On the other hand, these results do not align well with the *supply effect* channel that predicts lower total borrowing costs for SLLs.

5.3 Do borrowers draw down or renegotiate SLLs?

In this section, we present additional evidence on the dynamics of SLLs over the life of a loan to corroborate the interpretations of our results thus far. These include how intensively SLLs are utilized by borrowers and how frequently their contract terms are renegotiated. First,

we examine loan utilization at the firm level, leveraging data on credit line drawdowns from CapitalIQ. We focus on a sample of borrowers that obtain revolving credit SLLs and their matched counterparts for which drawdown data are available.[23] For this sample, we examine whether high- or low-transparency SLL borrowers draw down larger or smaller shares of their credit lines and whether their drawdown behavior changes after obtaining an SLL.

We report the results in Table 9. The key outcome variable of interest is the dollar share of a firm's lines of credit that have been drawn down. In Panel A, we report univariate statistics prior to SLL issuance. Ex ante, we find that high-transparency SLL borrowers utilize a similar proportion of their credit lines compared to their matched control firms. In contrast, low-transparency SLL borrowers draw down a lower share of their credit lines compared to their matched control firms. Specifically, the average share of drawn down lines of credit in the three years preceding a low-transparency SLL issuance is 0.09, compared with 0.23 for their matched control firms. This difference is statistically significant at the 5% level.

[Insert Table 9 here]

In Panel B of Table 9, we then examine whether firms' drawdown behaviors change after obtaining SLLs, in the same stacked DID framework as in Table 6. For high- and low-transparency borrowers alike, we find no evidence that they become more or less likely to draw down after SLL issuance. The cofficient on $SLL\ borrower_i \times PostIssuance_{i,t}$ is economically and statistically insignificant for both samples. This suggests that firms do not alter their liquidity management decisions with regards to their credit lines after issuing SLLs.

Taken together, the results indicate that low-transparency borrowers draw down less than other firms both before and after SLL issuance. As such, they neither benefit from spread reductions when sustainability targets are met nor incur penalties from spread in-

[23] We use a portion of the matched sample used in the stacked DID analysis in Table 6 for which drawdown data are available. We manually match firms in our sample using company names to firms in Capital IQ. Capital IQ reports drawn and undrawn portions of firm-level lines of credit. Although these variables are sparsely populated in Capital IQ, we are able to obtain this information for 336 out of 974 revolver SLL borrowers in our dataset. We drop term loan SLL borrowers for this analysis.

creases when targets are missed. This finding further supports the *greenwashing* hypothesis, which posits that, for low-transparency borrowers, the SLL label holds greater significance than the underlying ESG-contingent contract terms that are less likely to be activated.

Next, in Table 10, we examine renegotiations in SLLs at the loan level by comparing the likelihood of renegotiation between SLLs and matched control loans. The sample includes 1,671 SLL revolvers and their matched counterparts.[24] In Panel A, we estimate a linear probability model where the dependent variable is a dummy variable indicating whether a revolver is renegotiated before maturity. The key explanatory variable is a dummy variable indicating whether a loan is an SLL. We control for the facility amount, maturity, secured status, leveraged loan status, a borrower's public listing status, and the availability of the borrower's credit rating. The regressions also include country, industry, and year-of-issuance fixed effects. We find that SLLs are unconditionally just as likely to be amended as comparable, conventional loans. The coefficient on SLL_i is small and statistically insignificant in both subsamples containing high- or low-transparency SLLs and their matched counterparts.

[Insert Table 10 here]

However, when we turn to the relation between year-on-year changes in a borrower's ESG performance and subsequent loan renegotiations, we find that high-transparency SLLs become significantly less likely to be renegotiated when borrowers improve their ESG performance more substantially (see Panel B of Table 10). Since ESG performance is relevant only to SLLs and not to conventional revolver loans, we restrict this analysis to our set of SLL revolvers. The key explanatory variable is the year-on-year change in a borrower's ESG score after SLL issuance, denoted as ΔESG score.[25] The dependent variable is a dummy variable indicating whether an SLL is renegotiated before maturity. In column 1, the coefficient on ΔESG score is negative and statistically significant at the 1% level. The coefficient suggests

[24] We use a portion of the same loan-level matched sample used in Table 2. Twenty-six percent of the revolvers in this sample are renegotiated before maturity.

[25] We obtain similar results when using a two-year change in the borrower's ESG score.

that a one standard deviation increase in ΔESG score reduces the likelihood of renegotiation by 6.3 percentage points for high-transparency SLLs.

This result suggests that high-transparency borrowers who perform well in terms of their ESG scores might be content with the ESG-contingent loan spread reductions upon meeting KPI targets, lessening their need to renegotiate the loan contract terms. In contrast, low-transparency SLLs exhibit no relationship between improvements in borrower ESG performance and renegotiation tendencies. Echoing our previous results, this finding is consistent with the notion that sustainability-linked contract terms of low-transparency SLLs carry little weight for borrowers, serving primarily as *greenwashing* labels.

5.4 Do stock investors price the value or costs of SLLs?

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 might 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 ESG initiatives while being mindful of misleading or hollow claims firms make about their ESG commitments, we examine whether loan announcement returns vary depending on how transparent a loan's sustainability-linked contractual details are in the public domain.

Table 11 reports the average cumulative abnormal stock returns (CARs) of borrowers around public announcements of sustainability-linked loan issuance. The sample consists of 814 SLL issuance events for which announcement dates can be identified through Factiva news search and where the borrowers are publicly listed.[26] Stock returns are sourced from the

[26] As detailed in Table 11, 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 refine these search results based on borrower company names and the content of the news articles. Finally, we select announcement dates as the news dates of the earliest articles where the reported loan terms (e.g., loan

daily stock files of Compustat North America and Compustat Global. CARs are computed from a market model using the MSCI All Country World Equity Index as the benchmark.

In Panel A, we report average CARs for subsamples of high- and low-transparency SLLs and report the difference in the means between the two subamples. 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- and low-transparency loans is sizable. These results hold qualitatively for a variety of daily event windows (i.e., $[-1, 1]$, $[-1, 2]$, $[-1, 3]$, $[-1, 4]$, and $[-1, 5]$), with varying statistical significance. In Panel B, we control for general loan issuance effects documented in James (1987) by matching SLLs to conventional loans issued in the same country, industry, year, and with the closest facility amount. We then regress the loan-level CARs for various event windows on dummy variables indicating whether the loan is an SLL, whether an SLL and its matched control loan belong to the high-transparency group, as well as their interactions. Following Billett et al. (2006), we also control for borrower and loan characteristics, including market capitalization, market-to-book equity, the logarithm of loan amount divided by market capitalization, and a dummy variable indicating whether the loan is secured. These regressions test whether announcement returns for SLLs are higher than those for similar, conventional loans and whether this difference is more pronounced for high- or low-transparency SLLs. The coefficients on $SLL \times Hightransparency$ confirm that the announcement returns for high-transparency SLLs are economically and statistically larger than those for low-transparency SLLs.

[Insert Table 11 here]

These stock market reactions suggest that equity investors welcome SLL issuance when there is enough informational detail about the sustainability-linked aspect of the loan contract in the public domain. This is likely because investors find such information useful for forming expectations about a firm's ESG commitment. These results are consistent with re-

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.

cent studies on the demand for sustainable investments in public equity markets (see Bolton and Kacperczyk, 2021; Pastor et al., 2022). The results also suggest that public equity investors are vigilant against potential greenwashing practices. However, the greenwashing incentives documented throughout our analysis indicate that some stakeholders and investors may remain naïvely or knowingly content with the mere labeling of SLLs as an ESG signal. This is consistent with recent concerns raised by the SEC regarding ESG funds.[27] Overall, our analysis of SLL announcement returns suggests that public capital markets can help stakeholders assess the quality of ESG commitments made in opaque, private markets.

6 Conclusion

In this paper we provide the first comprehensive analysis of the sustainability-linked lending market, which has grown exponentially over the past six years. Sustainability-linked loans (SLLs) are general-purpose loans with loan terms that are contractually tied to a 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 sustainable financing instruments, such as green bonds that have received relatively greater attention from academics and practitioners in recent years.

SLLs have driven the growth of ESG lending in global syndicated loan markets, becoming one of the most important sustainable debt financing vehicles around the world. Consistent with the general-purpose nature of SLLs, they are relatively widespread across a variety of industries in comparison with use-of-proceeds–based green loans. Consistent with the role of visibility and catering to stakeholder demands, SLLs tend to be issued between large publicly listed borrowers and large syndicates comprised of reputable global banks through preexisting lending relationships in the form of revolving credit facilities.

The evidence from our main analysis is most consistent with two predominant incentives

[27] See *Barrons*, "SEC's Gensler is targeting greenwashing of ESG funds," March 1, 2022.

among SLL borrowers. Some borrowers aim to *certify* their preexisting ESG commitments by transparently disclosing the ESG-contingent terms of the SLL contracts to the public. These relatively high-transparency borrowers maintain their ESG profiles after SLL issuance, which are superior to other firms prior to issuance. Other SLL borrowers *greenwash* by withholding information on the contract details from the public. These low-transparency borrowers exhibit deteriorating ESG performance following SLL issuance, consistent with empty SLL labels crowding out genuine efforts to improve or sustain their ESG profiles. Supporting both of these underlying incentives, borrowers pay greater borrowing costs for SLLs, driven by significantly higher fees charged by lenders. We also provide evidence on revolver drawdowns and loan renegotiation patterns that are consistent with these incentives. Finally, we find that public equity investors exhibit increasing vigilance against potential greenwashing practices signified by the issuance of low-transparency SLLs.

While further research is needed as the SLL market continues to evolve, our findings suggest that improving transparency in the contractual terms governing ESG-contingent KPIs and pricing grids could significantly enhance the market's potential to serve as an effective platform for ESG-contingent financing. More broadly, our paper makes a significant contribution to the growing literature that explores how investors and firms incorporate stakeholder values into their financing contracts. Through our novel findings, we shed light on how the vast global syndicated loan market is developing 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 generating real and positive impacts on corporate ESG policies. Given growing regulatory uncertainty and societal debates over corporate ESG performance among various stakeholders around the world, our findings carry important implications for global banking and sustainable corporate finance practices.

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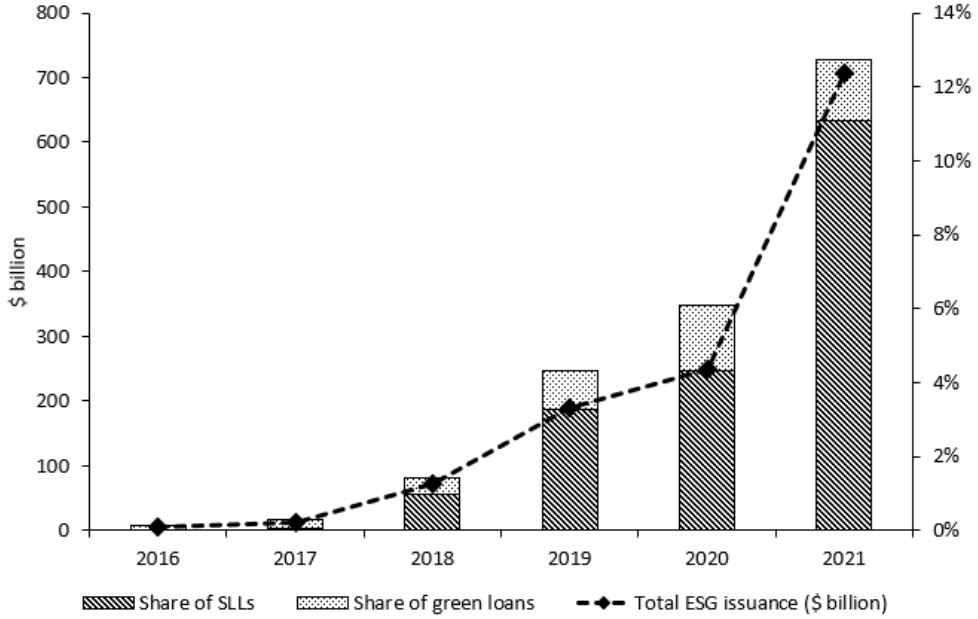
Figure 1. ESG lending over time

These figures illustrate the annual issuance of sustainability-linked loans (SLLs) and green loans during the sample period from 2016 to 2021. The samples consists of 1,831 SLLs and 1,532 green loan facilities from LSEG Loan Connector's DealScan (DealScan, hereafter). Panel A plots SLL and green loan issuances together. The dashed line indicates the total issuance amount of SLLs and green loans combined (left y-axis). In each bar, the dark and light areas indicate SLL and green loan issuance amounts as a fraction of all syndicated loans, respectively (right y-axis). Panel B plots the issuance of high- (light area) and low-transparency (dark area) SLLs.

Panel A. Total ESG loan volume (line), and shares of SLLs and green loans in all syndicated lending (bars)



Panel B. Shares of high- and low-transparency loans in all SLLs

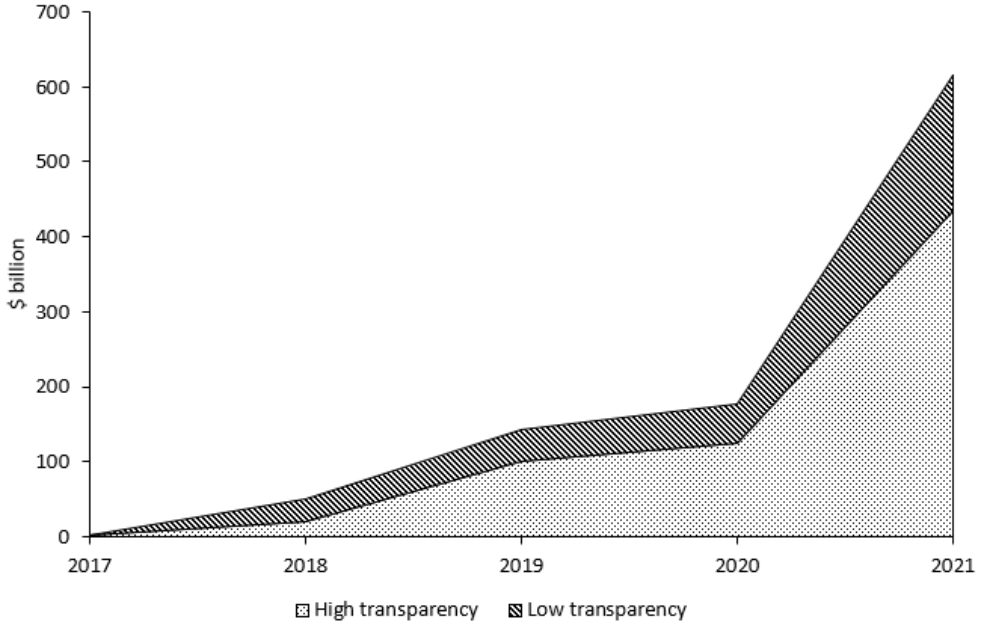


Figure 2. Sustainability-linked loans (SLLs) by region

This figure presents the annual issuance amounts of SLLs by region from 2016 to 2021. The sample consists of 1,831 SLL facilities in DealScan. For each year, the left, middle, and right bars indicate the total issuance amounts of SLL facilities issued in Europe, North America, and the rest of the world, respectively.

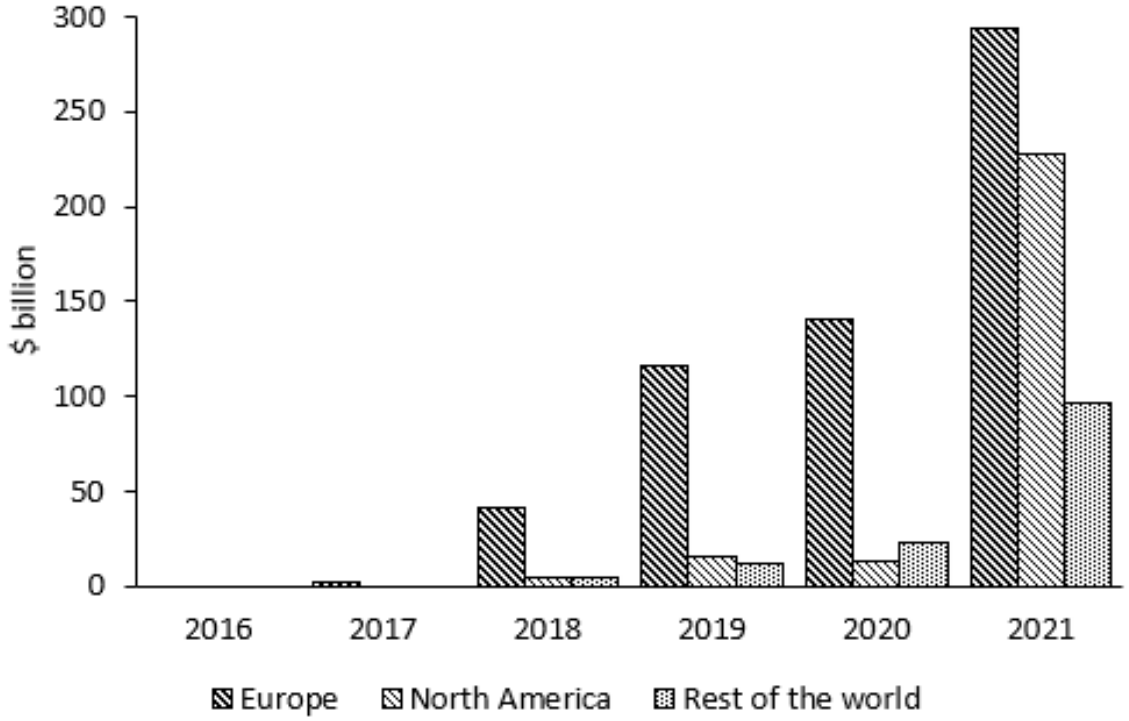
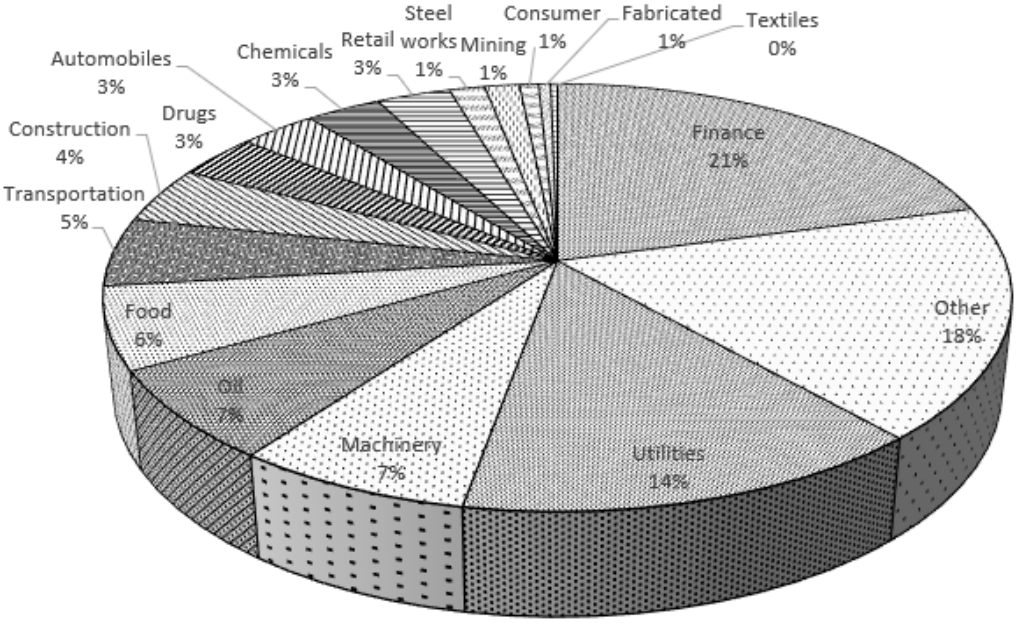


Figure 3. ESG lending by industry

These figures report the share of SLLs (Panel A) and green loan (Panel B) facilities issued in each borrower industry, defined using Fama-French 17 industry classifications. The sample consists of 1,831 SLLs and 1,529 green loans issued from 2016 to 2021. The pie charts plot the ratio of the issuance amount in each industry to the issuance amount across the entire sample (in %). Loan data are obtained from DealScan.

Panel A. Sustainability-linked loans (SLLs)



Panel B. Green loans

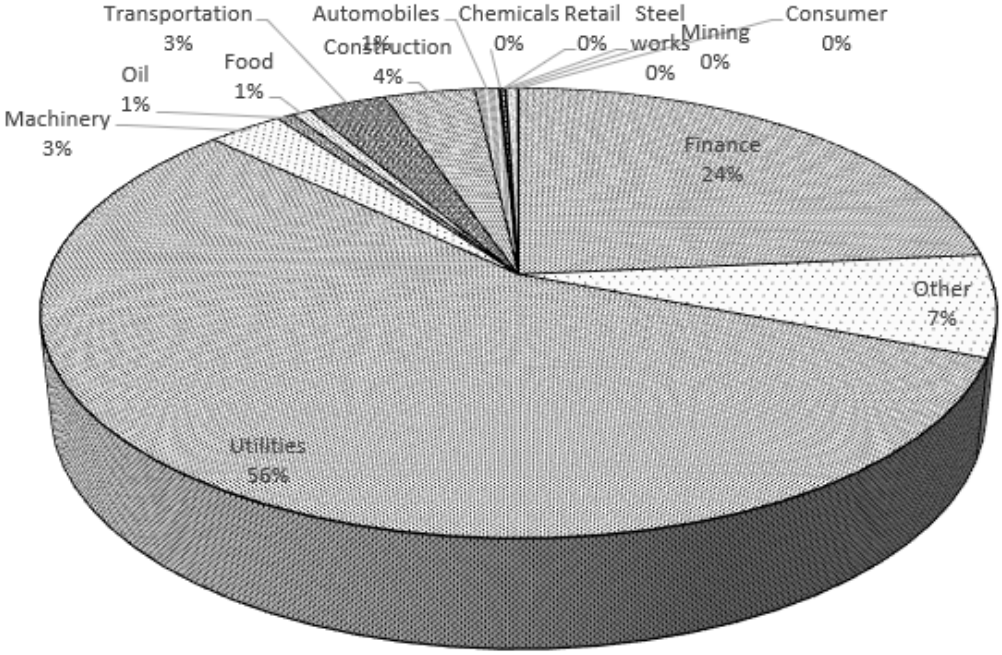


Figure 4. ESG score dynamics around SLL issuance

These figures plot results from replacing the $PostIssuance_{i,t}$ 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). Panels A and B plot the coefficients on the interaction terms between $SLL\ borrower_i$ and the yearly dummy variables for the high- and low-transparency SLL borrower subsamples, respectively, and their matched counterparts.

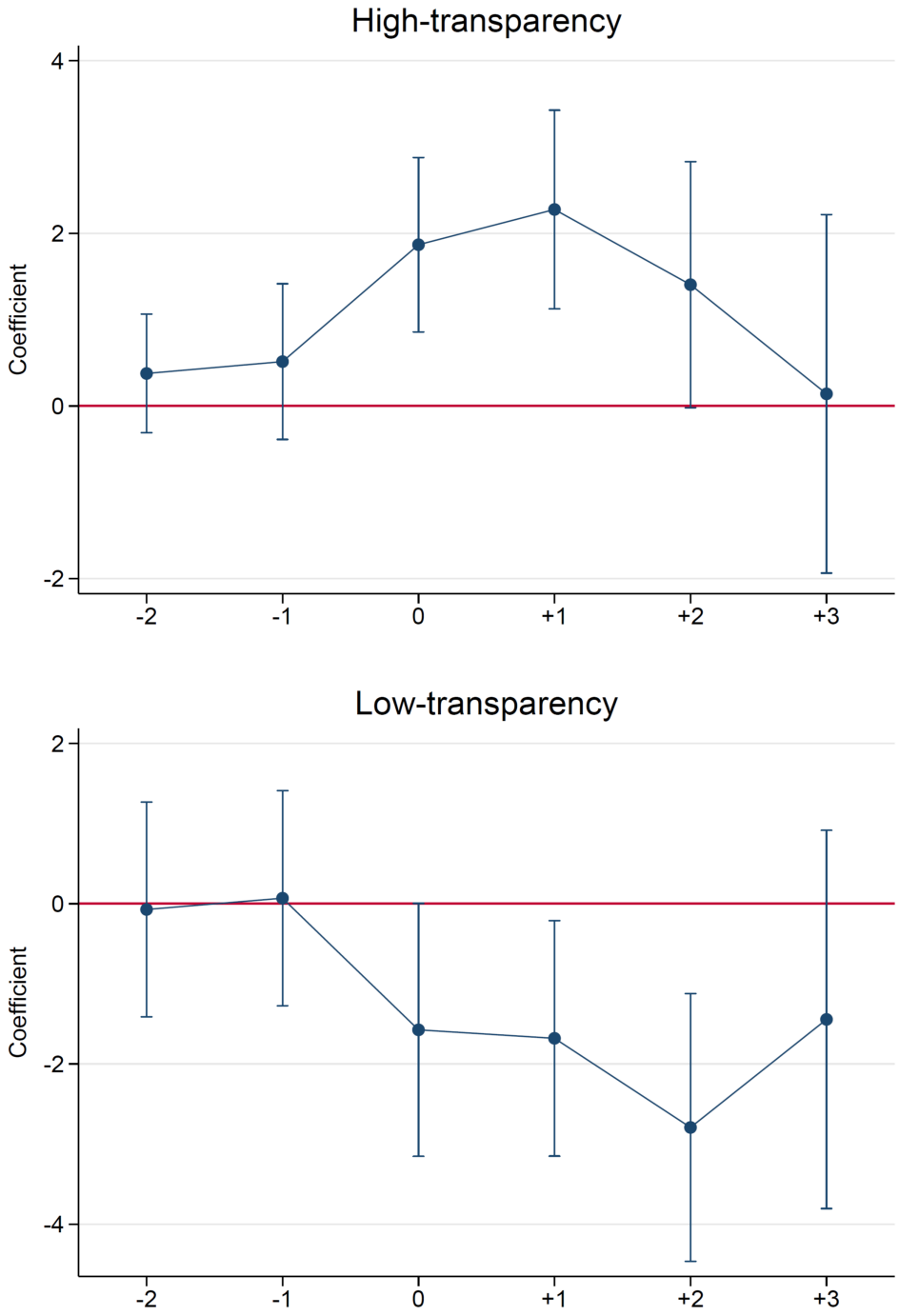
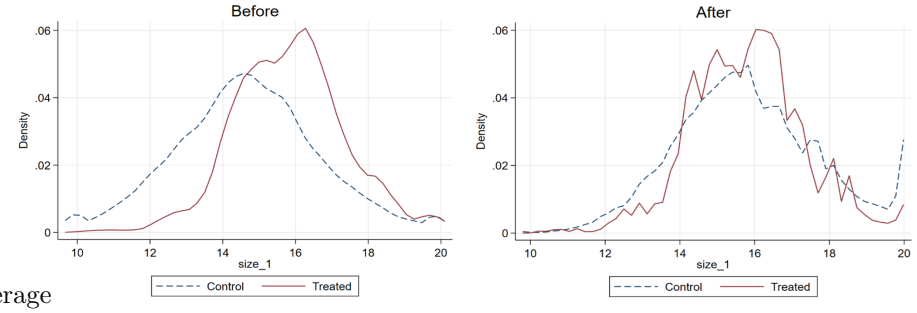


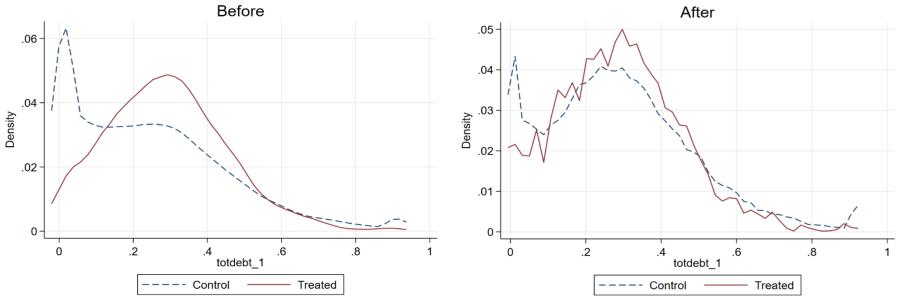
Figure 5. Covariate balancing before and after imposing overlap weights

These figures plot the distributions of covariates for SLL borrowers (treated) and control firms, before and after imposing "overlap weights," where we use the estimated propensity scores based on firm characteristics including size, leverage, ROA, and Tobin's Q as a weighting mechanism (see Li et al., 2018; Bartram et al., 2022). For each covariate (i.e., size, leverage, ROA, and Q), the solid line represents the probability density function for the treated group, while the dashed line represents the density function for the control group.

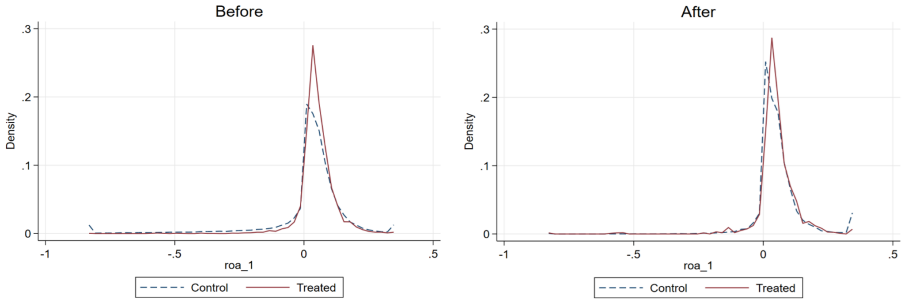
Panel A. Size



Panel B. Leverage



Panel C. ROA



Panel D. Q

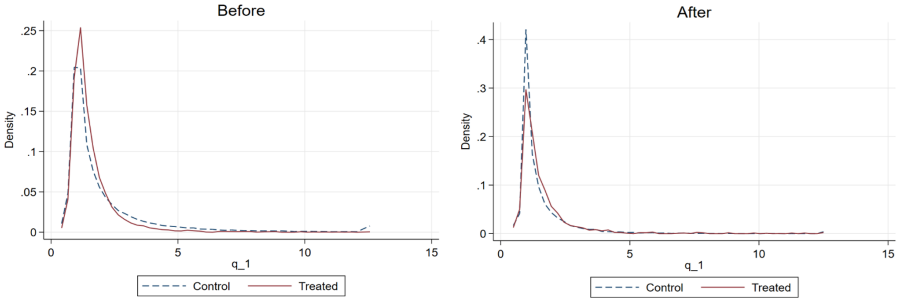


Figure 6. ESG score dynamics around SLL issuance: Synthetic control method

These figures present results from the "synthetic control method" (see Abadie et al., 2010; Xu, 2017). Each control firm is assigned a weight to minimize the Euclidean distance between each SLL borrower and the combination of control firms with respect to pre-treatment outcomes. These optimal weights are then used to construct the counterfactual for each SLL borrower as a weighted average of the control firms. The differences in ESG scores between each SLL borrower and its synthetic counterfactual are used to estimate the average treatment effect on the treated firms (ATT). The figures plot the ATT dynamics separately for high- and low-transparency groups. The x-axis represents years from the SLL issuance event, and the y-axis shows the estimated ATT. The 95% confidence intervals (shaded areas) are based on standard errors estimated using the nonparametric bootstrapping method for the synthetic control estimator.

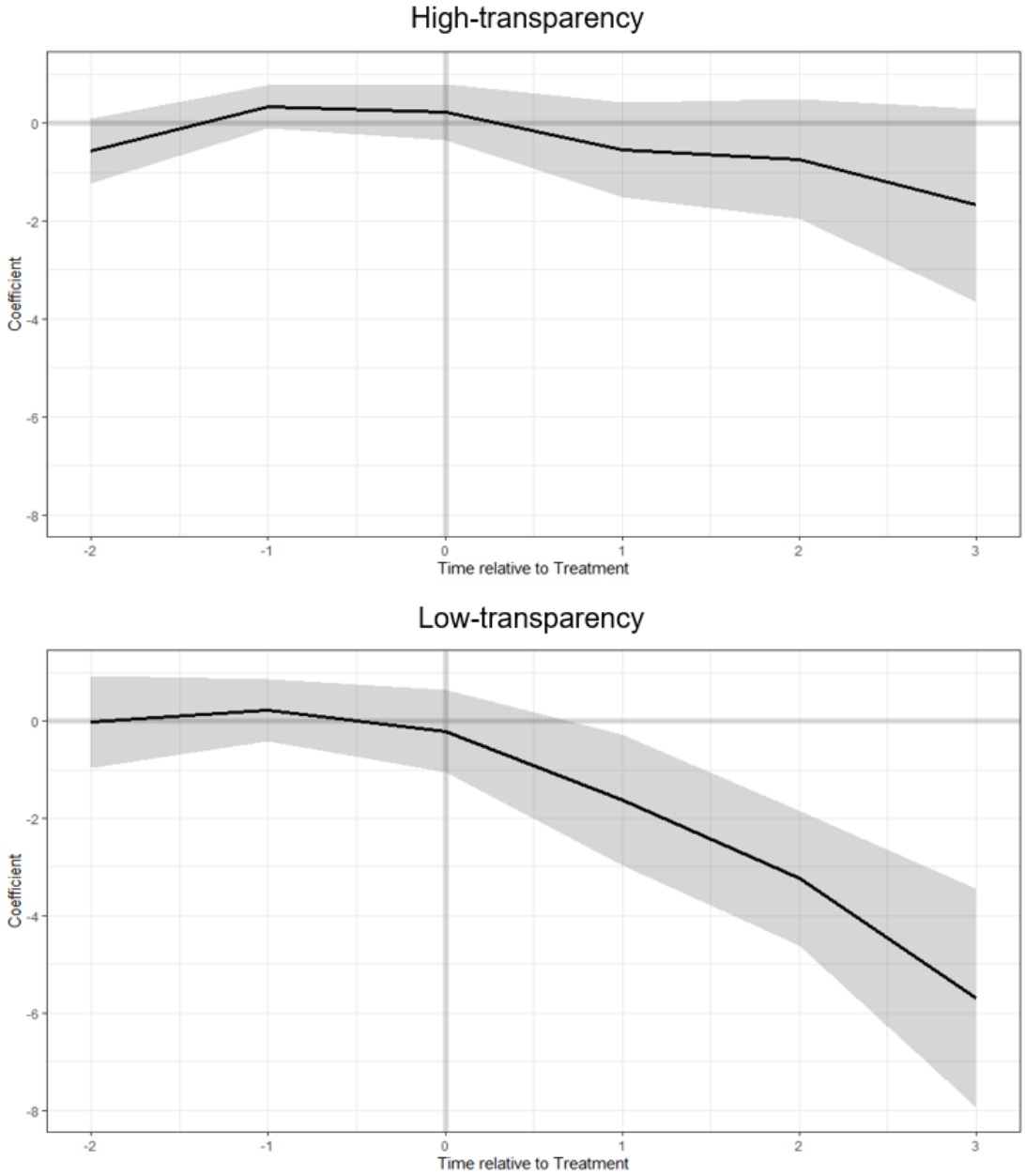


Table 1. Sustainability-linked loan (SLL) borrower and loan characteristics

This table presents univariate comparisons of SLLs 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 1,831 SLL facilities and 87,883 non-ESG control facilities. In Panel A we report the number of packages and facilities (i.e., # package and # facility) for the sample of SLLs (all SLLs as well as high- and low-transparency SLLs separately) and control loans, the average sales of borrowers in each facility group at the time of closing of a loan deal (i.e., Sales at close ($ million)), the fraction of publicly listed borrowers in each facility group (i.e., Public firm), 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 SLL facilities and non-ESG control facilities as well as their associated p-values (i.e., SLL − Control, and P-value). In Panel B, we match each SLL 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 1,106 SLL packages and 1,212 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 SLLs 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), the fraction of packages that consist entirely of revolving credit facilities (i.e., Only revolver), the fraction of packages that consist of both term loans and revolvers (i.e., Term loan A + Revolver), and the fraction of packages that consist of facilities other than term loans or revolvers (i.e., Others). Where applicable, we further report differences between SLL and control packages as well as their p-values (i.e., SLL − Control, and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Unconditional comparisons

	SLL	High transparency	Low transparency	Control	SLL − Control	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
# package	1,198	763	435	50,388		
# facility	1,831	1,150	681	87,883		
Sales at close ($ million)	9,232.79	9,474.10	8,674.73	6,303.38	2,929.41***	0.00
Public firm	0.47	0.52	0.37	0.21	0.25***	0.00
Deal size ($ million)	854.66	898.15	781.22	500.88	353.78***	0.00
Facility amount ($ million)	494.59	531.79	431.77	254.28	240.31***	0.00
Maturity (months)	55.05	53.84	57.08	61.08	-6.04***	0.00
Term loan A	0.28	0.23	0.37	0.42	-0.14***	0.00
Institutional term loan	0.04	0.03	0.04	0.07	-0.03***	0.00
Revolver	0.53	0.57	0.47	0.38	0.15***	0.00
Leveraged	0.11	0.10	0.12	0.27	-0.16***	0.00
Investment grade	0.44	0.46	0.41	0.12	0.32***	0.00

(continued)

Table 1. Sustainability-linked loan (SLL) borrower and loan characteristics (continued)

Panel B: Package-level matching by deal size, country, industry, year, and public/private status						
	SLL	High transparency	Low transparency	Control	SLL - Control	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
# package	1,106	686	415	1,212		
Sales at close ($ million)	9,907.53	10,258.06	9,219.15	7,436.54	2,470.99**	0.01
Deal size ($ million)	835.33	887.14	739.79	711.80	123.52***	0.00
Fraction of ESG loan within package	0.96	0.96	0.96	0.00		
Fraction of revolver	0.60	0.66	0.52	0.45	0.15***	0.00
Fraction of term loan A	0.26	0.21	0.35	0.33	-0.06***	0.00
Packages composed of						
Only term loan A	0.17	0.12	0.25	0.22		
Only revolver	0.52	0.57	0.43	0.35		
Term loan A + Revolver	0.15	0.14	0.16	0.17		
Others	0.16	0.17	0.16	0.26		

Table 2. Structure of sustainability-linked loan (SLL) syndicates

This table documents the syndicate structure of SLLs (all SLLs as well as high- and low-transparency SLLs separately) in comparison with 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), lenders that 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), lenders domiciled in countries that are not the borrower's country of incorporation (i.e., Foreign lender), lenders that have prior lending relationships with the borrowers over the previous five years (i.e., Relationship lender), and lenders that are relationship ESG-experienced lenders, relationship reputable lenders, or relationship foreign lenders. The bottom row shows the number of loan facilities in each group. The table also reports the differences between SLL facilities and their matched counterparts, along with the associated p-values (i.e., SLL − Matched, and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	SLL	High transparency	Low transparency	Matched	SLL − Matched	P-value
	(1)	(2)	(3)	(4)	(5)	(6)
# lead arranger	5.24	5.50	4.80	3.94	1.29***	0.00
ESG-experienced lender	5.15	5.43	4.68	3.69	1.46***	0.00
	[0.98]	[0.99]	[0.96]	[0.91]	0.06***	0.00
Reputable lender	4.54	4.75	4.19	3.22	1.31***	0.00
	[0.86]	[0.85]	[0.86]	[0.79]	0.07***	0.00
Foreign lender	3.24	3.48	2.83	2.01	1.23***	0.00
	[0.50]	[0.53]	[0.46]	[0.40]	0.10***	0.00
Relationship lender	3.42	3.65	3.04	2.25	1.17***	0.00
	[0.60]	[0.61]	[0.59]	[0.51]	0.09***	0.00
Relationship ESG-experienced lender	3.38	3.62	3.00	2.19	1.19***	0.00
	[0.60]	[0.60]	[0.58]	[0.50]	0.10***	0.00
Relationship reputable lender	3.05	3.25	2.73	1.99	1.06***	0.00
	[0.53]	[0.53]	[0.53]	[0.45]	0.08***	0.00
Relationship foreign lender	2.02	2.20	1.71	1.12	0.90***	0.00
	[0.28]	[0.29]	[0.25]	[0.19]	0.09***	0.00
Number of facilities	1,690	1,047	643	2,109		

Table 3. Disclosure quality of sustainability-linked loan (SLL) terms

This table reports the disclosure quality of contractual terms across SLLs, based on publicly available information on the contractual details of SLLs collected manually from the deal and facility comment and pricing grid sections of LSEG Loan Connector's DealScan database, public media coverage of SLL issuances including media releases by either the borrower or bank, annual business reports issued by SLL borrowers, and ESG/sustainability reports issued by SLL borrowers. An SLL is classified as "high-transparency" if it has at least some publicly available information on which measurable environmental or social KPIs determine the spread of the loan, and conversely defined as "low-transparency" if it does not. See Section 4 and Section A.3 of the Internet Appendix for additional details. Separately for high- and low-transparency SLLs, we report the number of loan facilities as well as the average borrower's sales when the loan was originated, the borrower's LSEG/Refinitiv 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 SLLs that publicly disclose the specific KPIs in the contract terms, we also report the fraction of loans that disclose the 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, the fraction of loans that disclose the specified target for the KPI which needs to be met to enjoy spread reductions or avoid spread increases, and the fraction of loans that report the magnitude of the reward (penalty) on the loan spread conditional on good (poor) ESG performance.

	High-transparency (1)	Low-transparency (2)	Diff (P-value) (3)
# facility	1,150	681	
Borrower attributes			
Sales at close ($ billion)	9,946.44	8,991.77	0.48
Ex ante ESG score	63.50	63.65	0.91
Civil law	0.62	0.66	0.18
Disclosed contract features			
Environmental KPI	0.93		
Environmental/Social KPI	0.56		
Third party ESG rating	0.29		
Specified KPI target	0.34		
Reward on loan spread	0.22		
Penalty on loan spread	0.15		

Table 4. SLL issuance and corporate ESG performance

This table reports results from panel OLS regressions estimating the difference-in-differences specification in Equation 1, analyzing borrower ESG performance around SLL issuance. The sample consists of 313 high-transparency and 138 low-transparency SLL borrowers along with 20,232 control firms that never issued an SLL during our sample period. We include in the control group only firms domiciled in countries with SLL issuance activity during our sample period. The dependent variable is the LSEG/Refinitiv ESG score. $SLL\ borrower_i$ is a firm-invariant indicator variable that equals one if a borrower obtains an SLL at any point during the full sample period and zero otherwise. $SLL\ borrower_i \times PostIssuance_{i,t}$ is an indicator variable that equals one for the years following SLL issuance for SLL borrowers and zero otherwise. Note that, in this setup, $PostIssuance_{i,t}$ is set to zero for control firms. In the regressions we also control for firm characteristics such as size, leverage, ROA, and Tobin's Q, and varying configurations of firm, year, country-by-year, and industry-by-year fixed effects. Columns 1 to 3 show results for the full sample, columns 4 to 6 show results for the subsample consisting of high-transparency SLL borrowers and control firms, and columns 7 to 9 show results for the subsample consisting of low-transparency SLL borrowers and control firms. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	Dependent variable: ESG score								
	Full sample			High-transparency			Low-transparency		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SLL borrower × PostIssuance	-0.230	-0.968**	-1.307***	0.262	-0.340	-0.613	-1.500*	-2.479***	-3.012***
	(0.584)	(0.435)	(0.451)	(0.724)	(0.533)	(0.545)	(0.891)	(0.688)	(0.729)
SLL borrower	8.939***			8.619***			9.731***		
	(0.827)			(0.973)			(1.434)		
Size	6.423***	2.866***	2.555***	6.416***	2.867***	2.561***	6.432***	2.854***	2.536***
	(0.097)	(0.172)	(0.169)	(0.098)	(0.172)	(0.169)	(0.099)	(0.173)	(0.170)
Leverage	-1.693**	-0.666	-0.637	-1.787**	-0.645	-0.623	-1.777**	-0.650	-0.626
	(0.703)	(0.532)	(0.520)	(0.705)	(0.534)	(0.521)	(0.709)	(0.535)	(0.523)
ROA	2.712***	-1.187***	-0.852*	2.728***	-1.205***	-0.870*	2.649***	-1.215***	-0.878**
	(0.712)	(0.451)	(0.444)	(0.712)	(0.451)	(0.444)	(0.711)	(0.452)	(0.444)
Q	0.942***	0.309***	0.292***	0.935***	0.309***	0.292***	0.945***	0.304***	0.287***
	(0.069)	(0.043)	(0.044)	(0.069)	(0.043)	(0.044)	(0.069)	(0.043)	(0.044)
Firm FE	N	Y	Y	N	Y	Y	N	Y	Y
Year FE	N	Y	N	N	Y	N	N	Y	N
Country × Year FE	Y	N	Y	Y	N	Y	Y	N	Y
Industry × Year FE	Y	N	Y	Y	N	Y	Y	N	Y
N	62,104	61,421	61,275	61,504	60,824	60,678	60,660	59,980	59,834
Adj. R^2	0.401	0.877	0.882	0.396	0.876	0.881	0.388	0.874	0.879

Table 5. Propensity score matched sample balancing

This table reports differences in the mean values of covariates between SLL borrowers and matched control firms included in the propensity score matched sample used in our stacked DID regressions. Following Flammer (2021), each SLL borrower is matched to a never-SLL borrower control firm in the same country and industry with the closest propensity score as of the year before SLL issuance. The propensity scores are computed from a logistic regression of SLL borrower status on firm size, leverage, ROA, Tobin's Q, ESG score, and the year-on-year growth of these variables. We then stack SLL borrowers and control firms within each matching cohort over the years –3 to +3 with respect to the SLL issuance year (or pseudo-issuance year for the control firm). The sample consists of 305 (130) high-transparency (low-transparency) SLL borrowers and 198 (84) matched control firms, where the same control firm is allowed to be matched to multiple SLL borrowers. For this matched sample, the table reports the mean values of size (assets), leverage (debt/assets), ROA, Tobin's Q, and ESG score separately for SLL borrowers and matched control firms over the three years prior to the SLL issuance event year as well as the differences in means between the two groups of firms and the corresponding t-statistics. In Panel A (Panel B) we report these statistics for the subsample of high-transparency (low-transparency) SLL borrowers and their matched counterparts.

Panel A. High-transparency SLL borrowers and matched firms

Variable	SLL borrowers (1)	Matched (2)	Diff (3)	t-statistic (4)
		Issuance year −1		
Assets ($ billion)	6.40	6.82	-0.41	-0.42
Debt/Assets	0.32	0.30	0.02	1.05
ROA	0.04	0.04	0.00	-0.56
Q	1.52	1.57	-0.05	-0.62
ESG score	62.90	61.32	1.58	0.99
		Issuance year −2		
Assets ($ billion)	5.79	6.36	-0.57	-0.63
Debt/Assets	0.30	0.29	0.01	0.77
ROA	0.05	0.05	0.00	0.18
Q	1.50	1.58	-0.08	-0.94
ESG score	61.27	58.14	3.13	1.90
		Issuance year −3		
Assets ($ billion)	5.85	6.07	-0.22	-0.24
Debt/Assets	0.29	0.27	0.02	0.97
ROA	0.06	0.06	0.00	-0.25
Q	1.44	1.56	-0.12	-1.47
ESG score	58.90	56.96	1.95	1.08
		Issuance year −3 to issuance year −1		
Assets ($ billion)	5.77	6.06	-0.29	-0.32
Debt/Assets	0.29	0.28	0.01	0.83
ROA	0.05	0.05	0.00	0.17
Q	1.48	1.58	-0.09	-1.21
ESG score	61.12	58.86	2.27	1.42

(continued)

Table 5. Propensity score matched sample balancing (continued)

Panel B. Low-transparency SLL borrowers and matched firms				
Variable	SLL borrowers (1)	Matched (2)	Diff (3)	t-statistic (4)
		Issuance year −1		
Assets ($ billion)	6.15	6.20	-0.05	-0.03
Debt/Assets	0.30	0.28	0.02	0.73
ROA	0.05	0.05	0.00	0.18
Q	1.60	1.46	0.14	1.16
ESG score	61.76	60.95	0.81	0.31
		Issuance year −2		
Assets ($ billion)	5.69	5.80	-0.11	-0.09
Debt/Assets	0.29	0.26	0.03	1.25
ROA	0.06	0.05	0.01	0.83
Q	1.59	1.49	0.10	0.90
ESG score	61.40	58.32	3.08	1.10
		Issuance year −3		
Assets ($ billion)	5.19	5.66	-0.47	-0.39
Debt/Assets	0.29	0.26	0.03	1.29
ROA	0.06	0.04	0.02	2.10
Q	1.61	1.46	0.15	1.33
ESG score	61.18	57.18	4.00	1.43
		Issuance year −3 to issuance year −1		
Assets ($ billion)	5.22	5.61	-0.39	-0.32
Debt/Assets	0.29	0.25	0.03	1.46
ROA	0.06	0.05	0.01	1.16
Q	1.61	1.50	0.11	0.98
ESG score	61.46	58.86	2.60	1.00

Table 6. SLL issuance and corporate ESG performance: Propensity score matching and stacked DID

This table reports results from stacked DID regressions of Equation 1, analyzing borrower ESG performance around the issuance of high- or low-transparency SLLs. Following Flammer (2021), each SLL borrower is matched to a never-SLL borrower control firm in the same country and industry with the closest propensity score as of the year before SLL issuance. The propensity scores are computed from a logistic regression of SLL borrower status on firm size, leverage, ROA, Tobin's Q, ESG score, and the year-on-year growth of these variables. We then stack SLL borrowers and control firms within each matching cohort, over the years −3 to +3 with respect to the SLL issuance year (or pseudo-issuance year for the control firm). The sample consists of 305 (130) high-transparency (low-transparency) SLL borrowers and 198 (84) matched control firms, where a given control firm is allowed to be matched to multiple SLL borrowers. The dependent variable is the LSEG/Refinitiv ESG score in columns 1 and 2, the LSEG/Refinitiv Emission score in columns 3 and 4, and the logarithm of direct CO_2e (CO_2-equivalent greenhouse gases) emission intensity from Trucost Environmental in columns 5 and 6. $SLL\ borrower_i$ is a firm-invariant indicator variable that equals one if a borrower obtains an SLL at any point during the full sample period and zero otherwise. $PostIssuance_{i,t}$ in this setting is a dummy variable that equals one for years following the SLL issuance event year (or pseudo-event year for control firms) and zero otherwise. The regressions also control for firm characteristics such as size, leverage, ROA, and Tobin's Q as well as firm-by-matching cohort and year-by-matching cohort fixed effects. Odd-numbered (even-numbered) columns show results for the high-transparency (low-transparency) group. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	ESG score		Emission score		Direct CO_2e emissions	
Transparency:	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
SLL borrower × PostIssuance	1.580**	-1.764**	-1.266	-3.368*	0.121	0.253***
	(0.734)	(0.855)	(1.039)	(1.718)	(0.076)	(0.085)
Size	-0.237	0.165	1.922	-0.053	-0.137	0.041
	(1.789)	(1.845)	(2.881)	(6.027)	(0.157)	(0.158)
Leverage	1.051	10.771	17.410**	-1.075	-0.363	0.352
	(4.357)	(6.767)	(7.677)	(14.621)	(0.590)	(0.654)
ROA	10.864**	-6.646	11.544	17.064	-0.302	0.603
	(5.406)	(5.915)	(7.936)	(12.450)	(0.717)	(0.672)
Q	0.417	-0.444	-0.865	-0.032	0.069	0.052
	(0.929)	(1.034)	(1.232)	(1.146)	(0.065)	(0.075)
Firm × Cohort FE	Y	Y	Y	Y	Y	Y
Year × Cohort FE	Y	Y	Y	Y	Y	Y
N	2,066	938	2,026	876	1,988	1,010
Adj. R^2	0.859	0.890	0.785	0.827	0.924	0.927

Table 7. SLL issuance and corporate ESG performance: Overlap-weighted regressions

This table reports results from "overlap-weighted" regressions where we use the estimated propensity scores based on firm characteristics including size, leverage, ROA, and Tobin's Q as a weighting mechanism, following Li et al. (2018) and Bartram et al. (2022). In Panel A we report the mean of each covariate (i.e., size, leverage, ROA, and Q) for the sample of 2,957 SLL borrower firm-year observations and 59,763 control firm-year observations, before and after imposing the overlap weights. As measures of distance between SLL borrowers and control firms, we report biases resulting from incomplete matching as defined by Rosenbaum and Rubin (1985) (i.e., % Bias), mean differences prior to applying overlap weights (i.e., Diff (t-stat)), and distributional differences after imposing overlap weights following Bartram et al. (2022) (i.e., Expected Absolute Density Deviation (EADD)). In Panel B we report results from estimating Equation 1 using the synthetically balanced sample after imposing overlap weights. The dependent variable is the LSEG/Refinitiv ESG score. $SLL\ borrower_i \times PostIssuance_{i,t}$ is an indicator variable that equals one for years following SLL issuance for SLL borrowers and zero otherwise. The regressions also control for firm characteristics such as size, leverage, ROA, and Tobin's Q, and varying configurations of firm, year, country-by-year, and industry-by-year fixed effects. Columns 1 and 2 show results for the full sample, columns 3 and 4 show results for the subsample consisting of high-transparency SLL borrowers and control firms, and columns 5 and 6 show results for the subsample consisting of low-transparency SLL borrowers and control firms. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A. Covariate balancing before and after imposing overlap weights

	SLL firms	Control firms					
	(N=2,957)	Before weights (N=59,763)			After weights (N=59,763)		
Variable	Mean	Mean	% Bias	Diff (t-stat)	Mean	% Bias	EADD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Assets ($ billion)	7.214	2.367	66.5%	31.35	7.214	0%	4.95
Debt/Assets	0.291	0.247	23.7%	11.52	0.291	0%	0.07
ROA	0.050	0.018	26.2%	10.89	0.050	0%	0.01
Q	1.603	2.093	-31.5%	-13.43	1.603	0%	0.55

Panel B. Overlap-weighted regressions

	Dependent variable: ESG score					
	Full sample		High-transparency		Low-transparency	
	(1)	(2)	(3)	(4)	(5)	(6)
SLL borrower × PostIssuance	-0.380	-0.448	0.297	0.263	-2.001***	-2.326***
	(0.438)	(0.419)	(0.543)	(0.503)	(0.684)	(0.668)
Controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	N	Y	N	Y	N
Country × Year FE	N	Y	N	Y	N	Y
Industry × Year FE	N	Y	N	Y	N	Y
N	60,981	60,980	60,384	60,383	59,540	59,539
Adj. R^2	0.889	0.895	0.886	0.893	0.885	0.891

Table 8. Pricing of sustainability-linked loans (SLLs)

This table reports results from loan-level tests of whether SLLs are associated with higher or lower borrowing costs relative to control non-ESG loans. We estimate OLS regressions using loan-level borrowing costs as the dependent variable. We measure borrowing costs by loan spreads and fees at issuance. The key explanatory variable is a dummy variable indicating whether a loan is an SLL. We perform separate analyses for high- and low-transparency loans in Panels A and B, respectively. In columns 1, 2, and 4, we follow Berg et al. (2017) and examine all-in spread drawn (AISD). In columns 3 and 5, we follow Berg et al. (2016) and calculate the total cost of borrowing (TCB), which additionally incorporates all fees associated with a loan. In column 1, we utilize the full sample of loans for which AISD data are available. In columns 2 and 3, we restrict the sample to loans that have data on both AISD and loan fees. In columns 4 and 5, we further match each SLL to a conventional loan on country, industry, issuance year, borrower public/private status, and closest facility size. We additionally control for the loan's facility amount, maturity, whether the loan is secured, whether the loan is a leveraged loan, whether the borrower is publicly listed, and whether the borrower is rated. We also include country, industry, issuance year, and loan-type fixed effects (the first three are subsumed in columns 4 and 5). Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

	Dependent variable: Borrowing cost in basis points				
	Full sample	Fees information available			
		Unmatched sample		Matched	
	AISD	AISD	TCB	AISD	TCB
	(1)	(2)	(3)	(4)	(5)
Panel A. High-transparency SLLs and control loans					
SLL	6.397	0.571	12.579***	-0.261	8.171**
	(9.040)	(5.859)	(4.814)	(3.245)	(3.484)
Controls	Y	Y	Y	Y	Y
Country, Industry, Year FEs	Y	Y	Y	N	N
Loan-type FE	Y	Y	Y	Y	Y
Matched pair FE	N	N	N	Y	Y
N	31,508	6,189	6,189	528	528
Adj R^2	0.473	0.516	0.466	0.907	0.848
Panel B. Low-transparency SLLs and control loans					
SLL	-2.696	4.130	17.557***	1.708	16.217*
	(11.727)	(6.555)	(5.936)	(6.711)	(8.763)
Controls	Y	Y	Y	Y	Y
Country, Industry, Year FEs	Y	Y	Y	N	N
Loan-type FE	Y	Y	Y	Y	Y
Matched pair FE	N	N	N	Y	Y
N	31,457	5,889	5,889	300	300
Adj R^2	0.472	0.512	0.468	0.877	0.144

Table 9. Sustainability-linked loan (SLL) drawdowns

This table reports results from an examination of credit line drawdowns at the firm-year level as a function of SLL issuance. The key outcome variable of interest is the drawn portion of firm-level lines of credit, obtained from CapitalIQ and manually linked to the matched sample used for the stacked DID analysis in Table 6. The sample consists of borrowers that obtain revolving credit SLLs and their matched counterparts for which drawdown data are available. We drop term loan SLL borrowers from this analysis. In Panel A we report univariate statistics comparing shares of drawn down lines of credit between SLL borrowers and matched control firms prior to SLL issuance. Column 1 shows differences between high-transparency SLL borrowers and their matched control firms while column 2 shows differences between low-transparency SLL borrowers and their matched control firms. The t-statistics and P-values corresponding to the differences are also reported. Panel B shows results from stacked DID regressions of drawdown shares on $SLL\ borrower_i \times PostIssuance_{i,t}$, controlling for firm characteristics such as size, leverage, ROA, and Tobin's Q, as well as firm-by-matching cohort and year-by-matching cohort fixed effects. Columns 1 and 2 show results for the high- and low-transparency groups, respectively. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A. Drawdowns prior to SLL issuance

	Differences in Means: Share of drawn down lines of credit	
	High-transparency (N=215)	Low-transparency (N=76)
	(1)	(2)
SLL borrower	0.17	0.09
Matched controls	0.22	0.23
Difference	-0.05	-0.14**
t-statistics	-1.39	-2.57
P-value	0.17	0.01

Panel B. Drawdowns following SLL issuance

	Dependent variable: Share of drawn down lines of credit	
	High	Low
	(1)	(2)
SLL borrower × PostIssuance	-0.001	0.087
	(0.048)	(0.070)
Size	-0.048	0.026
	(0.130)	(0.172)
Leverage	-0.012	0.197
	(0.181)	(0.310)
ROA	-0.419	0.199
	(0.294)	(0.522)
Q	0.072***	-0.030
	(0.023)	(0.059)
Firm × Cohort FE	Y	Y
Year × Cohort FE	Y	Y
N	438	134
Adj. R^2	0.292	0.553

Table 10. Sustainability-linked loan (SLL) renegotiations

This table reports results from loan-level analysis comparing the likelihood of renegotiation between SLLs and matched control loans. The sample includes 1,671 SLL revolvers and their matched counterparts as constructed in Table 2. In Panel A we report results from a linear probability model where the dependent variable is a dummy variable indicating whether a revolver is renegotiated before maturity. The key explanatory variable is a dummy variable indicating whether a loan is an SLL. The results are reported separately for high- and low-transparency SLLs. In Panel B we report results on the relationship between the likelihood of SLL renegotiation and year-on-year changes in the borrower's ESG performance after issuance, denoted as ΔESG score. The analysis is restricted to the sample of SLL revolvers in this setting. The dependent variable is a dummy variable indicating whether an SLL is renegotiated before maturity. The results are reported separately for high- and low-transparency SLLs. In all regressions we control for the loan's facility amount, maturity, secured status, leveraged loan status, public listing status of the borrower, and the availability of the borrower's credit rating. The regressions also include country, industry, and year-of-issuance fixed effects. Standard errors clustered at the firm level are reported in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A. Likelihood of SLL renegotiation

	Dependent variable: I(Renegotiated before maturity)	
	High-transparency	Low-transparency
	(1)	(2)
SLL	0.008	0.010
	(0.032)	(0.040)
Controls	Y	Y
Country FE	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
N	1,067	590
Adj. R^2	0.202	0.171

Panel B. ESG performance and SLL renegotiation

	Dependent variable: I(SLL renegotiated before maturity)	
	High-transparency	Low-transparency
	(1)	(2)
ΔESG score	-0.010***	0.007
	(0.004)	(0.006)
Controls	Y	Y
Country FE	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
N	406	141
Adj. R^2	0.229	0.247

Table 11. Borrower stock returns around SLL issuance announcements

This table reports cumulative abnormal stock returns (CARs) of borrowers for various time windows around public announcements of SLL issuance. The sample consists of 814 SLL issuance events for which loan announcement dates can be identified through Factiva news searches and where 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 a facility start date in DealScan (see Maskara and Mullineaux, 2011). We manually refine these search results based on borrower company names and the content of the news articles. Finally, we 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 an SLL 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. In Panel A, we report average CARs around various event windows for subsamples of high-transparency (N=567) or low-transparency (N=247) SLLs and report the differences in means between the two subamples as well as the associated P-values. In Panel B, each SLL is matched to a conventional loan issued in the same country, industry, and year, with the same borrower public/private status and closest facility amount. For this matched sample, the loan-level CARs for various event windows are regressed on dummy variables indicating whether a loan is an SLL and/or in the high-transparency group, as well as their interactions. Following Billett et al. (2006), borrower and loan characteristics are included as controls, including market capitalization, market-to-book equity, logarithm of loan amount divided by market capitalization, and a dummy variable indicating whether the loan is secured. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A. Univariate statistics

Event window	High-transparency (N=567)		Low-transparency (N=247)		Difference	P-value
	CAR (%)	Std. Err.	CAR (%)	Std. Err.		
	(1)	(2)	(3)	(4)	(5)	(6)
[-1, 1]	0.175	0.112	-0.408*	0.215	0.583**	0.017
[-1, 2]	0.309**	0.141	-0.246	0.254	0.555*	0.057
[-1, 3]	0.478***	0.171	-0.546*	0.314	1.024***	0.004
[-1, 4]	0.538***	0.197	-0.877**	0.396	1.415***	0.001
[-1, 5]	0.453**	0.205	-0.921**	0.458	1.374***	0.006

Panel B. CAR regressions

	Dependent variable: CAR (%)				
	[-1, 1]	[-1, 2]	[-1, 3]	[-1, 4]	[-1, 5]
	(1)	(2)	(3)	(4)	(5)
SLL × High transparency	0.848*	0.793*	1.160**	1.471**	1.516**
	(0.433)	(0.460)	(0.528)	(0.640)	(0.677)
SLL	-0.687**	-0.471	-0.708	-0.518	-0.933
	(0.337)	(0.385)	(0.439)	(0.550)	(0.593)
High transparency	-0.336	-0.249	-0.208	-0.136	-0.202
	(0.359)	(0.360)	(0.387)	(0.464)	(0.455)
Controls	Y	Y	Y	Y	Y
N	1793	1794	1794	1794	1794
Adj R^2	0.001	0.008	0.007	0.010	0.008

Appendix

A.1 Variable Definitions

Variable	Definition	Data Source
SLL borrower	A cross-sectional dummy variable that equals one if the borrower is issued a sustainability-linked loan (SLL) at any time during the sample period.	DealScan
PostIssuance	An indicator variable that equals one for firm-year observations after the SLL issuance year and zero otherwise.	DealScan
SLL	A dummy variable that equals one if the loan is an SLL and zero otherwise.	DealScan
High-transparency SLL	An SLL for which we find public information regarding their KPI metrics or how they are tied to loan spreads.	Multiple sources (see Section A.3)
Low-transparency SLL	An SLL for which we do not find any public information regarding their KPI metrics or how they are tied to loan spreads.	Multiple sources (see Section A.3)
ESG score	A firm's overall ESG percentile rank score for a given year.	LSEG/Refinitiv ESG
Emission score	Percentile rank score reflecting a firm's efforts and effectiveness with respect to reducing environmental emissions	LSEG/Refinitiv ESG
Direct CO_2 emissions	Greenhouse gas emissions from sources that are owned or controlled by a firm divided by the firm's revenue	S&P Trucost Environmental
AISD	All-in-spread drawn in basis points. Loan spread over LIBOR (see Berg et al., 2017).	DealScan
TCB	Total cost of borrowing in basis points, including all fees associated with loans (see Berg et al., 2016).	DealScan
Shares of drawn down lines of credit	Drawn portion of firm-level lines of credit in a given year.	CapitalIQ
I(Renegotiated before maturity)	A dummy variable indicating whether a loan is renegotiated before maturity.	DealScan
Time to amendment / Time to maturity	The ratio of the time from issuance to amendment relative to the time from issuance to maturity.	DealScan
CAR	Cumulative abnormal stock returns of borrowers for different time windows around public announcements of SLL issuance, computed from a market model using the MSCI All Country World Equity Index as the market benchmark.	Compustat North America / Global Daily Stock Files
Size	The natural logarithm of total assets in $ million.	Worldscope
Leverage	Total debt over total assets.	Worldscope
ROA	Return on assets. Earnings before extraordinary items divided by lagged total assets.	Worldscope
Q	Tobin's Q. Market value of assets divided by book value of assets.	Worldscope

(continued)

Variable	Definition	Data Source
Log(Facility amount)	The natural logarithm of the facility amount in $ million.	DealScan
Log(Maturity)	The natural logarithm of maturity in months.	DealScan
Secured	A dummy variable indicating whether a loan is secured.	DealScan
Leveraged loan	A dummy variable indicating whether a loan is a leveraged loan.	DealScan
Publicly listed	A dummy variable indicating whether a borrower is publicly listed.	DealScan
Rated	A dummy variable indicating whether a borrower is rated.	DealScan
Revolver	An indicator variable that equals one if a facility type is described as one of the following: "364-Day Facility," "Revolver/Line<1 Yr.," "Revolver/Line>= 1 Yr.," "Revolver/Term Loan," "Demand Loan," or "Limited Line."	DealScan
Term Loan A	A dummy variable indicating whether a loan is a term loan A.	DealScan

A.2 Examples of SLL Contract Terms

Excerpt from SLL loan agreement: Crown Holdings Inc., 2019

> *"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% . . .*

Three KPIs in SLL: Johnson Controls International plc, 2019

- 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.

A.3 Definition of High- and Low-Transparency SLLs

We classify SLLs as "high-transparency" or "low-transparency" according to the following algorithm. First, we classify SLLs for which we do not find any public information regarding their KPI metrics or how they are tied to loan spreads as "low-transparency" loans. The remaining SLLs are classified as "high-transparency" loans, which have publicly available information indicating that loan spreads are linked to some measurable metric of ESG performance (e.g., CO_2 emissions per tonne of transported cargo per nautical mile, percentage of women in the workforce, Sustainalytics score).

In the absence of a standardized reporting system for the contractual details of SLLs, we collect all available information regarding these details from four data sources: (i) The deal and facility comment and pricing grid sections of LSEG Loan Connector's DealScan database, (ii) public media coverage on SLL issuances including media releases by either the borrower or bank, (iii) annual business reports issued by SLL borrowers, (iv) and ESG/sustainability reports issued by SLL borrowers.

First, we fully utilize all relevant information that can be obtained through LSEG Loan Connector's DealScan. DealScan 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 recorded and provided by DealScan pertaining to the ESG-related KPIs and pricing grids of SLLs.

Second, we conduct an extensive manual search of media releases related to the issuance of SLLs. Specifically, we utilize the search algorithm on Factiva by requiring that a news article contain the keywords "ESG" or "environmental" or "social" or "governance" or "sustainability" or "green," while also containing the keywords "credit" or "loan" or "borrow." This search algorithm yields an extensive set of articles that cover the intersection of ESG/sustainability and credit/borrowing. Since not all of these articles are related to the issuance of SLLs by our sample firms, we manually read through these articles to ascertain

whether an article contains information about the contractual details of SLLs. To ensure accurate matching between the news articles and our sample observations, we require the news date to fall within six-months before and two-months after the SLL facility start date (see Maskara and Mullineaux, 2011).

Third and fourth, we collect and parse corporate annual reports and ESG/sustainability reports to identify disclosures around SLL issuances. We first visit our sample firms' corporate websites and manually search for and download ESG/sustainability and annual reports under investor relations, sustainability tabs, media, or press sections. If a corporate ESG/sustainability report cannot be found on a company's website, we separately conduct a general online search using the company's name. To further ensure that we correctly map a given annual report or ESG/sustainability report to our sample observations, we require the SLL facility start date to fall within the document's reporting period. Corporate annual reports typically state the fiscal year-end for the firm's financial statements, which can be used to determine the reporting period. Corporate ESG/sustainability reports often, but not always, clearly lay out the reporting period. If an ESG/sustainability report does not specify its coverage period, we assume it aligns with the firm's fiscal year as denoted in its annual report. From the collected reports, we identify loan-related keywords such as "borrow," "credit fac," "credit line," "financing," "line of credit," "credit," "loan," or "rcf." For annual reports, we also identify sustainability-related keywords such as "ESG," "environmental," "green," "sustainability," "sustainable," "renewable energy," "energy efficiency," "biodiversity," "circular economy," "emission," "energy transition," "recycle," "recycling," "water," "social," or "affordable housing." We then manually extract information about SLLs' contractual details from paragraphs that contain the identified keywords or adjacent paragraphs.

Based on information collected from these data sources, we record eight indicator variables for each SLL facility: "vague," "kpi_e," "kpi_s," "target_e," "target_s," "reward," "penalty," and "thirdparty." The variable "vague" equals one if there is any publicly avail-

able information indicating that the loan is labeled as an SLL and zero otherwise. The variable "kpi_e" equals one if there is publicly available information on which measurable environmental KPIs determine the spread of a loan and zero otherwise. The variable "target_e" equals one if there is publicly available information on the aforementioned KPI's target value that triggers a loan spread reduction or increase and zero otherwise. The variables "kpi_s" and "target_s" are defined similarly, but based on information about an SLL's social KPI. The variables "reward" and "penalty" equal one if there is publicly available information regarding the magnitude of the loan spread reduction or increase contingent on meeting or missing a KPI target. The variable "thirdparty" equals one if there is publicly available information regarding whether a given KPI is based on a third-party rating metric and zero otherwise. Each of these ingredient variables are initially suffixed by the abbreviated name of the data source, "ds" for DealScan, "md" for media, "ar" for annual report, and "er" for ESG/sustainability report. Hence, we start with 32 (8×4) indicator variables, which are first consolidated into the eight ingredient variables. For instance, if any of "kpi_e_ds" or "kpi_e_md" or "kpi_e_ar" or "kpi_e_er" equals one, we set "kpi_e" to equal one.

We use these eight variables to tabulate the summary statistics for SLL disclosure quality in Table 3. We also consolidate the variables to construct our baseline "high-" and "low-transparency" dummy variables, according to our own scoring system. We assign each loan a disclosure score ranging from one (1) to five (5). All SLLs start with a disclosure score of one. An SLL where "vague"=1 but all other seven indicator variables are zero is assigned a disclosure score equal to two. An SLL where either "kpi_e"=1 or "kpi_s"=1 is assigned a disclosure score of three. An SLL where not only "kpi_e"=1 or "kpi_s"=1 but also "target"=1 or "reward"=1 or "penalty"=1 is assigned a disclosure score of four. An SLL where not only "kpi_e"=1 or "kpi_s"=1 but also "target"=1 AND "reward"=1 or "penalty"=1 is assigned a disclosure score of five.

Finally, according to our definition, an SLL is defined as "high-transparency" if it has a

disclosure score of three or higher and conversely defined as "low-transparency" if it has a disclosure score of two or lower. Below are some examples of high- and low-transparency SLLs.

A.3.1 Examples of High-Transparency SLLs

Dürr AG

In 2019, the German mechanical and plant engineering firm Dürr AG secured a EUR 200 million sustainability-linked "Schuldschein" loan and EUR 750 million syndicated SLL, both of which have interest rates pegged to a third-party sustainability rating assigned by the rating agency EcoVadis. At the time of issuance, the company had a sustainability score of 55 points according to EcoVadis. If the company improved its score to at least 62 points, it would reduce its interest rate by 2 basis points. If, on the other hand, its sustainability score dropped to 40 points or less, the interest rate would increase accordingly by 2 basis points. All of this information regarding the exact KPIs as well as the targets and penalties/rewards were fully disclosed in the public announcement made by Dürr regarding the SLL. Below is a snapshot of the firm's public announcement.

Cogeco Inc.

In 2021, the Canadian telecommunications and media company Cogeco Inc. amended and extended two of its revolving credit facilities to 2027, at CAD 750 million and CAD 100 million. The two facilities were converted to SLLs, with CIBC acting as the lead sustainability structuring agent. The SLLs included pricing terms contingent on meeting two KPI targets: (i) Annual scope 1 and 2 greenhouse gas emissions reduction targets aligned with the Science-Based Target Initiative (SBTi) approved reduction target of 65% by 2030; (ii) Digital inclusion initiative to provide 75,000 homes in under-served areas of Canada with access to high-speed Internet service over a three-year period. While the details of the pricing terms were not publicly disclosed, the above KPIs were clearly indicated in the company's public announcement regarding the SLL. Below is a snapshot of the firm's public announcement.

A.3.2 Examples of Low-Transparency SLLs

AU Optronics Corp

In 2019, the Taiwanese display manufacturer AU Optronics signed a three-year, NTD 2 billion SLL with DBS Bank Limited. While the loan was publicized in the media as an SLL whose interest rates would be pegged to sustainability performance targets, the details regarding the sustainability-linked contractual features such as the exact KPIs or the magnitudes of the interest rate adjustments were not publicly disclosed. Below are snapshots of the public announcements regarding the SLL.

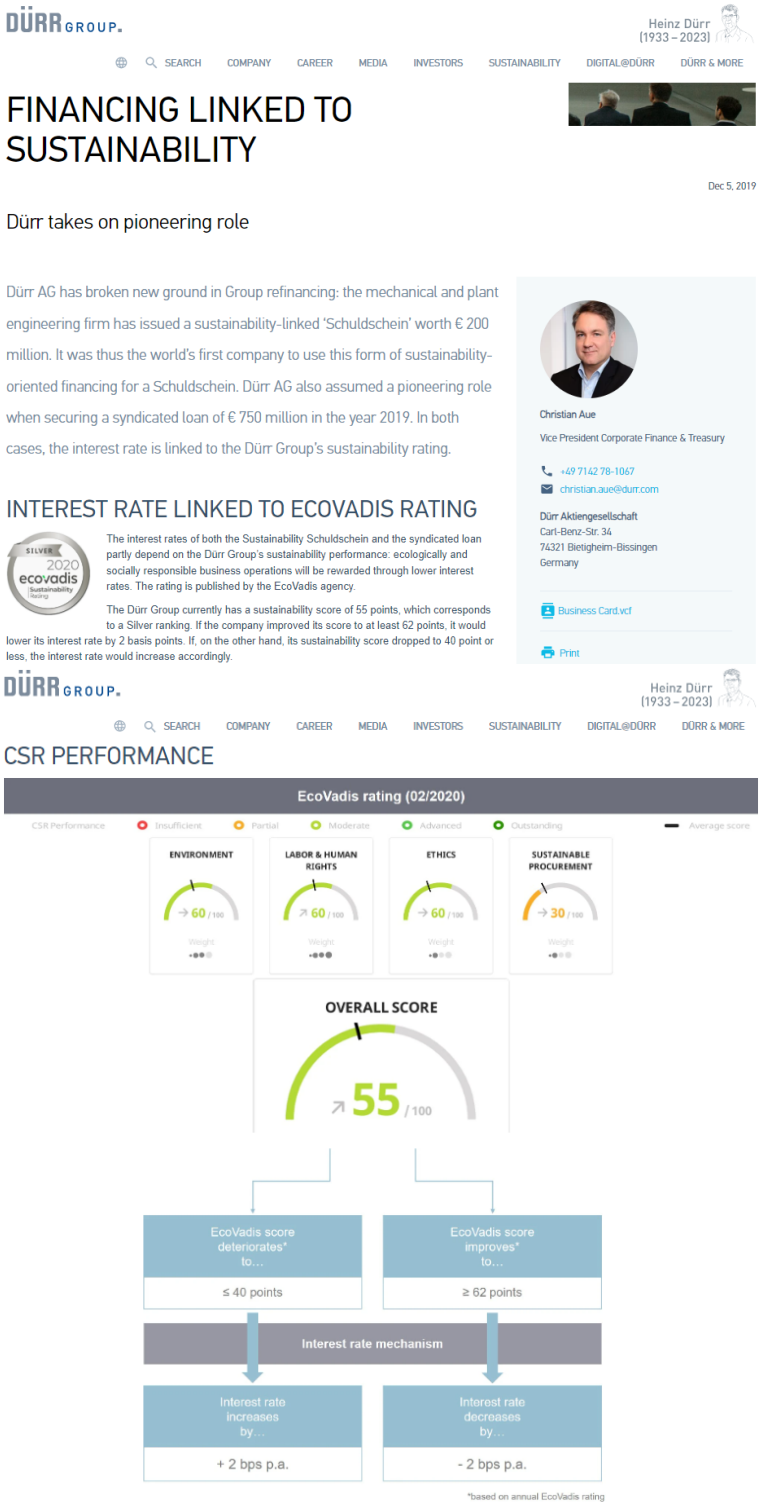
3i Infrastructure plc

At the end of 2021, 3i Infrastructure, an investment trust listed on the London Stock Exchange, refinanced its revolving credit facility as a GBP 900 million SLL, maturing in 2026. The loan was syndicated by a group of banks including Lloyds Bank plc as the facility agent. While the loan was publicized by 3i as an SLL in its investor relations statement and sustainability report, the details regarding the sustainability-linked contractual features such as the exact KPIs or the magnitudes of the interest rate adjustments were not publicly disclosed. Below are snapshots of the public announcements regarding the SLL.

Swisscom AG

In 2021, Swisscom AG, a major telecommunications provider in Switzerland, renewed one of its CHF 1 billion credit lines into an SLL, maturing in 2026. While the firm's annual report states that the amount of the credit margin on this line is linked to the achievement of defined sustainability targets by Swisscom, the details regarding the sustainability-linked contractual features such as the exact KPIs or the magnitudes of the interest rate adjustments were not publicly disclosed. Below is a snapshot of the annual report's description regarding the SLL.

Figure A.1. Public Announcement of SLL Issuance by Dürr AG



DÜRR GROUP.

Heinz Dürr (1933 – 2023)

SEARCH COMPANY CAREER MEDIA INVESTORS SUSTAINABILITY DIGITAL@DÜRR DÜRR & MORE

FINANCING LINKED TO SUSTAINABILITY

Dec 5, 2019

Dürr takes on pioneering role

Dürr AG has broken new ground in Group refinancing: the mechanical and plant engineering firm has issued a sustainability-linked 'Schuldschein' worth € 200 million. It was thus the world's first company to use this form of sustainability-oriented financing for a Schuldschein. Dürr AG also assumed a pioneering role when securing a syndicated loan of € 750 million in the year 2019. In both cases, the interest rate is linked to the Dürr Group's sustainability rating.

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INTEREST RATE LINKED TO ECOVADIS RATING

SILVER 2020 ecovadis Sustainability Rating

The interest rates of both the Sustainability Schuldschein and the syndicated loan partly depend on the Dürr Group's sustainability performance: ecologically and socially responsible business operations will be rewarded through lower interest rates. The rating is published by the EcoVadis agency.

The Dürr Group currently has a sustainability score of 55 points, which corresponds to a Silver ranking. If the company improved its score to at least 62 points, it would lower its interest rate by 2 basis points. If, on the other hand, its sustainability score dropped to 40 point or less, the interest rate would increase accordingly.

DÜRR GROUP.

Heinz Dürr (1933 – 2023)

SEARCH COMPANY CAREER MEDIA INVESTORS SUSTAINABILITY DIGITAL@DÜRR DÜRR & MORE

CSR PERFORMANCE

Figure A.2. Public Announcement of SLL Issuance by Cogeco Inc

Cogeco Transitions its Term Revolving Facilities into the First Syndicated Sustainability-Linked Loans in Canada within the Telecommunications and Media Sectors

MONTREAL, Dec. 17, 2021 /CNW Telbec/ - Cogeco Inc. (TSX: CGO) and Cogeco Communications Inc. (TSX: CCA) are pleased to announce the amendment and extension of their Term Revolving Facilities. Cogeco Communications Inc.'s $750 million Term Revolving Facility is extended to January 24, 2027 and Cogeco Inc.'s $100 million Term Revolving Facility to February 3, 2027. As part of the amendments, Cogeco and Cogeco Communications have transitioned the revolving facilities into a Sustainability-linked loan ("SLL") structure, underscoring Cogeco's strong leadership and dedication to sustainability and the organization's Environmental, Social and Governance (ESG) goals.

These facilities represent the first syndicated Sustainability-linked loans in Canada within the telecommunications and media sectors.

The SLL facilities incorporate ESG-linked incentive pricing terms which reduce or increase the cost of funding, depending on the annual performance against the following of Cogeco's targets:

- **GHG annual emissions reduction targets** which are aligned with the Science-Based Target Initiative (SBTi) approved Scope 1 and 2 GHG reduction target of 65% by 2030.
- **Digital inclusion initiative** to provide 75,000 homes in unserved and underserved areas of Canada with access to high-speed Internet service over a three-year period. Annual targets have been defined over that period.

Additionally, Cogeco will dedicate any savings achieved from the SLL towards internal sustainability initiatives.

"The SLL structure reflects goals which are at the core of our ESG mission, and represents material topics that matter to our stakeholders. Cogeco is determined to demonstrate strong and inspiring leadership and take concrete steps to address climate change and support the closing of the digital divide," said Patrice Ouimet, Senior Vice-President and Chief Financial Officer.

CIBC acted as the Sole Sustainability Structuring Agent, Joint-Bookrunner, Co-Lead Arranger, and Administrative Agent for the Term Revolving Facility of Cogeco Communications Inc., along with BMO Capital Markets and National Bank Financial Markets as the Co-Sustainability Coordinators, Joint-Bookrunners and Co-Lead Arrangers. CIBC acted as the Sole Sustainability Structuring Agent, Joint-Bookrunner, and Co-Lead Arranger for the Term Revolving Facility of Cogeco Inc, along with Scotiabank as the Joint-Bookrunner, Co-Lead Arranger and Administrative Agent.

Figure A.3. Public Announcement of SLL Issuance by AU Optronics Corp

DBS

DBS Bank and AU Optronics sign Taiwan's first sustainability-linked loan

Taiwan, Singapore, 21 May 2019 - DBS Bank Taipei Branch signed a three-year, NTD 2 billion (SGD 88 million) sustainability-linked loan with AU Optronics, marking a milestone for sustainable development in Taiwan. This is the first sustainability-linked loan in Taiwan and the first of its kind for an IT company in Asia Pacific. The loan was evaluated based on a series of environmental, social and governance (ESG) performance metrics.

DBS is partnering with customers to remain at the forefront of their industries, as sustainability considerations are gaining more attention globally. By launching Taiwan's first sustainability-linked loan, which pegs the interest rate to sustainability performance targets, the bank hopes to encourage more customers to build businesses that will leave a positive impact for the future.

AU Optronics has always been committed to supporting sustainable development. It has been listed on the Dow Jones Sustainability Index (DJSI) for nine consecutive years. It is also on the MSCI World ESG Leaders Index and the FTSE4Good Index. In addition, it has been ranked among the top 5% in Taiwan Stock Exchange's Corporate Governance evaluation. AUO has an excellent performance track record in diversified areas such as corporate governance, environmental sustainability, science education, culture preservation, social citizenship and inclusive workplace. Being the first to sign the sustainability-linked loan with DBS Bank Taipei Branch, AUO is cementing its commitment to adopting a sustainable approach to business operations and being a role model for Taiwanese companies in this area.

Lim Him Chuan, General Manager of DBS Bank (Taiwan), said that there is a growing trend for corporates to adopt more sustainable practices in their business operations. While seeking business growth, they are also considering social, environmental and governance factors. In 2018, DBS Group inked four sustainability performance-linked loans amounting to over SGD 600 million, demonstrating the bank's commitment to sustainability while offering financial innovation to customers.

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Wed, May 22, 2019 page12

DBS, AUO ink nation's first sustainability-linked loan

By Kao Shih-ching / Staff reporter

DBS Bank Taiwan (星展銀行) has inked a NT$2 billion (US$63.57 million) loan agreement with AU Optronics Corp (AUO, 友達光電), with interest rates set to move lower next year if the panel maker's sustainability performance improves, the bank said yesterday.

The loan is the first sustainability-linked loan in Taiwan, DBS said in a statement.

The core value of a sustainability-linked loan is to provide an effective incentive for companies to advance their environmental, social and governance (ESG) programs, DBS head of institutional banking group Tony Luo (羅綸有) said in the statement.

Companies hoping to apply for a loan would be evaluated by an independent third-party agency based on the applicant's ESG performance, Luo said.

If the results of the review meet or exceed the ESG targets set by DBS, the borrower's interest rate would be reduced, Luo said.

In AUO's case, DBS has set the targets after discussions with the company and would check if the borrower meets those targets next year, the bank said.

Given that AUO has already performed well in terms of corporate governance, environmental sustainability, science education, culture preservation, social citizenship and inclusive workplace, it would be hard for the company to make a big leap, so DBS has set reasonable objectives, it said.

As the first in Taiwan to sign a sustainability-linked loan, AUO is cementing its commitment to adopting a sustainable approach to business operations and being a role model for Taiwanese companies in this area, DBS Taiwan general manager Lim Him Chuan (林鑫川) said.

Figure A.3. Public Announcement of SLL Issuance by AU Optronics Corp (Continued)

DBS 星展銀行

Project Commitment to Sustainable Development Goals (SDGs)

INTRODUCTION

Sustainability at DBS is about being purpose-driven and taking a balanced approach to creating a better future for the next generation. DBS has actively championed the sustainability agenda through three pillars, which are Responsible Banking, Responsible Business Practices, and Creating Impact Beyond Banking. As the pioneer in driving sustainability awareness in Taiwan, DBS continues to deliver responsible financing with environmentally and socially impactful offerings. DBS focuses on renewable financing and provides sustainability-linked loans and green financial advisory for solar farm and wind farm clients. Meanwhile, DBS also issues an environmentally friendly credit card(eco card) for both consumer banking and institutional banking clients. DBS is committed to realizing clients' aspirations and creating greater positive impacts for society and the environment on the sustainability agenda through green finance.

FRAMEWORK AND STRATEGY

DBS' green financing plays a vital role to support sustainable development for a better future. DBS supports clients who are actively creating a positive impact by providing them financial advisory, sustainability-linked loans or syndicated loans, and other suitable green products with its Institutional Banking Group services. In Taiwan, DBS actively addresses environmental, social, and corporate governance (ESG) challenges by providing diversified financial practices to its clients and encouraging them to lead the change with DBS. DBS is the market pioneer in sustainability-linked loans. DBS Bank Taipei Branch signed a three-year, NTD2 billion (USD60 billion) sustainability-linked loan with AU Optronics, marking a milestone for sustainable development in Taiwan. With years of diligence and perseverance, DBS Taiwan has successfully completed several types of green financing transactions including sustainability-linked loans, solar farms, offshore wind farms as well as sewage treatments.

ACHIEVEMENT AND IMPACT

DBS Taiwan continues to demonstrate its commitment to sustainability in Taiwan. Riding on the robust renewable energy projects stimulated by government policy and the growing attention on sustainability in the business community, DBS Taiwan has completed various types of green financing transactions with a total amount of USD2.6 billion as of March 2022. DBS is committed to realizing clients' aspirations and creating greater positive impacts on society and the environment. DBS offers 11 sustainability-linked Loans (SSL), including AUO – the first SSL in Taiwan, TSMC – the biggest SLL (EUR1000 million) with the longest tenor (3-year) in Taiwan, Formosa, Wistron, and WPG. DBS has 7 solar projects, including Chenya Energy's floating solar plant financing (180MW) – the largest floating solar station in the world, and Marubeni solar plant financing (75MW). DBS also has 4 offshore wind farm project finance deals, including Formosa 1 (128MW) – the first offshore wind farm in Taiwan, CIP (589MW), Yunneng Yunlin (640MW), and Vena Energy (70MW). Additionally, DBS has 2 sewage treatment deals.

Figure A.4. Public Announcement of SLL Issuance by 3i Infrastructure plc

3i Infrastructure

About us ▾ Portfolio ▾ Investors ▾

The Company has a £900 million revolving credit facility ("RCF") in order to maintain a good level of liquidity for further investment whilst minimising returns dilution from holding excessive cash balances.

The RCF, which was refinanced in July 2022, comprises a base facility of £600 million and commitments under an accordion facility of £300 million. The RCF matures in November 2026.

The new facility is a sustainability-linked RCF; it includes stretching targets across Environmental, Social and Governance themes aligned with the Company's purpose. Performance against these targets will adjust the margin for the subsequent year.

The details of the sustainability-linked RCF are as follows:

Borrower: 3i Infrastructure plc

Committed: £900 million

Maturity: November 2026

Type: Multi-currency (£, €, US$) revolving credit facility secured by a floating charge over the bank accounts of the Company

Margin: 1.50% over SONIA, EURIBOR, SOFR

Financial covenants: loan to value covenant

Arranged by:

Barclays Bank plc
Industrial and Commercial Bank of China Limited, London Branch
Lloyds Bank plc
Natwest Markets plc
National Australia Bank Limited
Royal Bank of Canada
Skandinaviska Enskilda Banken AB
Sumitomo Mitsui Banking Corporation

Facility Agent: Lloyds Bank plc

Sustainability report continued

3i Infrastructure plc Annual report and accounts 2022 47

Our influence and approach to ESG management

Individual portfolio company ESG-related performance is monitored on a regular basis and progress towards a broad set of objectives is reviewed in detail each year using the Investment Manager's proprietary ESG assessment tool, as shown on page 48. The Investment Manager completes this assessment for all economic infrastructure investments in the portfolio and prepares and prioritises, alongside management, an action plan for the business based on the recommendations from this assessment. ESG value creation opportunities are also reviewed and prioritised with the portfolio company management teams. Management incentives are aligned with achievement of these plans, where appropriate.

At the start of this financial year the Board of Directors and the Investment Manager set several specific sustainability objectives, with the desire to take a big step forward in this area. We are pleased to have met all of these objectives, as set out in the table opposite.

For further information
www.3i-infrastructure.com/sustainability

Category	Outcome
Greenhouse gas emissions	We supported portfolio companies with implementing GHG emissions reporting and worked with a third-party specialist firm to review and refine the data and calculations, ensuring the methodologies and results are robust, consistent across the portfolio and reflect best practice for GHG accounting. Scope 1 and Scope 2 GHG emissions for each portfolio company are presented in our TCFD disclosures on page 55. We are now working with portfolio companies to consider potential opportunities to reduce their GHG emissions over time.
Investment process	The Investment Manager introduced an ESG assessment earlier in its investment process in order to assess the potential ESG risk of early-stage investment opportunities and identify where specialist due diligence may be required.
Climate scenario analysis	The Investment Manager developed its approach to climate scenario analysis, in line with the TCFD's recommendations, to help it assess the impacts on our portfolio companies from different climate-related scenarios. This analysis is discussed in more detail in our TCFD disclosures on pages 51 to 55.
Governance and reporting	We continued to assess ESG and climate-related reporting frameworks and evolved the Company's risk governance to incorporate different climate-related risks.
Suppliers	We set a policy outlining the minimum sustainability standards the Company will expect from its suppliers and assessed our current key suppliers against these criteria.
Financial agreements	In November 2021 we refinanced the Company's revolving credit facility ('RCF') as a sustainability-linked RCF. The new facility follows the Loan Market Association's Sustainability Linked Loan Principles and includes stretching targets across Environmental, Social and Governance themes aligned with our purpose. During the year, the Company also entered into sustainability-linked FX hedging agreements with some of its hedge counterparties. The Company can receive 'sustainability rebates' dependent on meeting the same sustainability targets as set for the Company's RCF. We are also considering the appropriateness of sustainability-linked credit facilities across the portfolio. ESVAGT has recently signed a facility with ESG targets across several themes aligned with its sustainability strategy.

Review of Investments and Sustainability

Figure A.5. Public Announcement of SLL Issuance by Swisscom AG

Credit lines

Swisscom has two confirmed lines of credit. In 2021, one line of credit was increased from CHF 1,000 million to CHF 1,200 million and the maturity date was extended to 2026. The second line of credit of CHF 1,000 million was converted in 2021 into a sustainability linked loan with a maturity date in 2026. The amount of the credit margin is linked to the achievement of defined sustainability targets by Swisscom. The two confirmed lines of credit are affected by the Interest Rate Benchmark Reform (known as the IBOR Reform). In Switzerland, the changeover from the reference interest rate LIBOR to SARON is taking place. In the course of the renewal or conversion of the lines of credit, the reference interest rate for CHF was also changed from LIBOR to SARON in each case. As of 31 December 2021, none of these lines of credit had been drawn down, as in the prior year.

Bank loans

					Carrying amount	
In CHF million	Maturity years	Par value in currency	Nominal interest rate	Effective interest rate	**31.12.2021**	31.12.2020
Bank loans in CHF [1]	2020–2021	199	0.00%	0.00%	–	199
Bank loans in EUR [1, 3]	2021–2023	200	Euribor +0.63%	0.10%	207	–
Bank loans in EUR [2, 3]	2017–2024	150	0.67%	0.67%	155	163
Bank loans in USD [2]	2009–2028	58	8.30%	4.62%	68	66
Bank loans in USD [2]	2009–2028	51	7.65%	4.63%	58	56
Total bank loans					**488**	**484**

1 Variable interest-bearing.
2 Fixed interest-bearing.
3 Designated for hedge accounting of net investments in foreign operations.

As of 31 December 2021, Swisscom had not taken on any short-term bank loans on a weekly or monthly basis (prior year: CHF 199 million). In the second quarter of 2021, Swisscom took on a bank loan of EUR 200 million (CHF 207 million), maturing in 2023. The funds received were used to repay existing debt. Bank loans to the value of EUR 350 million (CHF 362 million) may become due for immediate repayment if the shareholding of the Confederation in the capital of Swisscom falls below one third, or if another shareholder can exercise control over Swisscom.

Internet Appendix

for "ESG Lending"

IA.1 Analysis of Green Loans

Figure IA.1. Green loans by region

This figure presents the annual issuance amounts of green loans by region from 2016 to 2021. The sample consists of 1,532 green loan facilities in DealScan. For each year the left, middle, and right bars indicate the total issuance amounts of green loan facilities issued in Europe, North America, and the rest of the world, respectively.

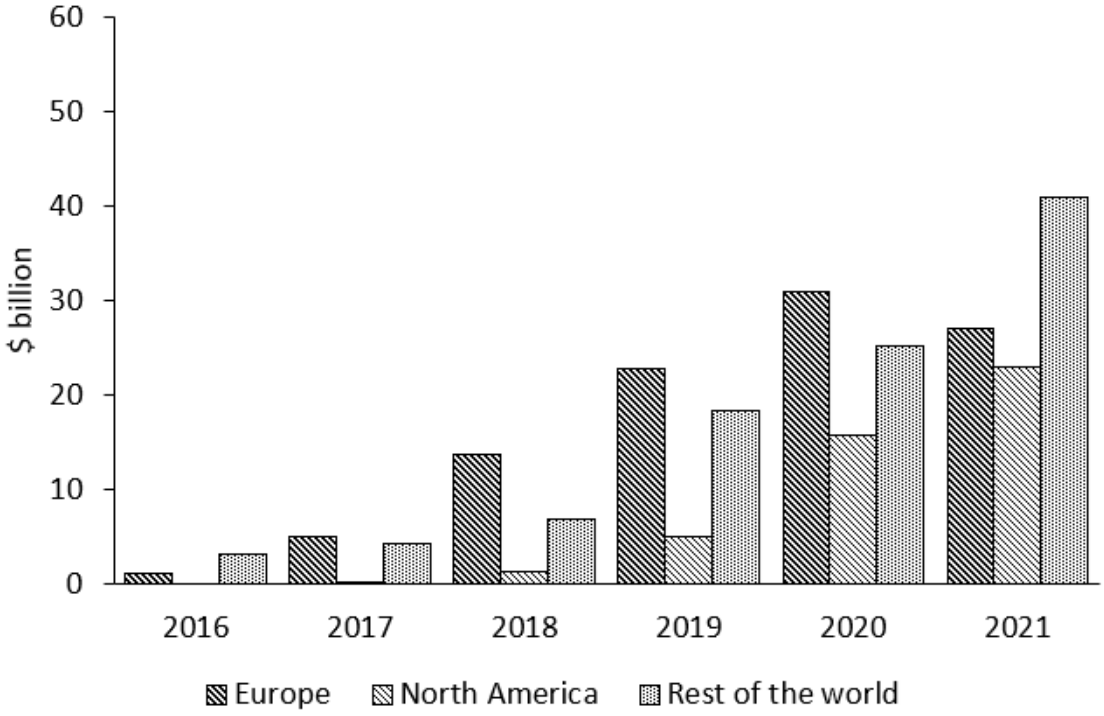


Table IA.1. Green loan borrower and loan characteristics

This table presents univariate comparisons of green loans 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 consisting exclusively of non-ESG facilities. The sample consists of 1,532 green loan facilities and 87,652 non-ESG control facilities. Panel A shows the number of packages and facilities (i.e., # package and # facility) for the sample of green loans and control loans, the average borrower's sales in each facility group at the time of closing of a loan deal (i.e., Sales at close ($ million)), the fraction of publicly listed borrowers in each facility group (i.e., Public firm), 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 green loan facilities and non-ESG control facilities as well as their associated p-values (i.e., Green − Control, and P-value). In Panel B, we match each 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 800 green packages and 817 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 borrower's sales 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 green loans 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), those comprised entirely of revolving credit facilities (i.e., Only revolver), those comprising 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 green loan and control packages as well as their p-values (i.e., Green − Control, and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Unconditional comparisons

	Green (1)	Control (2)	Green − Control (3)	P-value (4)
# package	803	50,308		
# facility	1,532	87,652		
Sales at close ($ million)	4,682.97	6,321.07	-1,638.10**	0.03
Public firm	0.10	0.21	-0.12***	0.00
Deal size ($ million)	538.71	502.63	36.09*	0.09
Facility amount ($ million)	160.59	254.34	-93.75***	0.00
Maturity (months)	102.04	61.04	41.00***	0.00
Term loan A	0.54	0.42	0.11***	0.00
Institutional term loan	0.01	0.07	-0.06***	0.00
Revolver	0.19	0.38	-0.19***	0.00
Leveraged	0.02	0.27	-0.25***	0.00
Investment grade	0.06	0.12	-0.06***	0.00

(continued)

Table IA.1. Green loan borrower and loan characteristics (continued)

Panel B: Package-level matching by deal size, country, industry, year, and public-private status				
	Green (1)	Control (2)	Green - Control (3)	P-value (4)
# package	800	817		
Sales at close ($ million)	4,654.57	4,031.09	623.48	0.63
Deal size ($ million)	327.98	307.83	20.15	0.35
Fraction of ESG loan within package	0.96	0.00		
Fraction of revolver	0.19	0.36	-0.18***	0.00
Fraction of term loan A	0.60	0.47	0.13***	0.00
Packages composed of				
Only term loan A	0.44	0.35		
Only revolver	0.12	0.27		
Term loan A + Revolver	0.15	0.18		
Others	0.29	0.20		

Table IA.2. Structure of green loan syndicates

This table documents the syndicate structure of green loans in comparison with the syndicate structure of control non-ESG loans matched on country, industry, year, borrower public-private status, and facility size. For each group we report 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 that are lenders with prior ESG lending history (i.e., ESG-experienced lender), lenders that 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), lenders domiciled in countries that are not the borrower's country of incorporation (i.e., Foreign lender), lenders that have prior lending relationships with the borrowers over the previous five years (i.e., Relationship lender), and lenders that are relationship ESG-experienced lenders, relationship reputable lenders, or relationship foreign lenders. The bottom row shows the number of loan facilities in each group. The table also shows the differences between green loan facilities and their matched counterparts, along with the associated p-values (i.e., Green − Matched, and P-value). *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

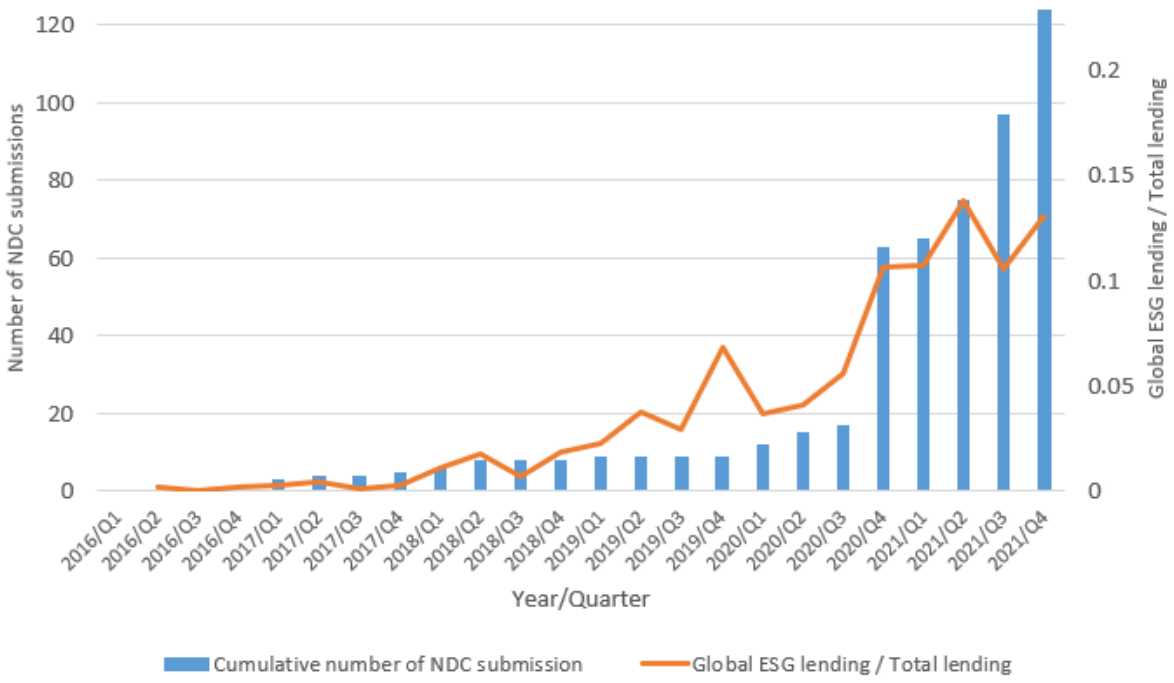
	Green (1)	Matched (2)	Green − Matched (3)	P-value (4)
# lead arranger	5.00	2.95	2.05***	0.00
ESG-experienced lender	4.73	2.57	2.17***	0.00
	[0.93]	[0.83]	0.10***	0.00
Reputable lender	4.00	2.20	1.80***	0.00
	[0.80]	[0.70]	0.09***	0.00
Foreign lender	3.44	1.48	1.96***	0.00
	[0.58]	[0.39]	0.18***	0.00
Relationship lender	0.92	1.07	-0.15*	0.07
	[0.17]	[0.33]	-0.16***	0.00
Relationship ESG-experienced lender	0.89	0.99	-0.10	0.20
	[0.17]	[0.30]	-0.13***	0.00
Relationship reputable lender	0.83	0.90	-0.08	0.31
	[0.16]	[0.27]	-0.12***	0.00
Relationship foreign lender	0.62	0.47	0.15**	0.02
	[0.10]	[0.10]	-0.01	0.33
Number of facilities	1,517	1,895		

IA.2 Additional Figures and Tables

Figure IA.2. 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 A: Global aggregate trends



Panel B: Average country-level ESG lending around NDC submissions

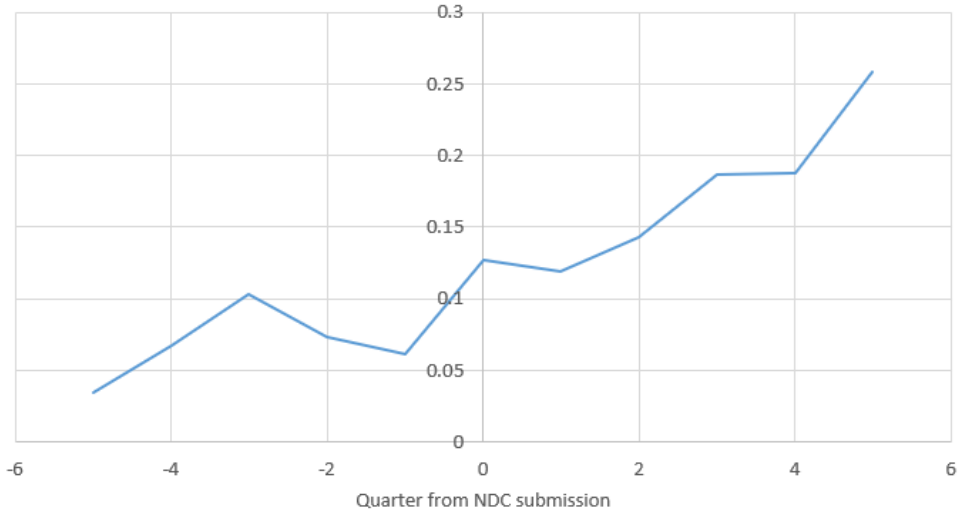


Figure IA.3. High- and low-transparency sustainability-linked loans (SLLs) by region

This figure plots the mix of high- and low-transparency SLL issuance by region from 2016 to 2021. The sample consists of 1,831 SLL facilities in DealScan. For each region, the bars indicate the aggregate shares of high- and low-transparency SLLs as a percentage of all SLL issuance during this period.

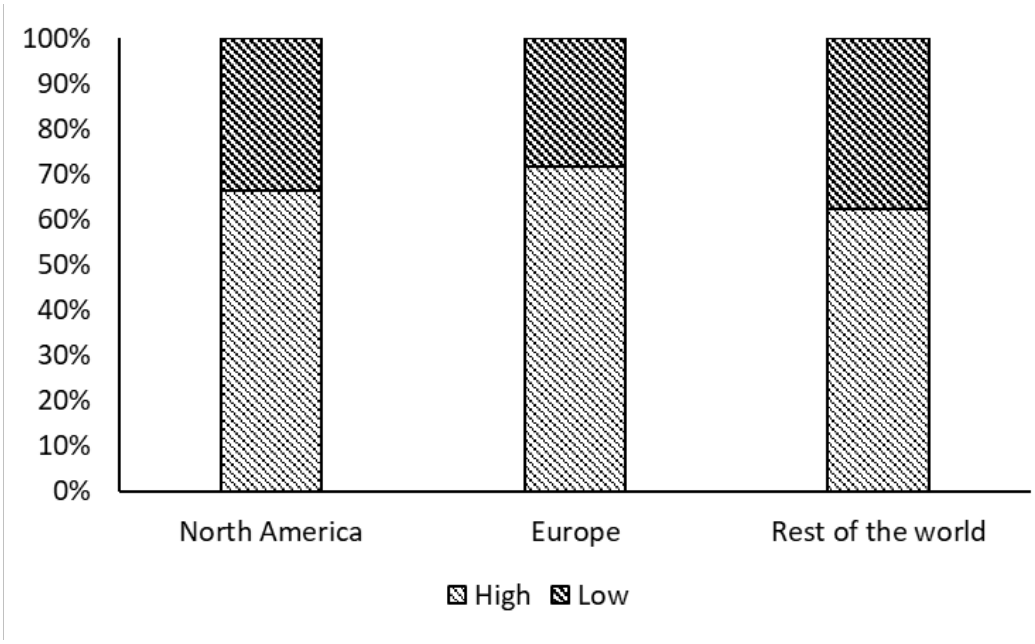
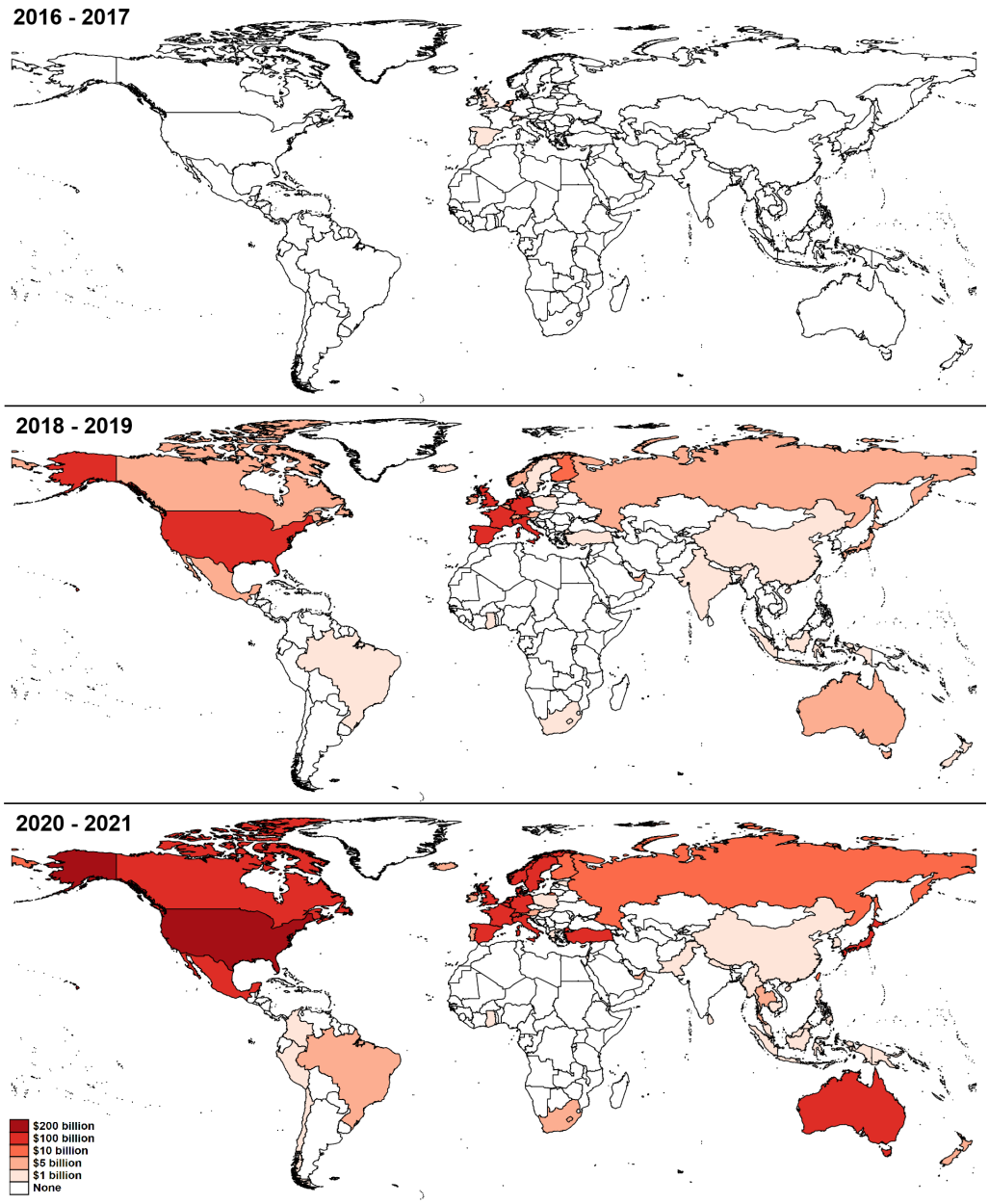


Figure IA.4. Evolution of ESG lending around the world

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 2021. The samples consist of 1,831 sustainability-linked and 1,532 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 two-year periods are noted in the top left corner of each map.

Panel A: Sustainability-linked loans



(continued)

Figure IA.4. Evolution of ESG lending around the world (continued)

Panel B: Green loans

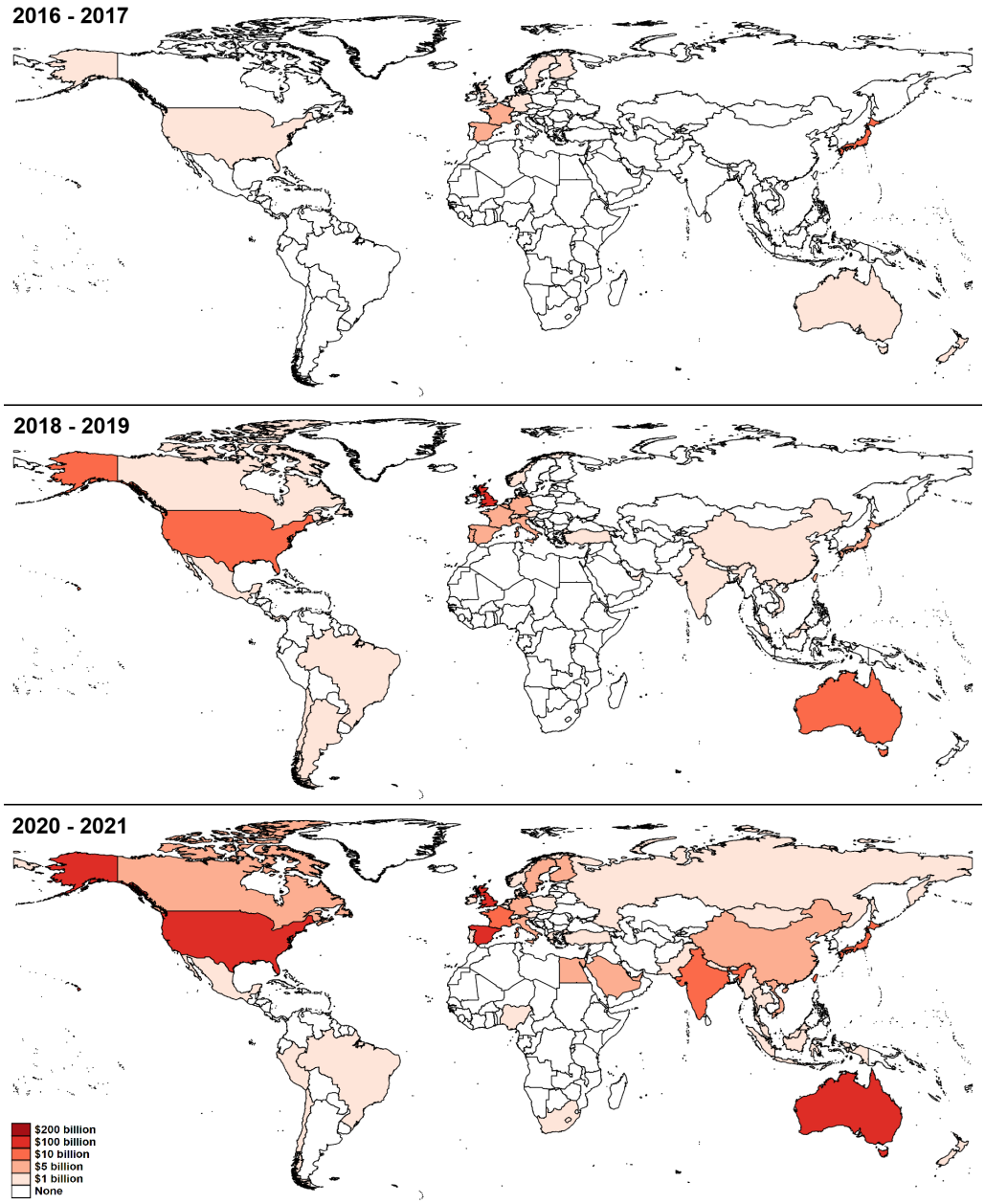
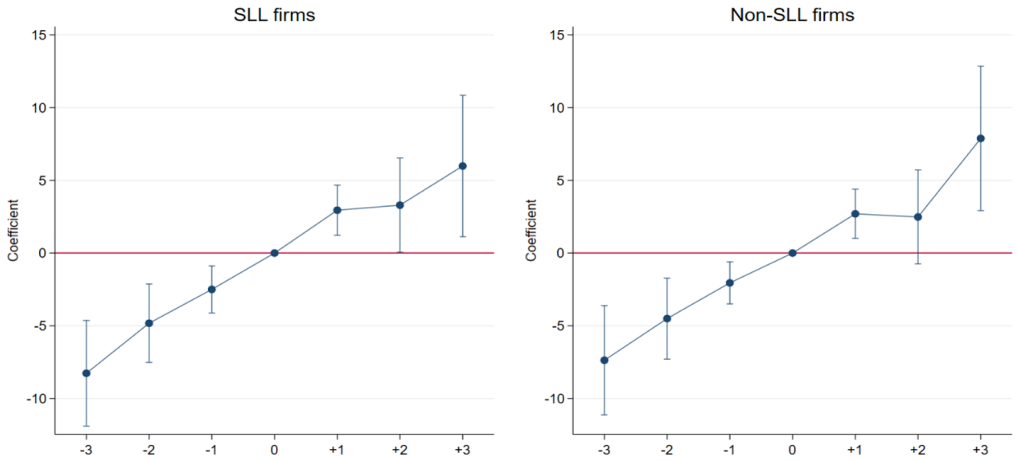


Figure IA.5. ESG score dynamics for SLL borrowers and matched firms, separately for high- and low-transparency groups

These figures plot coefficients on event time dummy variables indicating years from the SLL issuance year (or pseudo-event year for matched control firms), along with standard error bars around the point estimates. Following Flammer (2021), each SLL borrower is matched to a never-SLL borrower control firm in the same country and industry with the closest propensity score as of the year before SLL issuance. The propensity scores are computed from a logistic regression of SLL borrower status on firm size, leverage, ROA, Tobin's Q, ESG score, and the year-on-year growth of these variables. We then stack SLL borrowers and control firms within each matching cohort, over the years –3 to +3 with respect to the SLL issuance year (or pseudo-issuance year for the control firm). The sample consists of 305 (130) high-transparency (low-transparency) SLL borrowers and 198 (84) matched control firms, where a given control firm is allowed to be matched to multiple SLL borrowers. The dependent variable is the LSEG/Refinitiv ESG score. Panel A (B) plots ESG score dynamics separately for subsamples of high-transparency (low-transpatency) SLL borrowers and their matched counterparts. Standard errors are clustered at the firm level.

Panel A. High-transparency group



Panel B. Low transparency group

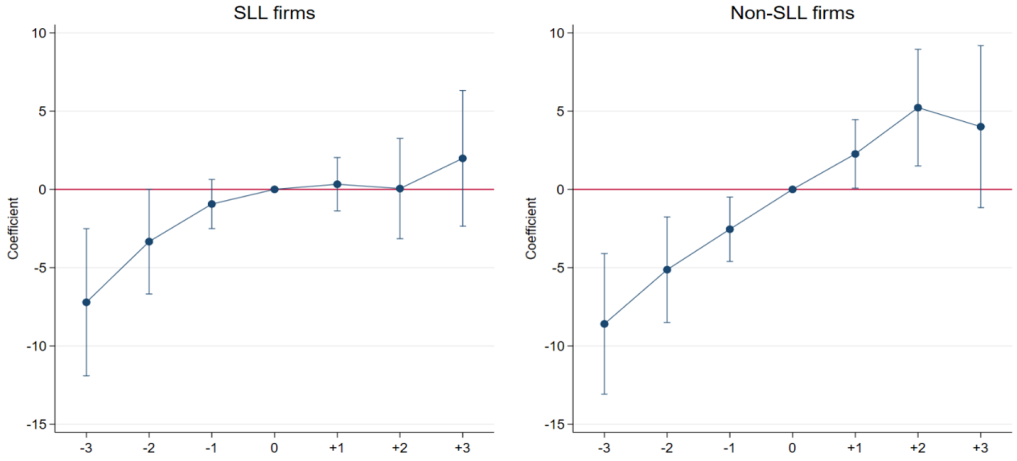


Table IA.3. ESG lending by country

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 1,831 SLLs and 1,529 green loans issued from 2016 to 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	433	267.70	United States	188	226.51	United States	245	41.19
France	242	127.05	France	182	112.43	United Kingdom	111	35.52
United Kingdom	225	109.30	United Kingdom	114	73.78	Spain	140	18.56
Spain	391	83.71	Germany	142	70.41	Australia	100	17.19
Germany	188	76.76	Italy	79	67.07	Japan	256	16.74
Italy	144	74.23	Spain	251	65.15	Singapore	82	15.50
Netherlands	81	56.89	Netherlands	66	55.52	France	60	14.62
Singapore	166	45.23	Singapore	84	29.73	Hong Kong	62	13.06
Australia	164	32.62	Canada	42	24.16	Taiwan	66	11.66
Japan	327	32.31	Sweden	29	24.11	Italy	65	7.16
Hong Kong	131	30.69	Belgium	22	18.92	Germany	46	6.35
Sweden	55	27.90	Switzerland	30	17.88	India	39	5.51
Canada	62	27.06	Denmark	14	17.79	Saudi Arabia	5	4.99
Belgium	35	20.93	Hong Kong	69	17.63	United Arab Emirates	14	3.97
Taiwan	110	20.78	Norway	19	16.46	Sweden	26	3.79
Switzerland	31	18.03	Japan	71	15.57	Canada	20	2.90
Denmark	17	17.95	Australia	64	15.43	Luxembourg	14	2.90
Norway	26	17.14	Mexico	13	13.29	Portugal	6	2.90
Finland	44	14.89	Finland	33	12.28	Finland	11	2.61
Mexico	16	13.89	Turkey	39	11.03	Belgium	13	2.01
Luxembourg	28	12.90	Luxembourg	14	10.00	China	12	1.62
Turkey	42	11.49	Taiwan	44	9.12	Egypt	1	1.50
United Arab Emirates	26	10.72	Ireland	9	8.96	Netherlands	15	1.37
Ireland	12	9.70	Russian Federation	21	7.47	Vietnam	21	1.26
Russian Federation	23	7.65	United Arab Emirates	12	6.75	Chile	12	1.09
India	41	6.51	Austria	31	5.33	Ireland	3	0.74
Austria	39	5.86	Cayman Islands	2	5.25	Norway	7	0.68
Cayman Islands	2	5.25	Brazil	6	3.13	Virgin Islands (British)	1	0.63
Saudi Arabia	5	4.99	New Zealand	31	3.00	Mexico	3	0.60
Portugal	16	4.62	Cyprus	3	2.62	Indonesia	2	0.57
Brazil	19	3.57	Thailand	13	1.77	Cyprus	1	0.54
New Zealand	33	3.30	South Africa	10	1.75	Austria	8	0.53
Cyprus	4	3.16	Portugal	10	1.72	Argentina	5	0.47
China	22	3.02	Iceland	4	1.54	Turkey	3	0.46
Thailand	18	2.10	Mauritius	2	1.50	Brazil	13	0.44
South Africa	12	1.96	China	10	1.40	Thailand	5	0.33
Chile	19	1.87	Indonesia	4	1.16	Myanmar	2	0.31
Indonesia	6	1.73	Ghana	6	1.13	New Zealand	2	0.30
Iceland	4	1.54	Bermuda	7	1.12	Pakistan	1	0.30
Egypt	1	1.50	India	2	1.00	Peru	6	0.23
Others	100	15.23	Others	39	8.42	Others	25	1.34
Total	3,360	1,233.73	Total	1,831	989.29	Total	1,529	244.44

Table IA.4. 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 activity over 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 that equals one if the country's legal system is of English origin and zero otherwise. Private credit is domestic credit extended to the private sector, normalized as a percentage of a country's GDP. Creditor right index is an integer ranging from 0 to 4 that counts how many of the following creditor protections a 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 regulations 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:	Abnormal sustainability-linked loan share				Abnormal green loan share			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Common law	-0.294*				0.173			
	(0.159)				(0.224)			
Private credit		0.683**				0.957**		
		(0.264)				(0.399)		
Creditor right index			0.055				0.146	
			(0.090)				(0.124)	
Stringency of environmental regulations				0.211*				0.285**
				(0.125)				(0.120)
N	168	150	125	137	168	150	125	137
R^2	0.016	0.062	0.002	0.029	0.005	0.105	0.015	0.045

Table IA.5. 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 1,831 (1,532) sustainability-linked (green) loan facilities and 87,883 (87,652) matched non-ESG (non-green) loan facilities. We regress an indicator variable for whether a 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., Log(FacilityAmount)), the natural logarithm of one plus the loan facility's maturity in months (i.e., Log(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., Log(# LeadArranger)), and the ratio of the number of relationship lenders to the total number of lead arrangers in the syndicate (i.e., 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)
Log(FacilityAmount)	0.005***	0.003***	0.003***	0.002***	-0.001	-0.000	-0.000*	-0.000*
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Maturity)	0.003***	0.002***	0.002***	0.002***	0.003*	0.002**	0.002*	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Revolver	0.014***	0.006***	0.006***	0.006***	-0.001	-0.000	-0.001	-0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log(# LeadArranger)	0.004**	0.003**	0.003*	0.002	0.004***	0.002**	0.001*	0.001*
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RelationshipLender	0.010***	0.005***	0.005***	0.004***	-0.005**	-0.001	-0.001	-0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Country FE	Y				Y			
Industry FE	Y				Y			
Year FE	Y				Y			
Country × Year FE		Y				Y		
Industry × Year FE		Y				Y		
Country × Industry × Year FE			Y				Y	
Country × Industry × Year × Public FE				Y				Y
N	89,696	89,678	89,522	89,395	89,168	89,150	89,049	88,959
Adj. R^2	0.254	0.631	0.624	0.628	0.637	0.847	0.846	0.846

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