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August 7, 2025

Re: Application to the NBER PhD Student Workshop on Climate Finance

Dear Professors Flammer and Giglio,

I am writing to express my keen interest in participating in the NBER PhD Student Workshop on Climate Finance to be held on October 9, 2025. I am currently pursuing my PhD in Sustainable Finance at the University of Kent**,** with an expected completion date of September 2025**.** My doctoral research is fully funded by the ESRC–SeNSS scholarship**,** and it focuses on the integration of environmental, social, and governance (ESG) factors into syndicated loan pricing and structuring.

The paper I am submitting, titled *"Is There a Greenium in Sustainable Corporate Loan Pricing,"* examines whether sustainable corporate loans (SCLs) are associated with pricing discounts (greenium) or risk premiums, using a unique dataset of syndicated loans issued between 2016 and 2024. The paper identifies meaningful regional heterogeneity in pricing effects, with robust evidence of greenium in Europe but not in the United States. This aligns closely with the workshop's goal of exploring how climate-related risks and ESG considerations shape financial markets.

My broader research agenda aims to understand the evolving role of banks in climate transition finance, the pricing dynamics of sustainability-linked loans, and the effectiveness of ESG key performance indicators in loan contracts. In the future, I plan to extend this work using causal inference and machine learning methods to forecast ESG risk pricing under alternative policy scenarios, including in Islamic financial markets. My goal is to publish in leading journals such as the *Journal of Corporate Finance* and *Journal of Business Ethics*, and to contribute to interdisciplinary research and policy development in climate-aligned capital markets.

I would greatly value the opportunity to present my work, receive constructive feedback, and engage with leading scholars in the field through this workshop. Dr Abdullah Iqbal (University of Kent, a.iqbal@kent.ac.uk), my primary supervisor, would be happy to provide a reference if required.

Thank you very much for considering my application. I look forward to the possibility of contributing to the workshop and learning from fellow participants.

Yours sincerely,
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Profile summary:

Doctoral researcher in Sustainable Finance (expected to complete in Sep'25) at the University of Kent with a decade-long track record spanning academia, banking, and applied policy research. Experienced in teaching finance and accounting modules at UK higher education institutions and contributing to interdisciplinary projects at Oxford and Kent. My research focuses on ESG performance, sustainable loan pricing, and Islamic finance, with papers presented at international conferences (IFABS Oxford). Awarded a fully funded PhD scholarship by the ESRC-SeNSS. Proficient in econometric analysis using R, STATA, and advanced databases including Refinitiv, Bloomberg and WRDS.

Research and Teaching Experiences

January 2023 – Present: Assistant Lecturer (Part-time), Kent Business School, University of Kent, UK

- Conducting seminars of modules, namely, Financial Accounting, Fixed Income Markets & Instruments

Marking answer scripts of modules, namely, Int. Business, Int. Marketing, Marketing & Society

Jan – Jun'24: Research Assistant (Part-time), Kent Business School, University of Kent, UK

- Worked on a Eurostar Research Project supervised by Professor Catherine Robinson,
- Estimated the economic benefits to the UK economy from Eurostar services, 2018-2035

Nov - Dec'23: Casual Research Assistant (Part-time), Center for Corporate Reputation, Saïd Business School, University of Oxford, UK

- Worked on a research project, "The diffusion of labor practices in global supply chains through a training program" funded by the Swiss National Science Foundation (SNSF) supervised by Dr Alessandro Guasti and Dr Matthew Amengual.
- Contributed to literature reviews, summarizing various theoretical perspectives, and contributing to the development of the working paper.

Research and Training Experiences

2017-22: Faculty Member, Islami Bank Training & Academy, Bangladesh

- Conducted a study on Online Training Effectiveness, collecting primary data through an online survey among the participants and recommended development ideas.
- Developed a comprehensive questionnaire for the online training need assessment system for all employees and managers of the Bank.
- Designed training courses on emerging skills, fintech, communication, and marketing for junior and mid-level bankers.
- Coordinated different training programs and ensured an effective learning environment.

2013-17: Senior Officer, R&D, Islami Bank Bangladesh PLC

- Conducted market research updating the global & Bangladesh economy.
- Developed and maintained a database of the banking sector in Bangladesh.
- Analyzed performance & market competitiveness of the Bank & provided policy support to management.

Banking and Teaching Experiences

2011 – 13: Officer, Islami Bank Bangladesh PLC, Dhaka, Bangladesh

- Managed Letters of Credit, SWIFT, Cash Dollar Endorsement, Foreign Currency Accounts, Students' Files, and Inward Foreign Remittance.

2008 – 11: Lecturer (Part-time), Saifur's, Rajshahi, Bangladesh

- Conducted classes on IELTS Preparation, MBA Admission Coaching, Written English, Spoken English Courses, and Varsity Admission Coaching.

Publications

Journal Articles

- Kinateder, H. *et al.* (2021) 'Does boardroom gender diversity decrease credit risk in the financial sector? Worldwide evidence', *Journal of International Financial Markets, Institutions and Money*, 73, p. 101347. Available at: https://doi.org/10.1016/J.INTFIN.2021.101347.
- Hassan, M.K. *et al.* (2023) 'A systematic literature review of risks in Islamic banking system: research agenda and future research directions', Risk Management, 26. Available at https://doi.org/10.1057/s41283-023-00135-z
- Reiazul, M.H. and Sohel, M.N.I. (2019) 'Are Islamic Banks Less Efficient than Other Banks? Evidence from Bangladesh', *Asian Economic and Financial Review*, 9(10), pp. 1136–1146. Available at: https://doi.org/10.18488/JOURNAL.AEFR.2019.910.1136.1146.

Book Chapter

- Rahman, M.M. and Sohel, M.N.I. (2019) 'Cash Waqf Deposit Product: An Innovative Instrument of Islamic Banks for Socio-Economic Development in Bangladesh', in *Revitalization of Waqf for Socio-Economic Development, Volume I*. Cham: Springer International Publishing, pp. 135–167. Available at: https://doi.org/10.1007/978-3-030-18445-2_8.

Under Review

- King, T., King, T., Islam Sohel, M. N., & Hasan, M. E. (2025). *Climate disclosure: a systematic literature review*. Submitted to *Accounting, Auditing & Accountability Journal*.

In Progress

- Sustainable corporate loans: A systematic literature review and future research agenda. Target: Journal of Accounting Literature (ABS 3)
- Do banks price ESG performance? Target: Journal of Banking and Finance (ABS 3)
- Greenium or risk premium? Sustainable corporate loan pricing: Target - *Journal of Corporate Finance* (ABS 4)
- Do sustainable corporate loans get favourable non-price contract terms? Target – JIFMIM (ABS 3)

Conference Presentations

- Sohel, M.N.I. et. al. (2025) 'Do sustainable corporate loans get favourable non-price contract terms?' In: KBS Conference 2025, University of Kent, UK.
- Sohel, M.N.I. et. al. (2025) 'Greenium or risk premium? Sustainable corporate loan pricing in the world' In: IFABS Oxford 2025 Conference, Oxford, UK.
- Sohel, M.N.I. et. al. (2024) 'Corporate borrower's ESG performance and bank interest rates.' In: Third PhD Student Research Day, Lille, France.
- Rahman, M.M. & Sohel, M.N.I. 2018 'No Poverty and Zero Hunger: Role of Financial Market in Bangladesh'. In: The Sixteenth National Conference, Dhaka.

- Rahman, M.M. & Sohel, M.N.I. 2018 'Liquidity Management through Sukuk: Potentials and Challenges in Bangladesh'. In: The Technical Workshop on Liquidity Management Tools for Islamic Financial Institutions, Dhaka.
- Sohel, M.N.I. & Rahman, M.M. 2017 'An Empirical Study to Assess If Islamic Banks' Assets Generate Less Revenue Than Conventional Counterparts'. In: The Annual Banking Conference, Dhaka.

Educational Qualifications and Certifications

- Pursuing PhD in Sustainable Finance at the University of Kent (Sep'22 – Present), UK
- MPhil (Coursework), Bangladesh University of Professionals (2020-2021), CGPA 3.90/4
- Executive MBA in Marketing, the University of Dhaka (2013-2017), CGPA 3.44/4
- MBA in Accounting, the University of Rajshahi (2007-2008, CGPA 3.46/4
- BBA in Accounting, the University of Rajshahi (2002-2007), CGPA 3.52/4
- Global Doctoral Course 2024 on Financial Economics of Climate and Sustainability, Harvard University
- Google Data Analytics Professional Certificate on Coursera (2021)
- Advanced Training on Research Techniques in Social Sciences (2019), University of Dhaka
- Diploma in Islamic Banking (2017), Islami Bank Training and Research Academy, Dhaka

Research Software and Databases

- Independent user of Excel, SPSS, STATA, R Programming, EndNote, Mendeley, and Zotero.
- Independent user of Refinitiv, Bloomberg, WRDS, and SASB databases.

Awards and Prizes

- Awarded a fully funded PhD scholarship by the Southeast Network for Social Sciences (SeNSS) under the Economic and Social Research Council (ESRC), UK.
- Won first prize in the annual essay competition 2021 on "Fintech and Islamic Banking: Bangladesh Perspective" organized by Islami Bank Officers' Welfare Society.

Co-curricular and Interests

- Member of PhD Students Committee, E-axes Forum on Climate Change, Macroeconomics, & Finance
- Member of European Finance Association (EFA)
- Volunteering as a Pro-master of Meditation Course at Quantum Foundation, Bangladesh.
- Volunteered as a Post Graduate Mentor (2023-2024) at Kent Business School, University of Kent.
- Volunteered in the SeNSS Student Committee (2022-2024).
- Led a team in the 19th Inter-University National Television Debate 2008.
- Volunteered as a Joint Secretary in Rajshahi University Newspaper Readers' Forum (2003-08).
- Volunteered as a Unit Leader of Rover Scout (1999-2000), MM Ali College, Bangladesh.

References are available on request.

Is There a Greenium in Sustainable Corporate Loan Pricing?

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Abstract

This study investigates whether sustainable corporate loans (SCLs) are priced at a discount, known as a "greenium," or if they incur a risk premium, with a focus on regional disparities. Drawing a sample of loans issued between 2016 and 2024, the study compares SCLs to equivalent conventional syndicated loans from the same borrowers. The findings indicate a significant reduction in loan spreads, with an average decrease of approximately 30 basis points (bps) across the sample. This effect is more pronounced in European markets, where loan spreads decline by 41 basis points. Conversely, this pricing advantage is absent in USA and other regions, indicating that SCLs may not universally offer cost benefits and could even attract a risk premium in less mature markets. These results underscore the influence of regulatory frameworks, investor demand, and market maturity on sustainable lending practices. Implications suggest that financial institutions in regions with robust ESG regulations might provide more favorable loan terms, while firms seeking cost-effective financing should consider engaging with sustainability-linked lending markets. Policymakers are encouraged to enhance ESG disclosure requirements and standardize sustainability-linked loan structures to promote broader adoption and consistent pricing across markets.

Keywords: Corporate finance, climate finance, syndicated loan, sustainable loan

JEL classification: G12, G14, G21

1 Introduction

Sustainability is on the priority agenda across the world. Concurrently, the financial sector has introduced various sustainable debt instruments to encourage sustainable transformations and assist companies in securing debt capital for sustainability reforms. Sustainable Corporate Loans (SCLs) emerged as an alternative source of sustainable debt in 2016, with a loan volume of approximately USD 6.1 billion, which reached USD 357.5 billion as of September 2024 (See Table 2). Given the substantial effort and investment required to shift towards a low-emission economy (Anser et al., 2020; Awan et al., 2022), scholars have examined the conditions that promote sustainable development (Ali et al., 2022a) and the environmental regulations that can motivate companies to enhance their sustainability practices (Ali et al., 2022b). Yet, there is limited knowledge about the financial advantages for borrowers. However, even a reduction in interest of a few basis points (bps) can result in savings of several million USD, potentially increasing the adoption of sustainable debt over conventional debt and thus supporting sustainable transitions. This paper aims to examine the pricing of SCLs and determine whether borrowers can benefit from lower initial financing costs compared to conventional loans.

Sustainable loans are loan instruments and contingent facilities, that encourage and support borrowers to achieve ambitious, predetermined sustainability goals. Broadly, it is categorized into three: (1) Sustainability-Linked Loans (SLLs), (2) Green Loans (GLs), and (3) Social Loans (SLs). Sustainability-linked loans (SLLs) are distinguished by their variable interest margins, which fluctuate based on the borrower's performance against predetermined sustainability targets agreed upon by both parties at the loan's inception (LSTA, 2022, 2022). Green loans, designed to incentivize environmentally responsible corporate behavior, emerged in 2014 with the first green loan issued by Royal Bank of Scotland (RBS) to Sainsbury's as a £200 million revolving credit facility (Sainsbury's, 2014). The loan's interest rate was linked to the borrower's carbon reduction efforts, setting a precedent for sustainability-linked lending.[1] The largest-ever sustainability-linked loan (SLL) is

[1] For details, see: https://www.about.sainsburys.co.uk/news/latest-news/2014/21-07-2014

the $10.1 billion revolving credit facility secured by Anheuser-Busch InBev (AB InBev) in February 2021 (ING, 2021). Led by ING and Santander, the five-year syndicated loan involved 26 global banks and ties interest rate to AB InBev's ESG targets, including water efficiency, PET packaging recycling, renewable energy adoption, and greenhouse gas reduction.[2] It is worth noting that the specific nature and structure of sustainability targets, as well as the adjustments to financing terms in an SLL, are subject to negotiation between the lender and borrower, allowing for customization to suit each individual loan agreement.

Extensive research has been conducted on the price disparities between conventional bonds and other sustainable debt instruments, particularly green bonds, yielding diverse outcomes. Whilst certain studies have not identified significant pricing variations between traditional and green bonds (Flammer, 2021; Larcker and Watts, 2020), numerous other investigations have revealed favourable financing conditions for entities issuing green bonds (Baker et al., 2022; Gianfrate and Peri, 2019; Hachenberg and Schiereck, 2018; Zerbib, 2019). A recent scholarly review focusing on green bonds indicates that, notably in the primary market, there is a lack of consensus among academics regarding the pricing advantages of green bonds (Cortellini and Panetta, 2021). While there is mixed evidence regarding the price advantage of green bonds, research on the pricing of other sustainable debt instruments remains scarce. The distinct characteristics of Sustainable Corporate Loans (SCLs) raise questions about how investors perceive them compared to use-of-proceeds (UoP) instruments like green bonds. Initial findings on sustainability-linked bonds (SLBs) have been presented in recent studies (Berrada et al., 2022; Kolbel and Lambillon, 2022). Kolbel and Lambillon (2022) demonstrate that SLBs offer issuers an average cost of capital reduction of 29.2 bps compared to conventional alternatives. In the sustainable loan sector, Kim *et al.* (2021) provide preliminary evidence on pricing effects, indicating that SCLs are priced at a non-significant negative premium of 6.8 bps in a multivariate context, whilst green loans have a significant negative premium of 56.3 bps. These findings suggest that SCLs are priced differently from conventional debt. However, research in this area is still

[2] For details, see: https://www.ing.com/Newsroom/News/ING-in-largest-ever-sustainability-linked-loan.htm

nascent, particularly concerning potential factors driving these price disparities.

Prior research has demonstrated that borrowers' sustainability characteristics are factored into loan pricing (Bae et al., 2018; Goss and Roberts, 2011). Immel *et al.* (2021) extended this analysis to green bonds, revealing that issuers with notably high environmental, social and governance (ESG) scores receive more favourable financing terms. However, to our knowledge, no studies have yet explored the impact of sustainable corporate loan characteristics on pricing. This study aims to address this gap by examining how syndicated corporate loan attributes affect price disparities between SCLs and CCLs. Additionally, scholars have begun to explore the role of lending syndicates' sustainability features in loan origination (Hauptmann, 2017; Houston and Shan, 2022). Nevertheless, no research has yet determined whether the loan characteristics of the banking syndicate continue to influence loan pricing in regional comparison perspectives. Given the rapid growth of sustainable debt products, empirical evidence is necessary. Thus, this study bridges the research gap in the influence of syndicated loan characteristics on sustainable debt pricing.

To address this research gap, this study offers new insights into SCL pricing. To investigate if there is any pricing difference in terms of spread (bps) between SCL and Conventional Corporate Loans, this study follows Larcker and Watts (2020) while analyzing the sample of Sustainable Corporate Loans. Drawing upon extant literature on corporate motivations for opting for sustainable loan rather than conventional one, this research has primarily identified four key drivers. These include (i) signaling motivation, where signals are credible only when they are costly to imitate by firms with inferior attributes (Riley, 1979; Spence, 1973); (ii) cost of capital motivation, where sustainable debt reduces financing costs (Fama, 2021; Pástor et al., 2021; Pedersen et al., 2021; Schmittmann and Gao, 2022); (iii) risk mitigating motivation, where sustainable corporate loan pricing mechanisms can serve as a tool for lenders to enforce ESG-related discipline on borrowers, thereby mitigating risks (Flammer, 2021; Loumioti and Serafeim, 2022); and (iv) greenwashing motivation, which involves misleading claims about sustainability efforts (Carrizosa and Ghosh, 2022; Lyon and Montgomery, 2015; Marquis et al., 2016).

Based on this theoretical setting, this research examines a global dataset comprising 1,614 SCLs in full sample and 285 SCLs in paired sample. Each SCL is paired with a traditional loan from the same borrower, sharing similar attributes except for the sustainability target connection. Then a multivariate fixed effects regression analysis is employed to explore how syndicate corporate loan-specific factors impact these initial financing costs. The findings indicate a significant reduction in loan spreads, with an average decrease of approximately 30 basis points (bps) across the sample. This effect is more pronounced in European markets, where loan spreads decline by 41 basis points. The observed reduction suggests that sustainable lending practices and ESG-linked loan mechanisms may contribute to improved borrowing conditions, particularly in regions with stronger regulatory frameworks and investor demand for sustainable finance. These results align with existing literature on the cost advantages associated with sustainability-linked financial instruments and reinforce the growing importance of ESG considerations in credit markets.

This paper makes three key contributions to the growing literature on sustainable debt markets and corporate loan pricing. First, it deepens our understanding of how sustainability attributes are reflected in the pricing of Sustainable Corporate Loans (SCLs), contributing to the ongoing debate on whether these loans offer a "greenium"—a pricing benefit relative to Conventional Corporate Loans (CCLs). Building on recent studies such as Kim et al. (2021) and Du et al. (2022), this paper employs a rigorous matching methodology to isolate the spread differential between SCLs and observationally similar CCLs. Second, it adds a novel comparative dimension by systematically analyzing how the greenium varies across global regions—specifically Europe, USA, and the Rest of the World—thus highlighting the institutional and regulatory heterogeneity that shapes sustainable finance outcomes. This regional perspective has received limited attention in prior studies, despite its central relevance to both lenders and policymakers. Third, the paper contributes methodologically by combining loan-level matching with a set of fixed effects models and borrower-level robustness checks to address concerns about unobserved heterogeneity and endogenous selection into SCL issuance. Together, these

contributions position the paper at the intersection of corporate finance, banking, and institutional theory, offering new insights into how ESG-related preferences and risk perceptions are priced into corporate lending markets.

The subsequent sections of this paper are organised as follows. The second section examines the pertinent literature and formulates the hypotheses. The third section introduces the data and matching methodology employed in this empirical investigation. An overview of sustainable corporate loans is presented in section 4. Descriptive statistics of the dataset and empirical findings are discussed in section 5. Lastly, section 6 concludes with a summary of the main findings and their implications.

2 Literature review and hypothesis development

What drives certain corporate entities to opt for sustainable borrowing and lending? Sustainable Corporate Loans (SCLs) are bilateral agreements between borrowers and lenders, potentially offering benefits to both parties (Du et al., 2022). Drawing upon extant literature on corporate motivations for opting for sustainable loan rather than conventional one, this research has primarily identified four key drivers. These include (i) signaling motivation, where signals are credible only when they are costly to imitate by firms with inferior attributes (Riley, 1979; Spence, 1973); (ii) cost of capital motivation, where sustainable debt reduces financing costs (Fama, 2021; Pástor et al., 2021; Pedersen et al., 2021; Schmittmann and Gao, 2022); (iii) risk mitigating motivation, where sustainable corporate loan pricing mechanisms can serve as a tool for lenders to enforce ESG-related discipline on borrowers, thereby mitigating risks (Flammer, 2021; Loumioti and Serafeim, 2022); and (iv) greenwashing motivation, which involves misleading claims about sustainability efforts (Carrizosa and Ghosh, 2022; Lyon and Montgomery, 2015; Marquis et al., 2016).

2.1 Information asymmetry and signaling motivation

Firms inherently possess superior knowledge of their own capabilities compared to investors, creating an asymmetry of information that elevates transaction costs by complicating the identification of firms with desirable attributes. To mitigate this

challenge, firms employ signaling mechanisms as a strategic tool to credibly convey their characteristics, thereby reducing informational inefficiencies and enhancing market efficiency (Akerlof, 1970; Williamson, 2007). Debt covenants, as contractual provisions, help mitigate agency costs arising from misaligned borrower-lender objectives, ultimately affecting borrowing costs (Hart and Moore, 1988; Jensen and Meckling, 1976). Applying this framework to sustainable syndicated loans, sustainability-linked loan principles (SLLP, GLP, or SLP) emphasize transparency and disclosure to improve loan integrity and reduce informational asymmetries (Diamond, 1991; Lambert et al., 2007). Sustainable Corporate Loans (SCLs) incorporate pricing adjustments based on ESG targets (Loumioti and Serafeim, 2022), potentially lowering loan spreads by mitigating moral hazard and adverse selection risks (Chava, 2014). This aligns with agency theory (Jensen and Meckling, 1976), which suggests that performance-based financial agreements can reduce agency costs and moral hazard. The literature on performance pricing emphasizes how linking interest rates to borrower credit quality enhances contract completeness and mitigates agency costs (e.g., Asquith, Beatty and Weber, 2005; Roberts and Sufi, 2009; Costello and Wittenberg-Moerman, 2011; Christensen, Serafeim and Sikochi, 2021).

Signaling theory asserts that signals are credible only when they impose costs that firms with inferior attributes cannot easily imitate (Riley, 1979; Spence, 1973). In the context of sustainable corporate borrowing and lending, where investors often struggle to assess a firm's true environmental commitment, effective signaling mechanisms are necessary to distinguish genuinely sustainable firms from those that merely seek to appear so (Lyon and Maxwell, 2011; Lyon and Montgomery, 2015). In sustainable loan market, both borrowers and lenders can credibly signal their commitment to environmental sustainability. Several factors enhance the credibility of this signal. This credibility is first established through adherence to voluntary guidelines, such as the Green Loan Principles (GLP) and Sustainability-Linked Loan Principles (SLLP), developed by organizations like the Loan Market Association (LMA)—demands significant managerial resources and effort, imposing additional costs on the issuer. Though, these loans do not have a centralized certification body

to enforce compliance, they rely on contractual sustainability-linked covenants, which require borrowers to meet specific sustainability performance targets (SPTs). To further strengthen credibility, borrowers often obtain Second-Party Opinions (SPOs) or ESG ratings, providing independent assessments of their sustainability commitments. If they fail to meet these targets, they typically face financial penalties, such as higher loan interest rates, rather than regulatory sanctions. This lender-driven enforcement mechanism ensures accountability through market discipline and financial incentives, making sustainable loan credibility contingent on transparent reporting and strong contractual obligations. Thus, borrowing through sustainable loans serves as a credible means for firms to demonstrate their commitment to sustainability. For instance, ING CEO Steven van Rijswijk remarked on the largest-ever sustainability-linked loan (SLL) of $10.1 billion revolving credit facility as follows: "AB InBev has demonstrated a clear ambition level by incorporating a broad set of material sustainability targets into this core lending facility. I'm proud that ING is supporting AB InBev toward their goals with this sustainable financing structure and at the same time implementing our strategy to help our clients to address climate risks and steer towards a circular economy."[3]

Likewise, lenders signal their commitment to ESG principles through the issuance of SCLs. This signal is credible due to two key factors (Du et al., 2022). First, SCLs necessitate substantial long-term investments, imposing opportunity costs on banks. Second, as primary initiators and structurers of SCLs, banks have a vested interest in preserving the credibility of this loan segment. SCLs enable banks to expand loan portfolios while aligning with institution-wide sustainability commitments and promoting corporate ESG improvements (Sustainalytics, 2021). The rapid growth of SCLs market is driven by firms' pursuit of sustainability objectives (S&P Global, 2021). Additionally, banks face increasing scrutiny from stakeholders regarding their financing of carbon-intensive industries.

Thus, the signaling hypothesis predicts that firms' environmental engagement leads to positive shareholder responses. Event studies show abnormal stock returns following corporate sustainability initiatives (e.g., Klassen and McLaughlin, 1996;

[3] For details, see: https://www.ing.com/Newsroom/News/ING-in-largest-ever-sustainability-linked-loan.htm

Flammer, 2013, 2015; Krüger, 2015). This positive market reaction stems from the expectation that sustainability efforts yield long-term benefits, as supported by empirical evidence linking strong ESG performance to improved corporate performance (e. g., Edmans, 2011, 2012; Eccles, Ioannou and Serafeim, 2014; Flammer, 2015) and lower risk exposure (Godfrey et al., 2009).

2.2 The Cost of Capital

Another motivation is that sustainable loans may reduce financing costs if investors accept lower yields to support climate action. This would benefit firms by providing cheaper debt, potentially leading to a positive stock market reaction as equity investors gain from reduced borrowing expenses (Flammer, 2021). Sustainable loans, regulated in terms of proceeds allocation, impact assessment, reporting, and verification, are priced with ESG-related risks in mind, leading to distinct pricing mechanisms for sustainable and conventional syndicated loans, where banks consider additional factors beyond credit ratings (Schumacher, 2020).

Research on the pricing of sustainable versus conventional debt instruments has primarily examined green bonds and the existence of a "greenium"—a negative yield spread. Fama (2021) argues that investors valuing ESG actions may accept lower yields on sustainable bonds, leading to reduced capital costs (Fama and French, 2007). This aligns with stakeholder theory (Freeman, 1984), which suggests that financial instruments supporting sustainability benefit from lower financing costs. Green bonds also help mitigate information asymmetries through third-party certification (Schmittmann and Gao, 2022; Yu, 2005) and offer protection against climate risks (Pástor et al., 2021; Pedersen et al., 2021). Moreover, firms integrating ESG practices may attract lenders prioritizing sustainability, reinforcing stakeholder alignment (Freeman, 1984).

Borrowers with weaker ESG profiles face higher regulatory and compliance costs, leading to increased credit risk premiums (Bharath et al., 2008; Graham et al., 2008). Empirical evidence indicates that firms with strong ESG performance benefit from lower borrowing costs, suggesting a pricing advantage for sustainable loans (Chava, 2014; Hasan et al., 2017).

Borrowers obtaining sustainability-linked loans (SLLs) may benefit from lower

initial spreads due to their inherently lower credit risk or the potential penalty for failing to meet sustainability targets, which incentivizes them to negotiate reduced spreads upfront. However, counterarguments suggest that SLL borrowers may not always be financially stronger or possess significant bargaining power (Du et al., 2022). Moreover, while meeting sustainability targets can lead to subsequent rate reductions, this does not guarantee lower spreads at issuance.

SCLs offer potential cost advantages while enabling borrowers to enhance sustainability performance, reinforce ESG commitments, and strengthen lender relationships (Sustainalytics, 2021). Two contrasting perspectives exist. On one hand, SCLs serve as a credible signal of sustainability commitment, akin to sustainability reporting and third-party assurance but with financial accountability (e. g., Du and Wu, 2019). Conversely, they may facilitate impression management or "window dressing," particularly when economic incentives are weak, raising greenwashing concerns. Additionally, SCLs borrowers may not inherently exhibit lower risk, as ESG and CSR initiatives could increase idiosyncratic risk (Becchetti et al., 2015). For example, a few studies have documented a pricing advantage over conventional bonds for green bonds (Baker et al., 2022; Gianfrate and Peri, 2019; Hachenberg and Schiereck, 2018; Zerbib, 2019). Initial findings regarding the spreads of Sustainability-linked Bonds (Kolbel and Lambillon, 2022) and Sustainability-linked Loans (Kim et al., 2021) also indicate that sustainability-linked debt instruments tend to have lower spreads than their conventional counterparts. However, the empirical findings by Flammer (2021) contradict the cost of capital argument, as no evidence suggests that sustainable corporate loans are issued at a discount compared to non-sustainable loans.

2.3 Risk mitigation

ESG risks are increasingly recognized as systematic and non-diversifiable. Jagannathan, Ravikumar, and Sammon (2018) argue that ESG-related risks contribute significantly to firms' downside risk, reinforcing the notion that these risks must be managed proactively. Hoepner et al. (2016) extend this analysis by demonstrating that firms engaging in ESG initiatives experience reduced downside risk, ultimately benefiting not just shareholders but also creditors.

Ioannou and Serafeim (2019) argue that borrowers utilize sustainable syndicated loans to strengthen their ESG reputation, while lenders favor low-ESG risk borrowers to mitigate monitoring and reputational costs. As Flammer (2021) and Loumioti and Serafeim (2022) suggest, SCLs pricing mechanisms serve as an effective risk mitigation tool by enabling lenders to enforce ESG-related discipline on borrowers. By linking interest rate adjustments to predefined sustainability targets, these mechanisms create financial incentives for firms to improve their ESG performance, thereby reducing the likelihood of negative externalities, regulatory penalties, and reputational risks.

In addition to borrower-level risk mitigation, banks themselves face growing regulatory pressures to assess and manage climate-related financial risks (Nguyen et al., 2023; Palea and Drogo, 2020). Climate stress testing, scenario analysis, and evolving prudential regulations—such as the European Central Bank's supervisory expectations on climate risk—necessitate proactive risk management strategies. By financing sustainability-aligned projects, banks can reduce exposure to transition risks associated with regulatory tightening, carbon pricing mechanisms, and stranded assets. Moreover, integrating ESG considerations into loan pricing can contribute to lower expected credit losses, improved capital efficiency, and potential reductions in risk-weighted asset (RWA) requirements under regulatory frameworks.

Empirical evidence supports this argument. Amiram et al. (2021) find that banks that were early adopters of the Equator Principles—an ESG-based risk management framework—tended to extend loans at reduced spreads, suggesting that ESG integration is associated with lower borrower credit risk. Relatedly, Ilhan, Sautner, and Vilkov (2021) show that firms with higher carbon intensity exhibit greater downside risk, highlighting the financial materiality of environmental risk exposure. The credit market reflects similar concerns, as Seltzer, Starks and Zhu (2022) report that firms with weaker environmental performance are more likely to receive lower credit ratings, indicating a direct link between ESG deficiencies and heightened borrowing costs. Taken together, these findings underscore the role of SCLs as a mechanism through which both the borrowers and lenders can mitigate climate risks while fostering sustainable corporate behavior.

2.4 Greenwashing

An alternative explanation is that both the borrower and lenders may use sustainable loans as a tool for greenwashing. Greenwashing refers to the practice of making misleading or unsubstantiated claims about a firm's environmental commitment (e.g., Lyon and Montgomery, 2015; Marquis, Toffel and Zhou, 2016; Berrone, Fosfuri and Gelabert, 2017). Greenwashing takes multiple forms, including selective disclosure, deceptive eco-labeling, misleading imagery (e.g., nature-themed visuals on products), and vague sustainability narratives (Lyon and Montgomery, 2015). If SCLs are used primarily as a form of window dressing, there should be no significant difference in risk levels between SCLs and non-SCLs borrowers and lenders. In contrast, following the SCLs principles suggest sustainable loans impose substantial costs on firms, making them an unlikely greenwashing strategy compared to lower-cost alternatives. Yet, concerns persist about their potential for greenwashing, particularly as the market expands. Moreover, critics argue that reliance on private governance, such as voluntary certification standards, rather than public regulatory oversight, weakens enforcement. If greenwashing were the primary motive, no significant environmental improvements would follow loan issuance. However, studies suggest that borrowers enhance their sustainability performance after securing such loans (e. g., Carrizosa and Ghosh, 2022; Du, Harford and Shin, 2022; Dursun-de Neef, Ongena and Tsonkova, 2022). Loumioti and Serafeim (2022) contradict as they find that sustainability-linked loans are predominantly issued to low-ESG risk borrowers, implying limited effects on ESG performance improvements. Given these conflicting perspectives, the first hypothesis is as follows:

Hypothesis 1: Sustainable corporate loans exhibit a greenium, resulting in lower pricing compared to conventional loans.

2.5 Regional variation in the greenium of sustainable corporate loans

According to Institutional Theory, firms' strategic and organizational decisions are shaped by external social, political, and economic pressures, as they seek to align with legitimized practices or enhance their legitimacy in the eyes of stakeholders (Jennings and Zandbergen, 1995; North, 1990). In line with this theory, recent research highlights significant regional variations in the pricing of sustainable debt

instruments such as sustainable loans and bonds. The existence of a **greenium**—a lower cost of borrowing for sustainable debt—varies across financial markets due to differences in investor demand, regulatory frameworks, and institutional contexts. Pietsch and Salakhova (2022) analyze the euro area and find that the greenium has strengthened over time, particularly for issuers with credible sustainability commitments. Similarly, Caramichael and Rapp (2024) document that the greenium is more pronounced in Europe than in other regions such as USA and China, reflecting stronger investor preferences and policy incentives. Furthermore, the EU taxonomy for classifying sustainable economic activities ("European Commission," 2021) and the green asset ratio ("European Banking Authority," 2021), which measures the proportion of bank assets invested in taxonomy-compliant activities, may redirect investments towards instruments, such as SCLs. Consequently, the following hypothesis is proposed.

Hypothesis 2: The greenium in sustainable corporate loan pricing is stronger in Europe than in USA and the Rest of the World.

3 Data and methodology

3.1 Data and sample selection

Our primary source of loan-level data is the Refinitiv DealScan database, accessed via the Wharton Research Data Services (WRDS) platform. DealScan provides comprehensive global coverage of syndicated loan transactions and detailed information on facility-level terms and lender structures. From this database, we identify syndicated corporate loans originated globally between January 1, 2016, and September 30, 2024, a period selected to capture the emergence and growth of sustainable corporate lending. This timeframe is consistent with the institutionalization of Sustainability-Linked Loan (SLL) frameworks, which were not operational before 2016. We exclude financial sector borrowers from our sample. Financial firms are subject to different regulatory requirements and capital structure considerations, and their loan use and risk profiles differ substantially from those of non-financial firms. This exclusion is standard practice in the corporate finance literature and enhances the interpretability of results across sectors (Goss and Roberts, 2011)(See 2011).

We restrict the sample to loan facilities rather than deal-level aggregates to allow for precise measurement of pricing and contractual terms, as multiple facilities within a deal can vary in pricing, purpose, and structure. The dependent variable is the all-in-drawn spread, measured in basis points, which reflects the effective borrowing cost at loan origination (see Table 1 for descriptive statistics). It is a widely used measure of borrowing costs in empirical corporate finance research (e.g., see Bradley and Roberts, 2015).

To capture sustainable corporate lending activity, we construct a binary indicator for Sustainable Corporate Loans (SCLs) using DealScan's "market segment" classification. Because DealScan does not explicitly label all SCLs, we follow recent literature (e.g., Du et al., 2022) in deriving this indicator through the presence of sustainability-linked tags, ESG keywords, and relevant annotations in the market segment and deal remarks fields. This approach ensures broad coverage of sustainability-linked instruments while avoiding misclassification.

Our dataset includes a rich set of facility-level covariates widely used in the syndicated loan literature, including tranche size, maturity, loan type (e.g., term loan, revolving credit), purpose (e.g., general corporate purposes, project finance), covenant structure, collateral status, and whether the loan is sponsor-backed. These variables serve as important controls for observable heterogeneity in contract design (see Table 1 for full definitions).

To focus exclusively on syndicated lending, we exclude bilateral loans and filter out observations with missing or unreliable pricing data. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. Our final sample comprises a novel dataset of sustainable and conventional corporate loan facilities across regions, suitable for investigating the pricing differential—commonly referred to as the "greenium"—across geographies.

3.2 Methodology

This study examines whether sustainable corporate loans (SCLs) are priced more favourably than conventional loans and whether this pricing advantage—the greenium—varies across global regions. We estimate a series of cross-sectional regressions using syndicated loan facility-level data following Qian and Strahan

(2007) and Santos (2011), where the dependent variable is the natural logarithm of the all-in-drawn spread in basis points. The model is specified as follows:

$$Spread_{i,b,t} = a_0 + \beta * SCLdummy_{i,b,t} + \gamma * Loan_{i,b,t} \quad (1)$$

$$+ \delta_t + \eta_i + \theta_j + \lambda_c + \varepsilon_{i,b,t}$$

Where *i* denotes the i^{th} loan observation to borrower *b* in time *t*. a_0 is loan-specific intercept, capturing unobserved heterogeneity across loan observations. *SCLdummy* is the binary variable assigned one if the loan is sustainable (green or social or sustainability linked loan), otherwise zero. The coefficient β measures the impact of sustainable corporate loan status on loan spread. $Loan_{i,b,t}$ is a vector of loan-specific characteristics (e.g., loan size, maturity, number of lenders), with γ representing the coefficients associated with these characteristics. δ_t is time fixed effects, controlling for time-varying macroeconomic or market-wide factors such as interest rate fluctuations and economic conditions. η_i Borrower fixed effects, which account for unobserved borrower-specific characteristics, including creditworthiness, operational risks, and historical performance. θ_j denotes industry fixed effects, where *j* is the industry sector of the borrower. These effects capture unobserved, industry-specific influences on loan pricing, such as sectoral risk profiles, growth prospects, and industry-level sustainability practices. λ_c represents country fixed effects, capturing cross-jurisdictional differences in lending environments, regulatory frameworks, and sustainability standards. The inclusion of both borrower and industry fixed effects is critical, given that both firm-level and sector-level factors significantly influence loan pricing. Finally, $\varepsilon_{i,b,t}$ is the error term. By including time, borrower, industry, and country fixed effects, the model controls for unobserved factors that could simultaneously affect loan spreads and sustainability classification, thereby mitigating omitted variable bias. The model is designed to test the hypothesis that sustainable loans are priced at lower spreads compared to traditional loans. This specification aligns with prior research investigating the link between ESG factors and loan pricing, as well as studies examining loan characteristics and credit risk (See Goss and Roberts, 2011; Chava, 2014).

3.3 Propensity Score Matching (PSM)

As suggested by Roberts and Whited (2013), the Propensity score matching (PSM) is employed to ensure a robust comparison and mitigate potential selection bias in estimating the effect of SCLs on loan spreads following Flammer (2021) and Pohl, Schuler and Schiereck (2023). This method accounts for observable differences between the treatment (SCL) and control (CCL) groups, improving comparability and strengthening causal inference. A two-stage matching procedure is implemented. In the first stage, it is verified whether both loans share the same investment-grade status, ensuring comparability in credit risk profiles. In the second stage, the closest possible match is identified based on key loan characteristics, including tranche amount, loan maturity (tenor), number of lenders, and the time gap (in days) between the issuance of the SCL and the corresponding CCL. This process ensures that each SCL is paired with a CCL from the same borrower that exhibits the highest degree of similarity. Full matching is conducted using a generalized linear model (GLM) to estimate propensity scores, ensuring optimal balance between the groups. The propensity scores are derived from loan-specific characteristics, including tranche amount, maturity, number of lenders, and issuance time gap. Additionally, exact matching is applied at the borrower level and for investment-grade status, guaranteeing that loans are compared within the same credit risk category.

4 Sustainable Corporate Loans

4.1 Sustainable Corporate Loans overtime

Table 2 presents annual syndicated loan issuance from January 2016 to September 2024, with a split between conventional and sustainable loans. The sustainable syndicated loan market has grown significantly, from $6.1 billion (0.27% of total syndicated loans) in 2016 to $466.7 billion (14.15%) in 2022. The 2020–2021 period marked a sharp inflection, with issuance surging from $204.2 billion (6.28%) to $459.7 billion (11.60%), driven by regulatory initiatives and global net-zero commitments. espite a decline to $357.5 billion in 2024, sustainable loans retained a strong market presence (15.5%). Over 2016–2024, cumulative issuance reached $2.10 trillion, representing 7.59% of the $27.69 trillion syndicated loan market. The shift from niche ESG lending to a mainstream financing tool aligns with stakeholder

and institutional theories, as borrower ESG commitments are reinforced by regulatory and investor pressures.

[Table 2 here]

Table 3 presents sustainable corporate loan issuance, detailing facility counts, total volumes, and average loan sizes. The market expanded from 100 facilities ($6.07 billion) in 2016 to a peak of 1,911 facilities ($430.9 billion) in 2023, before declining in 2024. The average facility size rose from $61 million in 2016 to $362 million in 2021, reflecting increased large-scale corporate participation. However, a subsequent shift toward mid-market borrowers led to smaller average facility sizes ($225 million in 2023). The sustainable loan market's evolution can be divided into two phases: rapid growth (2016–2021), supported by the rise of sustainability-linked loans and policy incentives, followed by a broader borrower base (2022–2024), reflecting ESG mainstreaming but also heightened scrutiny and financing costs. The sustained share of sustainable loans, despite market corrections, underscores their transition into an integral corporate financing tool.

[Table 3 here]

4.2 Sustainable corporate loans across industries

Table 4 presents the industry distribution of sustainable corporate loans (2016–2024, up to September), detailing facility counts, total volumes, and sectoral shares. Sustainable loan issuance is concentrated in capital-intensive industries, led by utilities (29.88%, $628.15 billion, 2,775 facilities), reflecting its role in renewable energy and climate investments. Manufacturing (7.43%), real estate (6.33%), and oil and gas (4.66%) highlight the use of SCLs for industrial transition. However, Pinto, Alves and Goncalo (2024) find a concentration of sustainable loans in three key industries: real estate (18.7%), utilities (12.6%), and computers and electronics (12.4%), which collectively represent 44.1% of total sustainable loan issuance by volume. Despite regulatory pressures, oil and gas firms still rely on conventional financing. Automotive (4.49%) and technology (4.45%) sectors demonstrate strong participation, likely driven by electric vehicle and clean tech investments. Chemicals

(3.70%), food and beverage (3.76%), and construction (3.73%) increasingly adopt ESG-linked debt for decarbonization. Healthcare (2.71%), telecommunications (2.88%), and transportation (3.00%) indicate expanding sustainable financing beyond high-carbon industries, though mining (0.74%), agriculture (0.69%), and hospitality (0.52%) show limited engagement. With 7,924 facilities totaling $2.10 trillion, sustainable loans are now integral to corporate finance. Industry differences in ESG reporting and investment intensity shape financing patterns, warranting further research on sectoral pricing dynamics and risk-adjusted returns.

[Table 4 here]

4.3 Sustainable corporate loans across regions and countries

Table 5 shows the distribution of sustainable corporate loan facilities across major regions, covering the number of facilities, total loan amount, and regional market share from 2016 to September 2024, excluding financial sector borrowers. Western Europe dominates the market with 52.43% of total issuances, totaling $1.10 trillion across 3,692 facilities. This aligns with the findings of Pinto, Alves and Goncalo (2024). This reflects the region's stringent ESG regulations and developed sustainable finance markets. Asia follows with 23.11% ($485.89 billion, 2,712 facilities), driven by rapid economic growth and increasing ESG adoption in China, Japan, and India. North America accounts for 17.36% ($364.92 billion, 855 facilities), lagging behind Europe due to weaker ESG regulations and a preference for green bonds over sustainability-linked loans. The Middle East holds 2.18% ($45.94 billion, 90 facilities), benefiting from net-zero initiatives in Gulf nations. Eastern Europe and Latin America represent 2.16% ($45.45 billion, 270 facilities) and 1.86% ($39.14 billion, 174 facilities), respectively, signaling early-stage sustainable finance adoption. Africa has the smallest share at 0.90% ($18.86 billion, 131 facilities), constrained by limited capital market access and macroeconomic instability.

[Table 5 here]

Table 6 presents the distribution of sustainable corporate loan facilities across countries from 2016 to September 2024, excluding financial sector borrowers.

Countries with loan amounts below $5 billion are grouped under “Others.” The United States leads with 16.56% of total issuance ($348.14 billion), followed by France (9.79%), Germany (8.43%), and the United Kingdom (6.96%), reflecting Europe’s dominance in sustainable finance. Spain (5.82%) and Italy (5.60%) further underscore the EU’s role. In Asia, Japan (4.01%), Taiwan (3.35%), Hong Kong (3.11%), and Singapore (4.51%) are key markets, with India (2.76%) expanding due to green energy investments. The Netherlands (4.47%) and Nordic countries show steady ESG financing growth. Saudi Arabia (1.15%) and the UAE (0.73%) drive the Middle East’s sustainable finance expansion. China (0.61%), Canada (0.42%), and Brazil (0.41%) remain minor players, reflecting market and regulatory differences.

[Table 6 here]

5 Empirical results

5.1 Descriptive statistics

Table 7 presents summary statistics for the key variables used in the analysis.

The average loan spread is 308.32 basis points (BPS) with a median of 275 BPS, reflecting moderate variation across loans (standard deviation of 181.39 BPS). Loan size varies widely, with a mean of $346.02 million and a median of $120 million, indicating that a few large loans contribute to a positively skewed distribution (skewness = 3.66). Loan maturities range from 8 to 216 months, with an average of 59.51 months, showing a right-skewed distribution (skewness = 2.15). The number of lenders per facility averages 5.99, with a median of 4, suggesting that many loans involve relatively small syndicates. In a similar context, Pinto, Alves and Goncalo (2024) reports an average loan spread of 278.1 basis points, a mean facility size of $739.2 million, an average maturity of 56.8 months (4.73 years), and an average of 6.5 lenders per facility.

Covenant usage is low, with only 10% of loans having covenants, while 31% of loans are revolving credit facilities. General-purpose loans represent 43% of the sample, and 59% of loans are investment grade. Approximately 46% of loans are secured, while call protection is present in only 11% of facilities. Sustainable corporate loans (SCLs) represent only 4% of total facilities, reinforcing their relatively limited but growing role in corporate lending. Sponsored loans account for

42% of observations, suggesting a significant role for private equity and institutional investors. These statistics provide insights into loan pricing, structure, and sustainability features, serving as the foundation for regression analysis in subsequent sections.

[Table 7 here]

Table 8 presents Pearson correlation coefficients for key variables, examining relationships between loan spread, sustainability-linked corporate loan (SCL) identification, loan characteristics, and financing features.

Loan spread is negatively correlated with SCL ID (-0.15), loan size (-0.18), and number of lenders (-0.34), indicating that sustainability-linked loans, larger loans, and those involving more lenders tend to have lower spreads. In contrast, spread is positively correlated with loan maturity (0.13), secured loans (0.36), call protection (0.24), and sponsored loans (0.55), suggesting that longer-maturity, secured, and private equity-backed loans are associated with higher borrowing costs.

SCL ID is positively correlated with loan maturity (0.08) and number of lenders (0.13) but negatively correlated with investment-grade loans (-0.20) and sponsored loans (-0.17), indicating that sustainability-linked loans tend to have longer maturities and larger syndicates but are less frequently investment-grade or private equity-backed.

Loan size shows a strong positive correlation with number of lenders (0.43) and call protection (0.17), highlighting that larger loans often involve more syndicate members and contractual protections. In contrast, secured loans are negatively correlated with loan size (-0.03) and investment-grade loans (-0.08), implying that collateralized loans tend to be smaller and less frequently issued to high-credit borrowers.

General-purpose loans and revolving credit facilities show moderate positive correlations with covenants (0.10 and 0.07, respectively), while investment-grade loans are positively associated with covenants (0.12) but negatively linked to loan maturity (-0.18) and secured loans (-0.08), suggesting that high-credit borrowers secure shorter-term financing with fewer collateral requirements.

The correlations suggest that sustainable corporate loans differ structurally from conventional loans in pricing, syndicate structure, and risk characteristics. These insights provide a foundation for further regression analysis on loan pricing determinants.

[Table 8 here]

5.2 Mean difference test of loan characteristics

Before investigating the effect of corporate loan being sustainable on loan interest rates, the mean difference test of loan attributes between CCL and SCL is conducted. Table 9 reports the mean differences in key loan characteristics between conventional corporate loans (CCLs) and sustainable corporate loans (SCLs), including spread, loan amount, maturity, and the number of lenders.

SCLs exhibit a significantly lower average spread of 169.57 basis points compared to 314.01 basis points for CCLs, with a mean difference of -144.44 basis points ($t = 47.62$). This indicates that sustainable loans are priced more favorably, potentially reflecting lower credit risk perceptions or borrower incentives tied to sustainability commitments.

The average loan amount for SCLs is $386.56 million, which exceeds the $344.36 million average for CCLs by $42.20 million ($t = -2.63$). This suggests that sustainable loans are associated with larger financing needs, possibly due to capital-intensive sustainability projects or stronger investor demand.

SCLs also have significantly longer maturities, averaging 72.67 months compared to 58.98 months for CCLs, with a mean difference of 13.70 months ($t = -10.86$). The extended maturity period may reflect the long-term nature of sustainability investments or favorable lending terms offered for ESG-aligned borrowers.

The number of lenders is higher in SCLs, averaging 9.30 compared to 5.86 in CCLs, with a mean difference of 3.44 ($t = -18.72$). This indicates greater syndicate participation in sustainable lending, which may be driven by increased investor appetite for ESG-related debt instruments.

These results highlight significant structural differences between conventional and sustainable loans, particularly in terms of pricing, size, maturity, and syndicate composition. The findings suggest that sustainability-linked debt is gaining

prominence as a distinct financing category with potentially lower borrowing costs and broader syndicate participation.

[Table 9 here]

5.3 Multivariate regression analysis and discussion

5.4 Greenium or risk premium?

Table 10 presents the results of regressions analyzing the relationship between loan spreads and sustainable corporate loans (SCLs). The analysis is conducted on the full sample (CCL 30,572 and SCL 1,614) and regional subsamples (Europe, USA, and the rest of the world).

SCLs are consistently associated with lower spreads across all models. The effect is most pronounced in Europe (-16.4%, Model 2), followed by USA (-8.2%, Model 3) and the rest of the world (-5.4%, Model 4). The global model (Model 1) indicates an overall spread reduction of 10.8%, which aligns with Pohl, Schuler and Schiereck (2023) though some studies find no price difference between sustainable and conventional debt instruments (Flammer, 2021; Pinto et al., 2024). These results suggest that SCLs benefit from preferential pricing, with stronger effects in markets where ESG financing is more developed. Thus, the baseline results support hypothesis 1.

Loan size is positively correlated with spreads in the global and USA models, indicating that larger loans tend to be more expensive in these markets. However, this effect is not significant in Europe and the rest of the world. Loan maturity is positively associated with spreads across all models, particularly in Europe (0.148) and the rest of the world (0.121), suggesting that longer-term loans carry higher risk premiums. This finding is consistent with the result of Lin *et al.*, (2011) who argue that banks might face greater uncertainty and higher credit risk in loans carrying relatively long maturities. The number of lenders is negatively associated with spreads in all models except for the rest of the world, where the effect is insignificant. This finding suggests that a larger syndicate reduces financing costs, particularly in Europe and USA.

The adjusted R^2 values range from 0.814 (USA) to 0.921 (Rest of the World), indicating strong explanatory power. Overall, these results suggest that SCLs are priced more favorably than conventional loans, with regional variations likely driven

by differences in regulatory frameworks, market structure, and lender preferences for sustainable finance.

[Table 10 here]

Following the preliminary test in Table 10, the price difference between SCL and CCL on the cost of bank loans is examined by regressing loan interest rate (Spread) on the SCL as a dummy variable and all controlling variables. Table 11 presents the results of regressions, controlling for all loan characteristics while incorporating fixed effects at the borrower, industry, country, and year levels. The analysis is conducted for the full sample and regional subsamples, including Europe, USA, and the rest of the world.

SCLs are associated with significantly lower spreads in the global model (-5.8 bps) and exhibit the strongest effect in Europe (-10.9 bps) and the rest of the world (-20.1 bps). The baseline results hold and support hypothesis 1. However, the effect is not significant in USA, suggesting that pricing advantages for sustainable corporate loans vary by region, likely reflecting differences in regulatory frameworks and market integration of sustainability-linked debt, supporting hypothesis 2.

Loan size is negatively associated with spreads in the global and regional models, except for the rest of the world, where the relationship is not significant. This suggests that larger loans generally receive lower spreads, particularly in developed markets. Loan maturity is positively associated with spreads across all regions, with the strongest effect observed in Europe (0.142), indicating that lenders apply a premium for longer-term commitments.

The number of lenders is negatively correlated with spreads in all models except for the rest of the world, where the effect is insignificant. This suggests that syndicate size plays a role in reducing borrowing costs, particularly in Europe and USA.

Additional loan features also influence spreads. Revolving credit facilities and general-purpose loans are associated with lower spreads, while secured loans and call protection provisions increase borrowing costs. Investment-grade loans consistently exhibit lower spreads across all models, particularly in Europe (-19.9 bps) and the rest of the world (-22.3 bps), reinforcing the importance of creditworthiness in

pricing. The positive coefficient (0.038), significant at the 5% level, for the security variable indicates that banks impose an additional insolvency premium on firms. This is consistent with the argument of Booth and Booth (2006). Pledging collateral can be regarded as a quality signal of borrowers. High-risk borrowers will be relatively required by banks to provide collateral due to their higher default risk. It means that the worse creditworthiness of the firms is, the higher the loan interest rate will be charged by the bank. Firms' asset size is negatively associated with loan interest rate. Sponsored loans are associated with higher spreads in all models except for the rest of the world, where the effect is not significant.

The adjusted R^2 values range from 0.833 (USA) to 0.912 (Rest of the World), indicating strong explanatory power. These findings suggest that SCLs benefit from lower spreads in most regions, with variations driven by credit risk factors, loan structure, and regional market conditions.

[Table 11 here]

5.5 Propensity score matching

To further account for selection bias, the propensity score matching (PSM) is employed to compare sustainable and conventional loans with similar characteristics as suggested by Roberts and Whited (2013). The matched sample ensures that observed differences in loan spreads are not driven by variations in loan size, maturity, number of lenders, or borrower credit quality. Following the application of this procedure, a sample of 285 sustainable corporate loans and a quasi-identical loan-level matched sample of 440 conventional loans are obtained. The following regression results are based on the PSM-adjusted sample**,** allowing for a more precise estimation of the effect of SCLs on loan spreads. This approach strengthens the validity of the findings by isolating the impact of sustainable corporate loans from confounding factors present in the full sample analysis.

Table 12 presents the results of regression analyses examining the impact of sustainable corporate loans (SCLs) on loan spreads using a propensity score-matched sample. The models control loan characteristics, firm-specific factors, and fixed effects at the borrower, industry, country, and year levels. The analysis is conducted

for the global sample and across regional subsamples, including Europe, U.S. and the rest of the world.

The estimated coefficient for Sustainable Corporate Loans (SCL ID) in the full sample (Model 1) is -0.101, indicating that firms securing sustainable loans experience a 9.61% reduction in loan spreads compared to those obtaining conventional loans. This effect translates into an average reduction of approximately 30 basis points (bps) in loan spreads, given the sample mean spread of 308.32 bps. This implies that, holding other loan characteristics constant, firms issuing sustainable syndicated loans experience a lower cost of borrowing, with the reduction in loan spreads reflecting the financial market's recognition of sustainability-linked lending as a potentially lower-risk or more attractive financing option. At 30 bps, the magnitude of the negative premium (greenium) is in line with negative premium of 29.2 identified by Kolbel and Lambillon (2022), but much higher than the negative premium of 6.8 bps identified by Kim et al. (2021), and 9 bps identified by Pohl et al. (2023). The cost of capital benefits of sustainable loans align with the range observed for green bonds. Existing literature on the green bond premium reveals significant variation, from no notable premium (Flammer, 2021) to modestly negative premiums (Baker et al., 2022) and cost savings of up to 18.5 basis points in the primary market (Gianfrate and Peri, 2019). This heterogeneity stems from the structural differences between sustainability-linked instruments: while sustainability-linked bonds (SLBs) primarily impose coupon increases for unmet targets, sustainability-linked loans (SCLs) often incorporate spread reductions when sustainability targets are achieved.

The economic significance is more pronounced in the European market (Model 2), where the estimated coefficient for SCL ID is -0.144, implying a 13.42% reduction in loan spreads. This effect corresponds to a reduction of 41 basis points, leading to annual savings of approximately $1.42 million per loan and a cumulative saving of $7.10 million over a five-year period. The substantial discount in Europe likely reflects the region's well-developed sustainable finance ecosystem, underpinned by regulatory initiatives such as the EU Taxonomy and the Sustainable Finance Disclosure Regulation (SFDR), which promote the integration of environmental,

social, and governance (ESG) factors into credit risk assessments. European financial institutions, which are subject to more stringent ESG disclosure and risk management requirements, may offer more favorable pricing for sustainable loans due to reduced perceived credit risk, lower expected capital requirements, or increased demand from ESG-conscious investors.

In contrast, the estimated effect of SCLs in USA is not statistically significant, with a coefficient of -0.063. This corresponds to an estimated spread reduction of only 2.04%, which, although directionally consistent with the global trend, does not provide robust evidence that sustainable syndicated loans benefit from systematically lower pricing in the region. The weaker financial incentive in USA may stem from differences in regulatory oversight, where ESG considerations in lending remain largely voluntary and less standardized compared to the European Union. Furthermore, USA lenders may not yet fully integrate ESG factors into pricing models or may perceive sustainability-linked loans as entailing additional compliance costs or unverified risk mitigation benefits.

The estimated coefficient of -0.095 for the rest of the world suggests a 3.08% reduction in loan spreads, though the effect is statistically insignificant. This indicates that ESG considerations in syndicated loan pricing are still evolving in emerging markets, likely due to weaker regulations, limited investor demand, and lower ESG disclosure. While some financial institutions recognize the long-term benefits of sustainability-linked lending, short-term costs may outweigh pricing advantages.

Regional differences highlight varying levels of sustainable finance integration. In Europe, strong regulatory support and investor demand lead to significantly lower borrowing costs for sustainable syndicated loans. However, USA and other regions do not show consistent loan spread reductions, underscoring the role of institutional frameworks and market maturity. As ESG regulations and risk assessment models advance, the pricing advantage of SCLs may become more pronounced globally.

Loan maturity is positively associated with spreads globally and in USA (0.118) but has a negative effect in emerging markets (-0.152). Covenants increase spreads in the rest of the world (0.608), while call protection commands a premium across all markets. Investment-grade status raises spreads only in emerging markets (0.855).

Overall, SCLs enjoy lower spreads, particularly in Europe, while regional disparities in credit risk and loan structures shape pricing dynamics.

[Table 12 here]

To ensure the robustness of our findings, we re-estimate the regression models using both the full sample and a restricted sample that excludes the COVID-19 period (2020–2021). The objective of this robustness check is to assess whether the effects observed in the full sample persist when the COVID-19 period is excluded, given the potential distortions caused by economic uncertainties and policy interventions during the pandemic.

When the COVID period is excluded, the negative coefficient for sustainable loans becomes more pronounced and statistically significant at the 1% level in the global model (-0.112), the European model (-0.200), and the Rest of the World model (-0.345), while remaining insignificant in the USA model (-0.074). These results indicate that the greenium effect becomes more evident when the COVID period is excluded, particularly in Europe and the Rest of the World.

The robustness analysis confirms the persistence of the greenium effect in sustainable loans, with the effect notably strengthening in Europe and the Rest of the World when the COVID period is excluded. This finding suggests that pandemic-related economic disruptions may have temporarily diluted the sustainability premium, especially in global markets and Europe. The consistency of key loan characteristics, such as loan amount, maturity, and number of lenders, across both samples supports the robustness of our main findings. The variation in the effect of secured loans between the full and restricted samples highlights the potential influence of collateral requirements during periods of economic uncertainty.

These results underline the importance of accounting for exogenous shocks, such as the COVID-19 pandemic, when analyzing the relationship between sustainability-linked loan characteristics and loan pricing.

[Table 13 here]

6 Conclusion

This study examines the pricing advantages of Sustainable Corporate Loans (SCLs) compared to Conventional Corporate Loans (CCLs), with a focus on regional

differences. At the global level, SCLs are associated with a statistically significant reduction in loan spreads, indicating that financial markets perceive sustainable corporate lending as lower-risk or more attractive. However, this effect varies by region. In Europe, SCLs lead to a 41-basis-point reduction in loan spreads, translating into estimated annual savings of $1.42 million per loan. In contrast, the pricing advantage is not statistically significant in USA or other regions, suggesting that ESG considerations in syndicated loan pricing are less established outside Europe.

The strong pricing advantage of SCLs in Europe is likely due to a well-developed regulatory framework, greater investor demand for ESG-aligned instruments, and integration of sustainability factors into credit risk models. Key regulations, such as the EU Taxonomy and the Sustainable Finance Disclosure Regulation (SFDR), enhance transparency and incentivize sustainable lending. In contrast, USA's voluntary ESG disclosures and differing lender risk perceptions may explain the absence of a pricing discount.

These findings suggest that European financial institutions are more advanced in integrating ESG factors into credit pricing. As regulatory pressures and investor expectations grow globally, lenders outside Europe may need to adjust their risk assessment models. Policymakers aiming to promote sustainable finance should consider stronger ESG regulations, as greater standardization of disclosure requirements could expand the pricing benefits of SCLs beyond Europe.

7 Appendix

Table 1

Variable	Definition
Spread	All-in spread drawn is defined as the amount the borrower pays in basis points over LIBOR or LIBOR equivalent for each dollar drawn down.
SCL ID	A dummy variable that equals one if the loan facility is flagged as Sustainable Corporate Loan and zero otherwise.
Loan Size $MN	Natural log of the loan facility amount in millions of dollars.
Loan Maturity	Natural log of the number of months to maturity of a loan facility.
Covenants ID	A dummy variable that equals one if the tranche has any covenant and zero otherwise.
Revolver ID	A dummy variable that equals one if the tranche type is revolver and zero otherwise.
General Purpose ID	A dummy variable that equals one if the tranche purpose is general and zero otherwise.
Investment Grade Rating ID	A dummy variable that equals one if the credit rating of the borrower is investment grade and zero otherwise.
Secured ID	A dummy variable that equals one if the loan facility is secured by collateral and zero otherwise.
Call Protection ID	A dummy variable that equals one if the tranche has any call protection option and zero otherwise.
Sponsored ID	A dummy variable that equals one if the tranche is sponsored and zero otherwise.

Notes: This table describes the variables used in the multivariate regression analysis. All data is collected from the LPC DealScan database.

Table 2

Annual syndicated loan amount

Year	Conventional (Million US$)	Sustainable (Million US$)	Sustainable Share (%)	Total (Million US$)
2016	2,229,914	6,073	0.27	2,235,987
2017	3,133,521	9,218	0.29	3,142,739
2018	3,589,321	41,894	1.15	3,631,215
2019	3,045,001	126,168	3.98	3,171,169
2020	3,045,094	204,185	6.28	3,249,279
2021	3,504,781	459,736	11.60	3,964,517
2022	2,830,965	466,710	14.15	3,297,675
2023	2,262,097	430,881	16.00	2,692,978
2024	1,949,002	357,532	15.50	2,306,534
Total	25,589,696	2,102,397	7.59	27,692,093

Notes: This table exhibits an overview of the annual syndicated loan amount covering conventional loan amount, sustainable loan amount in million US$ and sustainable syndicated loan share in percent from 2016-2024 (Till September 2024) excluding the financial sector borrowers.

Table 3

Annual sustainable corporate loan facilities

Year	Facilities (#)	Amount (Million $)	Per-Facility (Million $)
2016	100	6,073	61
2017	93	9,218	99
2018	164	41,894	255
2019	415	126,168	304
2020	722	204,185	283
2021	1,269	459,736	362
2022	1,832	466,710	255
2023	1,911	430,881	225
2024	1,418	357,532	252
Total	7,924	2,102,397	265

Notes: This table exhibits an overview of the annual sustainable corporate loan facilities covering no. of loan facilities (#), loan amount, and average per-facility in million US$ from 2016-2024 (Till September 2024) excluding the financial sector borrowers.

Table 4

Sustainable Corporate Loans across industries

Industry	Facilities (#)	Amount (Million US$)	Industry share (%)
1. Utilities	2,775	628,147	29.88
2. General Manufacturing	629	156,281	7.43
3. Real Estate	606	133,041	6.33
4. Oil and Gas	127	97,871	4.66
5. Automotive	251	94,490	4.49
6. Technology	245	93,636	4.45
7. REITS	415	84,781	4.03
8. Beverage, Food, & Tobacco Processing	294	79,012	3.76
9. Construction	324	78,368	3.73
10. Chemicals, Plastics & Rubber	238	77,754	3.7
11. Wholesale	208	70,604	3.36
12. Transportation	187	62,978	3
13. Telecommunications	128	60,457	2.88
14. Healthcare	203	56,906	2.71
15. Business Services	220	48,092	2.29
16. Retail & Supermarkets	152	45,483	2.16
17. Shipping	211	44,412	2.11
18. Services	162	35,093	1.67
19. Government	87	24,569	1.17
20. Media	44	23,707	1.13
21. Aerospace and Defense	18	23,003	1.09
22. Paper & Packaging	100	20,309	0.97
23. Mining	59	15,500	0.74
24. Agriculture	88	14,480	0.69
25. Hotel & Gaming	56	10,838	0.52
26. Textiles and Apparel	49	9,109	0.43
27. Broadcasting	10	6,010	0.29
28. Leisure and Entertainment	23	3,739	0.18
29. Restaurants	15	3,728	0.18
Total	7,924	2,102,397	100

Notes: This table demonstrates an overview of the sustainable corporate loan facilities in terms of the major industry covering no. of loan facilities, total amount in million US$, and industry share in percentage from 2016-2024 (Till September 2024) excluding the financial sector borrowers.

Table 5

Region-wise sustainable corporate loan facilities

Region	Facilities (#)	Amount (Million $)	Region share (%)
1. West Europe	3,692	1,102,215	52.43
2. Asia	2,712	485,886	23.11
3. North America	855	364,915	17.36
4. Middle East	90	45,935	2.18
5. East Europe	270	45,451	2.16
6. Latin America	174	39,139	1.86
7. Africa	131	18,857	0.9
Total	7,924	2,102,397	100

Notes: This table displays an overview of the total Sustainable Corporate Loans in terms of major geographic regions covering no. of loan facilities, total amount in million US$, and region share in percentage during the sample period 2016-2024 (Till September 2024) excluding the financial sector borrowers.

Table 6

Country-wise Sustainable Corporate Loans

Country	Facilities (#)	Amount (Million $)	Country share (%)
1. United States	812	348,137	16.56
2. France	629	205,802	9.79
3. Germany	459	177,332	8.43
4. United Kingdom	400	146,363	6.96
5. Spain	850	122,352	5.82
6. Italy	457	117,725	5.6
7. Singapore	299	94,784	4.51
8. Netherlands	148	93,873	4.47
9. Japan	830	84,337	4.01
10. Taiwan	561	70,493	3.35
11. Hong Kong	275	65,485	3.11
12. Australia	286	63,471	3.02
13. India	124	58,065	2.76
14. Sweden	141	44,581	2.12
15. Switzerland	56	33,272	1.58
16. Norway	70	27,626	1.31
17. Belgium	62	27,543	1.31
18. Denmark	47	25,517	1.21
19. Saudi Arabia	33	24,181	1.15
20. Finland	107	23,898	1.14
21. Poland	99	21,982	1.05
22. Mexico	27	16,275	0.77
23. Luxembourg	50	16,099	0.77
24. United Arab Emirates	42	15,325	0.73
25. China	83	12,924	0.61
26. Austria	103	12,426	0.59
27. Ireland	25	10,985	0.52
28. Portugal	42	10,837	0.52
29. Canada	39	8,848	0.42
30. Brazil	38	8,714	0.41
31. Russian Federation	21	7,235	0.34
32. Thailand	51	7,169	0.34
33. Indonesia	34	7,038	0.33
34. Cyprus	11	6,694	0.32
35. South Africa	54	6,507	0.31
Others (64)	559	78,504	3.77
Total (99)	7,924	2,102,397	100

Notes: This table presents a snapshot of the total Sustainable Corporate Loans in terms of countries covering no. of loan facilities, total amount in million US$, and country share in percentage during the sample period 2016-2024. Others Include countries having total loan amount below $5,000 million.

Table 7

Variable	*n*	Mean	Median	SD	Min	Max
Spread (BPS)	40994	308.32	275	181.39	31.5	850
SCL ID	40994	0.04	0	0.19	0	1
Loan Size ($MN)	40980	346.02	120	622.66	3	4000
Loan Maturity (Months)	40504	59.51	60	31.74	8	216
Covenants ID	40994	0.10	0	0.30	0	1
Revolver ID	40994	0.31	0	0.46	0	1
General Purpose ID	40994	0.43	0	0.49	0	1
Investment Grade ID	32627	0.59	1	0.49	0	1
Secured ID	40994	0.46	0	0.50	0	1
Call Protection ID	40994	0.11	0	0.31	0	1
Sponsored ID	32627	0.42	0	0.49	0	1

Notes: This table shows the number of observations and descriptive statistics of the variables in regression models. Variables are described in Table 1

Table 8

Pearson correlation matrix

Variable	1	2	3	4	5	6	7	8	9	10	11
Spread											
SCL ID	-.15**										
Loan Size $MN	-.18**	.01**									
Loan Maturity	.13**	.08**	-.01								
Number of Lenders	-.34**	.13**	.43**	-.03**							
Covenants ID	-.15**	.01	.15**	-.06**	.22**						
Revolver ID	-.17**	-.00	-.01*	-.15**	.11**	.07**					
Genera Purpose ID	-.21**	.02**	.07**	-.18**	.09**	.10**	.21**				
Investment Grade ID	-.04**	-.20**	.07**	-.18**	.00	.12**	.08**	.08**			
Secured ID	.36**	-.04**	-.03**	.19**	-.11**	-.01*	-.07**	-.14**	-.08**		
Call Protection ID	.24**	-.04**	.17**	.19**	-.04**	.02**	-.23**	-.03**	-.01*	.37**	
Sponsored ID	.55**	-.17**	-.16**	.12**	-.20**	-.16**	-.10**	-.30**	-.02**	.44**	.19**

Notes: This table reports the Pearson correlation coefficients of the variables of interest in this study. The variables include the Spread, SCL ID, Loan Size measured in millions of USD, Loan Maturity measured in months, The details of definitions and measurements of all the variables are reported in Table 1. The notations **, and * denote statistical significance at the 1% and 5% levels, respectively.

Table 9

Mean differences of loan characteristics between CCL and SCL

Loan characteristics	Conventional Corporate Loan	Sustainable Corporate Loan	Difference
Spread (BPS)	314.01	169.57	-144.44*** (47.62)
Loan amount MN US$	344.36	386.56	42.20*** (-2.63)
Loan maturity	58.98	72.67	13.70*** (-10.86)
Number of lenders	5.86	9.30	3.44*** (-18.72)

Notes: This table shows the mean differences of loan features between CCL and SCL. The attributes of loans are Spread, Loan amount, Loan maturity and Number of Lenders. The definitions and measurements of all variables are reported in Table 1. The numbers in parentheses represent values of t-statistics. The notations ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10

Table 10: Results of the regression analysis with continuous variables and full sample

	Dependent variable: log (Spread)			
Variables	Model 1 (World)	Model 2 (Europe)	Model 3 (USA)	Model 4 (Rest World)
Sustainable Loan ID	-0.108***	-0.164***	-0.082**	-0.054**
	(0.018)	(0.056)	(0.032)	(0.023)
Log (Loan Amount)	0.007***	0.004	0.009***	-0.002
	(0.002)	(0.005)	(0.002)	(0.004)
Log (Loan Maturity)	0.057***	0.148***	0.031***	0.121***
	(0.008)	(0.028)	(0.008)	(0.019)
Log (Number of Lenders)	-0.053***	-0.063***	-0.075***	0.006
	(0.006)	(0.015)	(0.007)	(0.010)
Observations	40,492	4,673	27,068	8,751
Year, Borrower, Industry, Country FE	Yes	Yes	Yes	Yes
Adjusted R2	0.863	0.832	0.814	0.921

Notes: This table presents the regressions of Spread on SCL, controlling for loan features (loan amount, loan maturity and number lenders), firm, year effect, industry, country fixed effects. The details of definitions and measurements of all the variables are reported in Table 1. All regressions are estimated using fixed effects, with clustered (at borrower level) robust standard errors (in parenthesis). The notations ***, **, and * denote statistical significance at the 1%, 5%, 10% levels, respectively.

Table 11

Results of the regression analysis with all variables and full sample

	Dependent variable: log (Spread)			
Variables	Model 1 (World)	Model 2 (Europe)	Model 3 (USA)	Model 4 (Rest World)
Sustainable Loan ID	-0.058**	-0.109**	-0.031	-0.201**
	(0.029)	(0.053)	(0.035)	(0.084)
Log (Loan Amount)	-0.023***	-0.015***	-0.026***	0.007
	(0.002)	(0.006)	(0.002)	(0.006)
Log (Loan Maturity)	0.040***	0.142***	0.018**	0.100***
	(0.008)	(0.027)	(0.008)	(0.030)
Log (Number of Lenders)	-0.043***	-0.054***	-0.044***	0.004
	(0.006)	(0.015)	(0.007)	(0.028)
Covenants ID	-0.025*	0.051	-0.030**	0.012
	(0.014)	(0.043)	(0.015)	(0.069)
Revolver ID	-0.105***	-0.112***	-0.104***	0.002
	(0.004)	(0.012)	(0.005)	(0.016)
General Purpose ID	-0.076***	-0.076***	-0.076***	-0.070
	(0.007)	(0.021)	(0.007)	(0.051)
Investment Grade ID	-0.046***	-0.199***	-0.027**	-0.223***
	(0.010)	(0.033)	(0.010)	(0.064)
Secured ID	0.038***	0.125***	0.023**	0.060
	(0.011)	(0.042)	(0.012)	(0.055)
Call Protection ID	0.137***	0.036**	0.163***	0.179***
	(0.009)	(0.017)	(0.010)	(0.062)
Sponsored ID	0.126***	0.109***	0.126***	0.091
	(0.015)	(0.030)	(0.017)	(0.109)
Observations	32,186	4,404	25,698	2,084
Year, Borrower, Industry, Country FE	Yes	Yes	Yes	Yes
Adjusted R2	0.849	0.858	0.833	0.912

Notes: This table presents the regressions of Spread on SCL, controlling for loan features (loan amount, loan maturity, number lenders along with a range of binary variables such as covenants, revolver, general purpose, and investment grade), firm, year effect, industry, country fixed effects. The details of definitions and measurements of all the variables are reported in Table 1. All regressions are estimated using fixed effects, with clustered (at borrower level) robust standard errors (in parenthesis). The notations ***, **, and * denote statistical significance at the 1%, 5%, 10% levels, respectively.

Table 12

Results of the regression analysis with all variables and propensity score matched sample

	Dependent variable: Log (Spread)			
Variables	Model 1 (World)	Model 2 (Europe)	Model 3 (USA)	Model 4 (Rest World)
Sustainable Loan ID	-0.101***	-0.144***	-0.063	-0.095
	(0.037)	(0.050)	(0.056)	(0.172)
Log (Loan Amount)	0.009	0.018	0.007	-0.027
	(0.014)	(0.016)	(0.021)	(0.027)
Log (Loan Maturity)	0.118***	0.111	0.114**	-0.152***
	(0.045)	(0.077)	(0.056)	(0.058)
Log (Number of Lenders)	-0.010	-0.064	0.020	-0.104
	(0.032)	(0.048)	(0.043)	(0.109)
Covenants ID	0.043	0.188	0.014	0.608***
	(0.058)	(0.200)	(0.067)	(0.218)
Revolver ID	-0.025	-0.005	-0.017	-0.008
	(0.038)	(0.041)	(0.061)	(0.072)
General Purpose ID	-0.028	-0.052	0.003	0.200
	(0.039)	(0.052)	(0.065)	(0.156)
Investment Grade ID	0.010	-0.020	0.020	0.855***
	(0.021)	(0.015)	(0.051)	(0.278)
Secured ID	0.038	0.083	-0.018	-0.107
	(0.073)	(0.077)	(0.095)	(0.162)
Call Protection ID	0.134**	0.134***	0.131	0.577***
	(0.055)	(0.051)	(0.119)	(0.165)
Sponsored ID	0.096	-0.073	0.226	0.443**
	(0.092)	(0.071)	(0.201)	(0.205)
Constant	5.474***	5.546***	4.328***	5.461***
	(0.216)	(0.348)	(0.247)	(0.532)
Observations	725	255	382	88
Year, Borrower, Industry, Country FE	Yes	Yes	Yes	Yes
Adjusted R2	0.847	0.892	0.781	0.880

Notes: This table presents the regressions of Spread on SCL, controlling for loan features (loan amount, loan maturity, number lenders along with a range of binary variables such as covenants, revolver, general purpose, and investment grade), firm, year effect, industry, country fixed effects. The details of definitions and measurements of all the variables are reported in Table 1. All regressions are estimated using fixed effects, with clustered (at borrower level) robust standard errors (in parenthesis). The notations ***, **, and * denote statistical significance at the 1%, 5%, 10% levels, respectively.

Table 13

Regression results excluding covid (2020-2021) sample

	Dependent variable: Log (Spread)			
	Model 1 (World)	Model 2 (Europe)	Model 3 (USA)	Model 4 (Rest World)
Sustainable Loan	-0.112***	-0.200***	-0.074	-0.345***
	(0.034)	(0.054)	(0.047)	(0.121)
Log (Loan Amount)	-0.023***	-0.016***	-0.027***	0.005
	(0.002)	(0.006)	(0.003)	(0.006)
Log (Loan Maturity)	0.060***	0.169***	0.036***	0.084**
	(0.010)	(0.030)	(0.010)	(0.035)
Log (Number of Lenders)	-0.041***	-0.037**	-0.046***	0.030
	(0.008)	(0.018)	(0.009)	(0.033)
Revolver Loan ID	-0.103***	-0.119***	-0.100***	-0.042**
	(0.005)	(0.013)	(0.005)	(0.017)
General Purpose ID	-0.084***	-0.077***	-0.087***	-0.035
	(0.008)	(0.023)	(0.009)	(0.041)
Investment Grade ID	-0.054***	-0.179***	-0.042**	-0.019
	(0.014)	(0.036)	(0.017)	(0.074)
Secured ID	0.017	0.063	0.008	-0.013
	(0.013)	(0.043)	(0.014)	(0.053)
Call Protection ID	0.137***	0.041**	0.170***	0.007
	(0.011)	(0.021)	(0.012)	(0.047)
Sponsored ID	0.130***	0.088***	0.138***	0.067
	(0.019)	(0.033)	(0.022)	(0.088)
Observations	24,318	3,492	18,809	2,020
Year, Borrower, Industry, Country FE	Yes	Yes	No	Yes
Adjusted R^2	0.860	0.884	0.842	0.909

Notes: This table presents the regressions of Spread on Sustainable Loan, controlling for loan features (loan amount, loan maturity, number lenders along with a range of binary variables such as covenants, revolver, general purpose, and investment grade), firm, year effect, industry, country fixed effects excluding the covid period (2020-2021). The details of definitions and measurements of all the variables are reported in Table 1. All regressions are estimated using fixed effects, with clustered (at borrower level) robust standard errors (in parenthesis). The notations ***, **, and * denote statistical significance at the 1%, 5%, 10% levels, respectively.

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