The pricing of sustainable syndicated loans

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This paper provides a comparative analysis of sustainable and conventional syndicated loan spreads and pricing. Using a cross-section of 24,962 syndicated loan tranches closed between 2018 and 2022 in OECD countries, we show that sustainable and conventional loans are differently priced, spreads of sustainable versus conventional loans do not differ significantly, and banks rely on contractual, macroeconomic, bank syndicate structure, and borrowers' characteristics when pricing sustainable tranches. At the deal-level, our results do not support the hypothesis of sustainable debt financing as a mechanism for reducing firms' funding costs. We also find that economies of scale, institutional, and information asymmetry arguments affect firms' choice between sustainable and conventional syndicated deals.

Key words: ESG; syndicated loans; credit spreads; loan pricing; cost of borrowing.
JEL classification: G12; G23; G32; Q56

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1. Introduction

Since the Paris Climate Agreement in 2015, firms have been integrating environmental, social, and governance (ESG) based solutions into their strategies, ranging from guaranteeing inclusiveness in their workforce, leading environmental initiatives or reinforcing their governance structures (Krueger *et al.*, 2020; Cornell and Shapiro, 2021; Edmans and Kacperczyk, 2022; Pollman, 2022; Edmans, 2023). However, the United Nations Commission on Trade and Development estimates a yearly gap in the financing of the Sustainable Development Goals of $4.3 trillion by 2030 (UNCTAD, 2022). Under this framework, the support of the financial system in directing funds toward sustainable development becomes crucial.

Among available sustainable debt financing instruments, sustainable bonds represent a rapidly growing financial asset class.[1] Likewise, sustainable syndicated lending - sustainability-linked, social, and green syndicated loans[2] - totaled $716.6 billion during 2021, more than tripling 2020 levels and setting an all-time full-year record. Despite this exponential growth of the sustainable syndicated loan market in the last decade, representing a 14.6% stake of the global syndicated lending in 2022 ($693.4 billion for a total of $4,737.2 billion),[3] further analyses on how this bank debt class works is still needed. For example, are sustainable and standard syndicated corporate loans similarly priced? Why do corporates choose to close sustainable loans over standard syndicated loans? Are sustainable loan spreads lower than the spreads of similar syndicated loans? These are the questions that we explore in this paper.

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[1] According to Refinitiv Deals Intelligence reviews, sustainable finance - green, social, and sustainability - bond issuance surpassed $1.0 trillion for the first time in 2021, an increase of 45% compared to 2020.

[2] We use the term "sustainable loans" to refer to all types of sustainable loans collectively, including green, sustainability-linked, and social loans. Green and social loans are loan instruments made available exclusively to (re)finance eligible green and social projects, respectively. Sustainability-linked loans are loan instruments for which the economic characteristics can vary depending on whether the borrower achieves predetermined ESG objectives. In 2018, the Loan Market Association (LMA), the Asia Pacific Loan Market Association (APLMA), and the Loan Syndications and Trading Association (LTSA) released the Green Loan Principles (GLP), the Sustainability Linked Loan Principles (SLLP) in 2019, and the Social Loan Principles (SLP) in 2021. For further details see: https://www.lsta.org/content/?_industry_sector=guidelines-memos-primary-market.

[3] Sustainable Finance Review, full year 2021; Global Syndicated Loans Review, full year 2022. Source: Refinitiv (https://www.refinitiv.com/dealsintelligence).

This work contributes to three strands of literature. First, we add to the existing body of research on the determinants of syndicated loan spreads. The theoretical and empirical literature on traditional syndicated loan pricing is vast and growing.[4] Within this literature, several studies examine the impact of ESG characteristics of borrowers and ESG risks on syndicated loan spreads. Previous works have focused on the effect of corporate social responsibility on loan spreads (Goss and Roberts, 2011), the causal relationship between firms' social capital levels and the cost of bank financing (Hasan et al., 2017), the association between firm exposure to carbon risk through carbon emissions and syndicated loan spreads (Kleimeier and Viehs, 2018; Ehlers et al., 2022; Degryse et al., 2023; Ho and Wong, 2023), and whether physical climate change risks are priced into the corporate loan market (Delis et al., 2018; Correa et al., 2023). However, research on the determinants of sustainable syndicated loan spreads is practically non-existent. The only exception is Pohl et al. (2023), who examine the impact of sustainability characteristics of lenders and borrowers on the difference between sustainability-linked and conventional loan spreads. Their findings indicate that sustainability-linked loans have lower spreads, and this advantage is greater for companies with high environmental standards. We contribute to the existing literature by examining how common pricing factors compare between sustainable and conventional syndicated loans and analyzing the determinants of loan spreads for a specific sample of sustainable loans. Additionally, we follow an instrumental variable approach to address the fact that, in the process of loan syndication, both spread and maturity cannot be split and treated separately (Bharath et al., 2011; Alves et al., 2022). We also use endogenous switching regression models (Lokshin and Sajaia, 2004) to study pricing, taking into account the potential self-selection by firms between closing sustainable versus conventional deals.

Second, this paper also contributes to recent literature that examines if sustainable debt instruments have lower spreads than traditional alternatives. Authors focus essentially on market financing via green bonds and find mixed evidence: although Tang and Zhang (2020) and Flammer (2021) find that the yields of green *versus* brown bonds do not differ significantly; several studies find a negative yield spread (Wang *et al.*, 2020; Fatica

[4] See, among others, Carey and Nini (2007), Qian and Strahan (2007), Bae and Goyal (2009), Maskara (2010), Bharath *et al.* (2011), Lim *et al.* (2014), and Cumming *et al.* (2020).

et al., 2021; Löffler *et al.*, 2021; Caramichael and Rapp, 2022). Regarding the corporate syndicated loan market, banks can offer sustainable syndicated loans as a way of mitigating moral hazard and adverse selection costs with respect to borrowers' ESG activities (Christensen *et al.*, 2021; Flammer, 2021; Loumioti and Serafeim, 2023). Considering that there is an inverse relation between ESG risk and credit riskiness (e.g., Goss and Roberts, 2011; Chava, 2014; Hock *et al.*, 2020), we would expect sustainable loans to have lower spreads than comparable conventional loans. To the best of our knowledge, there are only two papers that make a preliminary analysis of this issue. Despite their focus on the economic motivations of borrowers and lenders driving sustainable loans, Du *et al.* (2023) and Kim *et al.* (2023) find that spreads at closing do not differ significantly between sustainability-linked loans and matched conventional loans. However, Kim *et al.* (2023) find evidence of a greenium effect when comparing green with nongreen syndicated loans. We extend this literature by examining sub-samples of sustainability-linked, green, and social loans, employing an instrumental variable approach, utilizing a matching methodology, and applying endogenous switching regression models.

Third, the paper also contributes to the literature that studies what the determinants of firms using sustainable debt instruments are. Extant literature presents the cost of capital motivation as one of the key reasons (Fama, 2021; Pedersen et al., 2021; Pástor et al., 2021; Gao and Schmittmann, 2022). If lenders are willing to trade-off financial returns for societal benefits, sustainable loans can be used by firms to reduce the cost of financing (Freeman, 2010; Flammer, 2021). Works closest to ours include Loumioti and Serafeim's (2023) findings, which focus on the analysis of which type of borrowers are more likely to receive sustainability-linked financing, and the relation between a borrower's ESG risk and the characteristics of sustainability performance indicators and pricing incentives. We extend this literature by analyzing if the cost of borrowing affects firms' choice between sustainable and conventional loans. This is of particular interest since, in our sample, 714 deals are issued by switchers, firms that choose both debt types in the sampling period.[5]

[5] In our sample, a firm is considered to be a switcher if it closes both types of syndicated loans during the sample period; that is, if it closes a traditional syndicated loan and then a sustainable one, or vice versa. See Panel E of Table 1 for more details on the top 10 switchers.

Using a large sample of syndicated loans (712 sustainable loans and 24,250 traditional corporate loans, worth $527.8 billion and $11,027.3 billion, respectively) closed by firms located in OECD countries in the 2018-2022 period, we document that sustainable and conventional loans are differently priced. Results obtained from a generalized method-of-moments (GMM) estimation method show that factors important for conventional loan pricing include credit rating, if the tranche is subordinated and the borrower's level of experience in the syndicated loan market, lead bank's reputation and number of banks involved, and market volatility are also important for determining spreads on sustainable loans. However, common pricing factors that affect conventional loan pricing, such as time to maturity, borrower's rating, transaction size, and type of financial system and shareholders' protection level in the borrower's country, do not influence sustainable loan spreads.

Our findings document that sustainable loan spreads do not differ significantly from those of comparable conventional loans, in line with the results of Tang and Zhang (2020) and Flammer (2021) for green bonds and Du *et al.* (2023) and Kim *et al.* (2023) for sustainability-linked loans. Contrary to Kim *et al.* (2023), we do not find evidence of a greenium effect when comparing green loans with comparable conventional loans. Therefore, we do not corroborate the hypotheses of banks offering sustainable syndicated loans as a way of mitigating moral hazard and adverse selection costs with respect to borrowers' ESG activities; or that banks demand lower loan spreads in anticipation of the potential lower risks they face in debt contracting for firms with better ESG performance (Chava, 2014; Nguyen et al., 2023). Although we use virtually all sustainable loans with available spread information closed since 2018, our sample of sustainable loans is about 4.6% of the total syndicated loan amount. In addition, the choice between sustainable and conventional syndicated deals may be endogenous to spreads. To mitigate these effects, we (*i*) build a loan-level matched sample of conventional loans following Flammer (2021) - for each sustainable loan, we match an otherwise similar conventional loan by the same borrower -; and (*ii*) use an endogenous switching regression model (Lokshin and Sajaia, 2004). Our results hold when we use these methodologies.[6]

[6] To create a matched sample of conventional loans, we employ a propensity score matching (PSM) by creating a 1 to 1 matching algorithm that captures the most identical loan closed by the same borrower in the same year, using the following characteristics: credit rating, loan size, and maturity.

Our evidence is not consistent with the cost of capital motivation for firms using sustainable debt funding. Findings at the deal level indicate that the cost of borrowing, measured by deals' *weighted average spread* (WAS), does not differ significantly between sustainable *vis-à-vis* conventional syndicated deals. Furthermore, considering that compared to conventional syndicated loan financing, sustainable deals are more restrictive, as the proceeds from sustainable loans are committed to ESG-aligned projects, and entail more transaction costs namely for first-time borrowers because borrowers must appoint an external review provider to assess the alignment of their loans or develop the internal expertise to confirm alignment with the sustainable loan principles. Additionally, there is limited enforcement of the law for supervising their integrity, therefore we address the following question: what are the benefits other than borrowing costs that determine firms' decision to choose sustainable *vis-à-vis* conventional syndicated deals?

We find strong evidence that sustainable loan financing mitigates the deadweight costs of asymmetric information frictions. Borrowers that choose sustainable deals seek long-term financing and deals are more likely to be syndicated by relationship banks and closed by switchers. Results seem to be consistent with the prediction that firms choose sustainable financing for larger debt borrowings because of the potential economies of scale in relation to issuance costs. As in Kim *et al.* (2023), our findings suggest that sustainable deals are extended to firms with better creditworthiness. In addition, we find that smaller and more concentrated syndicates decrease the probability of observing a sustainable deal over a conventional one. Institutional factors also affect firms' choice: borrowers in countries with higher shareholders' protection, but lower levels of contract enforcement prefer sustainable syndicated deals vis-à-vis conventional syndicated funding. Finally, a country's environmental policy stringency increases the probability of a firm choosing a sustainable deal.

This paper is organized as follows. Section 2 reviews the literature and describes the research hypotheses. Section 3 describes the data and variables we use in our tests. In section 4, we examine the determinants of sustainable *vis-à-vis* conventional syndicated loan spreads. It also analyzes if the market prices loans differently across sustainable and comparable traditional syndicated loans. Section 5 examines which factors influence the choice between sustainable *versus* conventional syndicated deals. Section 6 presents the main conclusions of this study.

2. Literature review and hypotheses

2.1. The financial economics of sustainable loans

Koninklijke Philips closed the world's first sustainable loan in 2017, a €1 billion syndicated loan with an interest rate linked to sustainability performance and rating. In our sample, the first sustainable loan was closed by the American firm CMS Energy Corp., in June 2018, with a tranche size of $551 million and a 5-year maturity. The largest issuance, with a similar maturity and a tranche size of $10 billion, was closed in 2022 by Ford Motor Company, 'to invest in clean transportation projects, including investments in Ford's electric vehicle lineup'. Over the last few years, the syndicated loan market has financed a broad range of project types, tranche sizes, and maturities. However, what are the main characteristics of sustainable loans that make them different from traditional ones?

Sustainable loans can be segmented into three typologies. Green loans are instruments made available for the purposes of financing a 'green project'. Social loans are extended to projects with a primary objective of inducing social benefits or the achievement of positive social outcomes. Sustainability-linked loans are used for general business purposes, with the terms tied to the borrowers' ESG-related performance, measured via key performance indicators (KPIs) and sustainability performance targets (SPTs). These financial assets have two major distinguishing features. First, proceeds are used for ESG projects. Second, they should fulfil sustainable loan principles: the Green Loan Principles (GLP), the Sustainability Linked Loan Principles (SLLP), and the Social Loan Principles (SLP).[7] Therefore, borrowers must appoint an external review provider to assess the alignment of their loans or, as the loan market is traditionally a relationship-driven market, develop the internal expertise to confirm alignment with the principles (self-certification). Complying with the sustainable loan principles may require substantial

[7] The GLP and SLP aim to promote the development of green and social projects, respectively, based on four central components: (*i*) use of proceeds; (*ii*) process for project evaluation and selection; (*iii*) management of proceeds; and (*iv*) reporting. The SLLP are based around the following core components: (*i*) selection of KPIs; (*ii*) calibration of SPTs; (*iii*) loan characteristics; (*iv*) reporting; and (*v*) verification.

managerial effort and resources, which is costly to the borrower, namely for first-time borrowers (Caramichael and Rapp, 2022).[8]

Sustainable loans, especially sustainability-linked loans, are contractual innovations that intend to tie a loan's interest rate to the borrower's ESG performance indicators. This ties into agency theory (Jensen and Meckling, 1976), which suggests that aligning the interests of borrowers and lenders through performance-linked terms can mitigate agency costs and reduce moral hazard. Extant literature on performance pricing, which focuses on analyzing contract design features that link a loan's interest rate to the borrower's credit quality, highlights the importance of performance-sensitive debt in mitigating agency costs and enhancing contract completeness (e.g., Asquith et al., 2005; Roberts and Sufi, 2009; Costello and Wittenberg-Moerman, 2011; Christensen et al., 2021). As mentioned by Flammer (2021) and Loumioti and Serafeim (2023), sustainability-linked pricing adjustments may be used by lenders to discipline borrowers' ESG activities and mitigate risks.

Moreover, stakeholder theory (Freeman, 2010) suggests that companies engaging in sustainable practices align themselves better with the interests of a broader range of stakeholders, including lenders who value ESG performance. Due to the specific characteristics of sustainable loans – as they are set up in accordance with specific rules regarding their use of proceeds, impact measurement, reporting, and verification, and as they are theoretically assigned for certain sustainability-linked or ESG-aligned projects, assets, or activities (Schumacher, 2020) - their pricing is usually conditional on ESG-related risks (Chava, 2014). Therefore, one would expect that sustainable and conventional syndicated loans are priced differently by common pricing factors and that banks rely more on other factors than credit ratings when pricing sustainable syndicated loans. This leads us to the hypothesis:

Hypothesis 1 (H1): Sustainable and conventional loans are influenced differently by common pricing factors.

[8] Whilst each of the GLP, SLLP, and SLP include suggestions as to the main focus areas, the absence of any standard market document allows the parties to decide if a loan is consistent with the principles. The main objective is to act as a warning system concerning the issue of 'green/sustainability/social washing' where a loan's green, sustainability-linked, or social features are exaggerated.

2.2. Spreads across syndicated loan classes

It is widely acknowledged that agency conflicts and informational problems are among the major theoretical determinants of corporate borrowing choices. Contracting provisions, such as debt covenants, can serve as useful disciplinary tools to reduce agency costs of debt that arise from the misalignment of objectives between borrowers and lenders, thereby affecting the cost of borrowing (Jensen and Meckling, 1976; Hart and Moore, 1988).

The existing literature comparing spreads and pricing of sustainable versus conventional debt instruments focuses predominantly on green bonds and the analysis of a negative yield spread - referred to as 'greenium' - and its determinants. Theoretical literature generally argues that green bonds should be issued at a premium over comparable corporate bonds. According to Fama (2021), if investors value the ESG actions of firms, investment decisions that incorporate ESG criteria will be rewarded with higher share prices and lower costs of capital. Therefore, if investors prefer holding sustainable bonds, these bonds will be priced at a premium compared to traditional corporate bonds (Fama and French, 2007). This perspective aligns with stakeholder theory (Freeman, 2010), which posits that sustainable financial instruments may attract lower costs due to improved stakeholder alignment. Additionally, green bonds may mitigate asymmetric information problems, particularly when investors have different levels of private information and varying capabilities to screen firms, through 'green' certification and third-party reviews (Yu, 2005; Gao and Schmittmann, 2022).[9] They can also function as a hedge against climate risks (Pedersen et al., 2021; Pástor et al., 2021).

Applying similar reasoning to syndicated loans governed by sustainable loan principles (SLLP, GLP, or SLP), transparency and disclosure requirements are intended to enhance loan integrity and reduce information asymmetries between lenders and borrowers (Diamond and Verrecchia, 1991; Lambert et al., 2007). Sustainability-linked loans, in particular, tie economic costs to predefined sustainability targets

[9] Gao and Schmittmann (2022) present a model of the corporate green bond market under asymmetric information without a green preference, and show that green bonds have a price premium over conventional bonds when there is information asymmetry, transition risk, and it is costly to engage in greenwashing.

(Loumioti and Serafeim, 2023), potentially lowering spreads by mitigating moral hazard and adverse selection risks associated with ESG activities (Chava, 2014).[10]

Furthermore, regulatory pressures on banks to assess climate risks (Palea and Drogo, 2020; Nguyen et al., 2023) suggest that loans meeting sustainability criteria may consume less capital, resulting in lower spreads compared to traditional loans. Conversely, higher perceived regulatory, compliance, and litigation risks for borrowers with weaker ESG profiles may lead to higher credit risk premiums (Bharath et al., 2008; Graham et al., 2008). The literature also indicates that firms with strong ESG performance metrics typically benefit from lower spreads (Chava, 2014; Hasan et al., 2017), suggesting that sustainable loans may offer a cost advantage. Under this framework, we propose the following hypothesis:

Hypothesis 2 [H2]: Sustainable and conventional syndicated loans spreads differ significantly, and sustainable loans have lower spreads than comparable traditional syndicated loans.

2.3. The cost of borrowing motivation

To date, the literature on the motivations behind corporations use of sustainable rather than traditional debt financing has primarily focused on capital markets and presents the following main motivations: (*i*) signaling motivation, as sustainable debt signals the firm's commitment to sustainability (Lyon and Maxwell, 2011; Loumioti and Serafeim, 2023; Kim et al., 2023);[11] (*ii*) liquidity motivation, as sustainable bonds can increase the liquidity of an issuer's assets (Flammer, 2021; Tang and Zhang, 2020); (*iii*) greenwashing motivation, involving unsubstantiated or misleading claims about the company's environmental commitment through selective disclosure and misleading narratives (Lyon and Montgomery, 2015; Marquis et al., 2016; Carrizosa and Ghosh, 2023); and (*iv*) cost of capital motivation, where sustainable debt may reduce the cost of financing (Fama, 2021; Pedersen et al., 2021; Pástor et al., 2021; Gao and Schmittmann, 2022). Evidence also

[10] The proceeds of a sustainable loan should be credited to a dedicated account or otherwise tracked by the borrower in an appropriate manner. In addition, by having borrowers report on the use of sustainable loan proceeds (e.g., the amounts allocated and their expected/achieved impact), these principles promote a considerable change in transparency that facilitates the tracking of funds to sustainable projects or sustainable-linked actions.

[11] Along this line of reasoning, extant literature provides evidence that the stock market responds positively to the eco-friendly behavior of companies (Klassen and McLaughlin, 1996; Flammer, 2013,2021; Krueger, 2015; Tang and Zhang, 2020; Wang *et al.*, 2020).

indicates that contractual characteristics - such as cost and size - and borrower characteristics - such as board gender diversity, profitability, and debt structure - along with investors' green preferences, influence firms' decisions between green and conventional bonds (Cicchiello et al., 2022; Lin and Su, 2022).

Regarding syndicated loans, Ioannou and Serafeim (2019) argue that borrowers use sustainable syndicated loans to signal their ESG reputation, while lenders may target low-ESG risk borrowers to reduce monitoring costs and reputational risks. Loumioti and Serafeim (2023) show that sustainability-linked loans are more prevalent among low ESG risk borrowers and find no significant relationship between borrowers' ESG risk and the materiality or tightness of sustainability KPIs, suggesting that these loans are unlikely to drive ESG performance improvements. This contrasts with findings from Dursun-de Neef et al. (2023), Kim et al. (2023), Carrizosa and Ghosh (2022), and Du et al. (2022), which indicate that borrowers improve their sustainability performance after closing sustainability-linked loans, particularly those with a strong commitment to sustainability practices and lenders aiming to enhance their reputation.

Sustainable syndicated loans typically involve a pyramid structure with a few arranging banks at the top and many providing banks at the bottom.[12] Tranches are structured to achieve specific risk-return levels, and subordination levels are determined to optimize the deal's overall borrowing cost. According to asymmetric information theory, debt securities with different seniority levels can mitigate agency problems and reduce monitoring costs, providing a rationale for syndicated deal arrangements (Allen and Winton 1995; Sannikov 2013). Tranching can also help lessen asymmetric information problems in loan contracting (DeMarzo 2005).

Thus, by integrating the literature on the cost of capital motivation for firms using sustainable debt with the literature on security design, we propose the following hypothesis:

Hypothesis 3 [H3]: Firms use sustainable syndicated deals to reduce their borrowing costs.

3. Data and variable definition

3.1. Sample selection

[12] Syndicated loans can be tranched into heterogeneous loans, usually distributed across lenders with different risk aversion. See Dennis and Mullineaux (2000), Esty and Megginson (2003), and Maskara (2010) for an in-depth analysis of syndicated loans; and Du *et al.* (2023) for sustainability-linked loans.

Our sample consists of individual loans extracted from Loan Analytics, which provides comprehensive coverage of the global syndicated loan market (Ehlers, 2022), and covers the 2018-2022 period. For all sustainable loans in the database, Loan Analytics assigns three market segment flags corresponding to SLLP for those that comply with the Sustainability Linked Loan Principles, GLP for those that comply with the Green Loan Principles, and SLP for those that comply with the Social Loan Principles.[13] The remaining syndicated loans were classified as conventional loans. Following Carey and Nini's (2007) approach, to reduce the problem of unmeasured credit quality correlated with nationality, pricing and firms' choice determinants are examined based on a sample including only deals closed in OECD countries. To have a more comparable sample and avoid selection bias problems, we selected only conventional loans for which the borrower industry and country have at least one record of sustainable loan issuance. We also require that loan tranches have information available on tranche and transaction size, and concentrate on loans identified as having the purpose of financing new investments or projects. We exclude loans made for project finance transactions as they are extended to newly incorporated special purpose entities. As the longest maturity for sustainable loans is 20 years, we eliminated conventional loans with a maturity of more than 20 years, and excluded all tranches that were cancelled within 30 days post-issuance.

As the unit of observation is a single tranche, multiple tranches from the same deal appear as separate observations in our database. Therefore, we aggregate tranche-level data (e.g., spread, maturity, and rating) to perform a deal-level analysis in section 5. To do this, we required that the primary purpose of each loan is the same for each specific deal, and that the sum of all loans in the package equals the deal amount.

As we wish to analyze how spreads and pricing processes on sustainable loans compare with those of comparable conventional loans, we select from our full sample those issues that have the necessary information to compute the spread. Borrowers' credit rating was also extracted from Loan Analytics. In addition, to take possible

[13] A facility cannot be labeled as green/social if it includes a green/social and non-green/non-social tranche(s); the green/social label applies only to the tranche(s) aligned to the GLP/SLP. We also verified with the Dealscan database that the classification made by Loan Analytics is correct. The loans classified as sustainable are essentially the same in both databases. For the cases where there were discrepancies between the two databases (8 observations in total), we consulted the borrower's website to ascertain the correct typology.

outliers into account, we winsorize the data at the 1% and the 99% levels. Finally, Data on macro variables, such as market volatility and slope of the yield curve, were obtained from Datastream.

These screens yield a sample of 24,962 syndicated loans (16,759 deals) worth €11,555.1 billion, of which 712 tranches (430 deals) worth €527.8 billion are classified as sustainable loans (581 sustainability-linked loans, 119 green loans, and 12 social loans) and 24,250 tranches (16,329 deals) worth €11,027.3 billion as conventional loans. Panel A of Table 1 presents the distribution of loans per year, while Panel B and Panel C present the industrial distribution and the loan allocation to borrowers in a particular country. Panel A shows that while conventional loans showed stability in the amounts closed over the sample period, sustainable loans saw a sharp increase in 2021 and 2022, particularly for sustainability-linked loans. Panel B reveals striking similarities between sustainable and conventional loan issuance: they are concentrated in two regions, with issuers located in the US and Western Europe accounting for 92.7% and 94.9%, respectively. Perhaps the most remarkable difference is how frequently conventional loans, in our sample, are extended to projects in North America. Panel B reveals that sustainable loans are concentrated in three key industries; i.e., real estate (18.7%), utilities (12.6%), and computers and electronics (12.4%) account for 44.1% of all sustainable loan issuance by volume. Conventional loan issuance reveals a far less concentrated industrial pattern, with borrowers in computers and electronics (12.9%), finance and insurance (12.1%), and healthcare (9.2%) industries receiving the higher percentages.

****** Insert Table 1 about here ******

Panel D provides information in relation to identifying the biggest players and their relative importance in syndicated loan markets, while Panel E ranks the top 10 switching firms, those that close both sustainable and conventional loans in the sampling period, by value and number of deals. The top 10 sustainable and conventional borrowers contributed to a significantly different weight, by value of deals: while the top 10 sustainable loan borrowers issue 21.1% of all tranches in our sample, the top 10 conventional loan issuers are responsible for only 4.6% of all loan issuance in OECD. Interestingly, none of the firms that are in the top 10 for sustainable loans are in the ranking for conventional loans. Panel D shows that the top 10 sustainable and conventional loan switchers contribute to a weight of 29.0% and 38.9% of all issuance by volume, respectively. It is interesting to note that only 4 borrowers (Ford Motor, Pfizer, Dell, and Crown Castle International) are in the top 10 for both loan types.

3.2. Dependent and core independent variables

Table 2 provides detailed definitions and sources for all the variables used, as well as the expected impact of explanatory variables on loan spreads.

****** Insert Table 2 about here ******

3.2.1. Spread

The *spread* corresponds to the price for the risk associated with the loan at closing, defined as the tranche all-in pricing above Libor or Euribor. It is the interest rate that the borrower pays to the lender on the amount drawn on the loan, measured as a markup over a benchmark.[14] Loans differ in the currency in which they are denominated, raising the possibility that expectations about exchange rate movements might drive differences in loan spreads across markets. We address this problem by converting contract spreads into dollar-equivalent spreads using, as proposed by Carey and Nini (2007), forward exchange rates as of the loan contract signing date. For syndicated loans, the spread does not represent the full economic cost of credit, as there are, typically, several tranches funding a deal. We test the robustness of our results by aggregating tranches at the deal level and computing the *weighted average spread (WAS)* as the weighted average between the loan spread and its weight in the deal size.

3.2.2. Independent variables

Recent empirical studies indicate that several contractual factors convey information about the pricing of loans and bonds (e.g., Carey and Nini 2007; Chen *et al.* 2007; Qian and Strahan 2007; Bae and Goyal 2009; Christodoulakis and Olupeka, 2010; Maskara 2010; Bharath *et al.* 2011; Lin *et al.* 2011; Lim *et al.* 2014; Alves *et al.* 2021). These include credit rating, deal size, currency risk, loan and interest rate type, and fees.

We begin by addressing the core independent variables. In order to test hypothesis H2, we use an indicator variable that takes the value one for *sustainable* loans, those that comply with SLLP, GLP or SLP, and expect that sustainable loans have lower spreads than comparable traditional syndicated loans. To investigate the term structure of spreads, we include loan *maturity* and the logarithm of maturity (*log maturity*) as

[14] According to Loan Analytics, the tranche all-in pricing 'measures how much a borrower has had to pay out to the banks for the loan at the tranche level […] it also considers the fees as well as the margin.'

explanatory variables. It is widely agreed that borrowers usually demand higher premiums for longer-term securities. Credit ratings are a central determinant of bond and loan spreads. As the information on loan ratings provided by Loan Analytics is not available for several tranches, we include the dummy variable *rated*, equal to 1 if the loan has a credit rating from Fitch, Moody's and/or S&P, and 0 otherwise. For those tranches with at least one credit rating assigned by Fitch, Moody's and/or S&P, we converted credit ratings as follows: AAA=Aaa=1, AA+=Aa1=2, and similarly until D=24. If a tranche has two or three credit ratings, we computed the average. Rating scales are inverse scales, so we expect spreads to increase as the rating decreases. We also use firms' credit ratings to capture the borrowers' likelihood of fully meeting their financial obligations as they are due. As for loan tranches, we use *rated borrower* and *borrower rating* as additional core variables. We expect rated loans/borrowers to face lower spreads, and the higher the rating, the higher the tranche spread.

From the literature on debt pricing and debt choice, we adopt several control variables, as discussed in Section 2 of the online appendix. These variables are expected to influence not only loan spreads but also the choice process between sustainable and conventional syndicated loans.

3.3. Financial characteristics of sustainable versus conventional loans

We describe the sample, by loan typology, in Table 3. This section constitutes the most exhaustive such comparison in the literature. Table 3 also presents Wilcoxon's z-tests and Fisher's exact tests comparing the values of each variable in the sustainable loan subsample with the corresponding values in the conventional loan subsample. Almost all of the pair-wise comparisons indicate statistically significant differences between the common pricing variables associated with the two subsamples.

****** Insert Table 3 about here ******

Regarding the relative pricing of sustainable loans *versus* conventional loans, Table 3 shows that the average spread is economically and statistically higher for conventional loans (280.5 bps) than it is for sustainable loans (198.3 bps). A conventional loan of average size matures in 4.7 years, which is a short period if we compare it with the average of 5.1 for sustainable loans. Average credit ratings for conventional loans (12.6 | BB-) are significantly worse than for sustainable loans (10.9 | BB+). As expected, similar results are obtained when comparing the borrower's credit rating between these two loan categories.

The average transaction size exhibited by conventional loan deals is lower than the average transaction size exhibited by sustainable loan deals. This can be explained by the higher transaction costs involved in the structuring of a sustainable deal *vis-à-vis* conventional deals as borrowers must appoint an external review provider to assess the alignment of their loans or develop the internal expertise to confirm alignment with the sustainable loan principles. A significantly larger number of tranches per transaction is issued in a sustainable loan deal: in a typical conventional loan deal, the average number of tranches per transaction is 1.9, which is smaller than the average of 2.4 for sustainable ones. In addition, the average number of banks participating in sustainable loan issuances is 10.7 and is significantly larger than the average of 6.4 for conventional loan deals. This finding suggests that underwriting banks wish to increase the tranching level and the number of institutions participating in a sustainable loan issuance of a given size in order to spread risks over a larger number of banks. Finally, we find that the level of bank reputation is stronger for sustainable loans *versus* conventional ones.

The dummy variables detailed in Table 3 clearly suggest that sustainable and conventional loans are fundamentally different financial instruments. Sustainable loan tranches are more frequently issued with and by a borrower with a credit rating from Fitch/Moody's/S&P, than conventional loans. Sustainable loans are much more likely to be closed by experienced borrowers (65.0% *versus* 56.1%) and switchers (58.9% *versus* 2.9%) and be subject to currency risk (16.9% *versus* 7.1%) than conventional loans. While about 1.8% of conventional loans are subordinated, these loans are only 0.3% of sustainable loans closed in the sampling period. Additionally, a significantly small fraction of sustainable loans is arranged by a domestic lead bank (85.8%) compared to the sub-sample of conventional loans (90.7%); and sustainable loans verify a higher fraction of tranches provided by a former lender (55.1% *versus* 42.0%). Finally, the two loan categories do not differ significantly in terms of fee information and being classified as term loans.

Our results indicate that the common pricing characteristics differ significantly in value between sustainable and conventional loan tranches. Therefore, we would expect the impact on pricing to be loan specific.

4. The pricing of sustainable *versus* conventional loans

4.1. Determinants of sustainable and conventional loan spreads

To examine the common pricing determinants of individual sustainable and conventional loans, we follow an instrumental variable approach to address maturity and spreads that are jointly determined, as both spread and maturity are determined simultaneously once negotiations for the financial package begin (e.g., Bharath et al., 2011). We confirm that maturity is endogenous by estimating the Durbin-Wu-Hausman chi-squared test. We reject the null hypothesis that maturity is exogenous to spread as we obtain a chi-squared test statistic of 432.12 (*p*-value = 0.000). We use the model described in equation (1).[15] The dependent variable is the *spread*, in basis points. We employ GMM regression techniques and use the tranche size and if the loan is tranched as instruments for maturity. We do so for two reasons. First, the tranche size and if the loan is tranched are correlated with maturity. The 2008 financial crisis and the subsequent European sovereign debt crisis manifested a shortage of liquidity, which was reflected in a maturity reduction for loans. Since during these crises banks lost balance sheet capacity to lend, particularly for longer periods, it is plausible to associate maturity with both tranche size and the number of tranches for syndicated loans. Larger tranches might imply lower maturities since they constitute a larger share in lenders' loan portfolios. Berger et al. (2005), DeMarzo (2005), and Bali and Skinner (2006) point out that the choice of debt maturity is influenced by the level of information asymmetry. Regarding the loan market, Maskara (2010) and Cumming et al. (2020) show that structuring debt into tranches reduces market incompleteness and asymmetric information. Therefore, if the loan is tranched, it could increase loan maturity by reducing the deadweight costs of asymmetric information. Second, the tranche size and if the loan is tranched are not correlated with non-observed determinants of spread, as we control (to the best of our knowledge) for all other variables through which the tranche size and number of tranches per deal impact spreads. In particular, if the loan is tranched affects loan spreads through credit rating and number of tranche variables - in syndicated deals, loans are structured via the creation of different tranches with different risk-return profiles and, therefore, with different spreads. The same goes for the tranche size, which influences the spread via

[15] We use a reduced-form model along the lines of existing pricing models for corporate bonds (e.g., Campbell and Taksler 2003; Chen *et al.* 2007; Marques and Pinto 2020) and loans (Carey and Nini 2007; Qian and Strahan 2007; Daniels and Ramirez 2008; Bae and Goyal 2009; Bharath *et al.* 2011; Lin *et al.* 2011; Lim *et al.* 2014).

transaction size - larger tranches lead to a larger deal size - and the number of banks - the larger the number of banks involved in the banking syndicate, the larger the number of tranches the deal will have so that the total volume of the operation is shared by all the bank lenders. Furthermore, credit rating, number of tranches, transaction size, and number of banks are included as controls in our estimation equation.

Due to time-varying risk premia and as our analysis is conducted by tranches, we estimate standard errors clustered by year and deal, and estimate a regression of the following form:

$$Spread_{i,t} = \alpha_0 + \beta_1 Sustainable_{i,t} + \beta_2 Maturity_{i,t} + \beta_3 \operatorname{Log} maturity + \beta_4 Rated_{i,t} + \beta_5 Tranche\ rating * Rated_{i,t} + \gamma\ Contractual\ controls_{i,t} + \delta\ Syndicate\ structure_{i,t} + \varphi\ Macroeconomic\ Controls_t + \varepsilon_{i,t} \quad (1)$$

where the subscripts refer to loan *i* at time *t*.

A Chow test for a structural break is used to examine whether the spreads associated with sustainable and conventional loans are influenced differently by common pricing characteristics. In essence, we are testing whether the pricing characteristics used in equation (1) are significant in both sustainable and conventional tranches and, if so, whether they have the same coefficient values. We conclude that sustainable and conventional tranches are distinct financial instruments and that they are financial instruments influenced differently by common pricing characteristics because of the Chow test statistic of 44.1 (83.6 if we compare sustainability-linked loans with conventional loans; 35.1 if we compare green loans with conventional loans; and 22.5 if we compare social loans with conventional loans), which is higher than the critical level. Hence, we corroborate H1 and examine, in section 4.2., the determinants of spreads for each loan instrument separately.

We start our analysis by comparing spreads among securities. Results presented in columns 1 and 2 of Table 4, for the samples discussed in section 3.3., suggest that sustainable loan spreads do not differ significantly from those of conventional loans. Considering that in our sample only 44.9% of loans have a credit rating, which is a key pricing factor, in Models [3] and [4] we re-estimate the previous models by including rated loans only, and the coefficient of the *sustainable* variable remains statistically insignificant. In previous models, the *sustainable* dummy may suffer from endogeneity, due to the lack of plausibly exogenous variation in the choice between sustainable and conventional loans. Second, in the full sample, sustainable loans are about 4.6% of the total sample. As suggested by Roberts and Whited (2013) and following a methodology similar to Flammer (2021), we re-estimated model [1] for a matched sample. We proceed as follows. We match each sustainable loan to the most comparable conventional loan by using a PSM approach (loan-level PSM), by creating a 1 to 1 matching algorithm that captures the most identical conventional loan issued by the same firm in the same year, using the following characteristics: rating, loan size, and maturity. After applying this procedure, we end with a sample of 417 sustainable loans and a quasi-identical loan-level matched sample of 417 conventional loans. By design, this matching procedure provides for each sustainable loan a matched conventional loan issued by the same firm that is as similar as possible except for the fact that the sustainable loan is issued to fund an ESG-linked activity.

****** Insert Table 4 about here ******

Results presented in column 5 of Table 4 show, again, that the sustainable loan spread does not differ significantly from that of matched conventional loans[16]. Similar results are obtained in models [6] and [7] when re-estimating model [2] including loans extended to borrowers in capital intensive industries (model [6]) or high carbon industries (model [7]) only.[17] These results are contrary to the arguments of sustainable finance theoretical literature (Fama, 2021; Pedersen et al., 2021; Pástor et al., 2021; Gao and Schmittmann, 2022) and the stakeholders theory (Freeman, 2010). Therefore, thus far and considering the three sustainable loan categories together in the same sample, we do not corroborate H2. We will analyze this further in the next section when using endogenous switching regression models and computing average treatment effects.

We perform a variety of econometric tests to assess the relevance and validity of our instruments. These tests and their results are presented at the bottom of Table 4. We implement GMM regression techniques and use the tranche size and if the loan is tranched as instruments for maturity. To test if our instruments are relevant, we conduct Anderson's LR test of the null hypothesis that correlations between instruments and the endogenous variable are essentially zero. We reject the null hypothesis for all the models presented in Table 4, implying that the instruments are strongly correlated with maturity. We also

[16] We also constructed an alternative PSM matching based on a wider vector of variables, namely rating, loan size, maturity, number of tranches and number of banks. Untabulated results remain mostly unchanged, but the sample is considerably smaller.
[17] Similar results were obtained for a subsample of loans closed by switchers. Results are available from the authors upon request.

estimate Hansen's *J*-statistic for overidentification restrictions. The reported statistics indicate that the overidentifying restrictions are not rejected, which provides support to the exogeneity of the tranche size and if the loan is tranched. We can thus conclude that our instruments are relevant and valid.

As presented in Table 1, the sample of sustainable loans is divided into 581 sustainability-linked loans, 119 green loans, and 12 social loans with available information on tranche/transaction size and spread. Table 5 presents the results of re-estimating models in Table 4 in which the sustainable dummy is replaced by three dummy variables one for each sustainable loan category. Analysis of the table shows that for all the samples used, sustainable-linked loans do not have lower spreads than conventional loans. Concerning green loans, results seem to corroborate Kim *et al.'s* (2023) findings for the full sample (models [1a] and [2b]), since the coefficient of the green loan variable is negative and statistically significant. However, when we run these models for the subsamples of rated loans (models [3a] and [4a]) and, above all, for the matched sample (model [5a]), the coefficient loses statistical significance. For social loans, the results must be analyzed with great caution, as the sample is very small. The results also seem to show, focusing on the matched sample (model [5a]), that there is no difference in spreads between social loans and conventional loans. Similar results are obtained for subsamples of loans closed by borrowers in capital intensive and high carbon industries (models [6a] and [7a]).

4.2. Loan pricing and borrowing choice

Results in Table 3 show that sustainable and conventional loans have significantly different characteristics Therefore, the selection might be important in this context. Additionally, in our sample borrowers can choose between sustainable and conventional loan deals: borrowers that use both deals to fund their investment projects are responsible for 714 deals and about 60% of sustainable tranches are closed by such firms. Finally, Kim *et al.* (2023) provide evidence suggesting that borrowers and lenders facing greater stakeholder demand self-select ESG loan contracts.

As the choice may be endogenous to spreads, we use an endogenous switching regression model (Lokshin and Sajaia, 2004) to study the pricing, taking into consideration the potential self-selection by firms between closing a sustainable loan *versus* a conventional loan. We perform a full information maximum likelihood (FIML) method on the credit spread samples of our model specifications - models [1] and [2] of Table 4 - simultaneously with a probit selection equation, where the choice between sustainable and conventional loans is a function of core, contractual, syndicate structure, and macro factors.[18] The empirical model consists of the following three equations:

$$Spread\ sustainable\ loan_{i,t} = \alpha_0 + \beta\ Core\ variables_{i,t} + \gamma\ Contractual\ controls_{i,t} + \delta\ Syndicate\ structure_{i,t} + \varphi\ Macroeconomic\ Controls_t + \varepsilon_{i,t} \quad (2)$$

$$Spread\ conventional\ loan_{i,t} = \alpha_0 + \beta\ Core\ variables_{i,t} + \gamma\ Contractual\ controls_{i,t} + \delta\ Syndicate\ structure_{i,t} + \varphi\ Macroeconomic\ Controls_t + \varepsilon_{i,t} \quad (3)$$

$$I^*_{i,t} = \delta_0(Spread\ sustainable\ loan_{i,t} - Spread\ conventional\ loan_{i,t}) + \beta\ Core\ variables_{i,t} + \gamma\ Contractual\ controls_{i,t} + \delta\ Syndicate\ structure_{i,t} + \varphi\ Macroeconomic\ Controls_t + u_{i,t} \quad (4)$$

where the third equation models loan selection: if $I^*_i > 0$, then firm *i* issues a sustainable loan; otherwise, it issues a conventional one. We adjust for heteroscedasticity and due to time-varying risk premia and cross-country differences, we estimate standard errors clustered by year and country. Considering the Wald test statistics of independent equations presented in Table 6, we accept the hypothesis of equations being independent, meaning that the firms' choice between sustainable and conventional loans does not affect the pricing of such securities.

****** Insert Table 6 about here ******

To examine further if characteristically similar loan tranches, which differ by deal type, have different spreads, we computed the average treatment effect (ATE) for spreads of sustainable *versus* conventional loans. We used models [1] and [2] of Table 4 and obtained the correct standard errors (as we account for the errors in the selection equation) for the ATE through bootstrapping. This involves resampling the data in memory with replacement, conducting 1,000 iterations. We show, again, that sustainable loan spreads do not differ significantly from those of conventional loans.

Overall, our results do not corroborate H2: banks do not seem to be offering sustainable syndicated loans as a way of mitigating moral hazard and adverse selection costs with respect to borrowers' ESG activities; and banks are still not incorporating into loan pricing the potential benefits of implementing ESG-linked projects for borrowers' credit risk. Our findings contrast with those of Kim et al. (2023), who provide evidence of a greenium

[18] We implement the FIML method to simultaneously estimate the binary and continuous parts of the model, ensuring consistent standard errors. For further details, see Lokshin and Sajaia (2004). This methodology has been used in other studies to mitigate potential self-selection problems (Marques and Pinto, 2020; Pinto and Santos, 2020).

effect, and Pohl et al. (2023), who report that sustainability-linked loans have lower spreads compared to conventional loans. However, our results align with Tang and Zhang (2020) and Flammer (2021), who find no significant difference in the yields of green versus brown bonds, as well as with Du et al. (2023) and Kim et al. (2023), who observe similar spreads for sustainability-linked loans.

Our results can be explained by two major factors. First, uncertainty and asymmetric information complicate pricing. Information on loan contracts, particularly for tranches with detailed information on the spread, is still very limited. Second, market pricing is also hampered by lack of consistent methodologies (e.g., opaque and unstructured methodologies make it hard for investors to extract information from ESG ratings), standardized metrics, and comparable disclosures (Eren *et al*. 2022). Given the recent introduction of sustainability-linked, green, and social loan financing, market players may be experimenting with identifying the most efficient contractual provisions and identifying the best way to compute the expected loss of a given sustainable loan.

With the increase in the volume of information on the market and with lenders becoming more sophisticated over time, increases in a borrower's sustainability performance may lead to a greenium in the syndicated loan market.

4.3. The pricing of sustainable vis-à-vis conventional loans

In Table 6, we find that borrowers' choice between sustainable and conventional loans does not affect the pricing process. In addition, we find that these two loan instruments are influenced differently by common pricing factors. Therefore, to study the pricing of sustainable loans, we use equation (1) and estimate separate models for sustainable and conventional loans, using the samples presented in Table 3 – models [10] and [11] for conventional loans; models [12] and [13] for sustainable loans. Table 7 presents pricing regression results for a sample of 712 sustainable loan tranches and 24,250 conventional loan tranches.

****** Insert Table 7 about here ******

Contrary to what we expected, there is an insignificant relationship between spread and maturity for sustainable loans in models [12] and [13]. Contrary to what is presented by extant literature on the term structure of spreads in syndicated loans, which finds a positive relationship between spreads and maturity, we find a convex relationship, a "smile" effect, between spread and maturity for conventional loans. This result is in line with

Alves *et al.'s* (2021) findings for a sample of syndicated loans for LBOs. Regarding the impact of credit risk on spread, Table 7 shows that rated loans have higher spreads, and the higher the credit risk, the higher the spread for both sustainable and conventional loans. However, while the borrower's credit rating influences positively and significantly the loan spread for conventional loans, it does not affect significantly the spread of sustainable loans.

The influence of *transaction size* on spread is negative and significant for conventional loans, suggesting that increasing the transaction size of a conventional deal by €100 million will reduce the required spread by 36.6 bps in model [10]. Therefore, our results indicate a positive price liquidity effect related to the size of the conventional loan deal. On the contrary, the deal size does not affect sustainable loans' pricing. As expected, subordinated tranches have higher spreads, after adjusting for the other factors included in the regression. Contrary to what we expected, experienced borrowers face higher spreads for both samples. The *number of tranches* affects sustainable *versus* conventional loans differently: while there are tranching benefits for conventional loans, we find an insignificant negative relationship with spreads for sustainable loans. Additionally, the influence of *currency risk, switcher, fee information,* and *term loan* variables is insignificant for both syndicated loan categories.

Regarding variables that reflect the syndicate structure, we find that bank relationships do not affect loan spreads in all models of Table 7. As expected, the spread and the *number of banks* are negatively and significantly related to sustainable loans. A larger number of banks involved may lower the spread because this may be associated with an increase in the certification of the transaction and thus mean that a higher number of banks will share default risk. However, this variable does not affect spreads for conventional loans. We find that if the syndicated deal is arranged by a domestic *versus* a foreign bank, it affects loan pricing for conventional loans only. Contrary to what we expected, *bank reputation* has a significant and positive impact on spreads for both sustainable and conventional loans. This result can be explained by the fact that most reputable banks might extract rent from the borrower and charge higher borrowing costs, as they provide a better guarantee for the success of the deal and a greater capacity to hold those loans on balance sheet.

The *country risk* behaves differently for sustainable loans than conventional loans. While the higher a country's credit risk, the higher the spreads paid by borrowers located in that country, there is an insignificant relationship between these two variables for sustainable loans. Surprisingly, the environmental policy stringency index (EPS) does not affect loan spreads for sustainable securities (nor for conventional ones).[19] Similarly, the yield curve slope does not affect syndicated loan spreads. As expected, the impact of market volatility is positive and significant for both sustainable and conventional loans.

Results in models [12] and [13] show that variables capturing law and institutional characteristics do not affect the pricing of sustainable loans. Concerning conventional loans, only two variables affect spreads: (*i*) conventional loans extended to borrowers in market-based financial systems have higher spreads, holding other factors constant, than those extended to borrowers in bank-oriented countries; and (*ii*) the impact of the index of anti-director rights, which proxy for equity investor protection, is negative and significant. Therefore, our results are inconsistent with the emphasis on the importance of institutional and legal factors in determining sustainable loan spreads.

Overall, our results are in line with H1 by showing that sustainable and conventional loan tranches are priced differently by common pricing factors.

5. Loan issuance and firms' cost of borrowing: a deal-level analysis

In this section, we focus on the firms' cost of borrowing and the choice between sustainable and conventional syndicated deals. Our goal is to examine if firms use sustainable deals to reduce their cost of borrowing (H3). In addition, we examine which borrowing firms' contractual and macro factors affect the choice process between sustainable and conventional debt. Our sample comprises deals that are divided into smaller loan tranches. Therefore, in this section, our descriptive and econometric analyses are based on the deals.

5.1. Deal characteristics

As we have more than one loan tranche per deal, the cost of borrowing is determined by the combination of the different tranches' spreads. We use the weighted average spread (WAS), calculated as the sum of the product of the weight of each tranche in the transaction size and the tranche's credit spread, as a measure of the total cost of borrowing. Similar processes were implemented to compute other deal level variables, like the weighted average

[19] Similar results were obtained when we replace this variable per the country ESG rating, proxied by Vigeo's country ESG rating at closing, or by environmental performance index ranks – EPI ranking.

maturity (WAM) and the weighted average rating (WAR). After aggregating loan tranches on a deal level, we identified 397 and 16,235 sustainable and conventional deals, respectively. Table 1 in the online appendix presents the characteristics of the sample of deals used. We find that the average WAS for sustainable deals is lower than that of conventional deals. As in our tranche-level analysis, we show that sustainable and conventional deal characteristics differ significantly, as we reject the null hypothesis of variables in Table 8 being similarly distributed.

5.2. Firms' cost of borrowing: sustainable versus conventional deals

We examine which one of the two financing transactions has the lowest borrowing cost by using equation (1). The dependent variable is now the WAS, and all independent variables are specified at the deal-level. Models [14] and [15] in Table 8 report estimates of this equation. The results suggest that, holding other factors constant, the WAS does not differ significantly between sustainable syndicated deals *vis-à-vis* conventional syndicated deals. Similar results are obtained when we re-estimate these models for a subsample of deals with information on credit rating – models [16] and [17] –; for a (deal-level) matched sample – model [18] –; and for subsamples of deals closed by firms in capital intensive industries – model [19] – or in high carbon industries – model [20]. We do not corroborate H3, as firms do not appear to use sustainable syndicated deals to reduce their borrowing costs. Thus, we do not find evidence supporting the cost of capital motivation presented by Fama (2021), Pedersen et al. (2021), Pástor et al. (2021), and Gao and Schmittmann (2022), nor the security design literature's argument that tranching can mitigate asymmetric information problems in loan contracting (DeMarzo 2005; Sannikov 2013).

****** Insert Table 8 about here ******

5.3. What factors affect firms' choice between sustainable and conventional deals?

As mentioned in section 2.1, sustainable deals are more restrictive and entail more transaction costs *vis-à-vis* conventional deals. These costs are related to the required assessment of the alignment of loans or the development of internal expertise to confirm alignment with sustainable loan principles. Therefore, sustainable deals' cost of borrowing should be higher than the one measured via the WAS, as the spread of a sustainable loan tranche does not include any other fees in addition to those found in a conventional transaction (Loumioti and Serafeim, 2023; Kim *et al.*, 2023). Considering that sustainable syndicated funding is equally as or more expensive than conventional syndicated funding, other contractual, macroeconomic, and firm-level countervailing benefits than borrowing costs should play a key role in the firms' choice process. We examine the factors affecting the choice process by using a logistic regression model. Our dependent variable, choice of debt, is a binary variable equal to 1 if the firm closes a sustainable deal and 0 if it closes a conventional deal.

$$Choice\ of\ debt_{i,t} = \alpha_0 + \beta\ Core\ variables_{i,t} + \gamma\ Contractual\ controls_{i,t} + \delta\ Syndicate\ structure_{i,t} + \varphi\ Macroeconomic\ Controls_t + \varepsilon_{i,t}$$

where the subscripts refer to deal *i* at time *t*. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by year and deal. Furthermore, in Table 9, we report coefficients, rather than odds ratios (exponential coefficients) because our main interest is in the direction of the effects, instead of their magnitude.

****** Insert Table 9 about here ******

Table 9 reports the results of the logistic regression (5). Estimations were developed following the stepwise approach used in section 4.1. Table 9 shows that WAM increases the probability of a firm choosing a sustainable deal, which is consistent with the prediction that by reducing the level of asymmetric information between lenders and borrowers, sustainable debt financing enables borrowers to raise funding with longer maturities (Flannery 1986; Diamond 1991). By fulfilling sustainable loan principles, borrowers mitigate adverse selection problems with respect to their ESG activities. This is also corroborated by a significant and positive relationship between variables *switcher* and *former lender* and the probability of observing a sustainable debt deal.

We find that sponsoring firms choose sustainable deals over conventional ones when issuing large amounts of debt due to issuance costs; i.e., sustainable loan financing is used for relatively large amounts of debt to economize on scale. Considering that compared to conventional syndicated loan financing, sustainable loans entail more transaction costs namely for first-time borrowers, firms choose sustainable deals for relatively large amounts of debt to capture expected economies of scale associated with borrowing contracting.

Findings also suggest that sustainable deals are extended to firms with better creditworthiness. Our results are in line with those of Kim et al. (2023), who find that sustainability-linked loans are larger than non-ESG loans and are typically issued to safer borrowers. Finally, the benefits of tranching are better than conventional deals.

Concerning variables that proxy for syndicate structure, we show that repeated borrowing from the same lender affects the choice between sustainable and conventional debt deals, increasing the probability of observing the former. This result is in line Kim *et al.'s* (2023) findings. Authors show that sustainability-linked loans are also more likely to be syndicated by relationship banks. However, this can raise greenwashing concerns, as it may imply that banks and borrowers with pre-existing relationships can conveniently relabel revolving credit lines as sustainable, namely for sustainability-linked loans, as these general purpose loans do not need to be tied to specific green or social projects.

Smaller and more concentrated syndicates decrease the probability of observing a sustainable deal, which can be explained by the fact that these deals are larger, requiring a higher number of participating banks to share the risks. Both foreign bank participation and bank reputation do not affect the borrowers' choice between sustainable and conventional deals.

The higher a country's environmental policy stringency, the higher the probability of a firm located in such a country to choose a sustainable deal over a conventional deal. Institutional factors also affect firms' choice: while the *anti-director rights* variable significantly and positively affects the sponsors' choice of sustainable over conventional deals, the impact of the enforcement level is significant and negative. This can be explained by the fact that there is currently limited enforcement of the law supervising the integrity of sustainable loans. Finally, the yield curve slope also affects significantly and positively the likelihood of observing a sustainable syndicated deal.

6. Robustness checks

We perform several additional robustness checks. First, since deal features may vary across countries depending on local lending markets, we re-estimate our models in Tables 4, 5, and 6 by double-clustering standard errors at the country-year level. Second, we re-estimated the models in Table 4 by including country fixed effects. Third, we re-estimated our models [2], [5], [2a], and [5a] for a sub-sample of loans extended to US borrowers only, to ensure that differences in spread determinants are not driven by unobservable time-varying characteristics of the countries in the sample. Fourth, as differences in covenants between conventional and sustainable deals might impact WAS and pricing, we re-estimated models [14] to [20] in Table 8 by adding covenant intensity, defined as the number of covenants per deal divided by the maximum number of covenants in a single deal in our sample, as an additional control.[20] In addition, we examine whether results presented in Table 9 are robust by considering firm fixed effects to address possible time invariant firm-level issues. We also re-estimate our models by using year times industry and country times industry fixed effects. Overall, our results remain qualitatively the same.

Sustainability-linked loan spreads are subject to adjustment based on borrowers' ESG performance during the life of the loan. Therefore, a straightforward comparison of loan spreads at closing does not capture the effective cost of borrowing. As a final robustness check, we manually gather data on sustainability rate adjustments from the Loan Analytics database. Our findings suggest that potential discounts for ESG performance do not appear to provide sufficient economic incentives as an average borrower could expect a maximum reduction of only six basis points on their all-in pricing. Tables containing these robustness tests are included in the online appendix.

7. Conclusion

This paper provides a comprehensive analysis of sustainable loan pricing, which has grown exponentially within the past five years. We compare spreads and the pricing of sustainable loans to that of conventional loans, using a cross-section of syndicated loans closed by borrowers in OECD countries during the 2018-2022 period. We also examine if comparable sustainable and conventional loans have significantly different spreads. At the deal level, we study whether sponsoring firms use sustainable deals to reduce borrowing costs and what the determinants of firms' syndicated deal choices are.

Our findings reveal that sustainable and conventional loans are influenced differently by common pricing characteristics. Sustainable loan spreads are primarily affected by (*i*) credit rating, loan subordination, and the borrower's history with syndicated loans, at the contractual level; (*ii*) the number of participating banks and the lead bank's reputation, at the syndicate structure level; and (*iii*) market volatility, at the macroeconomic level. In contrast, several contractual characteristics that influence conventional loan spreads - such as maturity, borrower's rating, transaction size, number of tranches, country risk, lead bank's domestic status, market-based financial system affiliation, and anti-director rights index - do not impact sustainable loan spreads. These findings are important for banks as they are calibrating their pricing models for a recent and increasingly significant product category.

[20] The deals with information on covenants represent only 5.6% of the total sample.

We find no significant difference in the spreads of sustainable loan tranches compared to similar conventional loans, a result that holds across subsamples of sustainability-linked loans, green loans, and social loans. Moreover, our deal-level analysis indicates that borrowers do not leverage sustainable loans to manage borrowing costs; the weighted average spread of sustainable loan deals does not differ significantly from that of comparable conventional deals. This is a pertinent issue for governments and policymakers, as the higher transaction costs associated with sustainable loans - without corresponding spread reductions - could deter companies from adopting such financing options, which is critical during the transition to a sustainable economy.

Given that firms choose sustainable financing to address adverse selection issues related to their ESG activities, capture expected economies of scale in borrowing, and appeal to higher creditworthy firms, our study holds significant implications for policymakers. As sustainable financing plays a vital role in fostering public and private investment and driving economic growth, a deeper understanding of sustainable syndicated loan instruments can enable more precise and effective regulatory interventions.

The main limitation of this study lies in the quality of the available data. Inadequate historical data, inconsistent methodologies - such as the significant ESG rating divergence documented by Berg et al. (2022) - and a lack of standardized metrics and comparable disclosures (Eren et al., 2022) increase uncertainty and asymmetric information, complicating loan pricing. Sustainable syndicated loans are a relatively recent financial instrument, and data on critical pricing factors such as spreads and tranche ratings are sparse. Future research could benefit from analyzing these instruments with a larger dataset, particularly for green and social loans.

Initial efforts to integrate ESG considerations into corporate strategies began with the 2015 Paris Agreement. While the Green Loan Principles, Social Loan Principles, and Sustainability Loan Principles have been established to provide best practice guidelines for the green, social, and sustainability loan markets, risks of “greenwashing”, “social washing”, and “sustainability washing” remain. Recent regulatory developments, such as the EU's Taxonomy Regulation (Regulation (EU) 2020/852) and the Securities and Exchange Commission’s (SEC) efforts to standardize ESG product labeling and disclosures, may help mitigate asymmetric information costs and improve security design. These issues are also suggested areas for future research.

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Table 1: Distribution of the sample by year, region and industry, and top borrowers and switchers

Panel A: Distribution of syndicated loans by year

	Sustainability-linked loans			Green loans			Social loans			Conventional loans		
Year	Number of loans	Number of deals	Total Value ($ million)	Number of loans	Number of deals	Total Value ($ million)	Number of loans	Number of deals	Total Value ($ million)	Number of loans	Number of deals	Total Value ($ million)
2018	4	4	3,399	6	4	872	0	0	0	5,925	3,905	2,494,770
2019	22	15	14,741	12	7	838	3	1	98	5,163	3,319	2,117,250
2020	54	27	33,684	20	11	3,755	0	0	0	3,794	2,623	1,596,492
2021	258	164	247,264	22	13	3,217	0	0	0	5,243	3,609	2,645,481
2022	243	147	201,587	59	32	17,192	9	5	1,137	4,125	2,873	2,173,317
Total	**581**	**357**	**500,676**	**119**	**67**	**25,874**	**12**	**6**	**1,236**	**24,250**	**16,329**	**11,027,309**

Panel B: Geographic distribution of syndicated loans

	Sustainable loans				Conventional loans			
Geographic region of borrower	Number of loans	Number of deals	Total Value ($ million)	% of Total Value	Number of loans	Number of deals	Total Value ($ million)	% of Total Value
Asia	100	57	17,780	3.37%	809	332	64,463	0.58%
Australia	12	3	2,675	0.51%	356	151	86,619	0.79%
Europe	271	133	120,354	22.80%	2,306	1,293	844,971	7.66%
Eastern Europe	1	1	1,251	0.24%	7	4	2,717	0.02%
Western Europe	270	132	119,103	22.57%	2,299	1,289	842,254	7.64%
Spain	111	47	21,794	4.13%	329	168	68,657	0.62%
United Kingdom	28	15	19,923	3.77%	466	271	215,937	1.96%
North America	326	234	386,427	73.22%	20,760	14,536	10,023,177	90.89%
United States of America	310	222	370,350	70.17%	19,758	13,865	9,619,997	87.24%
South America	3	3	549	0.10%	19	17	8,080	0.07%
Total	**712**	**430**	**527,785**	**100.00%**	**24,250**	**16,329**	**11,027,309**	**100.00%**

Panel C: Distribution of syndicated loans by industrial category of borrower

All loans	Sustainable loans				Conventional loans			
Industrial Category of Borrower	Number of loans	Number of deals	Total Value ($ million)	% of Total Value	Number of loans	Number of deals	Total Value ($ million)	% of Total Value
Commercial and Industrial	513	303	393,671	74.59%	19,762	13,055	8,512,771	77.20%
Agriculture, Forestry and Fishing	17	9	10,032	1.90%	419	250	123,072	1.12%
Communications	17	8	16,224	3.07%	633	385	507,247	4.60%
Construction/Heavy Engineering	39	21	14,466	2.74%	1,221	796	409,255	3.71%
Manufacturing	160	97	164,815	31.23%	7,541	4,947	3,476,086	31.52%
Auto/Truck	24	14	44,745	8.48%	661	423	297,911	2.70%
Chemicals, Plastic and Rubber	27	15	14,510	2.75%	810	535	430,511	3.90%
Computers and Eletronics	35	26	65,513	12.41%	2,846	1,854	1,418,744	12.87%
Food and Beverages	25	16	14,123	2.68%	958	620	399,078	3.62%
Mining and Natural Resources	3	3	6,379	1.21%	125	87	69,799	0.63%
Oil and Gas	17	13	27,460	5.20%	1,244	1,033	771,769	7.00%
Real Estate	184	108	98,591	18.68%	2,972	2,077	811,138	7.36%
Retail Trade	18	14	13,531	2.56%	704	505	382,374	3.47%
Services	58	30	42,173	7.99%	4,903	2,975	1,962,032	17.79%
Healthcare	28	16	30,428	5.77%	1,923	1,191	1,015,954	9.21%
Professional Services	23	12	10,286	1.95%	1,648	1,010	476,695	4.32%
Finance and Insurance	74	49	47,416	8.98%	2,161	1,624	1,331,423	12.07%
Utilities	76	53	66,324	12.57%	1,285	953	706,777	6.41%
Transportation	23	15	12,680	2.40%	829	564	318,030	2.88%
Multiple	26	10	7,694	1.46%	213	133	158,308	1.44%
Total	**712**	**430**	**527,785**	**100.00%**	**24,250**	**16,329**	**11,027,309**	**100.00%**

Panel D: Top 10 borrowers

Sustainable loans	By value of deals	By number of deals	Conventional loans	By value of deals	By number of deals
Ford Motor	6.28%	0.98%	UnitedHealth Group	0.65%	0.07%
Pfizer	2.78%	0.28%	AT&T	0.62%	0.04%
Dell	2.19%	0.28%	Depository Trust Corp.	0.58%	0.02%
American Electric Power	1.88%	0.56%	Johnson & Johnson	0.47%	0.02%
Alphabet	1.76%	0.28%	Boeing	0.45%	0.05%
Prologis LP	1.66%	0.98%	Walmart	0.42%	0.05%
CHPE LLC	1.21%	0.28%	Duke Energy	0.39%	0.03%
Welltower	1.15%	0.84%	American Tower	0.36%	0.07%
Crown Castle International	1.11%	0.28%	Exxon Mobil	0.35%	0.02%
Equinor ASA	1.06%	0.14%	Chicago Mercantile Exchange	0.32%	0.02%

Panel E: Top 10 Switchers

Sustainable loans	By value of deals	By number of deals	Conventional loans	By value of deals	By number of deals
Ford Motor	9.13%	1.67%	Ford Motor	6.68%	3.03%
Pfizer	4.05%	0.48%	Dell	4.43%	0.83%
Dell	3.18%	0.48%	Crown Castle International	4.40%	0.83%
American Electric Power	2.73%	0.95%	Deere & Co	4.23%	1.10%
Prologis LP	2.42%	1.67%	Ares Capital	3.73%	1.66%
Welltower	1.67%	1.43%	BlackRock	3.62%	1.10%
Crown Castle International	1.61%	0.48%	Pfizer	3.41%	0.41%
Hyundai Capital America	1.54%	0.48%	Occidental Petroleum	3.22%	0.55%
Intel	1.41%	0.24%	Southern California Edison	3.12%	1.10%
Hewlett Packard Enterprise	1.30%	0.24%	Carlyle Group	2.02%	1.38%

Panel A describes the distribution of sustainable and conventional syndicated loans by year, Panel B details the loan allocation to borrowers in a particular country, whereas Panel C presents the industrial distribution of loans. Panel D and Panel E rank the top 10 borrowers and switchers, respectively, by value and number of deals. Data are for syndicated loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Sustainability-linked loans are those that comply with the Sustainability-Linked Loan Principles, green loans with the Green Loan Principles, and social loans with the Social Loan Principles.

Table 2: Definition of variables, sources, and the expected impact on spread

Variable	Description	Source	Expected impact on spread
Dependent variables:			
Spread	Spread of the loan tranche (in bps) including margin and fees - thanche all-in pricing.	Loan Analytics	
WAS	The Weighted Average Spread (WAS) is the weighted average between the loan spread and its weight in the deal size.	Authors'	
Choice of debt	Dummy equal to 1 if a borrower closes a sustainable loan deal and 0 if it, instead, closes a conventional loan deal.	Authors'	
Independent variables:			
Core variables			
Sustainable	Dummy equal to 1 if the loan is ESG-linked, and 0 otherwise.	Loan Analytics	-
Maturity	Maturity of loan, in years.	Loan Analytics	+
Rated	Dummy equal to 1 if the loan tranche has a credit rating from Fitch, Moody's and/or S&P, and 0 otherwise.	Loan Analytics	-
Tranche rating	The Fitch, S&P and/or Moody's tranche rating at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=24. If a tranche has more than one credit rating, the average is computed.	Loan Analytics	+
Rated borrower	Dummy equal to 1 if the borrower has a credit rating from Fitch, Moody's and/or S&P, and 0 otherwise.	Loan Analytics	-
Borrower rating	The Fitch, S&P and/or Moody's tranche rating at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=24. If a tranche has more than one credit rating, the average is computed.	Loan Analytics	+
Contractual controls			
Transaction size	Loan deal size measured in $ million.	Loan Analytics	-
Number of tranches	Number of loans per deal.	Loan Analytics	-
Currency risk	Dummy equal to 1 for loans that are denominated in a currency different from the currency in the borrower's home country.	Loan Analytics	+
Experienced	Dummy equal to 1 for borrowers who have closed a syndicated loan (sustainable or conventional) previously.	Authors'	-
Switcher	Dummy equal to 1 for borrowers that have closed simultaneously a sustainable and a convenional loan in the sampling period.	Authors'	-
Subordinated	Dummy equal to 1 for tranches that are subordinated - classified by Dealscan as 'Junior Subordinated', 'Mezzanine', 'Senior Subordinated', 'Subordinated'-, and 0 otherwise.	Loan Analytics	+
Fee information	Dummy equal to 1 for tranches with information on fees (e.g., upfront fee, commitment fee, facility fee, cancellation fee), and 0 otherwise.	Loan Analytics	+
Term loan	Dummy equal to 1 if the loan is a term loan and 0 if the loan is a credit line.	Loan Analytics	+
Syndicate structure			
Former lender	Dummy equal to 1 if the borrowing firm already has an established relationship with a lead bank during our sampling period, and 0 otherwise.	Authors'	-
Number of banks	The number of lenders participating in the deal.	Loan Analytics	-
Domestic lead bank	Dummy equal to 1 if the bank's syndicate lead bank's (or at least one of the lead banks) nationality is the same as the deal country, and 0 otherwise.	Authors'	?
Bank reputation	Global syndicated loans mandated arrangers' rank according to Refinitiv League Tables for 2022. Ranks range from 1 (best) to 25 (worst).	Refinitiv Deals Intelligence	-

(Continued)

(continued)

Variable	Description	Source	Expected impact on spread
Macroeconomic controls			
Country risk	S&P's country credit rating at closing. The rating is converted as follows: AAA=1, AA+=2, and so on until D=22.	S&P Global Ratings	+
Country ESG rating	Vigeo's country ESG rating at closing. Ratings range from 0 to 100, with 100 being the highest score for Corporate Social Responsibility (CSR).	CSR Hub	-
EPS	Environmental policy stringency measure per country. A higher value represents a more stringent policy.	OECD	-
EPI Ranking	Environmental Performance Index (EPI) ranks countries on climate change performance, environmental health, and ecosystem vitality.	YaleCELP & CIESIN	-
High Carbon	Dummy equal to 1 for borrowers that belong to a high carbon industry, and 0 otherwise.	Ehlers et al. (2022)	+
Capital Intensive	Dummy equal to 1 for borrowers that belong to a capital intensive industry, and 0 otherwise.	Alves et al. (2021)	-
Market-based	Dummy equal to 1 if the loan is extended to a borrower located in a country with a market-based financial system, and 0 otherwise.	Demirgüc-Kunt and Maksimovic (2002)	+
Creditor rights	Measured using La Porta et al. (1998) indices, revised by Djankov et al. (2007). We use four creditor rights variables (no automatic stay on assets; secured creditors first paid; restrictions for going into reorganization; management does not stay in reorganization) and added up the scores to create an index as in Esty and Megginson (2003).	LLSV (1998); Djankov et al. (2007)	-
Enforcement	Measured using La Porta et al.'s (1998) indices. We use five enforcement variables (efficiency of judicial system; rule of law; corruption; risk of expropriation; risk of contract repudiation) and added up the scores to create an index.	LLSV (1998)	-
Anti director rights	Measured using La Porta et al. (1998) indices, revised by Spamann (2010). Formed by adding one when (*i*) the country allows shareholders to mail their proxy votes; (*ii*) shareholders are not required to deposit their shares prior to the general shareholders' meeting; (*iii*) cumulative voting or proportional representation of minorities on the board of directors is allowed; (*iv*) an oppressed minorities mechanism is in place; (*v*) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10% of the sample median; or (*vi*) shareholders have preemptive rights that can only be waived by a shareholder meeting. The range for the index is from zero to six.	LLSV (1998); Spamann (2010)	+
Volatility	The Chicago Board Options Exchange Volatility Index (VIX). VIX reflects a market estimate of future volatility.	Datastream	+
5yTB-3mTB	The yield curve slope. Obtained as the difference between the U.S. five-year Treasury Bond rate and the U.S. 3-month Treasury Bill rate.	Datastream	-

The following characters mean: – = negative impact on spread \| + = positive impact on spread \| ? = sign cannot be clearly determined based on extant literature.

Table 3: Univariate statistics - pricing features associated with loans compared

Variable of interest		All loans	Conventional	Sustainable
Continuous variables				
Spread (bps)	Mean	278.13	280.47	198.33 ***
	Median	250.00	250.00	150.00
	Number	24,962	24,250	712
Maturity (years)	Mean	4.73	4.72	5.09 ***
	Median	5.00	5.00	5.00
	Number	24,962	24,250	712
Tranche rating [1-24 weak]	Mean	12.52	12.58	10.92 ***
	Median	14.00	14.00	11.00
	Number	11,198	10,814	384
Borrower rating [1-24 weak]	Mean	12.56	12.62	10.75 ***
	Median	13.00	13.00	10.00
	Number	10,343	9,986	357
Transaction size ($ Million)	Mean	739.25	725.30	1,214.21 ***
	Median	341.76	329.18	751.80
	Number	24,962	24,250	712
Number of tranches	Mean	1.96	1.94	2.40 ***
	Median	2.00	2.00	2.00
	Number	24,962	24,250	712
Number of banks	Mean	6.53	6.41	10.74 ***
	Median	5.00	5.00	9.00
	Number	24,962	24,250	712
Bank Reputation [1-25 weak]	Mean	8.26	8.27	7.79 *
	Median	3.00	3.00	3.00
	Number	24,962	24,250	712
Dummy variables				
Rated	% of d=1	44.86%	44.59%	53.93% ***
	Median	0	0	1
	Number	24,962	24,250	712
Rated borrower	% of d=1	41.43%	41.18%	50.14% ***
	Median	0	0	1
	Number	24,962	24,250	712
Currency risk	% of d=1	7.35%	7.07%	16.85% ***
	Median	0	0	0
	Number	24,962	24,250	712
Experienced	% of d=1	56.33%	56.07%	65.03% ***
	Median	1	1	1
	Number	24,962	24,250	712
Switcher	% of d=1	4.54%	2.95%	58.85% ***
	Median	0	0	1
	Number	24,962	24,250	712
Subordinated	% of d=1	1.73%	1.78%	0.28% ***
	Median	0	0	0
	Number	24,962	24,250	712
Fee information	% of d=1	24.94%	24.92%	25.56%
	Median	0	0	0
	Number	24,962	24,250	712
Term loan	% of d=1	48.25%	48.20%	50.14%
	Median	0	0	1
	Number	24,962	24,250	712
Former lender	% of d=1	42.37%	42.00%	55.06% ***
	Median	0	0	1
	Number	24,962	24,250	712
Domestic lead bank	% of d=1	90.60%	90.74%	85.81% ***
	Median	1	1	1
	Number	24,962	24,250	712

This table reports summary statistics for a sample of syndicated loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Sustainable loans include sustainability-linked loans, green loans, and social loans. Information on the characteristics of loan issuances and borrowing firms was obtained from Loan Analytics. We test for similar distributions for sustainable *versus* conventional loans using Wilcoxon's rank-sum test for continuous variables and Fisher's exact test for discrete ones. ***, **, and * indicate significant difference at the 1%, 5%, and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 4: The pricing of syndicated loans

Dependent variable: Spread	**[1] All loans**	**[2] All loans with borrowers' rating**	**[3] Rated loans**	**[4] Rated loans with borrowers' rating**	**[5] Matched sample**	**[6] Capital intensive industries**	**[7] High carbon industries**
Independent variables:							
Core variables							
Sustainable	-16.83	-16.79	4.86	5.13	-20.74	-5.07	-36.21
	(0.300)	(0.318)	(0.565)	(0.540)	(0.147)	(0.724)	(0.398)
Maturity	169.85 ***	177.34 ***	157.60 ***	157.56 ***	-1.14	112.28	241.16
	(0.000)	(0.000)	(0.000)	(0.000)	(0.505)	(0.489)	(0.120)
Log Maturity	-525.68 ***	-549.49 ***	-488.16 ***	-489.14 ***	51.30	-344.49	-812.09
	(0.000)	(0.000)	(0.000)	(0.000)	(0.362)	(0.492)	(0.126)
Rated	41.32 ***	37.10 ***			63.21 ***	44.35	34.49 **
	(0.000)	(0.000)			(0.003)	(0.135)	(0.033)
Tranche rating*rated	22.62 ***	18.55 ***	29.59 ***	23.76 ***	19.96 ***	18.22 ***	19.70 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rated borrower		-0.18		-26.11 ***		-5.48	-12.64
		(0.974)		(0.000)		(0.782)	(0.288)
Borrower rating*rated borrower		4.57 ***		6.20 ***		3.72	7.26 ***
		(0.001)		(0.000)		(0.171)	(0.001)
Contractual controls							
Log transaction size	-20.09 ***	-20.62 ***	-9.20 ***	-8.71 ***	-5.76	-19.47	-21.21 *
	(0.000)	(0.000)	(0.002)	(0.004)	(0.263)	(0.188)	(0.055)
Number of tranches	-5.94 **	-5.94 *	-5.68 **	-5.80 **	-0.95	-7.63	-6.56
	(0.062)	(0.070)	(0.040)	(0.031)	(0.904)	(0.213)	(0.390)
Currency risk	17.40	17.03	0.32	0.45	-57.79 ***	-19.16	19.14
	(0.131)	(0.153)	(0.958)	(0.941)	(0.003)	(0.600)	(0.454)
Experienced	39.81 ***	39.76 ***	24.18 ***	23.39 ***	-25.02	33.51	44.12 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.551)	(0.131)	(0.003)
Switcher	6.81	7.52	-7.89	-7.13		0.07	17.62
	(0.546)	(0.518)	(0.195)	(0.235)		(0.996)	(0.434)
Subordinated	120.14 ***	118.18 ***	123.16 ***	131.69 ***		140.66	62.97
	(0.006)	(0.009)	(0.002)	(0.001)		(0.126)	(0.680)
Fee information	1.36	1.46	-3.05	-2.76	3.58	0.18	4.26
	(0.546)	(0.526)	(0.228)	(0.273)	(0.839)	(0.967)	(0.357)
Term loan	-3.01	-5.02	-17.51	-20.15 *	-3.79	-0.87	-23.88
	(0.746)	(0.598)	(0.140)	(0.089)	(0.802)	(0.972)	(0.511)
Syndicate structure							
Former lender	-8.73 ***	-9.03 ***	-10.79 ***	-10.20 ***	-4.96	-13.35 **	-3.68
	(0.002)	(0.002)	(0.000)	(0.001)	(0.665)	(0.044)	(0.474)
Number of banks	0.42	0.53	-0.11	-0.10	0.38	-0.41	0.31
	(0.562)	(0.481)	(0.811)	(0.837)	(0.663)	(0.871)	(0.818)
Domestic lead bank	-29.41 ***	-29.21 ***	-14.01 **	-14.08 **	-38.98 *	-38.80 ***	-16.18
	(0.000)	(0.000)	(0.018)	(0.016)	(0.094)	(0.003)	(0.224)
Bank reputation	3.36 ***	3.35 ***	2.30 ***	2.28 ***	0.60	2.14 ***	3.54 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.600)	(0.009)	(0.000)

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Dependent variable: Spread	[1] All loans	[2] All loans with borrowers' rating	[3] Rated loans	[4] Rated loans with borrowers' rating	[5] Matched sample	[6] Capital intensive industries	[7] High carbon industries
Independent variables:							
Macroeconomic controls							
Country risk	-10.83 ***	-11.34 ***	-2.31	-2.36	17.68 ***	-11.82	-14.26
	(0.003)	(0.003)	(0.401)	(0.390)	(0.002)	(0.507)	(0.133)
EPS	-14.64	-14.88	-5.81	-4.91	85.37 *	43.96	-14.23
	(0.433)	(0.440)	(0.670)	(0.717)	(0.085)	(0.385)	(0.744)
Market-based	78.71 ***	76.36 ***	8.36	7.53	11.10	109.61 **	34.70
	(0.003)	(0.006)	(0.593)	(0.626)	(0.481)	(0.012)	(0.548)
Creditor rights	-17.16	-16.95	-0.66	-0.53	-1.39	27.48	-12.82
	(0.112)	(0.128)	(0.924)	(0.939)	(0.625)	(0.547)	(0.591)
Enforcement	0.64	0.66	0.16	0.27	-15.86	-7.43	1.38
	(0.650)	(0.648)	(0.879)	(0.797)	(0.194)	(0.148)	(0.699)
Antidirector rights	-13.17 **	-12.88 **	6.45	7.00 *	63.43 *	-2.37	-20.27
	(0.011)	(0.016)	(0.119)	(0.091)	(0.077)	(0.819)	(0.183)
Volatility	-0.27	-0.26	-0.28	-0.24	1.44	-0.41	-0.13
	(0.197)	(0.224)	(0.182)	(0.242)	(0.492)	(0.104)	(0.736)
5yTB_3mTB	-0.01	-0.01 *	-0.06 *	-0.06 *	-0.05	-0.01	-0.03
	(0.750)	(0.736)	(0.094)	(0.091)	(0.507)	(0.954)	(0.763)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Funding purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal status fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	24,962	24,962	11,198	11,198	834	7,374	12,159
of which ESG	712	712	384	384	417	290	331
of which conventional	24,250	24,250	10,814	10,814	417	7,084	11,828
Adjusted R^2	44.46%	45.76%	52.60%	52.88%	41.27%	34.02%	37.65%
Anderson's LR statistic	8.87	8.69	19.08	18.82	11.98	10.41	11.68
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen's J-statistic	2.71	2.53	2.47	1.85	0.00	1.15	1.14
p-value	(0.100)	(0.111)	(0.116)	(0.174)	(1.000)	(0.283)	(0.204)

This table presents the results of GMM regressions on spreads (all-in pricing in bps) for syndicated loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Sustainable loans include sustainability-linked loans, green loans, and social loans. Information on the characteristics of loan issuances and borrowing firms was obtained from Loan Analytics. Models [1] and [2] reflect the full sample. Models [3] and [4] focus on a subsample for loans with information on credit rating. Model [5] is estimated for a subsample of sustainable loans and a matched sample (control group) of conventional loans. To create a matched sample of conventional loans, we employ a propensity score matching approach (bond-level PSM), by creating a 1 to 1 matching algorithm that captures the most identical conventional loan closed by the same firm in the same year, using the following characteristics: loan rating, size, and maturity. Models [6] and [7] focus on a subsample of firms belonging to capital intensive and high carbon industries, respectively. We conduct Anderson's LR test to evaluate the null hypothesis that our instruments – if the loan is tranched and the tranche size – and endogenous variables are not correlated, and Hansen's J-test for overidentification restrictions. For each independent variable, the first row reports the estimated coefficient, and the second row reports the p-value. Standard errors are heteroskedasticity robust and clustered at the deal-year level. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 5: The pricing of syndicated loans: category breakdown

Dependent variable: Spread	**[1a]** **All loans**	**[2a]** **All loans with borrowers' rating**	**[3a]** **Rated loans**	**[4a]** **Rated loans with borrowers' rating**	**[5a]** **Matched sample**	**[6a]** **Capital intensive industries**	**[7a]** **High carbon industries**
Independent variables:							
Core variables							
Sustainability-linked loan	17.14	18.31	9.52	9.63	-16.84	6.35	46.06
	(0.140)	(0.127)	(0.196)	(0.190)	(0.233)	(0.656)	(0.580)
Green loan	-169.89 **	-175.04 **	-142.64	-142.33	-35.58	-38.94	193.01
	(0.017)	(0.018)	(0.197)	(0.197)	(0.195)	(0.443)	(0.497)
Social loan	38.28	41.14	183.62 **	195.02 **	-24.70	3.30	
	(0.604)	(0.595)	(0.031)	(0.023)	(0.305)	(0.932)	
Maturity	162.03 ***	169.34 ***	155.49 ***	155.79 ***	-1.23	113.91	-223.36
	(0.000)	(0.000)	(0.000)	(0.000)	(0.484)	(0.497)	(0.323)
Log Maturity	-499.71 ***	-522.93 ***	-481.54 ***	-483.60 ***	54.60	-349.36	767.68
	(0.000)	(0.000)	(0.000)	(0.000)	(0.341)	(0.500)	(0.317)
Rated	41.20 ***	36.98 ***			62.26 ***	44.18	92.83 ***
	(0.000)	(0.000)			(0.003)	(0.147)	(0.002)
Tranche rating*rated	22.66 ***	18.55 ***	29.61 ***	23.78 ***	19.82 ***	18.32 ***	5.50
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.461)
Rated borrower		-0.25		-25.87 ***		-5.00	-22.99 **
		(0.964)		(0.000)		(0.809)	(0.031)
Borrower rating*rated borrower		4.61 ***		6.21 ***		3.74	4.88 *
		(0.001)		(0.000)		(0.169)	(0.057)
Contractual controls							
Log transaction size	-19.40 ***	-19.91 ***	-9.05 ***	-8.58 ***	-6.58	-19.72	5.85
	(0.000)	(0.000)	(0.002)	(0.004)	(0.235)	(0.199)	(0.674)
Number of tranches	-5.65 *	-5.64 *	-5.66 **	-5.77 **	-1.43	-7.72	2.75
	(0.066)	(0.075)	(0.039)	(0.030)	(0.863)	(0.223)	(0.711)
Currency risk	15.64	15.19	0.66	0.78	-56.93 ***	-19.61	-23.70
	(0.149)	(0.176)	(0.911)	(0.896)	(0.004)	(0.602)	(0.383)
Experienced	39.02 ***	38.93 ***	24.08 ***	23.30 ***	-22.88	33.69	4.71
	(0.000)	(0.000)	(0.000)	(0.000)	(0.595)	(0.140)	(0.820)
Switcher	5.19	5.85	-6.20	-5.37		-0.20	-122.62 *
	(0.621)	(0.589)	(0.298)	(0.361)		(0.989)	(0.083)
Subordinated	126.97 ***	125.19 ***	125.55 ***	133.68 ***		139.53	543.97 **
	(0.002)	(0.004)	(0.001)	(0.001)		(0.143)	(0.021)
Fee information	1.38	1.48	-3.10	-2.84	2.35	0.29	19.80 **
	(0.530)	(0.510)	(0.217)	(0.258)	(0.897)	(0.949)	(0.057)
Term loan	-1.18	-3.16	-16.60	-19.37 *	-4.42	-1.00	100.32 *
	(0.893)	(0.727)	(0.153)	(0.096)	(0.772)	(0.968)	(0.095)
Syndicate structure							
Former lender	-8.76 ***	-9.06 ***	-10.85 ***	-10.25 ***	-4.80	-13.53 **	-24.87 **
	(0.002)	(0.002)	(0.000)	(0.001)	(0.677)	(0.049)	(0.048)
Number of banks	0.21	0.30	-0.16	-0.14	0.12	-0.44	-5.75 *
	(0.762)	(0.662)	(0.731)	(0.762)	(0.892)	(0.861)	(0.058)
Domestic lead bank	-30.13 ***	-29.96 ***	-13.80 **	-13.88 **	-30.07	-38.92 ***	-6.81
	(0.000)	(0.000)	(0.018)	(0.017)	(0.214)	(0.003)	(0.618)
Bank reputation	3.34 ***	3.33 ***	2.30 ***	2.28 ***	0.47	2.13 **	4.71 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.742)	(0.013)	(0.000)

(Continued)

(continued)

Dependent variable: Spread	**[1a] All loans**	**[2a] All loans with borrowers' rating**	**[3a] Rated loans**	**[4a] Rated loans with borrowers' rating**	**[5a] Matched sample**	**[6a] Capital intensive industries**	**[7a] High carbon industries**
Independent variables:							
Macroeconomic controls							
Country risk	-10.42 ***	-10.93 ***	-1.81	-1.82	17.69 ***	-11.72	7.28
	(0.003)	(0.002)	(0.507)	(0.502)	(0.001)	(0.516)	(0.520)
EPS	-13.71	-13.92	-4.32	-3.34	82.94	42.78	-40.85
	(0.444)	(0.451)	(0.748)	(0.803)	(0.103)	(0.396)	(0.386)
Market-based	76.65 ***	74.27 ***	5.45	4.48	11.55	109.47 **	54.90
	(0.003)	(0.006)	(0.718)	(0.764)	(0.467)	(0.013)	(0.206)
Creditor rights	-15.15	-14.88	0.28	0.46	-1.54	27.70	0.53
	(0.137)	(0.157)	(0.967)	(0.946)	(0.599)	(0.554)	(0.979)
Enforcement	0.69	0.71	0.31	0.42	-15.73	-7.36	-1.98
	(0.610)	(0.608)	(0.761)	(0.676)	(0.196)	(0.152)	(0.578)
Antidirector rights	-12.54 **	-12.21 **	6.16	6.73	64.43 *	-2.20	24.83
	(0.011)	(0.017)	(0.134)	(0.103)	(0.074)	(0.836)	(0.287)
Volatility	-0.27	-0.26	-0.27	-0.23	1.58	-0.42	-0.51
	(0.182)	(0.209)	(0.196)	(0.258)	(0.465)	(0.100)	(0.251)
5yTB_3mTB	-0.02	-0.02	-0.06	-0.06	-0.06	-0.01	-0.08
	(0.637)	(0.622)	(0.114)	(0.112)	(0.445)	(0.922)	(0.404)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Funding purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal status fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	24,962	24,962	11,198	11,198	834	7,374	12,159
of which Sustainable	581	581	361	361	342	212	279
of which Green	119	119	19	19	67	70	52
of which Social	12	12	4	4	8	9	0
of which conventional	24,250	24,250	10,814	10,814	417	7,083	11,828
Adjusted R^2	9.98%	5.50%	53.40%	53.59%	35.58%	33.33%	36.99%
Anderson's LR statistic	9.26	9.07	20.02	19.77	10.97	10.39	12.57
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen's J-statistic	3.88	3.67	2.77	2.11	0.00	1.20	0.00
p-value	(0.149)	(0.155)	(0.110)	(0.146)	(1.000)	(0.273)	(1.000)

This table presents the results of GMM regressions on spreads (all-in pricing in bps) for syndicated loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Information on the characteristics of loan issuances and borrowing firms was obtained from Loan Analytics. Models [1a] and [2a] reflect the full sample. Models [3a] and [4a] focus on a subsample for loans with information on credit rating. Model [5a] is estimated for a subsample of sustainable loans and a matched sample (control group) of conventional loans. To create a matched sample of conventional loans, we employ a propensity score matching approach (bond-level PSM), by creating a 1 to 1 matching algorithm that captures the most identical conventional loan closed by the same firm in the same year, using the following characteristics: loan rating, size, and maturity. Models [6a] and [7a] focus on a subsample of firms belonging to capital intensive and high carbon industries, respectively. Sustainable-linked loan is a dummy variable equal to 1 if the loan complies with the SLLP, and 0 otherwise. Green loan is a dummy variable equal to 1 if the loan complies with the GLP, and 0 otherwise. Social loan is a dummy variable equal to 1 if the loan complies with the SLP, and 0 otherwise. We conduct Anderson's LR test of the null hypothesis that our instruments – if the loan is tranched and the tranche size – and endogenous variables are not correlated, and Hansen's J-test for overidentification restrictions. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Standard errors are heteroskedasticity robust and clustered at the deal-year level. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 6: Endogenous switching regression models

Dependent variable:	**[8]**		**[9]**	
Spread (bps)	**Conventional loans**	**Sustainable loans**	**Conventional loans with borrowers' rating**	**Sustainable loans with borrowers' rating**
Independent variables:				
Intercept	-268.46 ***	-561.42 ***	-268.99 ***	-563.55 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Maturity	0.48	-13.04 ***	0.42	-13.01 ***
	(0.726)	(0.000)	(0.760)	(0.000)
Log Maturity	20.93 ***	77.79 ***	20.77 ***	77.47 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Rated	71.45 ***	122.97 ***	64.95 ***	124.83 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Tranche rating*rated	24.67 ***	28.99 ***	18.06 ***	31.08
	(0.000)	(0.000)	(0.000)	(0.634)
Borrower rating*rated borrower			7.30 ***	-2.31 ***
			(0.000)	(0.000)
Log transaction size	-2.51 *	21.22 ***	-2.38 *	21.30 ***
	(0.063)	(0.000)	(0.075)	(0.000)
Number of tranches	-14.26 ***	-14.21 ***	-14.26 ***	-14.08 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Currency risk	17.80 ***	28.62 **	17.32 ***	28.59 **
	(0.000)	(0.040)	(0.000)	(0.040)
Experienced	56.30 ***	46.14 ***	55.80 ***	45.74 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Switcher	-97.52 ***	46.14	-97.06 ***	-25.20
	(0.000)	(0.167)	(0.000)	(0.218)
Subordinated	301.33 ***	201.83 *	308.64 ***	198.85 *
	(0.000)	(0.061)	(0.000)	(0.068)
Fee information	-1.91	-5.05	-1.88	-5.01
	(0.282)	(0.495)	(0.288)	(0.499)
Term loan	32.11 ***	-0.75	31.08 ***	-1.00
	(0.000)	(0.942)	(0.000)	(0.924)
Former lender	-9.43 ***	-8.17	-9.47 ***	-8.31
	(0.000)	(0.562)	(0.000)	(0.555)
Number of banks	-2.92 ***	-2.76 ***	-2.92 ***	-2.75 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Domestic lead bank	-36.68 ***	-4.48	-36.00 ***	-4.38
	(0.000)	(0.807)	(0.000)	(0.814)
Bank reputation	4.51 ***	3.45 ***	4.51 ***	3.42 ***
	(0.000)	(0.002)	(0.000)	(0.003)
Country risk	-5.50 ***	3.17	-5.73 ***	3.41
	(0.000)	(0.126)	(0.000)	(0.117)
EPS	23.86 ***	34.92 ***	23.63 ***	34.73 ***
	(0.000)	(0.001)	(0.000)	(0.001)
Market-based	94.35 ***	11.25	92.55 ***	11.29
	(0.000)	(0.499)	(0.000)	(0.506)
Volatility	0.65 ***	1.21 **	0.68 ***	1.18 *
	(0.000)	(0.047)	(0.000)	(0.054)
5yTB_3mTB	-0.05	0.06	-0.05	0.07
	(0.179)	(0.343)	(0.204)	(0.354)

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Dependent variable:		
Probability of observing:	Sustainable *versus* conventional loans	Sustainable *versus* conventional loans
Independent variables:		
Intercept	-0.11	-0.11
	(0.985)	(0.984)
Maturity	0.03	0.03
	(0.978)	(0.973)
Log Maturity	-0.03	-0.03
	(0.964)	(0.965)
Rated tranche	0.12	0.17
	(0.867)	(0.807)
Tranche rating*rated	-0.11	-0.06
	(0.661)	(0.809)
Rated borrower	-0.34 ***	-0.34 ***
	(0.008)	(0.005)
Borrower rating*rated borrower	-0.01	-0.07
	(0.933)	(0.278)
Log transaction size	0.18	0.18
	(0.105)	(0.107)
Number of tranches	0.06	0.06
	(0.764)	(0.764)
Currency risk	-0.03	0.01
	(0.989)	(0.998)
Experienced	-0.25 *	-0.25 *
	(0.063)	(0.068)
Switcher	1.13	1.13
	(0.115)	(0.116)
Subordinated	-2.02	-2.08
	(0.201)	(0.193)
Fee information	0.01	0.01
	(0.944)	(0.939)
Term loan	-0.36 ***	-0.36 ***
	(0.000)	(0.000)
Former lender	0.04	0.04
	(0.909)	(0.908)
Number of banks	0.02 ***	0.02 ***
	(0.000)	(0.000)
Domestic lead bank	0.29	0.28
	(0.672)	(0.670)
Bank reputation	-0.03	-0.03
	(0.619)	(0.620)
Country risk	0.09 ***	0.09 ***
	(0.006)	(0.006)
EPS	-0.28	-0.27
	(0.341)	(0.354)
Market-based	-0.65 ***	-0.63 ***
	(0.000)	(0.000)
Volatility	-0.01	-0.01
	(0.900)	(0.890)
5yTB_3mTB	0.00	0.00
	(0.763)	(0.766)
Number of observations	24,962	24,962
Average treatment effect	20.33	21.34
	(0.456)	(0.623)
Wald chi2	442.93 ***	419.40 ***
Log pseudolikelihood	-155,136.46	-155,092.95
Wald test of indep. equations	0.32	0.37

This table presents the results of estimating endogenous switching regression models on a sample of 712 sustainable loans and 24,250 conventional loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Sustainable loans include sustainability-linked loans, green loans, and social loans. We implement the full information maximum likelihood (FIML) method to simultaneously estimate binary and continuous parts of the model in order to yield consistent standard errors. For each independent variable, the first row reports the estimated coefficient, and the second row reports the p-value. Standard errors are heteroskedasticity robust and clustered at the deal-year level. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 7: Regression analyses of the determinants of loan spreads

Dependent variable: Spread	**[10] Conventional loans**	**[11] Conventional loans**	**[12] Sustainable loans**	**[13] Sustainable loans**
Independent variables:				
Core variables				
Maturity	159.69 ***	165.99 ***	30.22	33.28
	(0.000)	(0.000)	(0.465)	(0.445)
Log Maturity	-489.26 ***	-509.12 ***	-120.39	-132.88
	(0.000)	(0.000)	(0.466)	(0.445)
Rated	36.46 ***	32.25 ***	85.53 ***	98.48 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Tranche rating*rated	22.28 ***	18.64 ***	20.57 ***	22.44 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Rated borrower		0.18		-14.32
		(0.973)		(0.491)
Borrower rating*rated borrower		4.09 ***		-2.27
		(0.004)		(0.596)
Contractual controls				
Log transaction size	-18.28 ***	-18.70 ***	1.52	1.51
	(0.000)	(0.000)	(0.823)	(0.829)
Number of tranches	-6.52 **	-6.54 **	-6.66	-6.36
	(0.030)	(0.034)	(0.201)	(0.228)
Currency risk	10.05	9.51	21.15	23.20
	(0.342)	(0.382)	(0.434)	(0.417)
Experienced	41.09 ***	41.09 ***	22.41 **	21.43 **
	(0.000)	(0.000)	(0.012)	(0.015)
Switcher	2.13	2.65	-16.80	-16.79
	(0.834)	(0.799)	(0.309)	(0.317)
Subordinated	125.34 ***	123.75 ***	160.94 **	159.70 **
	(0.002)	(0.003)	(0.035)	(0.041)
Fee information	0.24	0.30	7.64	8.03
	(0.910)	(0.892)	(0.357)	(0.343)
Term loan	-0.74	-2.50	-1.36	-2.13
	(0.931)	(0.773)	(0.903)	(0.856)
Syndicate structure				
Former lender	-0.98	-0.96	6.26	7.32
	(0.703)	(0.711)	(0.641)	(0.589)
Number of banks	-0.07	0.01	-1.25 *	-1.22 *
	(0.911)	(0.986)	(0.088)	(0.096)
Domestic lead bank	-30.16 ***	-29.98 ***	-14.45	-14.71
	(0.000)	(0.000)	(0.465)	(0.471)
Bank reputation	3.37 ***	3.36 ***	2.54 ***	2.57 ***
	(0.000)	(0.000)	(0.003)	(0.003)

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Dependent variable: Spread	**[10] Conventional loans**	**[11] Conventional loans**	**[12] Sustainable loans**	**[13] Sustainable loans**
Independent variables:				
Macroeconomic controls				
Country risk	-10.64 ***	-11.05 ***	1.94	1.71
	(0.004)	(0.003)	(0.715)	(0.764)
EPS	5.94	6.45	18.23	14.63
	(0.720)	(0.705)	(0.566)	(0.671)
Market-based	69.61 **	67.51 **	25.92	24.80
	(0.012)	(0.018)	(0.607)	(0.633)
Creditor rights	-3.35	-2.76	-7.60	-9.69
	(0.749)	(0.797)	(0.662)	(0.609)
Enforcement	-0.23	-0.25	-0.33	-0.15
	(0.861)	(0.856)	(0.843)	(0.932)
Antidirector rights	-8.90 *	-8.53 *	-0.08	-0.87
	(0.065)	(0.085)	(0.992)	(0.918)
Volatility	0.55 ***	0.56 ***	1.34 *	1.29 *
	(0.001)	(0.001)	(0.054)	(0.067)
5yTB_3mTB	-0.03	-0.03	0.08	0.09
	(0.188)	(0.223)	(0.327)	(0.314)
Region fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Funding purpose fixed effects	Yes	Yes	Yes	Yes
Deal status fixed effects	Yes	Yes	Yes	Yes
Number of observations	24,250	24,250	712	712
Adjusted R^2	13.51%	9.93%	62.94%	61.40%
Anderson's LR statistic	10.27	10.12	1.76	1.70
p-value	(0.000)	(0.000)	(0.174)	(0.184)
Hansen's J-statistic	3.35	3.17	0.04	0.04
p-value	(0.067)	(0.075)	(0.846)	(0.850)

This table presents the results of GMM regressions on spreads (all-in pricing in bps) for syndicated loans with spread and tranche/transaction amount available, closed by borrowers located in OECD countries during the 2018-2022 period. Sustainable loans include sustainability-linked loans, green loans, and social loans. Information on the characteristics of loan issuances and borrowing firms was obtained from Loan Analytics. Models [10] and [11] reflect the full sample for conventional loans, while models [12] and [13] focus on the full sample for sustainable loans. We conduct Anderson's LR test to evaluate the null hypothesis that our instruments – if the loan is tranched and the tranche size – and endogenous variables are not correlated, and Hansen's J-test for overidentification restrictions. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Standard errors are heteroskedasticity robust and clustered at the deal-year level. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 8: Regression analyses of the cost of borrowing: sustainable versus conventional deals

Dependent variable: WAS	**[14] All deals**	**[15] All deals with borrowers' rating**	**[16] Rated deals**	**[17] Rated deals with borrowers' rating**	**[18] Matched Sample**	**[19] Capital intensive industries**	**[20] High carbon industries**
Independent variables:							
Core variables							
Sustainable	7.67	24.46	113.50	127.49	-13.34	-1.33	114.65
	(0.339)	(0.198)	(0.177)	(0.222)	(0.436)	(0.916)	(0.178)
WAM	-34.78 ***	-83.30 ***	-247.02	-272.96	16.20	-22.98	-187.55
	(0.003)	(0.001)	(0.164)	(0.212)	(0.693)	(0.336)	(0.120)
WAR	26.91 ***	42.34 ***	76.81 **	63.29 **	14.13 ***	20.74 ***	62.54 ***
	(0.000)	(0.000)	(0.022)	(0.028)	(0.000)	(0.000)	(0.006)
Rated borrower		121.32 ***		-91.04 **		56.18 ***	138.71 **
		(0.000)		(0.031)		(0.001)	(0.026)
Borrower rating*rated borrower		-3.17		20.51		4.43 *	-0.99
		(0.124)		(0.181)		(0.075)	(0.834)
Contractual controls							
Log transaction size	8.11 ***	9.26 *	39.39	45.53	-3.47	-3.66	42.14
	(0.009)	(0.065)	(0.179)	(0.219)	(0.764)	(0.410)	(0.177)
Number of tranches	-5.96 ***	1.83	-14.87	-19.07	1.36	-1.36	1.46
	(0.006)	(0.637)	(0.210)	(0.200)	(0.753)	(0.684)	(0.888)
Currency risk	11.83 **	-1.31	6.49	3.61	-53.04	5.62	-24.34
	(0.045)	(0.893)	(0.782)	(0.886)	(0.151)	(0.622)	(0.492)
Experienced	35.68 ***	51.38 ***	79.37	78.05	-3.86	22.10 ***	80.16 **
	(0.000)	(0.000)	(0.106)	(0.157)	(0.903)	(0.005)	(0.033)
Switcher	-12.98 ***	-25.70 ***	-82.80 *	-85.61		-0.35	-94.17
	(0.009)	(0.003)	(0.097)	(0.143)		(0.973)	(0.104)
Syndicate structure							
Former lender	21.34 ***	1.54	-14.30	-11.55	6.40	-5.93	4.21
	(0.000)	(0.731)	(0.436)	(0.558)	(0.604)	(0.295)	(0.719)
Number of banks	-1.04 ***	-2.41 ***	-5.22 *	-5.23 *	0.37	-2.04 ***	-3.19 *
	(0.000)	(0.000)	(0.056)	(0.097)	(0.832)	(0.000)	(0.069)
Domestic lead bank	-27.87 ***	-20.14 ***	5.05	5.85	-33.84	-48.75 ***	-20.65
	(0.000)	(0.002)	(0.782)	(0.776)	(0.219)	(0.000)	(0.235)
Bank reputation	4.40 ***	5.07 ***	5.43 ***	5.59 **	-0.31	2.94 ***	6.80 ***
	(0.000)	(0.000)	(0.008)	(0.023)	(0.833)	(0.000)	(0.000)

(Continued)

(continued)

Dependent variable: WAS	**[14] All deals**	**[15] All deals with borrowers' rating**	**[16] Rated deals**	**[17] Rated deals with borrowers' rating**	**[18] Matched Sample**	**[19] Capital intensive industries**	**[20] High carbon industries**
Independent variables:							
Macroeconomic controls							
Country risk	-1.98	-0.58	-18.55	-19.78	19.80	0.62	12.71
	(0.189)	(0.810)	(0.185)	(0.234)	(0.101)	(0.871)	(0.332)
EPS	15.09	29.34 *	83.66	96.35	84.24 **	14.56	89.76
	(0.119)	(0.075)	(0.279)	(0.307)	(0.020)	(0.419)	(0.180)
Market-based	54.67 ***	11.63	-164.12	-185.06	73.55 **	63.17 **	28.11
	(0.000)	(0.671)	(0.235)	(0.279)	(0.011)	(0.017)	(0.650)
Creditor rights	-6.42	4.98	51.12	57.17	24.91	-5.18	21.81
	(0.256)	(0.612)	(0.277)	(0.315)	(0.167)	(0.638)	(0.477)
Enforcement	-0.68	-1.86	-4.44	-4.76	-2.82	-2.48	-6.79
	(0.402)	(0.141)	(0.403)	(0.434)	(0.159)	(0.199)	(0.203)
Antidirector rights	-9.70 ***	-5.94	-11.88	-10.81	-6.62	-14.28 **	-10.81
	(0.001)	(0.172)	(0.506)	(0.570)	(0.694)	(0.045)	(0.392)
Volatility	-0.91 ***	-1.55 ***	-4.50	-4.82	1.92	-0.63 ***	-3.49 *
	(0.000)	(0.000)	(0.179)	(0.230)	(0.462)	(0.005)	(0.096)
5yTB_3mTB	0.04 *	0.08	0.16	0.17	-0.06	0.07	0.24 *
	(0.082)	(0.038)	(0.301)	(0.340)	(0.801)	(0.126)	(0.089)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Funding purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal status fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	16,632	16,632	8,074	8,074	586	5,106	8,239
of which ESG	397	397	257	257	293	154	196
of which conventional	16,235	16,235	7,817	7,817	293	4,952	8,043
Adjusted R^2	29.89%	30.44%	55.87%	56.89%	68.42%	40.78%	35.60%
Anderson's LR statistic	19.43	9.82	11.09	10.87	1.10	2.39	1.56
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.332)	(0.092)	(0.210)
Hansen's J-statistic	0.01	2.00	0.06	0.03	0.84	0.90	0.04
p-value	(0.930)	(0.157)	(0.805)	(0.853)	(0.360)	(0.342)	(0.844)

This table presents the results of GMM regressions on the determinants of deals' weighted average spread (WAS). *Sustainable* is a dummy variable. To create a matched sample of conventional deals, we employ a propensity score matching approach (deal-level PSM), by creating a 1 to 1 matching algorithm that captures the most identical conventional deal closed by the same firm in the same year, using the following characteristics: WAS, transaction size, and WAM. We conduct Anderson's LR test to evaluate the null hypothesis that our instruments – if the deal is tranched and year – and endogenous variables are not correlated, and Hansen's J-test for overidentification restrictions. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Standard errors are heteroskedasticity robust and clustered at the deal-year level. ***, ** and * indicate that the reported coefficients are significantly different from zero at the 1%, 5% and 10% levels, respectively. For a definition of the variables, see Table 2.

Table 9: Determinants of firms' debt choice between sustainable and conventional deals

Dependent variable: Choice of debt (Sustainable deal = 1; Conventional deal = 0)	**[21] All deals**	**[22] All deals with borrowers' rating**	**[23] Rated deals**	**[24] Rated deals with borrowers' rating**	**[25] Matched sample**	**[26] Capital intensive industries**	**[27] High carbon industries**
Independent variables:							
Core variables							
WAM	0.08 **	0.08 **	0.20 ***	0.21 ***	0.10	0.09 **	0.13 ***
	(0.019)	(0.016)	(0.000)	(0.000)	(0.369)	(0.013)	(0.006)
WAR	-0.12 ***	0.07	-0.16 ***	0.05	0.00	0.12	0.11
	(0.000)	(0.355)	(0.000)	(0.590)	(0.989)	(0.365)	(0.242)
Rated borrower		-0.14		0.33		-0.41	-0.26
		(0.482)		(0.387)		(0.264)	(0.356)
Borrower rating*rated borrower		-0.22 ***		-0.23 **		-0.28 **	-0.29 ***
		(0.002)		(0.012)		(0.027)	(0.002)
Contractual controls							
Log transaction size	0.31 ***	0.32 ***	0.31 ***	0.28 ***	0.36 *	0.29 **	0.33 ***
	(0.000)	(0.000)	(0.001)	(0.003)	(0.060)	(0.016)	(0.001)
Number of tranches	-0.24 **	-0.25 **	-0.53 *	-0.48 *	0.02	-0.36 *	-0.07
	(0.046)	(0.040)	(0.056)	(0.079)	(0.902)	(0.055)	(0.660)
Currency risk	-0.55 **	-0.49 **	-0.38	-0.42	0.75	0.14	-1.26 ***
	(0.025)	(0.044)	(0.226)	(0.177)	(0.108)	(0.738)	(0.002)
Experienced	0.20	0.23	0.15	0.18	-1.55 ***	0.17	0.08
	(0.348)	(0.275)	(0.711)	(0.652)	(0.005)	(0.605)	(0.801)
Switcher	3.88 ***	3.92 ***	4.07 ***	4.08 ***		4.20 ***	4.30 ***
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
Syndicate structure							
Former lender	0.22 **	0.19 **	0.18 **	0.19 **	1.97 ***	0.06 *	0.42 *
	(0.013)	(0.019)	(0.039)	(0.035)	(0.000)	(0.080)	(0.043)
Number of banks	0.06 ***	0.06 ***	0.04 ***	0.04 ***	0.01 *	0.04 *	0.06 ***
	(0.000)	(0.000)	(0.005)	(0.003)	(0.096)	(0.054)	(0.000)
Domestic lead bank	-0.10	-0.12	0.45	0.46	0.75	0.93	0.44
	(0.694)	(0.638)	(0.227)	(0.220)	(0.171)	(0.122)	(0.255)
Bank reputation	0.01	0.01	0.00	0.00	0.02	0.01	0.02
	(0.311)	(0.411)	(0.906)	(0.859)	(0.311)	(0.677)	(0.285)
Macroeconomic controls							
Country risk	0.06	0.06 *	0.16 **	0.17 ***	0.29 **	-0.14 **	-0.08
	(0.155)	(0.087)	(0.017)	(0.005)	(0.023)	(0.042)	(0.123)
EPS	0.85 ***	0.78 ***	1.51 ***	1.46 ***	1.37 *	1.17 **	0.37 **
	(0.004)	(0.008)	(0.001)	(0.001)	(0.075)	(0.038)	(0.045)
Market-based	-0.30	-0.16	-0.15	-0.08	-0.52	-1.90 **	-0.97
	(0.437)	(0.661)	(0.806)	(0.898)	(0.389)	(0.016)	(0.125)
Creditor rights	0.28	0.23	0.41	0.40	0.57	0.59 *	0.22
	(0.102)	(0.158)	(0.120)	(0.127)	(0.163)	(0.059)	(0.389)
Enforcement	-0.10 ***	-0.10 ***	-0.09 ***	-0.09 ***	-0.02	-0.19 ***	-0.07 *
	(0.000)	(0.000)	(0.007)	(0.003)	(0.725)	(0.000)	(0.078)
Antidirector rights	0.57 ***	0.50 ***	0.39 **	0.31 **	-0.06	0.66 ***	0.36 **
	(0.000)	(0.000)	(0.014)	(0.045)	(0.855)	(0.001)	(0.037)
Volatility	0.00 ***	0.00	-0.01 *	-0.01 *	-0.03	-0.01	0.00
	(0.809)	(0.750)	(0.098)	(0.095)	(0.119)	(0.263)	(0.894)
5yTB_3mTB	0.01 ***	0.01 ***	0.01 ***	0.01 ***	0.01 ***	0.01 ***	0.01 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Funding purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal status fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	16,632	16,632	8,074	8,074	586	5,104	8,224
of which sustainable	397	397	257	257	293	154	196
of which conventional	16,235	16,235	7,817	7,817	293	4,950	8,028
Correct predictions	97.98%	97.99%	97.83%	97.83%	77.30%	97.55%	98.15%
Pseudo R^2	0.458	0.462	0.510	0.513	0.317	0.489	0.469

This table presents the results of logistic regressions which predict firms' choice between sustainable and conventional debt financing. The dependent variable equals 1 when a firm selects a sustainable syndicated deal and 0 when it chooses a conventional syndicated deal. Information on the characteristics of loan issuances and borrowing firms was obtained from Loan Analytics. To create a matched sample of conventional deals, we employ a PSM approach, by creating a 1 to 1 matching algorithm that captures the most identical conventional deal closed by the same firm in the same year, using the following characteristics: WAR, transaction size, and WAM. For each independent variable, the first row reports the estimated coefficient, and the second row reports the *p*-value. Standard errors are heteroskedasticity robust and clustered at the firm-year level. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.