Financial Innovation via Sustainable Lending*

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Abstract

We investigate the incentives driving banks to introduce Sustainability-Linked Loans (SLLs) as an innovative financial product in the global syndicated loan market. Utilizing a comprehensive dataset of banks leading these deals, we find that both the structure of the loan market and economic considerations influence a bank's choice to offer the SLL product to local borrowers. Banks are more inclined to lead SLL deals when facing reduced competitive pressure from the local syndicated loan market. While banks are more likely to extend SLLs to borrowers in their home markets, upon entering a foreign market, they tend to select a country to which they have a larger exposure and with which they have a stronger prior lending relationship. Furthermore, we observe that providing SLL products to local borrowers enhances a bank's market share and boosts the profitability of its loan portfolio. However, these benefits appear to be primarily enjoyed by foreign banks. Finally, we find that a bank's decision to serve as a sustainability agent in an SLL deal is influenced by similar economic incentives. In summary, our results support the notion that banks, particularly foreign institutions, introduce SLL products to strengthen their reputation and attract new clients.

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1. Introduction

Banks play a crucial role in providing funding to facilitate the transition of businesses to a more sustainable world. During the past decade, sustainability-linked and green debt have emerged as new debt instruments that encourage companies to adopt sustainable practices. Sustainability-linked loans (SLLs) were first introduced in 2017 and have grown exponentially in global loan markets since then. SLLs are a new type of general-purpose loans that link pricing terms (e.g., interest rate) to one or more Key Performance Indicators (KPIs) measuring borrowers' environmental, social, and governance (ESG) performance. Relative to green loans, SLLs provide borrowers with more flexibility in the use of the proceeds as well as sustainability targets. Not surprisingly, the growth of the SLL market has far outpaced that of the green loan market in recent years. By the end of 2022, more than 200 banks from 34 countries have led or participated in at least one SLL to borrowers across more than 70 countries. Although the growth of the SLL market is doubtlessly a result of supply and demand, in this paper, we focus on the supply side and explore the economic incentives underlying banks' decisions to offer SLL as a new financial product in the global syndicated loan market.

Using a comprehensive sample of global banks leading SLLs between 2017 and 2022, we find that large banks are more inclined to offer SLLs, in line with the idea that the benefits outweigh the costs due to the economies of scale. On average, banks are more likely to offer SLLs in their home countries. However, when they decide to enter a foreign market, they tend to choose the market where they are more likely to gain a favorable reputation. This choice is influenced by their larger economic exposure to that market and a stronger history of lending relationships. We also find that the local loan market structure influences a bank's choice to offer SLL products. We observe a negative association between competition and the likelihood of offering SLLs. While market leaders are more likely to offer SLLs on average, their motivation is significantly diminished in highly concentrated markets, where they encounter intense monopolistic competition from similarly sized peers.

Furthermore, we find that ESG disclosure regulations in a bank's home country also play a positive role in encouraging banks to offer SLL products. Lastly, we find that leading an SLL deal enhances a bank's market power, measured by an increase in its market share in the subsequent year. It seems that these advantages are predominantly experienced by foreign banks. In line with the first-mover advantage linked to financial innovation, we find that banks offering SLLs experience improved profitability in the overall syndicated loan market in the same country in the subsequent year. Overall, our findings are consistent with a bank's decision to innovate being shaped by the cost-benefit tradeoff. Offering SLLs signals a bank's commitment to sustainability and enhances its reputation among investors and clients. Despite the costs associated with writing and enforcing loan contracts containing complex ESG metrics, investing in sustainability expertise gives banks a first-mover advantage and helps them expand their client base beyond their home countries.

We hasten to note that what we observe in our data may be an off-equilibrium outcome. In equilibrium, every bank that offers standard syndicated loans also offers SLLs, and SLLs become a standard loan product. This notion is consistent with the finding in Gale (1992) that a second equilibrium is achieved when all firms issue non-standard securities and non-standard securities become the standard ones. However, we argue that it takes time for the market to achieve such an equilibrium. Indeed, we observe an exponential growth in the number of banks offering SLLs during our sample period, consistent with a fast move towards the equilibrium of SLLs becoming a standard loan product.

Our study contributes to the recent literature on lender monitoring of borrowers' ESG performance. Amiram et al. (2021) find that banks that adopted the Equator Principles, a framework to manage environmental and social (E&S) risks in project finance, include more environmental covenants in their loan contracts. Choy et al. (2023) find that a stringent public environment increases lenders' monitoring incentives via environmental covenants. Wang (2023) finds that banks subject to ESG disclosure regulations improve borrowers' ESG performance via active engagements and monitoring. Houston & Shan (2021) find

that banks influence borrowers' subsequent ESG performance via the threat of exit. Our paper differs from these by studying a new monitoring mechanism, i.e., linking loan pricing to sustainability metrics.[1] Concurrent studies examining the contract design of SLLs and borrower characteristics document that SLLs are, on average, ineffective in improving borrowers' ESG performance. Loumioti & Serafeim (2023) find that SLL contracting is more prevalent among low ESG-risk borrowers, and the KPIs are often unrelated to a borrower's ESG risk. Kim et al. (2022) find that the disclosure of KPIs used in SLLs varies substantially. Borrowers' ESG scores deteriorate after the issuance of less transparent SLLs. Our paper differs from the above studies by focusing on the economic incentives for lenders to offer SLLs. We explore inter-market differences within banks to offer SLLs. Given that 46.9% of SLLs are issued by foreign banks, it is important to understand the within-bank inter-market incentives. This helps us understand the economic tradeoffs banks face when introducing a financial innovation to a particular market. A paper most related to ours is Du et al. (2022), which studies lenders' benefits from extending SLLs. Our paper differs from theirs in two main ways. First, our analysis is more granular, i.e., at the lender-borrower-country level rather than the lender level. Given that most of the market participants in the SLL market are large multinational banks with syndicated loans extended to borrowers worldwide, treating each borrower country as a separate observation allows us to understand better how local market dynamics affect banks' lending decisions in that particular country. Second, unlike Du et al. (2022), who focus on aggregate lender-level benefits (e.g., deposit and consumer loans at the parent bank level) associated with issuing SLLs, our analysis on the lender-borrower-country level within the syndicated loan market allows us to focus on the cost-benefit tradeoffs a bank faces at a particular product market.

Second, our study contributes to the broader literature on financial innovation in the banking industry. Our findings provide evidence supporting the theoretical arguments that banks' incentives to innovate reflect the cost-benefit tradeoffs (Gale, 1992; Thakor, 2012).

[1] Private debt contracts have started including environmental covenants decades ago.

A concurrent financial innovation that banks widely adopt is green loans, which are used to fund environmental or social projects. The major difference between SLLs and green loans is the intended use of proceeds. Without restrictions on how funds are deployed, SLLs provide borrowers with more flexibility (Guthrie, 2023). A noteworthy observation is that Kim et al. (2022) find very different borrower characteristics and loan features comparing SLLs with green loans. In contrast, our findings are similar across these two types of financial innovations (untabulated). This suggests that our results for banks' incentives for financial innovation are generalizable across different E&S loan products.

2. Sustainability-linked Loans (SLLs): Background and Examples

Since their introduction in 2017 by the Dutch bank ING, sustainability-linked loans (SLLs) have experienced remarkable growth. In 2022, over 1,000 SLLs were issued worldwide, totaling over $300 billion. SLLs are a subset of ESG loans designed for general purposes, but their pricing terms are directly influenced by specific ESG-related metrics. The loan spreads are determined by key performance indicators (KPIs) that reflect sustainability goals. Adjustments to these spreads might be based on various ESG targets, including ESG scores provided by external rating agencies like S&P, greenhouse gas (GHG) emissions, and employment-related measures such as employee health and diversity. When structuring a conventional syndicated loan, some banks act as lead arrangers, and others act as participants. Lead banks often play a more active role in facilitating the deal, overseeing the documentation and repayment, and monitoring the borrowers. A syndicated SLL has a similar structure but often designates one or more banks as the sustainability agent or coordinator, a role that exists in addition to the traditional role of the lead arrangers in the syndicated loan market. The sustainability coordinator collaborates with the borrower to set and integrate specific KPIs related to the borrower's ESG goals.

Sustainability agents play a pivotal role in formulating the sustainability part of the contract, which dictates potential pricing adjustments based on the borrower's performance

against the sustainability KPIs, often labeled as "sustainability adjustments". The effectiveness of such adjustment is subject to review and potential objections by other participating lenders. Adjustments are bound by specified caps and necessitate validation and reporting in tandem with the sustainability agent. For example, in the 2021 SLL agreement with Trimble Inc., BofA Securities (USA) Inc. and TD Securities (USA) LLC served as co-sustainability structuring agents. The agreement stipulates that the KPI metrics are based on GHG emissions (Scope 1 and Scope 2) and the percentage of gender-diverse employees. For 2022, the sustainability targets were set at a 13.6% reduction in GHG emissions and a gender diversity employee percentage greater than 30%, using 2019 as the benchmark. These targets are set for up to 2026. Upon reaching these targets and after the borrower submits the pricing certificate to the sustainability agent, the applicable margin can be adjusted by up to 0.05%, and the applicable facility fee percentage can be altered by up to 0.01%. Such design is analogous to performance pricing provisions used in traditional syndicated loan contracts, which often link pricing to financial ratios or credit ratings (Asquith et al., 2005).

While some companies disclose their ESG-related KPIs and the corresponding performance pricing grid, this information is not always publicly available. Representatives from top financial institutions have crafted a standard framework under the Sustainability Linked Loan Principles (SLLPs) for choosing and publicly disclosing KPIs in SLLs. However, these principles only serve as suggested guidelines. Market participants can voluntarily adopt them on a transactional basis, contingent on the specific nature of the deal.

Appendix C shows an example of an SLL issued to CMS Energy Corporation, a publicly listed energy company in the United States. The new SLL contract serves as an amendment to an existing five-year revolver. Compared to the previous contract (illustrated in the example), the update introduces sustainability adjustments to the price margins, adds a sustainability agent, and utilizes slightly different thresholds for the financial covenant while maintaining all other contractual features unchanged. Notably, both the old and new contracts feature an identical performance pricing provision linking price margins to credit

ratings. Regarding the sustainability adjustments, the contract defines two KPIs, "sustainability percentage" and "sustainability amount," both aiming to capture the sustainable portion of the total energy produced by the company. The borrower is rewarded (penalized) by a lower (higher) interest rate adjustment if the sustainable portion increases (decreases). However, the magnitude of the sustainability adjustment is small. Each pricing step, i.e., the increase or decrease in interest rates associated with a one-level change in the performance metric, is only 2.5 basis points for the sustainability adjustment, compared to a 12.5 basis points change for the credit rating adjustment.[2] It is important to highlight that these terms differ from what the borrower designates as "renewable energy" in its 10-K reports, thus explaining the detailed calculation steps provided in the contract. This is analogous to the adjustment for GAAP net income numbers used in financial covenants (Li, 2010). This example illustrates a transparent and sophisticated SLL contract.

As discussed above, green loans are another type of new loan product that banks have offered in recent years. Relative to green loans, SLLs have several benefits. First, while green loans are often specifically tied to financing environmentally friendly projects, SLLs do not restrict the use of proceeds. The sustainability metrics used in SLLs also encompass a wide range of environmental, social, and governance measures. Such flexibility allows borrowers to use the funds for various purposes, making SLLs more versatile and appealing to a broader spectrum of businesses. Linking ESG performance metrics to financial incentives or penalties provides a strong incentive for borrowers to actively improve their sustainability practices, fostering a proactive approach to environmental and social responsibility. Second, measuring and reporting on the impact of green projects can be challenging and time-consuming. SLLs, with their focus on overall sustainability performance, often involve simpler and more standardized reporting processes (e.g., using metrics disclosed in government filing). This

[2]This observation is consistent with the large sample evidence. Loumioti & Serafeim (2023) document that the mean sustainability adjustment for each pricing step is 4.8 basis points for SLLs in their sample. Asquith et al. (2005) find that the mean adjustment is 14 to 16 basis points for performance pricing provisions in traditional syndicated loan contracts.

ease of measurement and reporting can make SLLs more attractive for both lenders and borrowers. It is thus not surprising that the growth of SLLs outpaces that of green loans in recent years (Kim et al., 2022; Loumioti & Serafeim, 2023).

3. Literature Review and Predictions

Frame & White (2004) define financial innovation as "*something new that reduces costs, reduces risks, or provides an improved product/service/instrument that better satisfies participants' demands.*" We view SLLs as an innovative loan product that satisfies borrowers' need for sustainable finance. We thus rely on theoretical works on financial innovation to understand banks' incentives to introduce SLLs. We view a bank's decision to offer an SLL product as a result of cost-benefit tradeoffs. We propose the following benefits associated with introducing SLLs.

First, we expect banks offering SLLs to expand their client base within and beyond syndicated loan markets. There is a growing demand from companies and investors for sustainable financing options. By introducing loans linked to sustainability, banks can attract borrowers with sustainability commitment and capture this new market segment. Once a lending relationship is established, banks may also retain these borrowers for future traditional syndicated loans. Furthermore, banks that actively support sustainable initiatives can enhance their reputation and brand image. Offering SLLs allows banks to position themselves as responsible and forward-thinking institutions, which can attract clients beyond syndicated loan markets. Consistent with this conjecture, Homanen (2022) finds that banks that finance the Dakota Access Pipeline, a highly controversial environmental project, experienced a significant decline in deposit growth. Du et al. (2022) find that banks issuing SLLs can attract more deposits and extend more commercial and industrial loans. SLLs may also help improve banks' profitability. Banks may charge higher initial interests for SLLs, promising to reduce future interests once the sustainability-related KPIs are met later. With sustainability commitment, banks could also attract socially conscious investors, thus raising

capital at a lower cost. These conjectures are consistent with prior studies on other types of financial innovation: innovators often enjoy a first-mover advantage by capturing a larger market share (Tufano, 1989) and abnormal profits and economies of scale (Carow, 1999).

However, offering SLL as a new loan product is not without cost. We contend that the most significant cost is associated with lenders' information acquisition. Gale (1992) introduces the concept of "non-standard" securities, a novel financial product whose investors are unfamiliar with the underlying risks and payoff functions. If an investor makes a substantial investment in a new security, they are exposed to a significant amount of idiosyncratic risk. However, mitigating uncertainty involves costly information acquisition, and these costs can potentially be recovered by investing in a large number of new securities. In the context of SLLs, the uncertainty comes from lenders' unfamiliarity with the sustainability metrics used in the contracts and, thus, the lack of the ability to assess or manage the associated risks. Similarly, Thakor (2012) models banks' choice between innovative loans and standard loans. In his model, banks operate in a competitive banking system, and standard loans produce zero profits for each bank due to competition. Innovative loans come with the potential cost that investors may disagree over the likelihood of default (and thus withdraw the funding for these loans). As a result, not all banks innovate. Ultimately, the degree of innovation results from the tradeoffs between abnormal profits (from innovation) and the risk of refinancing (due to investor disagreement through the lack of familiarity with the new loans). We expect the information friction to be particularly pronounced among SLLs. Unlike financial ratios, which are often based on standardized and audited financial statements, ESG metrics used in SLLs are unstandardized, opaque, and often unverifiable (Kim et al., 2022; Du et al., 2022). These features make information acquisition and subsequent monitoring particularly costly. Banks lacking the resources or expertise to do so may find it unworthy to invest in these financial products. Banks with different risk appetites or areas of expertise may also be hesitant to adopt. In addition, the benefits which are often associated with scale are also unclear. For example, regional banks relying on relationship-building with local bor-

rowers may have little incentive to incur the initial costs. Consistent with this conjecture, prior studies document that large financial institutions are more likely to adopt financial innovation (Hannan & McDowell, 1984; Frame & White, 2004).

We thus expect a positive association between a bank's inclination to innovate through SLLs and the net benefits of innovation. We expect that these net benefits will be greater among larger banks and banks with a more extensive reputation exposure to a local market.

We also expect the local loan market structure to play a role in affecting a bank's decision to offer SLLs to its local clients, although the association between these two constructs is unclear ex ante. On the one hand, higher competition discourages innovation because it reduces post-entry rents (Romer, 1990; Aghion & Howitt, 1992; Grossman & Helpman, 1991). Specifically for financial products, patents typically do not protect innovation and product development. In the case of SLLs, most loan contract details are available in the public domain (e.g., SEC filings). These features make it easy for competitors to imitate, diminishing the advantages of innovation. On the other hand, in sectors with similar technological levels, competition might encourage innovation because innovating firms could differentiate their products and thus alleviate the competitive pressure (Aghion et al., 2005).

Next, we expect a bank's own ESG rating to play a role. On the one hand, highly rated banks often view ESG positively and thus are more inclined to offer SLLs as a new way to achieve their sustainability goals (Houston & Shan, 2021). On the other hand, poorly rated banks may offer SLLs as a cost-effective way to remedy their reputation (Cai et al., 2023).

Lastly, we expect ESG disclosure regulation to encourage banks to innovate via SLLs. Under the ESG regulation, banks are required to disclose the ESG performance of their portfolios. Wang (2023) finds that banks subject to ESG disclosure regulation in their home countries take actions to improve borrowers' ESG performance, such as imposing more environmental action covenants in loan contracts and terminating borrowers with poor ESG performance. Banks may employ SLLs to enhance their borrowers' ESG performance or demonstrate the sustainability of their loan portfolios.

4. Data

4.1. Sample Construction

In this section, we provide an overview of our dataset and the methodology employed for sample construction. We obtain our loan-level data from the Refinitiv DealScan database, which offers extensive details on the international commercial loan market, including contract-specific terms and stipulations. Each loan deal in DealScan is categorized within a market segment. Accordingly, a loan is classified as an SLL if it is designated under the "Environmental, Social & Governance/Sustainable Linked" market segment by DealScan. Our initial data set consists of 61,326 distinct loan deals (which corresponds to 861,815 lender-deal level observations) extending from January 2011 to December 2022, from which we have identified 2,379 unique SLLs. We initially include data starting six years prior to the issuance of the first SLL in 2017 to capture relationship banking in the preceding five years. Then, we keep loans issued post-2016, the year immediately preceding the first SLL. Given our emphasis on commercial loans, we exclude central and development banks, as well as transactions involving non-corporate borrowers, such as government entities and not-for-profit organizations. For each loan, we selectively keep only the lead banks for our analysis due to their significant roles in gathering information, drafting contracts, and monitoring (Sufi, 2007; Ivashina, 2009). A bank is deemed a lead arranger if it is listed as such in the "Lead Arranger" field within DealScan. Throughout our analysis, we consider only lead banks. Therefore, we use the terms "bank," "lender," and "lead bank" interchangeably from this point onward. Since our unit of analysis is at the bank-borrower country-year level, we next aggregate the SLLs by each lead bank, borrower country, and the year of the loan initiation. This step yields a total of 13,466 bank-country-year observations. Additionally, for a bank to be included in our sample, we require a minimum of two observations. Similarly, for a borrower country to be included, we require a minimum of two observations. The final data set for the baseline model includes 10,522 bank-country-year observations, representing 65,025 loans, of which 1,238 are SLLs (including amendments). Table 1, Panel A lists the detailed steps involved

in constructing our sample.

Panel B, Table 1 shows the sample distribution by lender headquarter country. It reports the year when ESG-disclosure regulation for banks was first introduced (Wang, 2023), the number of banks that lead syndicated loans, the number of banks that lead SLLs, and the number of banks that act as a sustainability agent. The United States has the largest number of lead banks in our sample (1,437), followed by Japan (224), Germany (215), and the United Kingdom (100). Despite having the largest number of lead banks, the United States has only 130 banks that led an SLL during our sample period, while Japan has 136. The limited involvement in SLLs by US banks is aligned with the absence of ESG-related regulations in the United States. Japan stands out as one of the earliest countries to enforce ESG regulations for its banking industry, i.e., 2005.

Panel C lists the top 20 lead banks by the total number of SLLs they have offered during our sample period. BNP Paribas and Credit Agricole, two French banks, stand out as the top two in the list(421 and 297, respectively), followed by HSBC, BofA Securities, and JP Morgan. Four of the top 20 banks are headquartered in France, four in the US, and three in Japan. Most of these banks have offered SLLs to borrowers located in more than 20 countries. Interestingly, the United States is the largest foreign market for seven of these non-US banks.

Panel D presents the sample distribution by loan initiation year. It highlights the significant growth of the SLL market from its introduction in 2017 to 2022. We provide additional details for our sample distribution across countries in Table OA1 of Appendix D.

5. Results

5.1. Determinants of Extending SLLs

We begin our analyses by first estimating the likelihood of a bank acting as a lead arranger in an SLL in a particular country in a given year. In particular, we estimate the following

specification:

$$Y_{i,j,t+1} = \alpha + \beta M_{j,t} + \gamma X_{i,j,t} + \eta_j + \delta_t + \epsilon_{i,j,t+1}, \quad (1)$$

where i identifies a bank, j refers to a country, and t refers to the year of loan initiation. The unit of analysis is at the bank-borrower country-year level. The dependent variable $Y_{i,j,t+1}$ is an indicator of whether a bank i leads at least one SLL in a borrower-country j in year *t+1* (*sll_lead_t*1). It takes the value of one if a bank i leads at least one SLL to borrowers domiciled in country j in year *t+1* (*sll_lead_t1*=1) and zero if a bank i does not lead any SLLs to borrowers domiciled in country j in year *t+1*, but it leads at least one non-sustainability loan to borrowers in country j in year t. We exclude banks that do not lead any syndicated loan (sustainability or non-sustainability) to borrowers in country j in year *t+1* from our analysis to focus on a bank's choice of offering SLLs in comparison to non-SLLs, rather than in comparison to not offering any loan.

M is a vector of loan market-level variables for a given borrower country lagged by one year. It includes a loan market concentration measure in year t (*total_hhi*) and an indicator for whether a borrower country has any SLL in year t (*country_year_esg_indicator*). *total_hhi* is measured with the Herfindahl–Hirschman Index, which is computed at the country-year level by adding the squares of the market shares of all banks operating in a specific country during a particular year. A higher *total_hhi* indicates greater market concentration. To calculate a bank's market share, we rely on DealScan's *lender_share* variable, which includes a bank's share in each loan deal. If the share percentage information is missing, we use the annual average of the sum of lead arrangers' shares in a tranche divided by the number of participating lead arrangers to infer missing percentage allocations. We then calculate our *share_amount* variable by multiplying *lender_share* and the total tranche amount in dollars. This variable represents the total dollar amount extended by each lead bank in a deal. We then aggregate the *share_amount* for all lead banks in each year and each country to determine the total lead market size. Subsequently, each lead bank's *market_share* is defined as its total amount extended in dollars in a given year and country, divided by the

total lead market size in that year and country.

X is a vector of bank-specific characteristics lagged by one year. It includes an indicator for whether a bank is a market leader, defined as 1 if the bank's loan amount ranks in the top 25% of all banks that extended loans in country j in year *t-1*(*loan-leader*); the bank's exposure to country j, defined as the loan volume issued to borrowers in country j relative to the bank's total loan volume in year *t-1* (*exposure*); the bank's relationship lending intensity, defined as the percentage of loans extended to borrowers in country j in year *t-1* that had lending relationship with this bank over the past five years (*rel_perc*); an indicator of whether a bank is foreign, defined as the bank's headquarter being different from the borrower's country of domicile(*is_foreign_bank*); an indicator for whether a bank is subject to ESG regulation, defined as one if the bank's headquarter country implemented ESG-reporting regulation for banking industry in year t(*bank_home_regulation*); an indicator for whether a bank has an ESG rating in Refinitiv in year t (*has_refinitiv*); and an indicator for whether a bank is publicly listed (*public*) in year t. We also control for bank size using the natural logarithm of the bank's total syndicated loan volume across all countries in year t (*ln_total_bank*).

To estimate the likelihood of a bank acting as a sustainability agent, we replace the dependent variable in Equation (1) with an indicator *sustainability_agent_t*1, defined as one if bank i played a sustainability agent role in any SLLs it extended to borrowers in country j in year *t+1*. It is defined as zero if the bank was not a sustainability agent for any of the SLLs it extended to borrowers in country j in year *t+1*. A bank is deemed a sustainability agent in a deal if DealScan records "sustainability agent" or "sustainability coordinator" in the data entry "primary role" or "additional roles." For this analysis, we only keep observations where the bank leads at least one SLL in a country-year. All the other variables remain the same. Appendix A provides detailed definitions of our variables. δ_t and η_c are year and country indicators to account for unobserved heterogeneity. To mitigate the effects of extreme observations, we winsorize all continuous variables at the 1% and 99% levels of their

respective distributions.

Table 2 presents descriptive statistics for the main variables in our sample. In particular, Panel A shows that, on average, 20.4% of banks in our sample lead an SLL. Out of the banks that lead an SLL, 16.2% of them play the role of a sustainability agent. 79.6% of banks in our sample of deals are foreign banks. 66.8% of banks come from a country that has ESG-related regulations. Panel B provides pairwise Pearson correlations of our main variables. Not surprisingly, leading an SLL and acting as a sustainability agent are positively correlated with a correlation coefficient of 0.33 (significant at 1% level). We also observe a positive correlation between bank size and their participation in an SLL deal (0.25) or as a sustainability agent (0.33).

We use two specifications to estimate this equation: an ordinary least squares (OLS) to assess the likelihood of leading an SLL and a Cox hazard rate model to assess the likelihood of entering the SLL market. Both borrower country and year fixed effects are incorporated into the OLS estimation. The hazard model estimation is stratified by borrower country and year. In our OLS estimation, we cluster standard errors at the bank and country levels, whereas for the hazard model, we cluster standard errors at the borrower country level.

Table 3 presents the results from this estimation. Column (1) reports the OLS results. It shows that bigger banks are more likely to offer SLLs. This finding aligns with the notion that the net benefits associated with introducing a new product are likely to be higher with economies of scale. In terms of competition, we also find that although market leaders are, on average, more likely to offer SLLs, this tendency is reduced in concentrated markets. Interestingly, leaders are less likely to offer SLLs in more concentrated markets. In contrast, smaller players are more likely to offer SLLs in more concentrated markets. This is probably because, in concentrated markets, leaders encounter intense monopolistic competition from similarly-sized peers (Bikker & Haaf, 2002). This finding is consistent with competition discouraging innovation. We also find that banks relying more on relationship banking are more likely to offer SLLs. This is consistent with findings in Kim et al. (2022) that SLLs are

more likely to be syndicated by relationship banks. Although foreign banks are less likely to extend SLLs, ESG regulation in a bank's home country plays a positive role in encouraging SLLs. Lastly, the coverage of ESG ratings and public status does not seem to affect banks' decision to offer SLLs. When looking at the marginal effects in the Cox hazard rate model estimation in Column (2), we find similar patterns: larger banks with a larger proportion of relationship loans and from countries with ESG regulations are more likely to enter the SLL market.

Columns (3) and (4) show the results estimating the likelihood of a bank acting as a sustainability agent using the subsample of banks leading SLLs. We find broadly similar results. We find that loan market leaders are more likely to act as sustainability agents, although they are less likely to do so in more concentrated markets. Banks facing ESG regulation in their home countries are more likely, while foreign banks are less likely to act as sustainability agents. Additionally, we find that ESG rating coverage plays a positive role: banks rated by Refinitiv are more likely to act as sustainability agents.

We next explore whether the incentives differ for foreign and domestic banks by splitting our sample by whether a bank is lending to a borrower in the same country where they are headquartered (domestic sample) or not (foreign sample). Table 4 shows the results for domestic banks in columns (1) and (2) and foreign banks in columns (3) and (4). While we see some similarities between foreign and domestic banks, we also note significant differences. In particular, we see that ESG regulation in a home country makes a foreign bank more likely to lead an SLL (column 3) or act as a sustainability agent in an SLL deal (column 4). The same coefficients, while positive, are statistically insignificant for the domestic bank subsample. We also see that a foreign bank's portfolio exposure to and prior lending relationship with borrowers in a country makes it significantly more likely to enter that country's SLL market (column 3), although not as a sustainability agent (column 4). In contrast, neither the portfolio exposure nor the lending relationship is significantly associated with a domestic bank's decision to lead an SLL. These findings suggest that economic incentives to retain

or expand their clientele base play an important role in affecting foreign banks' decision to enter the SLL market in a country.

We next turn to Refinitiv scores to understand whether a bank's existing environmental (*e_score*), social (*s_score*), and governance (*g_score*) scores are associated with its decisions to lead an SLL deal or act as sustainability agent. We use the environmental, social, and governance pillar scores from Refinitiv. Refinitiv scores range from 0 to 100, with higher scores indicating better performance in the respective pillar. We match 238 banks from Refinitiv with our baseline sample, resulting in 5,286 bank-borrower country-year observations. We re-estimate Equation 1 using the OLS model using our full sample and by splitting banks into foreign and domestic. As the three scores are highly correlated, we introduce them one at a time.[3]

Panel A of Table 5 shows descriptive statistics for the distributions of Refinitiv's E, S, and G component scores in our sample. All three scores are scaled by 0.01 to maintain a consistent range with other variables such as *exposure* and $total/_{h}hi$. The scores are positively correlated and range from 0 to 1, with the average *e_score* being 0.77, *s_score* being 0.75, and *g_score* being 0.66. Panel B of Table 5 shows the results. We include the same control variables as in earlier specifications. Panel B of Table 5 show the results for the full sample, as well as for the subsamples of foreign and domestic banks. Columns (1) to (5) report the results of the OLS regression on *sll_lead_t1*. We find that the coefficient *e_score* is positive and significant, but only for the full sample (Column 1) and the domestic subsample (Column 3), while the coefficients on *s_score* and *g_score* are both insignificant. We do not find the coefficient on any ESG score to be significant for the regressions on *sustainability_agent_t1*. Overall, we view these results as a bank's ESG scores play a rather limited role in affecting their decision to offer SLLs.

It is worth noting that despite the smaller sample size, the coefficients on other variables remain qualitatively similar to those reported in Table 3 and Table 4.

[3]In robustness analyses, we include all three scores jointly and find similar results.

5.2. Consequences of Extending SLLs

Next, we investigate the consequences of banks' decisions to enter the SLL market and/or act as sustainability agents. In particular, we examine whether leading SLLs in a country could subsequently help a bank gain market power. We also intend to see whether such an effect is mostly local or could transfer across markets. We thus introduce an additional indicator capturing whether a bank leads in a foreign country in year t ($sll\_foreign\_lead$). We estimate the following specification:

$$Consequence_{i,j,t+1} = \alpha Y_{i,j,t} + \beta M_{j,t} + \gamma X_{i,j,t} + \theta_i + \eta_j + \delta_t + \epsilon_{i,j,t+1}, \tag{2}$$

where i identifies a bank, j refers to a country, and t refers to the year of loan initiation. The dependent variable $Consequence_{i,j,t+1}$ is defined as bank i's loan market share in country j in year *t+1* ($market\_share\_t1$), loan market share through new borrowers in country j in year *t+1* ($new\_loan\_market\_share\_t1$), or portfolio exposure to country j in year *t+1* ($exposure_{t1}$). The main set of independent variables of interest is $Y_{i,j,t}$, including an indicator for bank i leading an SLL deal in country j in year t(sll_lead), an indicator for bank i leading an SLL deal in a different country other than j in year t($sll\_foreign\_lead$), an indicator for bank i acting as a sustainability agent in an SLL deal in country j in year t ($sustainability\_agent$), and an indicator for bank i acting as a sustainability agent in an SLL deal in a foreign country j in year t ($sustainability\_agent\_foreign$). The coefficients on sll_lead and $sll\_foreign\_lead$ thus capture the effect of a bank's SLL experience in local and foreign markets on its market share. The coefficient on $sustainability\_agent$ captures the *incremental* effect of sustainability agent experience on a bank's market power. We use the same set of control variables as in Equation 1 and include country, bank, and year fixed effects in all specifications.

We also investigate the the effect of a bank's SLL experience on its profitability, measured as the returns to its loan portfolios in country j in year *t+1*. For this analysis, we include

additional variables measuring the characteristics of a bank's loan portfolio, including the average maturity, average loan size, and the percentage of SLLs in the loan portfolio in country j in year $t+1$.

Table 6 presents the results of these analyses. We first show the summary statistics for this sample and the corresponding correlation table in Panel A and Panel B. The market share for an average bank is 2.1%, with 1.3% coming from new borrowers. On average, a bank has a loan portfolio exposure (*exposure_t1*) of 15.2% to a country, and its loan portfolio return (*portfolio_return_t1*) is 1.1%. An average of 8% of a bank's loan portfolio consists of SLLs. We observe in Panel B that the likelihood of leading an SLL in a local market is positively associated with the likelihood of leading an SLL in a foreign country, potentially because the required expertise is transferable within the same bank. We also observe that both market share and portfolio return are positively correlated with indicators of leading an SLL in both local and foreign markets. This provides preliminary support to the argument that entering the SLL market helps banks gain future market power and improve loan portfolio profitability.

Panel C presents the multivariate regression results on the three outcome variables for market power for the full sample and for the foreign and domestic subsamples. We see that leading a local SLL deal helps a bank gain future market share, attract new borrowers, and increase its loan portfolio exposure. However, such an effect only exists for foreign banks. Acting as a sustainability agent also has an incremental positive effect on a bank's future market share. Although such an effect exists for both foreign and domestic banks, for domestic banks, gaining market share is achieved via lending to existing borrowers rather than attracting new ones. However, being a loan leader in a more concentrated market does not have this significant impact. We further observe that leading an SLL in a foreign market does not significantly improve a bank's future market share, suggesting market segmentation: SLL experience and reputation do not seem to transfer across countries.

In Panel D, we investigate the impact of SLL experience on banks' profitability. As in

prior analyses, we show results first for the full sample and then for the subsamples of foreign and domestic banks. We find that banks' profitability increases for banks that act as an SLL lead in the full sample (Column 1) and that this effect comes from foreign banks (Column 2). While foreign banks, on average, have lower portfolio returns, this effect appears to be mitigated if foreign banks act as lead arrangers in SLL deals. We find that acting as a sustainability agent plays a limited role in affecting banks' loan portfolio profitability. Interestingly, we find that for domestic banks, leading an SLL deal in foreign markets helps a bank gain higher profits in its home market.

Overall, we find that leading an SLL in a foreign country improves a foreign bank's market share, and the improvement is mainly driven by attracting new borrowers to the market. Consistent with the first-mover advantage associated with financial innovation, we find that banks leading SLLs experience improvement in profitability in the overall syndicated loan market in the same country in the subsequent year.

It is possible that the de-globalization of banks can serve as an alternative explanation to our findings. In particular, if international banks leave a foreign market, that should increase domestic banks' and remaining foreign banks' market shares. If a decision to remain in the foreign market is positively associated with the decision to issue SLLs, we expect to observe a positive association between SLL experience and subsequent market share gains. However, we argue that our findings are unlikely to be driven by this alternative mechanism for two reasons. First, the de-globalization of foreign banks would benefit domestic banks the most. However, we do not find significant changes in the market shares of domestic banks. Second, we observe increased lending to new borrowers, especially by SLL banks. This suggests that issuing SLLs helps banks attract new customers over and above those that might have been affected by the exit of foreign multinational banks.

6. Conclusion

In this paper, we investigate the role of banks' participation in SLL loans as lead arrangers or sustainability agents. In particular, we hypothesize that a bank's decision to introduce SLLs is shaped by their cost-benefit tradeoffs. Issuing SLLs signals a bank's commitment to sustainability and helps attract socially conscious clients within and beyond syndicated loan markets. However, due to the complexity of ESG metrics used in SLLs, issuing such contracts may carry significant information acquisition and monitoring costs. Investing in the expertise gives banks a first-mover advantage and helps them expand their client base beyond their home country. Using a comprehensive sample of banks that participate in these deals, we find that the size and origin of the leading banks and the structure of the local syndicated market affect a bank's decision to enter the SLL market. On average, large banks with economies of scale and strong lending relationships with local borrowers are more likely to offer SLLs. Although multinational banks are more likely to lead SLLs in their home countries, when they decide to enter a foreign market, they are more likely to choose a market where they have a larger exposure and stronger past lending relationship. We also find evidence suggesting that local loan market competition discourages while ESG regulation in banks' home countries encourages SLL offerings.

When investigating the consequences of banks' decisions to enter these markets, we find that banks enter foreign SLL markets to enhance their reputation and gain market share. In particular, we find that leading an SLL in a country improves a foreign bank's market share, and the improvement is mainly driven by attracting new borrowers to the market. Consistent with the first-mover advantage associated with financial innovation, we find that banks leading SLLs experience improvement in profitability in the overall syndicated loan market in the same country in the subsequent year.

Our study adds to the emerging literature studying SLLs. Our paper focuses on the economic incentives for lenders to issue SSLs and explores inter-market differences within banks to issue SLLs. We also provide important insights into the decisions and the resulting

consequences of foreign banks entering this growing market.

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Appendix A. Variable definitions

Variable	Definition	Source
$share\_amount_{ijtq}$	Total loans extended by Bank i to borrowers in country j in year t. Loan amount of a tranche (q) = shares (lender_share) × tranche amount in dollars (tranche_amount_converted). If a lender_share is missing: for lead arrangers, use the annual average of the sum of lead arrangers' shares in a tranche ÷ participating lead arrangers; for participants, use the annual average of the sum of participant's shares in a tranche ÷ number of participants	DealScan
$exposure_{ijt}$	Exposure of Bank i to country j in year t. Total loan amount by Bank i in country j in year t ÷ Total syndicated loan amount by Bank i in all countries in year t	DealScan
$domestic\_exposure_{ijt}$	Bank i's exposure to its home country j in year t. Total loan amount by Bank i in its home country j in year t ÷ Total syndicated loan amount by Bank i in all countries in year t	DealScan
$market\_share_{ijt}$	Market share of Bank i in country j in year t in percentage. Total loan amount by Bank i in country j in year t ÷ Total loans to all borrowers in country j in year t * 100%	DealScan
$loan\_leader_{ijt}$	Indicator variable: 1 if the bank's loan amount is ranked in the top 25% of all banks extending loans in country j in year t and 0 otherwise	DealScan
$total\_hhi_{jt}$	Country j's Herfindahl–Hirschman Index (HHI) in year t. Sum of squared market shares (ijt)	DealScan
$country\_year\_sll\_indicator_{jt}$	Indicator variable: 1 if an SLL loan exists in country j in year t and 0 otherwise. Indicates the presence of an SLL loan in country j in year t	DealScan
rel_perc_{ijt}	Bank i's relationship loan percentage in country j in year t. Total loans by Bank i in country j in year t to relationship borrowers ÷ Total loans by Bank i in country j in year t; Relationship loans are those where the borrower has borrowed from Bank i in the past 5 years	DealScan
sll_perc_{ijt}	Percentage of SLL loans by Bank i in country j in year t of total loans by Bank i in country j in year t	DealScan
$average\_loan\_size_{ijt}$	Average loan size by Bank i in country j in year t. Total loan amount by Bank i in country j in year t ÷ number of loans by Bank i in country j in year t	DealScan
$average\_maturity_{ijt}$	Average loan maturity by Bank i in country j in year t; missing values replaced by country-year mean of average maturity for non-missing loans in country j in year t	DealScan
sll_lead_{ijt}	Indicator variable: 1 if Bank i extended SLL loans in country j at time t and 0 otherwise	DealScan
$sll\_foreign\_lead_{ijt}$	Indicator variable: 1 if Bank i extended SLL loans outside of country j at time t and 0 otherwise	DealScan
$sustainability\_agent_{ijt}$	Indicator variable: 1 if Bank i acts as sustainability agent in an SLL in country j in year t and 0 otherwise	DealScan
$sll\_origination_{ijt}$	Indicator variable: 1 if Bank i originated at least one SLL in country j in year t and 0 otherwise	DealScan
$sll\_new\_borrower_{ijt}$	Indicator variable: 1 if Bank i issued an SLL to at least one new borrower with whom the bank has no prior relationship in the past 5 years in country j in year t and 0 otherwise	DealScan

Variable	Definition	Source
$maturity_{ijt}$	The average maturity of of bank i's syndicated loan portfolio in country j in year t. Calculated by averaging each bank's "tenor maturity" in a country and year. Missing values of "tenor maturity" are filled with the country-year mean where these values are non-missing	DealScan
$new\_loan\_market\_share_{ijt}$	Market share of Bank i for new bank borrowers in country j in year t. Total loans by Bank i in country j in year t to borrowers that haven't borrowed from Bank i in country j from years t-5 to t ÷ Total loans to all borrowers in country j in year t	DealScan
$portfolio\_return_{ijt}$	Syndicated loan portfolio return of Bank i in country j in year t. Total interest income by Bank i in country j at year t ÷ total loan amount by Bank i in country j at year t; Interest income is the sum of "all in spread drawn" × amount of loan by Bank i in deal q in country j at year t. Missing values of "all in spread drawn" are filled with the country-year mean where these values are non-missing	DealScan
$is\_foreign\_bank_{ij}$	Dummy variable: 1 if Bank i's parent operating country differs from the borrower's operating country, 0 otherwise	DealScan
$bank\_home\_regulation_{it}$	Dummy variable: 1 if Bank i's parent country experienced ESG reporting regulation change, 0 otherwise	Wang (2023)
$ln\_total\_bank_{it}$	Log of total syndicated loan amount by Bank i in all countries in year t	DealScan
$public_{it}$	Dummy variable: 1 if Bank i is a public bank in year t, 0 otherwise	DealScan
$has\_refinitiv_{it}$	Dummy variable: 1 if Bank i appears in Refinitiv ESG ratings in year t, 0 otherwise	Refinitiv
e_score_{it}	Environmental score for Bank i in year t	Refinitiv
s_score_{it}	Social score for Bank i in year t	Refinitiv
g_score_{it}	Governance score for Bank i in year t	Refinitiv

Appendix B. SLL contract example 1

CMS Energy Corporation (Utilities, United States)

	Traditional Syndicated Loan	**Sustainability-linked Loan**
Issue date	May 27, 2015	June 5, 2018
Loan amount	$550 million	$550 million
Lead arrangers	Barclays Bank PLC, JPMorgan Chase Bank, MUFG Union Bank, Mizuho Bank, Merrill Lynch, Pierce, Fenner & Smith Incorporated, Bank of America,	Barclays Bank PLC, JPMorgan Chase Bank, MUFG Union Bank, Mizuho Bank, Merrill Lynch, Pierce, Fenner & Smith Incorporated, Bank of America
Sustainability Agent	None	Barclays Bank PLC
Financial covenants	The Company shall at all times maintain a ratio of Total Consolidated Debt to Total Consolidated EBITDA of not greater than 6.0 to 1.0.	The Company shall at all times maintain a ratio of Total Consolidated Debt to Total Consolidated EBITDA of not greater than (x) 6.25 to 1.0 for any twelve-month period ending on or before December 31, 2020 and(y) 6.0 to 1.0 for any twelve-month period ending thereafter.
Loan Type	Revolver	Revolver
Performance Pricing	Yes	Yes
Maturity	Five years	Five years
Interest Rate	LIBOR + 125 bps	LIBOR + 125 bps
Loan Purpose	General/working capital	General/working capital
Sustainability Adjustment	None	Yes

Details of performance pricing:

- Level I: S&P >AA, Moody's >A.
  Applicable Margin for Eurodollar Rate Loans: 1.000%
- Level II: S&P >A-, Moody's >AAA.
  Applicable Margin for Eurodollar Rate Loans: 1.125%
- Level III: S&P >BBB+, Moody's >Baa1.
  Applicable Margin for Eurodollar Rate Loans: 1.250%
- Level IV: S&P >BBB , Moody's >Baa2.
  Applicable Margin for Eurodollar Rate Loans: 1.500%
- Level V: any time when none of Pricing Levels I, II, III or IV is applicable.
  Applicable Margin for Eurodollar Rate Loans: 1.750%
- Note: The traditional syndicated loan and the SLL share identical performance pricing. Pricing levels are anchored to the senior debt rating by SP or Moody's.

Details of sustainability adjustments to margins:

- Sustainability Percentage >= Baseline AND:
  Sustainability Amount > 105% of Baseline Sustainability Amount, margin reduced by 0.025%
  Sustainability Amount > 110% of Baseline Sustainability Amount, margin reduced by 0.05%
- Sustainability Percentage < Baseline AND:
  Sustainability Amount <= 95% of Baseline Sustainability Amount, margin increased by 0.025%
  Sustainability Amount <= 90% of Baseline Sustainability Amount, margin increased by 0.05%

"Sustainability Amount" means, for any period, the Company's (including its subsidiaries) total Renewable Energy generation and supply (both generated and purchased) without duplication, measured in gigawatt hours, during such period, as reported in the Company's annual report on Form 10-K (or any successor form) for such period filed with the SEC. For the avoidance of doubt, the Company is under no obligation to update the Sustainability Amount between the filing of the annual reports on Form 10-K (or any successor form), has no obligation to report the Sustainability Amount in the Company's quarterly report on Form 10-Q (or any successor form), and is further under no obligation to advise of changes to the Sustainability Amount as a result of a business change throughout the year by or for the Company (other than any material inaccuracy of which it becomes aware as described in the definition of "Applicable Sustainability Adjustment" or Section 6.7(c)).

"Baseline Sustainability Amount" means the average of the Company's annual Sustainability Amount, for the end of each of the Company's 2015, 2016 and 2017 fiscal years, in each case as reported on the Company's annual report on Form 10-K for such fiscal year, resulting in 3,478 gigawatt hours as of the Closing Date.

"Sustainability Percentage" means, for any period, (x) the Sustainability Amount for such period, over (y) the Company's (including its subsidiaries) total energy generation and supply (both generated and purchased) without duplication, measured in gigawatt hours, during such period, as reported in the Company's annual report on Form 10-K (or any successor form) for such period filed with the SEC. For the avoidance of doubt, the Company is under no obligation to update the Sustainability Percentage between the filing of the annual reports on Form 10-K (or any successor form), has no obligation to report the Sustainability Percentage in the Company's quarterly report on Form 10-Q (or any successor form), and is further under no obligation to advise of changes to the Sustainability Percentage as a result of a business change throughout the year by or for the Company (other than any material inaccuracy of which it becomes aware as described in the definition of "Applicable Sustainability Adjustment" or Section 6.7(c)).

"Baseline Sustainability Percentage" means the average of the Company's annual Sustainability Percentage for the end of each of the Company's 2015, 2016 and 2017 fiscal years, in each case as reported on the Company's annual report on Form 10-K for such fiscal year, resulting in 8.66% as of the Closing Date.

Applicable Sustainability Adjustment (1):	
1. Baseline Sustainability Amount	3,478 *Gwh*
2. Sustainability Amount (comprised of Renewable Energy):	
(a) wind generation	*Gwh*
(b) solar generation	*Gwh*
(c) hydroelectric generation (excluding pumped storage)	*Gwh*
(d) biomass generation	*Gwh*
(e) other Renewable Energy generation (to the extent approved by the Majority Banks)	*Gwh*
(f) purchased wind generation	*Gwh*

	(g) purchased other Renewable Energy generation (as reported on Form 10-K)	*Gwh*
Minus	(h) Flint, MI (50%) for duplication	*Gwh*
Minus	(i) Grayling, MI (50%) for duplication	*Gwh*
	(j) **Sustainability Amount:** sum of 2(a) through 2(i)	= *Gwh*
	(k) Sustainability Amount divided by Baseline Sustainability Amount	*%*
3. Other Non-Renewable Energy Generation		
	(a) coal steam generation	*Gwh*
	(b) oil/gas steam generation	*Gwh*
	(c) hydroelectric generation (to the extent not constituting Renewable Energy)	*Gwh*
	(d) gas combined cycle	*Gwh*
	(e) gas/oil combustion turbine	*Gwh*
	(f) coal generation	*Gwh*
	(g) gas generation	*Gwh*
	(h) other gas generation	*Gwh*
	(i) nuclear generation	*Gwh*
Minus	(j) Filer City, MI (50%) for duplication	*Gwh*
	(k) sum of 3(a) through 3(j) = **Non-Renewable Owned/Purchased Generation**	*Gwh*
	(l) Sustainability Amount (2(j)) plus Non-Renewable Energy (3(k)) = **Total Owned/PurchasedGeneration**	
4. Baseline Sustainability Percentage		8.66%
5. Sustainability Percentage		%
	(total of Sustainability Amount (2(j)) divided by Total Owned/Purchased Generation (3(l))	

Below is from CMS' 2017 Annual Report. Note that one cannot obtain the baseline sustainability amount of 3,478 Gwh as stated in the contract directly by adding the numbers labelled as "renewable energy" in the table below (using these numbers directly will produce an average of 3,299 Gwh). One also cannot obtain the baseline sustainability percentage of 8.66% as stated in the contract by directly using these numbers below. This suggests that lenders make their own modifications, instead of just relying on the annual reports, when defining sustainable energy.

Presented in the following table are the sources of Consumers' electric supply for the last three years:

			GWh
Years Ended December 31	2017	2016	2015
Owned generation			
Coal	10,098	9,739	15,833
Gas	5,190	6,194	3,601
Renewable energy	1,078	1,083	1,056
Oil	12	8	-
Net pumped storage[1]	(290)	(316)	(186)
Total owned generation	16,088	16,708	20,304
Purchased power[2]			
Gas generation	5,521	6,139	4,301
Nuclear generation	6,780	6,927	6,909
Renewable energy generation	2,288	2,229	2,163
Coal generation	491	512	510
Net interchange power[3]	4,384	3,688	1,327
Total purchased and interchange power	19,464	19,495	15,210
Total supply	35,552	36,203	35,514

[1] Represents Consumers' share of net pumped-storage generation. During 2017, the pumped-storage facility consumed 997 GWh of electricity to pump water during off-peak hours for storage in order to generate 707 GWh of electricity later during peak-demand hours.

[2] Represents purchases under long-term PPAs.

[3] Represents purchases from the MISO energy market.

Appendix C. SLL contract example 2

Covanta (Energy, United States)

	Sustainability - linked Loan
Issue Date	November 30, 2021
Loan Amount	$3.5 billion
Lead Arrangers	Barclays Bank Plc, BNP Paribas SA, Citigroup, Citizens Bank NA, Credit Agricole Corporate & Investment Bank SA [Credit Agricole CIB], Credit Suisse AG, Fifth Third Bank, Goldman Sachs & Co, MUFG Union Bank NA, Royal Bank of Canada, Stifel Bank & Trust, Toronto-Dominion Bank, TD Securities LLC
Sustainability Agent	Barclays Bank Plc, Credit Suisse AG, TD Securities LLC
Loan Type	Revolver + Term Loan
Performance Pricing	YES
Sustainability Adjustment	YES
Maturity	Revolver 60 months, Term loan B, C 84 months,
Initial Interest Rate	LIBOR + 250 bps
Deal Purpose	Leveraged buyout

Details of sustainability adjustments:

"Sustainability Performance Targets" means, collectively, the Sustainably Processed Waste Target and the Waste Recycled/Reused Target; provided, however, that for purposes of determining if any Sustainability Performance Target has been achieved, the Borrower and its consolidated Subsidiaries may exclude the impact of (i) any amendment to, or change in, any applicable laws, regulations, rules, guidelines, standards and policies (or any amendment, change or inability to renew with consistent terms or obtain, any permits or licenses issued thereunder) applicable or relating to the business, operations or properties of the Borrower and its consolidated Subsidiaries following the Closing Date, including with respect to the measurement or calculation of any of the Sustainability Performance Targets or (ii) any force majeure or extraordinary or exceptional events or circumstances, including the occurrence of such events or circumstances with respect to the availability and/or continuous supply of any relevant residue or waste that is necessary, appropriate or, as of the date of this offering, anticipated, for the achievement of the Sustainability Performance Targets (including but not limited to market developments related to the availability and/or continuous supply of relevant residues or wastes, supply chain disruptions or physical impacts from extreme weather or climate change).

If a Sustainability Performance Target is not achieved as a result of the occurrence of any of the foregoing described in the proviso to the immediately preceding sentence, as determined by the Borrower in its reasonable judgment, such Sustainability Performance Target will be deemed to have been achieved for purposes of this Agreement and no interest rate adjustment shall result from the failure to achieve such Sustainability Performance Target.

"Sustainably Processed Waste" means all waste managed by the Borrower on behalf of customers and clients through energy recovery (or, the waste to energy process), recycling, and reuse in line with the EPA and the five step waste hierarchy established in the Waste Management Hierarchy of the U.S. EPA and the European Union.

"Sustainably Processed Waste Target" means the Borrower's target to increase the amount of Sustainably Processed Waste (measured in thousand tons) by a total of 2.5% in the year ending December 31, 2025 compared to the year ended December 31, 2020.

(g) From and including the Sustainability Rate Adjustment Date, the Applicable Rate with respect to the Initial Term Loans shall increase by:

(i) 0.125% per annum unless the Borrower has achieved the Sustainably Processed Waste Target as of the Testing Date (the "Sustainably Processed Waste Applicable Rate Adjustment Amount"); and

(ii) 0.125% per annum unless the Borrower has achieved the Waste Recycled/Reused Target as of the Testing Date (the "Waste Recycled/Reused Applicable Rate Adjustment Amount" and, together with the Sustainably Processed Waste Applicable Rate Adjustment Amount, the "Sustainability Adjustment Amount"); in each case, as certified by the Borrower to the Administrative Agent in a Pricing Certificate delivered to the Administrative Agent on or prior to the Step-Up Date (subject to any clerical or administrative errors (including any delays resulting therefrom)). For purposes of the foregoing, any change in the Applicable Rate resulting from the Pricing Certificate (or the non-delivery of the Pricing Certificate) shall be determined as of the fifth Business Day following receipt by the Administrative Agent of the Pricing Certificate delivered pursuant to this clause (g) (or, in the case of non-delivery of the Pricing Certificate, commencing on March 31, 2026) (in either case, the "Sustainability Rate Adjustment Date"); provided, that, the Borrower may elect not to deliver the Pricing Certificate, and such election shall not constitute a Default or Event of Default (but such **failure to so deliver the Pricing Certificate by March 31, 2026 shall result in the Applicable Rate with respect to the Initial Term Loans increasing by 0.250%** commencing on March 31, 2026); provided, further, that, for the avoidance of doubt:

Details of performance pricing:

First Lien Leverage Ratio	Initial Revolving Loan ABR Spread	Initial Revolving Loan Eurocurrency/RFR Rate Spread
Category 1: Frist Lien Leverage Ratio greater than 2.30:1.00	1.50%	2.50%
Category 2: Frist Lien Leverage Ratio equal to or less than 2.30:1.00 and greater than 1.80:1.00	1.25%	2.25%
Category 3: First Lien Leverage Ratio equal to or less than 1.80:1.00	1.00%	2.00%

Table 1: Sample Composition and Construction

This table reports the composition and construction of our regression sample. Panel A presents the steps of our sample construction. Panel B reports the regression sample distribution by lender parents' operating country. *Regulation year* denotes the year when ESG-related disclosure regulations were introduced in the country of the lender parent's operations. *Total number of lead banks* denotes the count of lenders that have served as lead arrangers in syndicated loan deals. *Total number of SLL lead banks* denotes the number of lenders that have acted as lead arrangers in Sustainability Linked Loans (SLL). *Total number of sustainability agent banks* quantifies the lenders that have served as sustainability agents. Panel C shows the top 20 lenders in our sample. Panel D shows the sample distribution by year.

Panel A: Sample Construction

Sample selection process	Remaining observations (loan-bank level)	Remaining unique loans
Raw loan-bank level data from 1.1.2011 - 12.31.2022	875,974	
Drop duplicates	860,815	61,326
Filter out non corporate borrowers	653,219	59,844
Keep loans from 1.1.2016 - 12.31.2022	399,729	27,355
Keep only lead arrangers	281,316	25,535
Aggregate to the bank-country-year-level	13,466	
Filter out 99 development and central banks	13,006	
Drop 2022 due to lack of t+1 data	11,138	
Drop singletons, require each group (bank, country, year) to have at least 2 observations	10,522	22,610
Final observations	10,522	

Table 1: Sample Composition, continued

Panel B: Sample Distribution by Country

Country	Regulation year	Sustainable Finance Disclosure Regulation	Total number of lead banks	Total number of SLLs lead banks	Total of sustainability lead banks
Australia	2005		48	11	4
Austria		2021	24	11	1
Bahrain			8	6	1
Belgium		2021	7	3	1
Brazil	2012		14	4	
Canada	2012		50	12	5
China	2008		43	21	5
Colombia			10	2	
Denmark	2009	2021	13	4	1
Finland	2011	2021	14	6	1
France	2003	2021	74	26	7
Germany	2005	2021	215	39	5
Ghana			2	1	
Greece		2021	5	2	
Hong Kong	2016		14	6	1
India	2012		59	6	
Indonesia			23	12	
Ireland	2008	2021	21	3	
Italy	2007	2021	75	22	6
Japan	2005		224	136	6
Jordan			5	1	
Kuwait			12	6	
Malaysia			14	5	1
Mexico			15	8	
Netherlands	1999	2021	37	5	3
New Zealand			5	1	
Norway	2013		11	3	2
Poland		2021	9	5	
Portugal	2010	2021	9	4	
Qatar			13	3	
Russian Federation			15	6	
Saudi Arabia			22	3	
Singapore	2017		14	5	3
South Africa	2010		17	7	3
South Korea			55	9	
Spain	2012	2021	80	29	6
Sweden	2009	2021	11	5	2
Switzerland			39	17	2
Taiwan	2008		42	36	2
Thailand			11	6	
Togo			2	1	
Ukraine			2	1	
United Arab Emirates			19	12	1
United Kingdom	2006		100	15	5
United States			1437	130	14

Table 1: Sample Composition, continued

Panel C: Top 20 banks

Bank	Bank headquarters country	Total number of SLL led	Total volume of SLLs led ($ billion)	Total number of countries led SLLs	Foreign country where the bank led most SLLs	Total number of SLLs in foreign countries
BNP Paribas SA	France	421	32.61	32	Germany	328
Credit Agricole Corporate & Investment Bank SA...	France	297	22.47	29	United States	169
HSBC Banking Group	United Kingdom	289	25.40	26	France	261
BofA Securities	United States	247	30.75	27	United Kingdom	148
JP Morgan	United States	231	31.59	22	United Kingdom	142
ING Group	Netherlands	217	17.47	29	Germany	183
Banco Santander SA	Spain	209	15.34	20	France	93
Societe Generale SA	France	188	16.51	23	Spain	110
UniCredit	Italy	187	14.63	22	Germany	166
Banco Bilbao Vizcaya Argentaria SA [BBVA]	Spain	182	10.39	18	France	66
Mizuho Financial Group Inc	Japan	179	19.97	27	United States	154
Citi	United States	179	22.39	25	United Kingdom	127
Deutsche Bank AG	Germany	167	15.10	19	Spain	138
Rabobank	Netherlands	161	13.88	27	United States	127
Barclays	United Kingdom	152	15.34	21	France	119
Natixis SA	France	149	11.14	21	Singapore	77
Commerzbank AG	Germany	143	11.71	18	France	83
Sumitomo Mitsui Financial Group Inc	Japan	142	13.83	24	United States	128
Mitsubishi UFJ Financial Group Inc	Japan	135	13.13	25	Australia	123
Caixabank SA	Spain	122	4.79	7	France	20

Table 1: Sample Composition, continued

Panel D: Sample distribution by year

Year	Total number of non-ESG loans	Total volume of non ESG-loans ($ billions)	Total number of SLLs	Total volume of SLLs ($ billions)	SLL relationship loan %	SLL origination %	SLL public borrower %	SLL new borrower origination %
2016	8887	3129.07						
2017	10164	3903.02	3	2.26	100.00	33.33	100.00	0.00
2018	10731	4276.03	29	18.22	3.45	68.97	65.52	68.97
2019	9895	3475.75	156	93.97	41.67	71.79	64.74	55.77
2020	8954	3392.08	237	132.04	50.21	80.17	51.90	56.12
2021	9646	3978.93	795	460.25	51.57	74.21	44.03	49.18
2022	6726	2846.83	1179	490.79	51.74	77.61	44.61	51.31

Table 2: Descriptive statistics

This table reports the summary statistics for the variables used in our determinants model. Panel A reports the descriptive statistics. Panel B reports the Pearson correlation coefficient. All continuous variables are winsorized at the 1% and 99% levels. All variables are defined in Appendix A.

Panel A: Summary Statistics

Variables	**count**	**mean**	**std**	**25%**	**50%**	**75%**
total_hhi	10,522	0.083	0.063	0.048	0.061	0.090
sll_lead_t1	10,522	0.204	0.403	0.000	0.000	0.000
sustainability_agent_t1	2,149	0.150	0.360	0.000	0.000	0.100
sll_origination_t1	10,522	0.096	0.295	0.000	0.000	0.000
sll_new_borrower_t1	10,522	0.081	0.273	0.000	0.000	0.000
country_year_sll_indicator	10,522	0.483	0.500	0.000	0.000	1.000
loan_leader	10,522	0.322	0.467	0.000	0.000	1.000
exposure	10,522	0.255	0.375	0.006	0.035	0.385
rel_perc	10,522	0.277	0.387	0.000	0.000	0.610
is_foreign_bank	10,522	0.796	0.403	1.000	1.000	1.000
has_refinitiv	10,522	0.499	0.500	0.000	0.000	1.000
bank_home_regulation	10,522	0.668	0.471	0.000	1.000	1.000
public	10,522	0.334	0.472	0.000	0.000	1.000
ln_total_bank	10,522	8.684	2.608	6.658	9.351	10.738

Table 2: Summary Statistics, continued

Panel B: Correlations

Variables	*sll_lead_t1*	*sustainability_agent_t1*	*sll_origination_t1*	*sll_new_borrower_t1*	*country_year_esg_indicator*	*total_hhi*	*loan_leader*	*exposure*	*rel_perc*	*is_foreign_bank*	*has_refinitiv*	*bank_home_regulation*	*public*
sustainability_agent_t1	0.329												
sll_origination_t1	0.644	0.280											
sll_new_borrower_t1	0.587	0.274	0.854										
country_year_sll_indicator	0.360	0.118	0.338	0.308									
total_hhi	-0.132	-0.052	-0.090	-0.081	-0.285								
loan_leader	0.217	0.179	0.217	0.223	-0.072	0.128							
exposure	-0.107	-0.046	-0.057	-0.037	0.017	-0.055	-0.047						
rel_perc	0.151	0.070	0.128	0.109	0.085	-0.184	0.095	-0.104					
is_foreign_bank	-0.002	-0.031	-0.021	-0.043	-0.016	0.020	-0.049	-0.727	0.048				
has_refinitiv	0.043	0.065	0.031	0.035	-0.042	0.020	0.075	-0.240	0.062	0.157			
bank_home_regulation	0.131	0.089	0.108	0.095	0.019	0.029	0.005	-0.296	0.006	0.234	0.093		
public	0.017	0.012	0.014	0.020	-0.024	0.014	0.086	-0.094	0.016	0.056	0.065	-0.189	
ln_total_bank	0.246	0.123	0.189	0.169	0.004	0.014	0.333	-0.724	0.220	0.474	0.229	0.123	0.160

Table 3: Determinants of banks' SLL decisions

This table examines the determinants of banks' decisions to lead or act as sustainability agents in a specific country for a particular year. Columns (1) and (2) display the results of the decision to lead. The dependent variable is the decision to lead an SLL in the following year. Column (1) presents the results from OLS estimation, while column (2) shows the marginal effects of the hazard model estimation. Columns (3) and (4) repeat the same regression as (1) but replace the dependent variable with *sll_origination_t*1 and *sll_new_borrower_t*1 respectively. Panel B reports the results of investigating the factors influencing banks' decisions to serve as sustainability agents. The sample is of banks that have led an SLL deal in a specific country within a particular year. Market-level metrics encompass a competition measure: *total_hhi*, and an indicator to identify if the country has any SLLs in that year: *country_year_sll_indicator*. Bank-specific measures include *loan-leader*, *exposure*, *rel_perc*, *is_foreign_bank*, *bank_home_regulation*, *has_refinitiv*, and *public*. We control for bank size with *ln_total_bank*. All continuous variables are winsorized at the 1% and 99% levels. Both country and year fixed effects are incorporated into the OLS estimations. The hazard model estimation is stratified by country and year. For OLS, standard errors are adjusted for clustering at the bank and country levels, whereas for the hazard model, they are clustered at the country level. The sample comprises 10,522 bank-country-year level observations. All variables are defined in Appendix A. Robust standard errors are reported in the parentheses. *, **, and *** represent 10%, 5%, and 1% significance, respectively.

Panel A: Sustainability lead

	Full Sample			
Dependent variables:	OLS *sll_lead_t1* (1)	Hazard *sll_lead_t1* (2)	OLS *sll_origination_t1* (3)	OLS *sll_new_borrower_t1* (4)
total_hhi	0.589***		0.371**	0.367**
	(0.213)		(0.166)	(0.153)
country_year_sll_indicator	0.067**		0.105***	0.093***
	(0.031)		(0.022)	(0.020)
loan_leader	0.241***	0.802***	0.181***	0.177***
	(0.032)	(0.165)	(0.031)	(0.032)
exposure	0.022	-0.272	0.042***	0.034**
	(0.022)	(0.299)	(0.015)	(0.014)
rel_perc	0.049***	0.692***	0.037***	0.024***
	(0.015)	(0.099)	(0.009)	(0.008)
is_foreign_bank	-0.111***	-1.128***	-0.056***	-0.063***
	(0.038)	(0.230)	(0.021)	(0.021)
bank_home_regulation	0.088***	0.819***	0.056***	0.049***
	(0.020)	(0.165)	(0.011)	(0.009)
has_refinitiv	0.005	0.022	0.006	0.010
	(0.013)	(0.066)	(0.009)	(0.008)
public	0.005	0.048	0.003	0.007
	(0.013)	(0.057)	(0.008)	(0.007)
ln_total_bank	0.035***	0.309***	0.020***	0.017***
	(0.005)	(0.037)	(0.003)	(0.003)
loan_leader × *hhi*	-1.010***	-1.062	-0.758***	-0.734***
	(0.238)	(2.058)	(0.232)	(0.229)
Observations	10,522	8,717	10,522	10,522
Adjusted R-squared	0.320		0.264	0.232
Country FE	YES	YES	YES	YES
Bank FE	NO	NO	NO	NO
Year FE	YES	YES	YES	YES
Cluster	Country, Bank	Country	Country, Bank	Country, Bank

Table 3: Determinants of banks' SLL decisions, continued

Panel B: Sustainability agent

	SLL Lead Sample	
Dependent variables:	OLS *sustainability_agent_t1* (1)	Hazard *sustainability_agent_t1* (2)
total_hhi	-0.066	
	(0.491)	
country_year_sll_indicator	-0.006	
	(0.027)	
loan_leader	0.196**	1.327***
	(0.067)	(0.355)
exposure	-0.209*	-0.439
	(0.084)	(0.313)
rel_perc	0.013	-0.022
	(0.024)	(0.264)
is_foreign_bank	-0.187*	-1.044***
	(0.088)	(0.324)
bank_home_regulation	0.138**	1.203***
	(0.047)	(0.285)
has_refinitiv	0.048**	0.247**
	(0.018)	(0.112)
public	0.007	0.062
	(0.013)	(0.124)
ln_total_bank	0.009	0.210***
	(0.010)	(0.070)
loan_leader × *hhi*	-0.905**	-1.268
	(0.274)	(5.663)
Observations	2,099	1,711
R-squared	0.208	
Adj. R-squared	0.185	
Country FE	YES	YES
Bank FE	NO	NO
Year FE	YES	YES
Cluster	Country, Bank	Country

Table 4: Foreign and domestic banks decisions

This table presents the results comparing foreign and domestic banks' decisions to lead or act as sustainability agents in a specific country for a particular year. Columns (1) and (2) display results for domestic banks. Domestic banks are defined as those that lend to a borrower in the same country as the bank's headquarters. Column (1) shows the results from the ordinary least squares estimation. Column (2) restricts the sample to domestic banks that have led an SLL deal in a certain country within a given year and shows the determinants of banks' decisions to act as sustainability agents. Columns (3) and (4) detail the results for foreign banks. Foreign banks are described as those lending to a borrower in a country different from the bank's headquarters. Column (4) narrows the sample to foreign banks that have led an SLL deal in a specific country during a specified year and analyzes the factors guiding banks' decisions to serve as sustainability agents. Market-level measures include a competition metric, *total_hhi*, and an indicator determining if the country initiated any SLLs during that year, *country_year_sll_indicator*. Bank-specific metrics include *loan-leader*, *exposure*, *rel_perc*, *bank_home_regulation*, *has_refinitiv*, and *public*. We account for bank size using *ln_total_bank*. All continuous variables are winsorized at the 1% and 99% levels. OLS estimations incorporate both country and year fixed effects. Standard errors are clustered at the country and bank levels and reported in parentheses. All variables are defined in Appendix A. Robust standard errors are reported in the parentheses. *, **, and *** represent 10%, 5%, and 1% significance, respectively.

Panel A: Sustainability lead

Dependent variables:	OLS Domestic Sample *sll_lead_t1* (1)	OLS Foreign Sample *sll_lead_t1* (2)	OLS Domestic Sample *origination_t1* (3)	OLS Foreign Sample *origination_t1* (4)	OLS Domestic Sample *sll_new_borrower_t1* (5)	OLS Foreign Sample *sll_new_borrower_t1* (6)
total_hhi	0.846**	0.412**	0.512**	0.278	0.559**	0.289*
	(0.336)	(0.198)	(0.226)	(0.172)	(0.232)	(0.150)
country_year_sll_indicator	0.110**	0.063*	0.151***	0.102***	0.147***	0.085***
	(0.050)	(0.034)	(0.054)	(0.024)	(0.055)	(0.021)
loan_leader	0.120***	0.228***	0.068*	0.181***	0.069*	0.173***
	(0.039)	(0.033)	(0.037)	(0.033)	(0.040)	(0.034)
exposure	-0.077	0.090***	-0.007	0.075***	-0.022	0.070***
	(0.054)	(0.025)	(0.058)	(0.019)	(0.066)	(0.018)
rel_perc	0.014	0.045***	0.013	0.037***	0.017	0.022**
	(0.015)	(0.017)	(0.019)	(0.011)	(0.018)	(0.009)
bank_home_regulation	0.130	0.082***	0.192	0.052***	0.196	0.040***
	(0.102)	(0.017)	(0.133)	(0.009)	(0.134)	(0.008)
ln_total_bank	0.064***	0.039***	0.050***	0.019***	0.047***	0.015***
	(0.014)	(0.006)	(0.012)	(0.004)	(0.013)	(0.004)
public	0.026*	-0.002	0.018*	-0.001	0.016	0.006
	(0.014)	(0.015)	(0.010)	(0.009)	(0.012)	(0.008)
has_refinitiv	0.019	-0.003	0.028*	-0.004	0.022	0.003
	(0.016)	(0.014)	(0.015)	(0.009)	(0.018)	(0.008)
loan_leader × *hhi*	-0.686***	-1.019***	-0.344	-0.810***	-0.349	-0.787***
	(0.237)	(0.192)	(0.248)	(0.189)	(0.271)	(0.190)
Observations	2,072	8,290	2,072	8,290	2,072	8,290
Adjusted R-squared	0.459	0.310	0.403	0.249	0.396	0.206
Country FE	YES	YES	YES	YES	YES	YES
Bank FE	NO	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES
Cluster	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank

Table 4: Foreign and domestic banks decisions, continued

Panel B: Sustainability agent

Dependent variables:	OLS Domestic Sample *sustainability_agent_t1* (1)	OLS Foreign Sample *sustainability_agent_t1* (2)
total_hhi	-0.017	0.092
	(0.820)	(0.527)
country_year_sll_indicator	0.133	-0.017
	(0.099)	(0.025)
loan_leader	0.195*	0.180***
	(0.107)	(0.048)
exposure	-0.183*	-0.044
	(0.106)	(0.084)
rel_perc	0.041	0.018
	(0.074)	(0.023)
bank_home_regulation	0.000	0.084**
	(0.000)	(0.038)
ln_total_bank	0.034**	-0.001
	(0.013)	(0.012)
public	0.034	0.008
	(0.042)	(0.044)
has_refinitiv	0.044	0.040
	(0.046)	(0.033)
loan_leaderxhhi	-1.367**	-0.855*
	(0.570)	(0.507)
Constant	-0.197	-0.002
	(0.177)	(0.110)
Observations	437	1,703
Adjusted R-squared	0.351	0.153
Country FE	YES	YES
Bank FE	NO	NO
Year FE	YES	YES
Cluster	Country Bank	Country Bank

Table 5: Role of Refinitiv ESG scores

This table investigates the influence of Refinitiv ESG scores on banks' decisions to either lead an SLL or act as a sustainability agent in a market within a given year. The results for *e_score*, *s_score*, and *g_score* are reported separately. Panel A presents the summary statistics for these ESG scores sourced from Refinitiv. Panel B reports the regression results mirroring the specification of the earlier determinant model but replacing the indicator of whether the bank possesses a Refinitiv rating with specific pillar scores. Columns (1) to (5) detail the decisions associated with leading a SLL. Specifically, columns (1), (2), and (3) relay the outcomes for the environmental pillar across the full sample, foreign sample, and domestic sample, respectively. Column (4) focuses on the social pillar, while column (5) covers the governance pillar. Columns (6) through (10) follow a similar structure but restrict the sample to banks that have led an SLL, exploring their decisions to serve as sustainability agents. At the market level, metrics encompass a competition measure, *total_hhi*, and an indicator highlighting if the country has initiated any SLLs during that year, labeled as *country_year_sll_indicator*. Bank-specific measurements feature *loan-leader*, *exposure*, *rel_perc*, *bank_home_regulation*, *has_refinitiv*, and *public*. We control for bank size using *ln_total_bank*. All continuous variables are winsorized at the 1% and 99% levels. OLS estimation includes both country and year fixed effects. Standard errors are clustered at the country and bank levels and reported in parentheses. All variables are defined in Appendix A. *, **, and *** represent 10%, 5%, and 1% significance, respectively.

Panel A: Summary statistics for the Refinitiv sample

variable	*e_score*	s_score						
s_score	0.729	1.000						
g_score	0.341	0.403						
	count	mean	std	min	25%	50%	75%	max
e_score	5286	0.771	0.239	0.000	0.692	0.862	0.929	0.990
s_score	5286	0.753	0.169	0.014	0.699	0.791	0.869	0.986
g_score	5286	0.663	0.215	0.010	0.514	0.716	0.841	0.964

Table 5: Role of Refinitiv ESG scores, continued

Panel B: Refinitiv regression results

	Full Sample					SLL Lead Sample				
	All	Foreign	Domestic	All		All	Foreign	Domestic	All	All
Dependent variables:	sll_lead_{t1}	sll_lead_{t1}	sll_lead_{t1}	sll_lead_{t1}	sll_lead_{t1}	$sustainability\_agent_{t1}$	$sustainability\_agent_{t1}$	$sustainability\_agent_{t1}$	$sustainability\_agent_{t1}$	$sustainability\_agent_{t1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
e_score	0.120***	0.085	0.113**			-0.007	-0.048	0.050		
	(0.037)	(0.054)	(0.044)			(0.088)	(0.096)	(0.226)		
s_score				0.042					0.046	
				(0.049)					(0.152)	
g_score					0.015					0.127**
					(0.035)					(0.062)
total_hhi	0.406***	0.259	0.757*	0.419*	0.418*	0.277	0.318	0.043	0.277	0.243
	(0.118)	(0.224)	(0.433)	(0.220)	(0.219)	(0.618)	(0.872)	(1.521)	(0.616)	(0.615)
country_year_sll_indicator	0.064***	0.055	0.150**	0.064*	0.064*	0.035	-0.015	0.395***	0.035	0.037
	(0.016)	(0.037)	(0.069)	(0.035)	(0.035)	(0.035)	(0.039)	(0.084)	(0.031)	(0.030)
loan_leader	0.196***	0.182***	0.090	0.199***	0.199***	0.204***	0.206***	0.277*	0.204***	0.201***
	(0.021)	(0.031)	(0.069)	(0.031)	(0.031)	(0.047)	(0.069)	(0.155)	(0.054)	(0.052)
exposure	0.042	0.126***	-0.011	0.039	0.036	-0.223**	-0.019	-0.045	-0.223**	-0.237**
	(0.036)	(0.047)	(0.054)	(0.039)	(0.039)	(0.095)	(0.101)	(0.198)	(0.104)	(0.109)
rel_perc	0.030**	0.028	-0.042	0.032	0.032	-0.018	-0.012	-0.202	-0.019	-0.021
	(0.015)	(0.021)	(0.035)	(0.020)	(0.020)	(0.031)	(0.033)	(0.154)	(0.030)	(0.030)
is_foreign_bank	-0.155***			-0.150***	-0.149***	-0.209***			-0.210**	-0.211**
	(0.023)			(0.048)	(0.049)	(0.050)			(0.085)	(0.085)
bank_home_regulation	0.087***	0.088***		0.106***	0.108***	0.173***	0.124***		0.171***	0.167***
	(0.024)	(0.030)		(0.027)	(0.027)	(0.051)	(0.044)		(0.047)	(0.043)
public	-0.009	-0.006	-0.003	-0.005	-0.004	0.030	0.037	0.059	0.031	0.036
	(0.021)	(0.023)	(0.021)	(0.020)	(0.020)	(0.069)	(0.068)	(0.046)	(0.062)	(0.062)
ln_total_bank	0.031***	0.035***	0.069***	0.033***	0.034***	0.001	-0.010	0.071*	0.000	-0.004
	(0.005)	(0.007)	(0.013)	(0.006)	(0.006)	(0.015)	(0.018)	(0.039)	(0.013)	(0.015)
loan_leader × *hhi*	-0.427***	-0.407***	-0.243	-0.437***	-0.440***	-0.646**	-0.959*	-0.590	-0.638**	-0.648**
	(0.129)	(0.149)	(0.385)	(0.152)	(0.152)	(0.257)	(0.523)	(0.506)	(0.302)	(0.279)
Observations	5,236	4,487	709	5,236	5,236	1,143	933	197	1,143	1,143
Adj. R-squared	0.336	0.308	0.548	0.333	0.333	0.180	0.140	0.429	0.180	0.183
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank

Table 6: Consequences of SLL lending for bank performance

This table presents the consequences when a bank leads an SLL or acts as a sustainability agent. The subsequent effects are observed in the year following the SLL leadership. An additional indicator, *sll_foreign_lead*, is incorporated if the bank led the deal in a foreign country. Panel A outlines the descriptive statistics of pertinent variables, while Panel B depicts their inter-correlations. Panel C delves into the competitive posture of banks post their SLL engagement. Columns (1) through (4) capture results from the entire sample: column (1) focuses on the bank's market share in the subsequent period, column (2) presents outcomes on the bank's share of transactions with new clientele unfamiliar to the overall market, and column (3) scrutinizes the bank's exposure in that market. Columns (4) to (6) and (7) to (9) replicate this analysis, respectively, specifically for foreign and domestic banks. Panel D illuminates findings related to the bank's profitability in the succeeding period, with columns (1) to (3), respectively, showcasing the full, foreign, and domestic samples. Both Panel C and Panel D regressions incorporate market-centric metrics, such as *total_hhi* and the indicator, *country_year_sll_indicator*, which ascertains if a country launched any SLLs within that year. Bank-specific metrics encompass *loan-leader*, *exposure*, *rel_perc*, *bank_home_regulation*, *has_refinitiv*, and *public*. Adjustments for bank size are made using *ln_total_bank*. Detailed descriptions for these variables are available in the appendix. All continuous variables are winsorized at the 1% and 99% levels. OLS estimation includes bank, country, and year fixed effects. Standard errors are clustered at the country and bank levels and reported in parentheses. All variables are defined in Appendix A. *, **, and *** represent 10%, 5%, and 1% significance, respectively.

Panel A: Summary statistics

Variables	count	mean	std	25%	50%	75%
sll_lead	10522	0.177	0.382	0.000	0.000	0.000
sll_foreign_lead	10522	0.491	0.500	0.000	0.000	1.000
sustainability_agent	10522	0.030	0.170	0.000	0.000	0.000
sustainability_agent_foreign	10522	0.197	0.398	0.000	0.000	0.000
market_share_t1	10522	2.068	4.920	0.000	0.186	2.048
new_loan_market_share_t1	10522	1.299	4.148	0.000	0.004	0.825
exposure_t1	10522	0.152	0.312	0.000	0.005	0.070
portfolio_return_t1	10522	1.056	2.853	0.000	0.432	1.297
average_maturity_t1	10522	36.723	38.306	0.000	41.475	60.000
average_size_t1	10522	56.241	163.018	0.000	28.720	77.664
esg_perc_t1	10522	0.079	0.218	0.000	0.000	0.000

Table 6: Consequences, continued

Panel B: Correlations

Variables	*sll_lead*	*sll_foreign_lead*	*sustainability_agent*	*sustainability_agent_foreign*	*market_share_t1*	*new_loan_market_share_t1*	*exposure_t1*	*portfolio_return_t1*	*average_maturity_t1*	*average_size_t1*	*sll_perc_t1*	*sll_market_share_t1*
sll_foreign_lead	0.371											
sustainability_agent	0.369	0.167										
sustainability_agent_foreign	0.378	0.503	0.301									
market_share_t1	0.097	0.109	0.125	0.093								
new_loan_market_share_t1	0.031	0.065	0.056	0.043	0.874							
exposure_t1	-0.020	-0.304	0.013	-0.175	0.075	0.088						
portfolio_return_t1	0.108	0.099	0.064	0.055	0.368	0.297	0.127					
average_maturity_t1	0.099	0.041	0.068	0.022	0.311	0.259	0.363	0.233				
average_size_t1	0.049	0.062	0.033	0.033	0.312	0.276	0.098	0.730	0.230			
sll_perc_t1	0.362	0.266	0.145	0.225	0.079	0.050	-0.001	0.031	0.158	0.050		
sll_market_share_t1	0.343	0.231	0.287	0.251	0.329	0.229	0.027	0.090	0.138	0.055	0.614	
ln_sll_count_t1	0.541	0.321	0.379	0.288	0.214	0.119	0.118	0.172	0.204	0.069	0.591	0.622

Table 6: Consequences, continued

Panel C: Consequences–market shares

	Full Sample			Foreign Sample			Domestic Sample		
Dependent variables:	OLS $market\_share_{t1}$	OLS $new\_loan\_market\_share_{t1}$	OLS $exposure_{t1}$	OLS $market\_share_{t1}$	OLS $new\_loan\_market\_share_{t1}$	OLS $exposure_{t1}$	OLS $market\_share_{t1}$	OLS $new\_loan\_market\_share_{t1}$	OLS $exposure_{t1}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
sll_lead	0.537***	0.209*	0.018**	0.507***	0.202**	0.012***	0.407	0.061	0.039
	(0.156)	(0.123)	(0.008)	(0.122)	(0.085)	(0.004)	(0.393)	(0.398)	(0.028)
sll_foreign_lead	0.130	0.219**	0.009	0.038	0.180*	-0.003	0.044	0.035	0.068**
	(0.117)	(0.107)	(0.007)	(0.108)	(0.103)	(0.004)	(0.578)	(0.540)	(0.028)
sustainability_agent	1.651***	0.468***	-0.005	0.939***	0.462***	0.020***	1.042*	-0.348	0.056*
	(0.317)	(0.120)	(0.010)	(0.287)	(0.143)	(0.006)	(0.526)	(0.566)	(0.032)
sustainability_agent_foreign	-0.316**	-0.289**	0.001	-0.241*	-0.283***	-0.010*	0.263	-0.478	0.009
	(0.145)	(0.115)	(0.006)	(0.137)	(0.101)	(0.005)	(0.465)	(0.574)	(0.025)
total_hhi	3.983	0.883	0.043	6.214***	2.819*	0.017	-8.090*	-8.045	-0.244
	(2.527)	(2.118)	(0.091)	(2.143)	(1.652)	(0.038)	(4.571)	(4.887)	(0.475)
country_year_sll_indicator	-0.044	-0.159	-0.002	0.049	-0.113	-0.004	0.173	0.111	-0.019
	(0.156)	(0.108)	(0.010)	(0.176)	(0.118)	(0.005)	(0.334)	(0.297)	(0.036)
rel_perc	0.279**	0.139*	0.002	0.241*	0.077	0.005	0.179	0.602*	-0.092***
	(0.136)	(0.084)	(0.005)	(0.134)	(0.076)	(0.007)	(0.223)	(0.354)	(0.027)
exposure	-0.232	-0.291	0.388***	0.607	0.366	0.274**	-0.692	-0.881	-0.122*
	(0.329)	(0.266)	(0.070)	(0.408)	(0.251)	(0.115)	(0.733)	(0.669)	(0.069)
ln_total_bank	-0.080	-0.054	0.034***	0.140	0.140	0.038**	0.106	0.006	0.018
	(0.073)	(0.074)	(0.010)	(0.101)	(0.085)	(0.015)	(0.088)	(0.106)	(0.018)
is_foreign_bank	-3.168***	-2.236***	-0.243***						
	(0.380)	(0.325)	(0.018)						
bank_home_regulation	1.049***	1.020***	-0.030	0.739**	0.796**	-0.078	1.347**	1.616*	0.150
	(0.284)	(0.249)	(0.052)	(0.354)	(0.354)	(0.047)	(0.649)	(0.891)	(0.119)
loan_leader	2.038***	0.960***	0.017*	2.099***	0.964***	0.025**	-0.358	-0.155	-0.017
	(0.294)	(0.207)	(0.010)	(0.277)	(0.186)	(0.011)	(0.676)	(0.533)	(0.034)
loan_leader × *hhi*	-1.856	-0.256	-0.094	-4.700**	-2.506*	-0.083	-6.417*	-5.957**	0.266
	(2.757)	(2.086)	(0.057)	(2.129)	(1.419)	(0.052)	(3.393)	(2.604)	(0.239)
Observations	10,522	10,522	10,522	8,290	8,290	8,290	2,072	2,072	2,072
Adjusted R-squared	0.270	0.212	0.674	0.210	0.142	0.442	0.609	0.486	0.403
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank	Country, Bank

Table 6: Consequences, continued

Panel D: Consequences–portfolio return

Dependent variable:	OLS Full Sample $portfolio\_return_{t1}$ (1)	OLS Foreign Sample $portfolio\_return_{t1}$ (2)	OLS Domestic Sample $portfolio\_return_{t1}$ (3)
sll_lead	0.268***	0.241***	0.057
	(0.061)	(0.071)	(0.119)
sll_foreign_lead	0.056	0.037	0.338**
	(0.040)	(0.039)	(0.167)
sustainability_agent	0.131	0.068	-0.496*
	(0.102)	(0.097)	(0.276)
sustainability_agent_foreign	-0.056	-0.041	0.714*
	(0.055)	(0.045)	(0.389)
total_hhi	0.036	0.694	-1.239
	(0.581)	(0.437)	(0.860)
country_year_sll_indicator	-0.136*	-0.108	-0.126
	(0.070)	(0.074)	(0.089)
rel_perc	0.125***	0.125***	0.093
	(0.044)	(0.039)	(0.072)
exposure	0.422	0.805**	0.195
	(0.317)	(0.367)	(0.177)
ln_total_bank	0.008	0.057	0.031
	(0.038)	(0.049)	(0.027)
average_maturity_t1	0.007***	0.007***	0.001
	(0.002)	(0.002)	(0.001)
average_size_t1	0.004**	0.004**	0.011***
	(0.002)	(0.002)	(0.001)
esg_perc_t1	-0.088	-0.038	-0.250
	(0.087)	(0.092)	(0.309)
is_foreign_bank	-0.307***		
	(0.092)		
bank_home_regulation	0.013	0.016	-0.464***
	(0.144)	(0.106)	(0.153)
loan_leader	0.457***	0.525***	-0.131
	(0.070)	(0.071)	(0.102)
loan_leaderxhhi	-0.577	-1.307***	0.918
	(0.649)	(0.370)	(0.904)
Observations	10,522	8,290	2,072
Adjusted R-squared	0.481	0.476	0.688
Country FE	YES	YES	YES
Bank FE	YES	YES	YES
Year FE	YES	YES	YES
Cluster	Country Bank	Country Bank	Country Bank

Appendix D. Online Appendix to "Financial Innovation via Sustainable Lending"

Appendix D.1. Additional Tables

Table OA1: Sample distribution by borrower and country

This table reports our sample distribution by borrower country. We include the number of banks that led SLLs and non-ESG loans (non-ESG loans exclude SLLs and green loans) and the number of foreign banks that led SLLs and non-ESG loans. We also report the number of unique SLLs and a number of unique non-ESG loans (excluding SLLs and green loans).

Country	Number of banks led SLLs	Number of banks led non-ESG loans	Number of foreign led SLL	Number of foreign banks led non-ESG loans	Number of unique SLLs	Number of unique non-ESG loans
United States	64	325	38	131	98	27080
United Kingdom	63	190	58	176	45	1689
Netherlands	57	122	54	114	46	677
France	54	118	47	98	120	2125
Singapore	53	82	51	79	45	125
Germany	53	137	43	101	131	2703
Switzerland	47	102	44	94	24	409
Spain	46	127	28	96	119	1603
Australia	42	114	36	100	53	543
Norway	33	56	30	53	17	251
Sweden	33	84	29	80	17	370
Denmark	32	48	29	44	8	153
Luxembourg	30	93	30	93	8	247
Hong Kong	29	69	27	65	26	64
Italy	27	86	20	64	34	1278
Belgium	27	64	25	61	15	264
Finland	26	44	25	39	21	223
Brazil	24	48	24	43	4	51
Austria	23	59	21	54	26	277
United Arab Emirates	21	73	13	58	9	115
Thailand	20	25	19	20	10	14
Ireland	20	76	18	74	6	188
Russian Federation	19	34	17	27	9	36
Mauritius	18	20	18	20	2	14
Cayman Islands	16	59	16	59	1	46
Taiwan	15	40		20	18	42
Cyprus	15	39	15	39	3	27
Mexico	14	28	13	26	12	96
Canada	14	99	9	88	22	1077
Portugal	12	31	11	26	3	50
Japan	12	32	1	18	52	541
South Africa	12	32	10	26	7	73
Ghana	12	13	12	13	3	8
Iceland	10	10	10	10	3	16
Chile	10	24	10	22	6	24
China	9	50	7	34	5	92
Estonia	7		7		3	
New Zealand	5	34	5	34	16	71
Israel	5	28	5	20	1	28
Indonesia	5	37	4	33	2	63
Slovakia	4	15	4	15	1	14
South Korea	2	22	2	16	2	39
Colombia	2	34	1	32	3	53

Appendix D.2. Calculation of the variable share_amount

Several of our measurements, such as *market_share*, *exposure*, and *total_hhi*, depend on accurately determining the volume of a bank's lending in a specific country within a given year. To construct those variables, we first calculate the *share_amount* variable, which represents the financial contribution of a bank within a specific tranche of a loan. This variable is calculated by multiplying two DealScan variables: *tranche_amount_converted* and *lender_share*. *tranche_amount_converted* represents the total dollar value of a tranche, while the *lender_share* indicates the proportional monetary involvement of each participating bank in that tranche.

When the *lender_share* variable is missing from DealScan, we employ an alternative method to estimate it. Because our primary focus is on lead banks, we calculate the *lender_share* by first taking the annual mean of the aggregate share percentages held by lead banks across all loan tranches for a specific year; this average is then divided by the total number of lead arrangers participating in each respective tranche, yielding the *lender_share*.

For illustration, consider a syndicated loan dated June 20, 2019, involving Barclays (lead arranger) and AccentCare Inc., where *lender_share* is not provided in DealScan. To estimate the *lender_share*, we first determine the average involvement of all lead banks in 2019, which stands at 67%. Next, this figure is divided by the number of lead banks in this specific tranche, in this case, 5. Consequently, the estimated *lender_share* for Barclays in this transaction is 13.4%. Finally, we multiply the estimated *lender_share* 13.4% by the *tranche_amount_converted* which is 355 ($ millions) to obtain the *share_amount*, of Barclays in this tranche-- 47.57 ($ millions).

We choose to use annual averages instead of country-specific annual averages to address the missing *lender_share* values for several reasons. First, relying on country-specific annual averages might result in inaccuracies due to a limited number of available *lender_share* data points at the country-year level. Our dataset comprises 274 unique country-years, with each unit representing a unique combination of a country and a year. In half of these country-years, there are fewer than 12 tranches for which valid *lender_share* data is available. Among the lowest 25% of these units, the number of tranches with valid *lender_share* data is as low as 4. This relatively small count at the lower quartile may lead to the presence of outliers, potentially introducing noise in our data analysis and predictions. Second, there is a noticeable consistency in the lead bank percentages over different years. This trend suggests that the shares held by lead banks in each tranche exhibit a stable characteristic, reinforcing the use of annual averages for more reliable estimations.