ESG Lending

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Abstract

This paper examines the environmental, social, and governance (ESG) loan market, which has grown from $6 billion in 2016 to $322 billion in 2021. This growth is driven primarily by *ESG-linked* loans where loan spreads are contingent on borrower ESG performance, as well as by use-of-proceeds based *green* loans issued for specific green projects. ESG-linked loans are mostly issued by large and publicly traded firms with superior ESG profiles. These loans are often structured as revolving credit facilities and syndicated by dominant global banks with good ESG profiles and pre-existing lending relationships with borrowers. Green loans, on the other hand, are mostly issued to privately held borrowers by non-relationship lenders. ESG loan borrowers enjoy a net pricing advantage, suggesting improved ESG profiles reduce credit risk or that lenders value being associated with ESG loans. We find that ESG-linked loans are opaque and vary widely in the extent of their contractual disclosures. Consistent with greenwashing, borrowers with low quality disclosures about ESG contract features experience deterioration in ESG scores after loan issuance. Borrowers with high quality disclosures continue to maintain good ESG profiles and stock markets react positively to such loan announcements. Overall, our results indicate market vigilance against potential greenwashing and suggest that as the market matures, the ESG loan market has potential to make a positive impact on corporate ESG performance.

Keywords: ESG, ESG Loans, ESG Lending, Sustainable Finance, Bank Lending

JEL classifications: G21, G32, M14

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1 Introduction

Stakeholders increasingly demand companies to be vigilant on environmental, social, and governance (ESG) related issues. Firms have responded to these demands by incorporating ESG considerations in their corporate policies, which cover a broad range of issues such as environmental externalities, employee welfare, and social diversity and inclusion. A nascent but growing literature in finance examines how capital providers and financial contracts shape and influence ESG policies of firms. While the bulk of this literature has focused on equity and bonds, very little is known about the role of banks and loan contracts in the rapidly evolving ESG financing space.[1] This is especially surprising given that bank loans are the primary source of debt financing for firms around the world.[2] This paper fills this void by documenting and characterizing the growth of ESG lending around the world and explaining the role of loan contracts in incentivizing borrower commitment to sustainability.

We define ESG loans as either general purpose loans whose terms are contractually tied to ESG performance (i.e., "ESG-linked loans") or loans whose proceeds finance environmentally and socially conscious projects (i.e., "Green loans"). Using Refinitiv DealScan data over the sample period from January 2016 to September 2021, we document that ESG lending activity around the world has grown exponentially during recent years – from $6 billion in 2016 to $322 billion in 2021 – becoming an important segment of the global loan market and eclipsing the global green bond and sustainability-linked bond markets.[3] ESG loans constituted more than 12% of global bank lending in 2021. Among all ESG lending activity in 2021, $289 billion, or 90%, was comprised of ESG-linked loans. The proliferation of these

[1] For research highlighting how equity investors express ESG concerns, see Krueger et al. (2020), Hartzmark and Sussman (2019), Dyck et al. (2019), and Dimson et al. (2015). For research on green bonds, see Flammer (2021), Tang and Zhang (2020), Zerbib (2019), and Baker et al. (2018).

[2] For instance, according to the US Flow of Funds data, bank loans constituted 59% of total nonfinancial business sector debt in the US in 2020. The share is much larger for small businesses. Beck et al. (2008) study firms in 48 countries and find that bank debt constitutes roughly 50% of total external financing.

[3] According to Flammer (2021), green bond issuance grew from $5 billion in 2013 to $96 billion in 2018. ESG-linked bonds, where bond terms are tied to issuer ESG performance, remain a niche market. Since late 2020, ESG-linked loan issuance (around $240 billion) has dwarfed ESG-linked bond issuance (around $18 billion) (see *Wall Street Journal*, "Deluge of debt is tied to carbon emissions and diversity", May 4, 2021).

general purpose loans has allowed ESG lending to spread to a broader set of industries beyond utilities, where a greater portion of green loan and bond financing remains concentrated.[4]

What explains the growth of ESG lending, and why do borrowers and lenders engage in ESG-linked loan contracts? One explanation is that ESG-linked loans enable borrowers to *credibly* signal their commitment to ESG issues to outside stakeholders. As investors and stakeholders increasingly require transparency on firms' ESG practices (see Krueger et al., 2020; Ilhan et al., 2020), the ESG lending market may have evolved in equilibrium as a performance pricing market where borrowers more capable of maintaining high ESG standards willingly borrow from lenders equipped with the expertise to effectively coordinate ESG performance pricing contracts and monitor the borrower's ESG practices. Another explanation is that firms and banks may engage in ESG-linked lending for "greenwashing" purposes, where the ESG contingent contract terms are written to showcase an *empty* emphasis on ESG to stakeholders. It is also possible that borrowers with limited access to financing may be compelled to subject themselves to higher ESG standards and monitoring by pro-social lenders in order to lower their borrowing constraints. Throughout our study, we present various analyses that help examine these possibilities, and provide preliminary evidence consistent with the role of ESG-linked loans as a greenwashing device. We also provide suggestive evidence that transparent disclosure of ESG contingencies in loan contracts alleviates greenwashing concerns and helps sustain good ESG practices.

Starting with an examination of the geographical distribution of ESG lending, we find that ESG-linked loans have originated and are more widespread in countries with civil law origins, consistent with Liang and Renneboog (2017) who document that firms in such countries are more likely to engage in corporate social responsibility (CSR) investments. Countries with civil law origins have more stakeholder-value oriented rules and regulations dictating corporate behavior compared to those with common law origins. It is plausible that this difference plays an important role in the development of ESG contingent lending markets

[4]Utilities account for 17% of the aggregate issuance amount of ESG-linked loans, compared to 59% and 32% of green loan and bond issuance, respectively.

as it does for CSR in general. On the other hand, green loans are no more widespread in some legal systems than others. Both ESG-linked and green loans, however, flourish under well-developed private credit markets and in countries with strict environmental regulations.

We then conduct detailed analysis at the loan level. We find that ESG-linked loans are larger in size compared to non-ESG loans. The average deal size of ESG-linked loans is $937.2 million, whereas a non-ESG loan deal is on average $520.8 million, which is 44% smaller in size. ESG-linked loans tend to be issued to larger, safer (i.e., investment grade), and publicly listed borrowers. These findings are consistent with the notion that large and economically important firms have strong incentives to signal ESG-friendly practices given their high visibility and scrutiny from stakeholders. We also find that ESG-linked loans are structured mainly through revolving credit facilities (i.e., 55% of all ESG-linked loan facilities) and more likely to contain lenders with past lending relationships with the borrower. These two features could potentially facilitate effective contracting around ESG commitments by setting contingencies that can be monitored, enforced, and renegotiated with ease (see Berger and Udell, 1995; Berlin et al., 2020). In contrast, green loans are not significantly larger than non-green loans, and the vast majority of them are project finance loans (i.e., 69% of all green loan facilities) issued mostly to non-investment grade privately-held borrowers. Green loans are less likely to be originated by relationship banks. Finally, ESG loans tend to be syndicated by larger groups of lenders, which are mainly comprised of the dominant global lenders with past ESG lending experience.

We also examine loan spreads at issuance. We find that ESG-linked loans are not priced differently from non-ESG loans at issuance, suggesting that borrowers who meet ESG performance targets in the future may enjoy lower spreads pursuant to their ESG performance pricing contracts. On the other hand, green loans are issued at lower spreads. This contrasts with green bonds (see Flammer, 2021), which are priced no differently from non-green bonds, indicating that the typical bond investor may not be willing to trade off financial returns for other considerations. Our results suggest that large reputable banks, who are regulated by

stakeholders with such considerations, may have incentives to make this trade-o .

Next, we manually parse through loan disclosures provided by Re nitiv and document that the quality of disclosure regarding contractual details of ESG-linked loans is generally low, and that there is considerable heterogeneity in the amount of information disclosed. These ndings are consistent with concerns among practitioners that it is di cult to verify the validity of ESG loan labels or gauge what real impact they may have in disciplining borrowers on sustainability issues[5]. To understand the real consequences of ESG lending practices and to shed more light on greenwashing concerns, we examine ex-ante ESG pro les and ex-post ESG performance of borrowers and relate them to disclosure quality. Using ESG performance information obtained from Re nitiv's Asset4 database, we nd signi cant and positive associations between the likelihood of ESG lending and the ESG scores of both borrowers and lenders ex-ante. On the other hand, we nd within-borrower ex-post deterioration in ESG scores after ESG loan issuance for loans where the quality of disclosure regarding the contractual details is poor. ESG-linked borrowers with good disclosure quality continue to maintain their superior ESG scores ex-post. To alleviate concerns about the subjective nature of ESG scores, we also use plausibly more objective measures such as emissions or resource usage scores provided by Re nitiv and nd similar results.

Our results are overall consistent with greenwashing, where large borrowers and global lenders who both have reputational incentives to signal ESG commitment build on their lending relationships to obtain certi cation through explicit ESG loan contracting, but do not follow up on their commitments. However, the relatively better performance of borrowers with good disclosure quality suggests that ESG-linked loans have the potential to become an e ective nancing tool that allows lenders and borrowers to credibly commit to and work towards incorporating ESG considerations in their corporate policies. Consistent with investors' vigilance against greenwashing practices, we nd that stock markets react positively to public announcements of ESG-linked loan issuance only when the quality of

[5] See Bloomberg, September 8, 2021, June 22, 2021, February 3, 2020.

disclosure regarding the contractual details is relatively high. Hence, as the ESG lending market evolves and matures, it is possible that with increased public scrutiny and more established institutional practices the ESG lending market will take up a more central role in the push towards increased ESG considerations in corporate policies.

Our study complements recent work on the market for green bonds (see Flammer, 2021; Tang and Zhang, 2020; Zerbib, 2019; Baker et al., 2018). A key distinction of our paper in relation to this literature is that we document the widespread use of \general purpose" loans that are designed to incentivize rms across industries to improve their overall sustainability pro les rather than achieve narrower objectives that are tied to speci c projects. This departure from use-of-proceeds based ESG contracting helps democratize ESG contingent nancing for borrowers that are not in the business of operating \green projects," and for lenders who provide capital to such industries. In contrast, the market for green bonds, which are issued for speci c purposes and earmarked for green or ESG improving projects, is inexorably limited to a narrower set of industries.

More broadly, our study contributes to the burgeoning literature on ESG investing. Along the capital structure spectrum, much of the literature has focused on why equity investors value sustainable investments and how they monitor or a ect corporate ESG performance.[6] Our paper lls an important gap by documenting how lenders and rms contract on ESG-related issues in the vast bank lending market. Recent studies suggest that good ESG pro les provide rms with protection against downside risks associated with reputation, customer loyalty, or regulatory oversight.[7] [8] These risks have important implications for creditors who

[6] See, among others, Azar et al. (2021), Bellon (2021a), Bolton and Kacperczyk (2021), Dottling and Kim (2021), Gibson et al. (2021), Heath et al. (2021), Naaraayanan et al. (2021), Pastor et al. (2021), Cao et al. (2020), Gibson et al. (2020), Hoepner et al. (2020), Humphrey et al. (2020), Ilhan et al. (2020), Krueger et al. (2020), Oehmke and Opp (2020), Pedersen et al. (2020), Dyck et al. (2019), Hartzmark and Sussman (2019), Barko et al. (2018), and Dimson et al. (2015).

[7] See Hoepner et al. (2020), Albuquerque et al. (2020), Albuquerque et al. (2019), Ding et al. (2020), Lins et al. (2017). In particular, see Bartram et al. (2022), Bellon (2021a,b), Stroebel and Wurgler (2021), Ivanov et al. (2021), and Krueger et al. (2020) for evidence that climate regulations and legal liability pose important sources of risk for rms.

[8] For example, as illustrated in Figure A.1, ESG lending has grown in lockstep with increasing national commitments and therefore heightened societal and regulatory pressure to combat climate change.

lend money to corporations (see Acharya et al., 2011; Houston et al., 2010; Anginer et al., 2021; Correa et al., 2021). While recent studies examine the role of corporate and lender ESG pro les in lending relationship matching (see Kacperczyk and Peydro, 2021; Houston and Shan, 2021; Shin, 2020; Hauptmann, 2017), our study is the rst to directly examine how bank loans are structured to contract around and mitigate ESG-related risks.

Finally, we also contribute to the literature on ESG monitoring and reporting. Banks, much like institutional investors, are uniquely positioned to e ectively monitor rms' progress on ESG considerations. However, it is also possible that some banks would instead partake in greenwashing practices, re ecting con icts of interest in signalling ESG commitments. In fact, a recent literature highlights that metrics of ESG performance are often opaque or misleading, presenting a pervasive problem for stakeholders (see Berg et al., 2021, 2022; Tang et al., 2022). Studies have also shown that this entails risks that investors should be vigilant about (see Berg et al., 2021; Serafeim and Yoon, 2021). Our ndings complement these recent studies. We show that greenwashing is indeed a valid concern in the ESG lending market that investors are vigilant about. We also show that transparent disclosure regarding ESG-related contract terms alleviates such concerns. Overall, our ndings contribute to a more complete picture of how ESG concerns are re ected in loan contracts, providing more institutional texture to the fundamental understanding of sustainable nancing.

2 ESG Lending

We begin by providing an introduction and characterization of ESG loans. There are broadly two types of ESG loans: *ESG-linked loans* and *green loans*. ESG-linked loans are general purpose loans where loan pricing terms are tied to ESG performance of the borrowing rm. These loans are also called *sustainability-linked loans*. ESG-linked loans are often originated in the form of revolving credit lines or term loans, and the loan spreads on these loans are pegged explicitly to key performance indicators (KPIs) incorporating sustainability goals.

These KPIs may be ESG scores assigned to borrowers by external rating agencies (e.g., Sustainalytics), or speci c measures such as greenhouse gas (GHG) emissions or employee safety. Green loans, analogous to green bonds, are loans where the proceeds are earmarked exclusively to nance environmental and climate-friendly projects (e.g., renewable energy, biodiversity conservation, sustainable water, wastewater management, carbon capture, etc.).

2.1 ESG-Linked Loans

The ESG-linked loan market has grown rapidly since 2017 when Royal Philips NV announced the rst loan of this kind. The company signed an agreement with a consortium of 16 banks for a new EUR 1 billion revolving credit facility with an interest rate dependent on the company's year-on-year sustainability performance. This innovative contract was created by Philips in collaboration with ING as the sustainability agent of the facility.[9] A key exibility with sustainability linked loans is that the proceeds can be used for non-green purposes, broadening the scope for borrowers and lenders concerned with sustainability issues.

To understand how these newly introduced instruments work, consider the loan obtained by Crown Holdings Inc (NYSE: CCK) for general purpose. The loan was originated in 2019 by a syndicate of lenders, with BNP Paribas as the sustainability agent overseeing and enforcing the ESG contingent loan term. The sustainability related KPI in the loan agreement is a \sustainability rating" assigned by Sustainalytics, an independent ESG ratings provider (later acquired by Morninstar, Inc.), and the interest rate charged by the lender decreases (increases) when Crown's sustainability rating is higher (lower). An excerpt from the loan agreement details this arrangement, as shown below.

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

[9] Other banks in the consortium included ABN AMRO, Bank of America Merrill Lynch, BNP Paribas, Citi, Deutsche Bank, Goldman Sachs, HSBC, ICBC, JPMorgan, Mizuho Bank, Morgan Stanley, MUFG, Rabobank, Société Générale and UBS.

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

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

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

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

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

Although there is variation across deals, the example contract above, which exhibits a total spread change of 10 basis points based on its sustainability performance, represents the typical deal in our sample when such pricing information is available. To put into context, one can compare this spread change to the spread change in a typical credit rating based performance pricing contract. For example, HP Inc. borrowed a revolving credit facility in 2020, where the spread was set to increase by 12.5 basis points if its S&P credit rating was downgraded from A- to BBB+, a downgrade of one notch.

The terms of sustainability-linked loans need not be tied to third-party ESG ratings. ESG-linked loans also give borrowers the exibility to tailor KPIs around more speci c ESG objectives for their stakeholders. For example, Johnson Controls International plc (NYSE: JCI) entered into a loan contract in 2019 where ING Capital LLC acted as the sustainability structuring agent. The loan pricing terms were tied to meeting speci c targets regarding employee safety and greenhouse gas (GHG) emissions by 2025. The loan contract identi ed three measurable KPIs related to these objectives and their yearly targets, as follows.

- KPI#1: Total Recordable Incident Rate (TRIR) - A measure of the Health and Safety performance of Johnson Control's operations.

- KPI#2: GHG Savings- Reduction in greenhouse gas emissions acheived by the company by implementing energy e ciency and renewable energy customer projects.
- KPI#3: GHG Intensity Target - The company's GHG emissions scaled by revenues.

Clearly, Johnson Controls was able to commit to speci c targets for a broad range of sustainability objectives through these KPIs. The loan margins were set to increase, decrease, or be maintained based on how the actual KPI metrics performed relative to their contractual targets, similar to the Crown Holdings example described above.

These examples highlight unique features of ESG-linked loans that allow borrowers and lenders to engage in ESG contingent contracting with exibility both in terms of the purpose of the loan as well as commitments to speci c sustainability objectives. These are marked departures from what has conventionally been available as instruments for green nancing, for example, use-of-proceeds based green bonds where the capital raised could be used only for speci c sustainable projects (e.g., renewable power plants, energy e cient buildings, etc.).

To facilitate common industry standards for ESG-linked loans, the Sustainability Linked Loan Principles (SLLP) were developed by an experienced group of representatives from leading nancial institutions active in the global syndicated loan market. The SLLP set out a framework based on the following ve components: (1) selection of KPIs that are relevant, core, and material to the borrower's sustainability and business strategy, (2) calibration of sustainability performance targets (SPTs) for each KPI in an ambitious manner, (3) loan characteristics (typically spreads) linked to meeting SPTs, (4) reporting of detailed SPT performance, at least once a year, and preferably reported publicly, and (5) independent and external veri cation of performance against SPTs, preferably made publicly available. The SLLP are recommended guidelines to be voluntarily applied by market participants on a deal-by-deal basis depending on the underlying characteristics of the transaction.

2.2 Green Loans

While the green bond market has grown rapidly in the past decade (see Flammer, 2021; Tang and Zhang, 2020; Zerbib, 2019; Baker et al., 2018), a similar use-of-proceeds based green nancing market has also developed in the loan market. Green loans, unlike ESG-linked loans, are loans that fund speci c projects with explicit sustainable features. At the core of a green loan are the Green Loan Principles that provide a list of categories eligible for green projects, based on the following four components: (1) use of proceeds, (2) process for project evaluation and selection, to be developed by borrowers and lenders, (3) management of process, which includes a separate account that can be tracked by borrowers to maintain transparency, and (4) reporting, which is prepared internally and externally reviewed and veri ed by auditors or independent ESG rating providers.

For example, Spanish pulp mills operator Ence Energia (BME:ENC) announced a EUR 66 million green loan nancing deal in 2018 to fund part of the construction of a new 46MW biomass power plant in Puertollano, central Spain, that was scheduled to become operational in 2020. The plant is designed to mainly use agroforestry residues from the surrounding area as fuel, making it a green project nanced speci cally by the loan. The green loan has a seven year maturity. Banco Santander SA is the green agent for the loan facility.

In short, the growth of ESG lending has opened the door to general purpose debt tied to the borrower's ESG performance on a wide variety of measures, as well as to green project nance lending that complements the market for green bonds. Using a global and comprehensive sample of loan-level data, we provide an early examination of the characteristics, distribution, and contracting incentives of ESG lending.

3 Data and Sample

Our loan-level data comes from Re nitiv DealScan. For all loans in the database, DealScan assigns two market segment ags according to the de nitions above { \ESG-linked loan"

and \green loan." Re nitiv DealScan uses information from loan agreements, public media releases, and discussions with lenders and borrowers to con rm such loan features. Using the DealScan market segment table, we classify a loan facility as an ESG-linked or green loan. We identify 1,127 ESG-linked loans and 1,228 green loans that raised $662 billion and $191 billion in total, respectively, over the sample period from 2016 to 2021 (as of September).[10] In all of our analysis, continuous variables are winsorized at the 1% and 99% levels. In this section, we provide a brief summary of these loans along several dimensions.

[Insert Table 1 here]

Table 1 describes the time-series trends in the issuance of ESG-linked and green loans. Global ESG lending activity totalled $853 billion during the sample period. Most of this lending consisted of ESG-linked loan issuance, amounting to $662 billion in total. Both in terms of the dollar amount and number of loans, the size of the overall ESG lending market has grown exponentially from $6 billion in 2016 to $322 billion in 2021 (as of September). The ESG-linked loan segment, which was non-existent prior to 2017, had grown to a $289 billion market by 2021. ESG-linked loan issuance grew even more substantially after 2020 when the global economy and nancial markets were disrupted by the COVID-19 pandemic. The green loan market, which raised a total of $191 billion over our sample period, grew rapidly as well from $6 billion in 2016 to $33 billion in 2021.

[Insert Figure 1 here]

We further illustrate these trends in Figure 1, which shows the annual issuance amounts of ESG-linked and green loans from 2016 to September 2021. ESG loans constituted less than 1% of the total lending market in 2016, and has since grown remarkably to constitute more than 12% of the global loan market in 2021. Since its introduction in 2017, ESG-linked

[10] While we rely on DealScan as it provides the most comprehensive source of data on the contractual terms of loans, we cross-check the sample coverage with two additional sources, Bloomberg and Re nitiv Eikon, and con rm that they largely overlap or are subsumed by DealScan.

loan issuance has grown exponentially, contributing to most of the increase in ESG lending and outweighing the amount of green loans each year.

[Insert Table 2 here]

Table 2 reports the distribution of ESG-linked and green loans over the sample period across the Fama-French 17 industries of borrowers. Industry distribution of ESG-linked loan issuance is wide-spread, unlike the concentration of use-of-proceeds based green loan issuance within utilities. 59% of green loan issuance is concentrated in the utilities industry where environmental considerations are closely tied to rms' operations and projects, similar to what has been documented for green bonds by Flammer (2021). In contrast, only 17% of ESG-linked loans are issued by rms in the utilities industry. In fact, setting aside the utilities industry, we nd that the industrial distribution of ESG-linked loans is comparable to that of the DealScan loan database in general. The widespread use of ESG-linked loans is consistent with the fact that the proceeds from these loans can be used for general purposes rather than for speci c projects, while the loan terms can be tied to broad ESG objectives.

[Insert Table 3 here]

In Table 3, we report the breakdown of ESG lending activity by the borrower's country of incorporation. Notably, we nd that borrowers from the United States and western European countries are prevalent in the ESG-linked loan market in terms of aggregate proceeds, with U.S., France, Spain, Italy, U.K., Germany, and Netherlands comprising 70% of all global issuance. Fourteen of the top twenty countries in the list are also among the top twenty most sustainable countries according to Sustainalytics, suggesting that ESG-linked loans are prevalent in places where stakeholders demand rms to incorporate ESG considerations in their corporate policies. China, which is the leading country in the green bond market, lags behind Europe in the ESG-linked loan market[11]. Although the United States is the

[11] According to Flammer (2021), China ranked rst in terms of aggregate green bond issuance in 2013-2018.

largest single country in terms of ESG-linked loan issuance, its global market share in the ESG-linked loan market (i.e., 18%) is signi cantly lower than its market share in the global syndicated loan market (i.e., 52%).[12] While western European countries also rank highly in terms of green loan issuance, Japan, Singapore, Australia, Taiwan, and Hong Kong, among others, rank higher in this market compared to their activity in the ESG-linked loan market.

[Insert Figure 2 here]

In Figure 2, we graphically summarize this cross-country distribution by region (i.e., Europe, North America, and rest of the world) each year over our sample period. The top gure shows that the majority of ESG borrowers worldwide are incorporated in European countries, especially until 2020. This is largely driven by the distribution of ESG-linked loans, as shown in the second gure. While lagging behind Europe, ESG-linked loan issuance by North American borrowers has been comparable to the rest of world combined { for example in 2019 { but grew more than threefold in 2021. On the other hand, the bottom gure illustrates that the rest of the world (e.g., Japan, Australia, Hong Kong, Singapore, Taiwan, etc.) is relatively more prominent in the issuance of green loans, whereas North America remains dormant in this segment of the ESG lending market. European rms have been active borrowers in both ESG-linked and green loan markets.

[Insert Figure 3 here]

We further visualize the temporal evolution of ESG lending activity around the world in Figure 3, which presents year-by-year heat maps illustrating the dollar intensity of ESG-linked loan (Panel A) or green loan (Panel B) issuance activity across di erent countries. Panel A shows that ESG-linked loans started to emerge in 2017 across western Europe. The growth in ESG-linked loan issuance thereafter has been swiftest in European countries (e.g., France, Italy, and Spain), but has also quickly become widespread in other parts of the world.

[12] According to the 2020 global syndicated loans review by Re nitiv.

The United States was the largest issuer of ESG-linked loans in 2021. Panel B illustrates the growth of green loan issuance around the world. Overall, green loans have propagated broadly as well, albeit with less intensity. These loans were initiated in western European countries and Japan, and have also been popularized in the United States and Australia.

In short, the ESG loan market, and ESG-linked loans in particular, has grown rapidly in the past several years, spreading across diverse industries and prominently among U.S. and western European borrowers. These preliminary ndings guide our subsequent analysis to study the determinants and incentives of ESG lending and borrowing. Our study is the rst to provide novel documentation of the global emergence of ESG contingent debt contracts.

4 Results

4.1 Cross-Country Determinants of ESG Lending Activity

We begin by investigating cross-country determinants of ESG lending. To avoid confounding di erences in general banking sector activities across countries, we compute \abnormal ESG-linked (green) loan shares" at the country level as the dependent variable. Speci cally, we take the di erence between the country's aggregate ESG linked (green) loan issuance over our sample period as a fraction of worldwide ESG-linked (green) loan issuance, and the country's non-ESG loan issuance as a fraction of worldwide non-ESG loan issuance. The variable captures the intensity of ESG-linked (green) loan issuance in a country in excess of the country's normal lending activity during our sample period.

[Insert Table 4 here]

To explain abnormal loan shares, we conduct a cross-sectional analysis in the spirit of Djankov et al. (2007), where we consider institutional di erences across countries such as legal origins (i.e., common or civil law origin), private credit provision (i.e., domestic credit extended to the private sector), the strength of creditor rights (i.e., no automatic stay,

priority for secured creditors, restrictions on reorganizations, or management does not stay in reorganization), and stringency of environmental regulation (i.e., 1-very lax to 7-very stringent) as key explanatory variables. Private credit provision is obtained from World Bank Open Data. We adopt common law origin status and creditor rights index from Djankov et al. (2007) and La Porta et al. (1998). Following Ben-David et al. (2021), we collect information on the stringency of environmental regulation from the World Economic Forum. The regression is a cross-sectional model with one observation for each country.

An important determinant that explains the issuance of ESG-linked loans, but not the issuance of green loans, is the country's legal origin. We nd that countries with common law origins exhibit signi cantly less ESG-linked loan issuance activity than civil law countries. Common law countries emphasize shareholder protection and discretion-based private market outcomes, while discouraging unfair practices through the judicial system. Civil law countries, on the other hand, are more stakeholder oriented and based on interventions through rules and regulations. Liang and Renneboog (2017) document that stakeholder oriented civil law countries are more likely to support CSR friendly economies. Our result that civil law countries are more likely to house active ESG-linked loan markets is consistent with their ndings, further highlighting the role of stakeholder oriented legal regimes in facilitating private contracts that induce commitment to such values. In contrast, we nd no evidence that legal origins matter for the development of green loan markets, which are primarily project nancing deals that are less indicative of commitment to broader ESG agendas.

For both ESG-linked and green loans, however, we nd that robust private credit markets are essential for the development of rich ESG lending markets. This is consistent with the notion that well developed credit markets, with e ective institutions to support them, foster innovations in nancial markets. We also nd that ESG-linked and green loans both ourish under stricter environmental regulations, consistent with the idea that these loans arise as lenders and borrowers respond to heightened stakeholder pressure.

Overall, our results suggest that legal origins, private credit markets, and environmental

regulations are important determinants of ESG lending activity at the country level. Next, we focus our analysis at a more granular level to study detailed characteristics of the loans themselves, as well as the borrowers and lenders who contract on such loans.

4.2 Borrower and Loan Characteristics

In this section, we examine borrower and loan characteristics of ESG-linked and green loans, and compare them with control loans without ESG contingent features. We report unconditional comparisons as well as matched-sample analysis, in Table 5.

[Insert Table 5 here]

Panel A reports unconditional comparisons. We restrict the control group to loans issued to borrowers in countries with at least some ESG lending activity during our sample period. ESG-linked loan borrowers are signi cantly larger than non-ESG borrowers as measured by their sales as of the time of deal closure (i.e., average $10.8 billion vs. $6.6 billion). ESG-linked loan borrowers are also more likely to be publicly listed than non-ESG borrowers: 52% of ESG-linked loan borrowers are publicly-listed rms, whereas only 21% of control loan borrowers are. Correspondingly, the average deal size of ESG-linked loans is substantially larger than non-ESG loans as well (i.e., deal size $937.2 million vs. $520.8 million, and facility amount of $533.3 million vs. $245.5 million). While ESG-linked loans have marginally shorter maturities, we later show that they have longer maturities controlling for facility type.

ESG-linked loan facilities are substantially more likely to be revolving credit facilities compared to the control sample (i.e., 55% vs. 37%). Revolving credit facilities, unlike term loans, are typically held by relationship lenders, which facilitates e ective contracting around commitments by setting contingencies that can be monitored, enforced, and renegotiated with ease (see Berger and Udell, 1995; Berlin et al., 2020). We provide more evidence on lender-borrower relationships in our analysis of the syndicate structure of ESG lenders.

We also nd that ESG-linked loans are issued by high credit quality rms: They are more

likely to be rated investment grade and less likely to be leveraged loans. This contradicts the \constraint argument" where rms reluctantly borrow on ESG-contingent terms from ESG-conscious banks to alleviate borrowing constraints. To the contrary, our results indicate that ESG-linked borrowers are on average less credit-constrained.

On the other hand, green loan borrowers tend to be smaller in terms of sales (i.e., $5.1 billion vs. $6.4 billion) and less likely to be publicly listed (i.e., 10% vs. 21%) than control loan borrowers. The average deal size of green loans is also no larger than control loans { In fact, they consist of smaller loan facilities (i.e., $155.2 million vs. $241.7 million). In contrast to ESG-linked loans, green loans are also less likely to be revolving credit facilities (i.e., 18% vs. 36%) and overwhelmingly likely to be project nancing vehicles (i.e., 69% vs. 9%) compared to control loans. As green loan borrowers are typically small and privately held, these loans are also less likely to be investment grade.

Overall, Panel A of Table 5 suggests that ESG-linked loans are obtained by large and economically important rms. Such rms are likely to have strong incentives to signal ESG-friendly practices given their visibility and correspondingly high demand from stakeholders.[13]

In Panel B of Table 5, we examine the package structure of ESG loans. Since package structure could systematically vary with loan size and other borrower-lender characteristics, we match each ESG-linked or green loan package to a control non-ESG loan package originated in the same year and country as the ESG loan. We also match on borrower's industry and on whether the borrower is a privately held or publicly listed company. Finally, we retain the control loan package closest in deal size to the ESG loan package. Our matched sample contains 694 (625) ESG-linked (green) loan packages and 734 (641) matched packages.[14]

Our analysis of loan package composition indicates that ESG-linked (green) loan packages are almost exclusively comprised of ESG-linked (green) loan facilities (i.e., 97% and 96%, respectively). Consistent with the unconditional analysis, the results also show that ESG-

[13] 90% of the ESG-linked borrowers in our sample are among the top 10% in terms of market capitalization in each of their respective countries of domicile, indicating that these rms are \national champions".

[14] We end up with a few one-to-many matches when there are multiple control packages with the same closest deal amount.

linked loans are signi cantly more likely to consist of revolving credit facilities rather than term loans. In fact, more than half of all ESG-linked packages are composed entirely of revolvers (i.e., 54%). Also consistent with the unconditional analysis, green loan packages are mostly comprised of term loans (i.e., 43% of them consisting only of term loans).

Overall, our examination of the borrowers, deals, and facilities in ESG lending contracts reveal that ESG-linked loans are large in size, borrowed by economically important and reputable rms, and mostly consist of general purpose revolving credit facilities. In contrast, green loans are borrowed mainly by privately held rms for project speci c purposes in relatively smaller term loans. The distinctly high proportion of revolvers in ESG-linked loans suggest that they may arise primarily from preexisting lending relationships. Next, we study the syndicate structure of ESG lenders to further investigate this issue.

4.3 Lending Syndicate Structure

In this section, we explore the syndicate structure of ESG-linked and green loans, and provide insights into the incentives of lenders who participate in the burgeoning ESG lending market. We match each ESG-linked or green loan facility to a non-ESG control loan facility based on country, industry, year, borrower public-private status, and closest facility size. We retrieve information on lenders for each loan facility from Re nitiv. For each facility, we identify all lead arrangers in the syndicate following Cai et al. (2018) and Houston et al. (2018). We are able to nd information on 11,164 (9,902) lead arrangers for 1,035 (1,208) ESG-linked (green) loan facilities and 1,352 (1,526) non-ESG matched facilities.

For these lead arrangers of the loan syndicates, we study lender characteristics that are likely to be crucial to ESG lending at a global scale. First, we examine lenders' experience in the ESG market. To the extent this novel loan product requires expertise in formulating, coordinating, and monitoring contract terms, banks with prior experience in ESG loan issuance could have an advantage over other banks. Second, we examine the lender's status as a prominent global bank (i.e., reputable lender). Stakeholder demand for ESG commit-

ment is likely to be greater for large global banks, thereby a ecting the banks' incentives to engage in ESG lending. Such banks are usually under greater scrutiny by regulators and governments. In addition, the global status of such banks could also help with the certi ca-tion role of bank loans (see James, 1987), and could signal the lender's con dence regarding the borrower's commitment towards ESG related issues. Third, we investigate the lender's domicile in relation to the borrower's domicile (i.e., foreign lender). Cross-country frictions { nancial, regulatory, physical, or cultural { are known to create lending home bias (see Carey and Nini, 2007; Giannetti and Laeven, 2012b,a; De Haas and Van Horen, 2013; Popov and Van Horen, 2015; Houston et al., 2018). Assessing whether ESG borrowers overcome such frictions in order to obtain ESG loans from globally reputed and experienced banks can give useful insights regarding the ESG lending process and the future growth of this market. Lenders from countries with a strong ESG culture, for example, may be more capable of acting as a coordinating agent in ESG-linked loan contracts. Finally, we investigate the lender's banking relationship with the borrower (i.e., relationship lender), as relationship lending is an important factor for e ective contracting and nancing (see Berger and Udell, 1995; Petersen and Rajan, 1994; Dahiya et al., 2003; Schenone, 2004; Acharya and Johnson, 2007; Bharath et al., 2007). For instance, a lender with a previous lending relationship with the borrower may be more capable of designing an ESG-linked loan that is better tailored for the borrower. On the other hand, relationship banking may also foster mutually bene cial greenwashing arrangements between the borrower and lender at the expense of stakeholders.

To explore these agendas, we classify lenders into groups. We classify lead arrangers with ESG lending history in our sample as ESG-experienced lenders. We de ne reputable lenders as the top 5% lenders in terms of total lending amount over the previous ve years from the loan origination. We identify foreign lenders as lead arrangers from countries other than the borrower's country of incorporation. Finally, we designate a lead bank as relationship lender if it had any prior lending relationship (as a lead arranger) with the borrower over the previous ve years from the initiation of a loan. Based on these de nitions, we report

the number and fraction of speci c types of lenders comprising the syndicate of ESG-linked or green loans, and compare them against the matched non-ESG samples.

[Insert Table 6 here]

Table 6 presents these results. The average ESG-linked (green) loan is syndicated by a signi cantly larger group of lenders than the average non-ESG loan (i.e., 5.57 (4.68) vs. 3.99 (2.78) lenders). This is possibly due to the need for a dedicated \sustainability agent" to handle ESG contingencies in loan contracts. It is also possible that there is a greater demand from lenders (and their stakeholders) to co-lead such deals. Next, we examine the di erent types of lenders comprising the lending syndicate. For each type, we report both the average number of lenders and the average fraction of lenders comprising the syndicate (in brackets). Both ESG-linked and green loans are signi cantly more likely to have a larger number and higher fraction of ESG-experienced lenders, reputable lenders, and foreign lenders as part of the syndicate. In other words, ESG-linked and green loans alike have larger syndicate size and tend to attract reputable global banks seeking and procuring repeated business in ESG loan origination. From a loan contracting point of view, this is consistent with the complexity of ESG loans requiring specialized lenders to handle ESG-speci c contract features. From a bank stakeholder-demand point of view, this is also consistent with a large number of global reputable banks seeking to actively participate in a limited number of \hot" ESG loans.

Importantly, Table 6 shows that relationship lending plays a distinctively critical role in facilitating ESG-linked loan issuance. 59% of all ESG-linked loan lead arrangers have previous lending relationships with the borrowers, compared to 52% of non-ESG matched loans. In sharp contrast, only 16% of green loan lead arrangers are relationship lenders, compared to 34% of non-green matched loans. The importance of lending relationships permeates all other lender categories: There are signi cantly more relationship ESG-experienced lenders, relationship reputable lenders, and relationship foreign lenders on the syndicates of ESG-linked loans, whereas the opposite is true for green loans. This is also consistent with our earlier nding that ESG-linked loans are more likely to be structured as revolving credit

facilities, which are typically relationship-based. A potential interpretation for this nding is that lending relationships facilitate more e ective tailoring and monitoring of ESG commitments speci c to the borrower. Another interpretation could be that it is substantially easier for banks to relabel revolving credit lines of their existing relationship borrowers as ESG-linked loans when they renew or rollover these general purpose loans that are not tied to a speci c project (in the spirit of \greenwashing"). We further delineate these possibilities in our analysis of ESG performance around ESG loan issuance.[15]

4.4 ESG Loan Pricing

Are ESG-linked and green loans priced di erently from other comparable loans? To the extent ESG lending is driven partly by increased demand from creditors, ESG loan borrowers could potentially raise nancing at a lower spread. Additionally, good ESG pro les can protect rms against downside risks (see Albuquerque et al., 2020), which could translate into lower spreads at issuance. On the other hand, there are implicit and explicit costs of an ESG loan. Structuring and monitoring ESG-terms of such a loan entails additional costs, some of which could be incorporated in the loan spread. More importantly, rms could potentially engage in ESG activities to cater to some key stakeholders even when it is not value enhancing for the rm. Such practices could again increase loan spreads at issuance.

To investigate this question empirically, we follow Berg et al. (2017) and examine all-in-spread-drawn (AISD) di erences between ESG and non-ESG loans. We estimate the following regression speci cation:

$$AISD_{i;j} = \quad + \quad _1 \quad ESG_{i;j} + \quad _2 \quad X_j + \quad _3 \quad Z_i + I(Country \quad FF17 \quad Year) + \quad _{i;j} \quad (1)$$

The dependent variable, $AISD_{i;j}$, is the spread over LIBOR for loan facility j issued by borrower i. We perform separate analysis for ESG-linked and green loans. $ESG_{i;j}$ is a

[15] We also recon rm our univariate ndings in multivariate kitchen sink regressions, reported in Table A.2.

dummy variable equal to one if the loan is ESG-linked or green, and zero otherwise. X_j controls for facility characteristics such as facility amount, maturity, security and loan type. Z_i controls for borrower characteristics such as rating and public listing status.

The results are reported in Table 7. ESG-linked loans do not seem to be priced di erently from non-ESG loans. While ESG loans pay 98 basis points less compared to non-ESG loans from the same country and industry and issued in the same year (see Column 1), the discount largely disappears after controlling for rm and loan characteristics. This suggests that borrowers do not enjoy pricing bene ts from obtaining ESG-linked loans. However, given that ESG-linked loans feature performance pricing linked to meeting KPI targets, the insigni cant spread di erence at issuance is also consistent with lower spreads on ESG-linked loans for borrowers who meet their targets in the future.

On the other hand, green loans are issued at a lower spread. Our most stringent speci - cation, which controls for loan and borrower characteristics, suggests that green loans have AISD that are 56 basis points lower than a comparable non-green loan. As these are use-of-proceeds loans and do not have ESG-related performance pricing, our results suggest that creditors are clearly willing to reduce spreads for green loans. This is in contrast to Flammer (2021), who nds no di erence in spreads for green and non-green bonds. Flammer (2021) notes that the typical bond investor may not be willing to trade o nancial returns for other considerations. It is possible that large reputable banks, who are regulated by stakeholders with such considerations, would be incentivized to make this trade-o .

4.5 Disclosure Quality of KPIs in ESG-Linked Loans

To gauge the credibility of ESG commitments signi ed by the issuance of ESG-linked loans, investors must rely on information regarding the contractual details such as what the speci c KPIs are and how they are tied to loan terms. However, in the absence of regulations or disclosure requirements in the emerging ESG lending market, this information is voluntarily and selectively disclosed by borrowers and lenders. A common criticism among practitioners

is that this information is scarcely available, making it di cult to verify the validity of ESG loan labels and navigate the opaque market.[16] The lack of detail, or quality, of such disclosures is in turn skeptically viewed as an indication of greenwashing. It is therefore important to examine the quality of KPI information disclosures in ESG-linked loans.

While it is not straightforward to collect all contractual information that is made publicly available in the absence of standardized reporting rules, we document KPI disclosure quality by fully utilizing information that can be obtained through Re nitiv DealScan. Re nitiv exploits a vast array of public information sources such as company business reports, earnings calls, media releases, and direct interactions with lenders and borrowers. Details regarding ESG-related KPIs and relevant performance pricing grids are processed by Re nitiv's ESG loan expert analysts and then made available via remarks and ags in the database. We manually read through these texts and classify ESG-linked loans as follows.

We de ne \good disclosure" ESG-linked loans as those that include statements that the loan spreads are linked to ESG-related KPIs. Among good disclosure loans, we further identify whether the speci c KPIs themselves are transparently listed in the loan contract descriptions. We de ne \poor disclosure" loans as those that do not disclose information about the linkages between KPIs and loan terms. We further break down poor disclosure loans based on whether they have at least vague remarks about sustainability or no ESG-related information at all, other than in their labels.

[Insert Table 8 here]

These statistics are summarized in Table 8. Half of the ESG-linked loans in our sample voluntarily disclose information regarding the linkage between KPIs and loan terms (i.e., 584 \good disclosure" loans out of 1,127 loans). Of these, only 456 loan facilities provide detailed descriptions of what the KPIs actually are. 236 ESG-linked loans report no information about the contractual terms whatsoever, other than being labeled as an ESG-linked loan.

[16] See Bloomberg, September 8, 2021, June 22, 2021, February 3, 2020.

We also examine how disclosure quality relates to some important attributes of borrowers and loans. Consistent with the cultural emphasis on sustainability, a larger (smaller) fraction of good (poor) disclosure ESG-linked loans tend to be obtained by borrowers domiciled in countries with civil law origins. Also consistent with higher external pressure for information disclosure, a larger (smaller) fraction of good (poor) disclosure loans are obtained by publicly listed borrowers. Indicating that some banks and borrowers with extant lending relationships may simply apply ESG-linked loan labels without substance, a higher (lower) fraction of poor (good) disclosure loans tend to be amendments of previously existing loans.

Unsurprisingly, good disclosure loans are more likely to disclose that the KPI is based on a third party ESG rating (e.g., KLD rating or Sustainalytics ESG score) or external KPI measurement and validation, and also more likely to disclose which lender within the syndicate is the ESG agent or sustainability coordinator. However, these fractions are fairly low even for good disclosure loans (i.e., 22% and 12%, respectively). Among ESG-linked loans that publicly list speci c KPIs, the overwhelming majority, or 95%, tie the loan spreads to an environmental KPI (e.g., greenhouse gas emissions). 26% use both environmental and social KPIs (e.g., emissions, labor safety, workforce diversity). Interestingly, there is an asymmetric pattern in how loans disclose the rewards and penalties to be applied to loan spreads conditional on ESG performance. 24% to 27% of good disclosure loans disclose the spread rewards conditional on meeting ESG performance targets, but only 14% to 17% disclose the penalties should the borrower miss the target.

Overall, our ndings suggest that disclosure quality in ESG-linked loans is generally low, and that there is considerable heterogeneity in the amount of contractual detail disclosed. We later exploit this heterogeneity in our ESG performance analysis to further delineate potential incentives in ESG-linked loan contracting.

4.6 Loan Issuance and ESG Performance

A natural and important question to ask to narrow down the interpretation for the ESG lending market is whether borrowers and lenders previously committed to ESG issues are more likely to engage in ESG contingent loan contracting, and whether such explicit and contractual commitments impact their ESG performance ex-post. In conjunction with the aforementioned results, examining this question further helps identify the underlying motives of borrowers and lenders who actively participate in ESG lending markets. In this section, we investigate this issue using rm-level ESG scores from the Re nitiv Asset4 database.

Re nitiv gathers extensive publicly available information on ESG performance from companies' annual reports, corporate websites, non-governmental organization (NGO) websites, stock exchange lings, CSR reports, news media, and etc. Their analysts process this rich information for a large set of rms around the world (most of which are publicly listed), assigning values corresponding to ten sub-categories under three major categories: Environmental (Resource use, emissions, innovation), Social (Workforce, human Rights, community, product responsibility), and Governance (Management, shareholders, CSR Strategy). Within each category, values are assigned by aggregating various indicator variables that capture speci c aspects related to the category. These values are in turn converted to cross-sectional percentile rank scores. The scores for each of the ten categories are combined into an overall ESG score for each rm, which indicates the company's overall ESG performance.

The coverage of the Asset4 database constrains our sample to loans associated with only publicly listed borrowers and lenders. We focus on ESG-linked loans in this part of the analysis as we aim to examine the heterogeneity in disclosure quality around the contractual details regarding ESG contingent performance pricing[17]. After manually matching our loan sample with the Asset4 database on borrower and lender company names, we are left with 689

[17] We do not lose many observations by dropping green loans from this analysis, because there are few publicly listed green loan borrowers with valid ESG scores. Green loan borrowers are mostly privately held rms that are not covered by the Asset4 database.

ESG-linked and non-ESG matched loans associated with 424 borrowers and 273 lenders.[18]

4.6.1 Ex-Ante ESG Pro les and ESG-Linked Loan Issuance

We begin by examining whether borrowers and lenders previously committed to ESG issues (as measured by their Asset4 ESG score) are more likely to engage in ESG contingent loan contracting. We run a linear probability model and report the results in Table 9. The dependent variable is an indicator variable for whether a loan is an ESG-linked loan. We regress the dependent variable on the borrower's lagged ESG score, the average of the lead lenders' lagged ESG scores, and the di erence between the borrower's and lenders' ESG scores as explanatory variables. We further include the facility amount, maturity, revolving credit facility status, project nance status, the number of lead arrangers, the fraction of relationship lenders in the syndicate, and country-by-industry-by-year xed e ects as control variables. Standard errors are clustered at the country-by-industry level. Panels A and B each report results from OLS and logistic regressions, respectively.

[Insert Table 9 here]

We nd that both the borrower's and lender's ex-ante ESG scores are strongly and positively associated with the likelihood of ESG-linked loan issuance, even after controlling for one another. A one standard deviation increase in the borrower's (lender's) ESG score is associated with a 11.1% (8.8%) higher likelihood of ESG-linked loan issuance, statistically signi cant at the 1% (5%) level. These results are consistent with recent ndings that

[18] We match on company names because there are no common identi ers between the DealScan and Asset4 databases. To obtain a high quality name mapping, we rst merge DealScan and Compustat/Compustat Global using link tables provided by Chava and Roberts (2008) and Schwert (2020). To obtain a more complete coverage of global company names, we further merge the DealScan-Compustat linked dataset with Worldscope. We use all the available company names obtained through this process to match our loan sample with the Asset4 database. We nally conduct a thorough manual check through Google searches and Capital IQ corporate trees to con rm matches and further match any unmatched cases. The set of borrowers and lenders matched with Asset4 account for 70.08% (424 out of 605) and 63.34% (273 out of 431) of publicly listed borrowers and lenders in our original sample, which is comparable to the matching yield of green bond issuers in the analysis of Flammer (2021) (69.78% or 157 out of 225 rm-year observations).

borrowers and lenders with similarly high ESG ratings tend to form lending relationships (see Kacperczyk and Peydro, 2021; Houston and Shan, 2021; Hauptmann, 2017).

4.6.2 ESG-Linked Loan Issuance and Ex-Post ESG Performance

The fact that ESG-linked loans tend to be issued to borrowers that already have superior ESG pro les raises the question of whether these contractual commitment devices a ect ex-post ESG performance. If ESG-linked loans serve as credible signals to commitment to ESG-friendly practices, one would expect the superior ex-ante ESG pro les to further improve or at a minimum be sustained after ESG-linked loan issuance. On the other hand, a deterioration of ESG performance ex-post could be indicative of \greenwashing" around ESG-linked loan issuance. We investigate the e ects of ESG-linked loan issuance on future borrower ESG performance by estimating a panel regression speci cation as follows.

$$\begin{aligned} \text{ESG Score}_{i;t} = \quad & + \quad {}_1 \ \text{ESG Borrower}_i \quad \text{PostLoanIssuance}_{i;t} \\ & + \quad {}_2 \ \text{ESG Borrower}_i + \quad {}_3 \ \text{PostLoanIssuance}_{i;t} \\ & + \text{I(Firm)} + \text{I(Country} \quad \text{Year)} + \text{I(Industry} \quad \text{Year)} + \quad {}_{i;t} \end{aligned} \tag{2}$$

The dependent variable is one of the following ESG performance metrics of the borrower: The overall Asset4 ESG score, ES score de ned as the average of the environmental and social scores separately reported in Asset4, E score which captures environmental performance, or components of the E score such as the emission score re ecting e orts to reduce direct scope 1 emissions, resource score re ecting e orts to reduce indirect scope 2 emissions from resource usage, and innovation score re ecting e orts to develop environmentally friendly products or abatement technologies. $\text{PostLoanIssuance}_{i;t}$ is an indicator variable for whether the borrower had obtained an ESG-linked loan during or before the given year. ESG Borrower_i is a cross-sectional dummy variable indicating whether the borrower obtains an ESG-linked loan at any time throughout the entire sample period. We further control for rm and country-by-industry-by-year xed e ects. The coe cient, ${}_1$, captures a quasi di erence-

in-di erences estimator that tests whether ESG borrowers experience di erential changes in their ESG scores after obtaining an ESG-linked loan, compared to non-ESG borrowers. To estimate this model, we construct a rm-year panel dataset consisting of 4,044 borrower-year observations. We retain the time-series of ESG scores collected from Asset4 for the ESG and control borrowers in our sample during the period from 2010 to 2020.

[Insert Table 10 here]

Table 10 reports the results. In Panel A, the regressions are run on the full matched sample of borrowers. The dependent variable in columns (1) and (2) is the overall Asset4 ESG score. The dependent variable in columns (3) and (4) is the ES score de ned as the average of the environmental and social scores separately reported in Asset4. The dependent variable in columns (5) and (6) is the E score which captures environmental performance. The signs on the coe cients for $ESG\ Borrower_i \quad PostLoanIssuance_{i,t}$ are negative in all six speci cations. Much of the di erence in ESG performance between ESG and non-ESG loan borrowers is explained by their pre-issuance level di erence. The coe cients of $ESG\ Borrower_i$ in columns (1), (3), and (5) show that on average ESG borrowers have 10.79, 13.09, and 13.93 higher ESG, ES, and E scores, respectively, than non-ESG borrowers. However, the negative e ects of ESG lending on borrower ESG performance turn economically and statistically signi cant after controlling for rm xed e ects, which subsume $ESG\ Borrower_i$. Within- rm, all ESG performance metrics deteriorate after ESG-linked loan issuance. The magnitude of the relative decline in ESG scores of ESG borrowers compared to non-ESG borrowers ranges from 4.3 to 6.2 points, which is economically meaningful and corresponds to half of the pre-issuance level di erences between ESG and non-ESG borrowers.

Market participants, media, and academics have all raised concerns about the subjective nature and inconsistency of some third-party ESG scores (see Berg et al., 2021, 2022; Tang et al., 2022). Acknowledging these concerns, we further dig into the components of Asset4 scores to isolate measures that are plausibly more objective. Speci cally, we use the three

components of E score - (i) Emission reduction score, which measures a company's commitment and e ectiveness towards reducing environmental emissions; (ii) Resource use score, which measures a company's capacity to reduce usage of materials, energy, or water; and (iii) Innovation score, which re ects a company's capacity to reduce environmental costs for its customers. In particular, emission and resource scores are likely to be more objectively measured. Consistent with the results in the earlier columns, we nd that emission, resource, and innovation scores fall after ESG-linked loan issuance.

To further delineate whether the ex-post within- rm deterioration in ESG performance is consistent with greenwashing, we exploit the cross-sectional heterogeneity across ESG-linked loans in the quality of their disclosures regarding how the loan terms are tied to speci c KPIs. In Panel B of Table 10, the quasi di -in-di regressions with rm and country-by-industry-by-year xed e ects are run on subsamples consisting of borrowers obtaining ESG-linked loans with good or poor KPI disclosure quality and their matched non-ESG counterparts. The results paint an interesting picture. ESG-linked loans with good disclosure quality are not associated with post issuance decline in borrower ESG scores. Such borrowers, who have high ESG scores to begin with, continue to maintain their superior ESG scores. On the other hand, consistent with a greenwashing hypothesis, we nd a sharp deterioration in ESG performance following the issuance of an ESG-linked loan of lower KPI disclosure quality.

Taken together, we document potential matching in ESG lending arrangements, where large borrowers with high ESG scores aim to signal their commitment to maintain the high quality of their ESG pro les, by obtaining ESG-linked loans from reputable ESG-experienced global lenders they share previous banking relationships with. However, we nd that ESG loan issuance itself has no positive impact on ex-post borrower ESG performance, but in fact is followed by within-borrower deterioration in ESG performance. This ex-post deterioration is driven by ESG-linked loans with poor KPI disclosure quality. There is no ex-post deterioration in ESG scores following the issuance of high disclosure quality loans, suggesting greater commitments toward high ESG standards by such borrowers.

4.7 Stock Market Reactions Around ESG Loan Issuance

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

[Insert Table 11 here]

Table 11 reports average cumulative abnormal stock returns (CARs) of borrowers around public announcements of ESG-linked loan issuance. The sample consists of 412 ESG-linked loan issuance events for which announcement dates can be identi ed through Factiva news search and borrowers are publicly listed.[19] CARs are computed from a market model using the MSCI All Country World Equity Index as the benchmark. We report average CARs for subsamples of ESG-linked loans with good (N=241) or poor (N=171) KPI disclosure quality, and report the di erence of means between the two subamples. Standard errors of the average CARs are adjusted for clustering at the borrower level.

The event study indicates that the average CAR is positive for ESG-linked loans with good disclosure quality, but negligible or negative for poor disclosure loans. The di erence in CARs between good and poor disclosure loans is also sizeable. This result qualitatively holds for a variety of daily event windows (i.e., [5; 10], [1; 10], [1; 3], [1; 3], and [1; 10]),

[19] As detailed in Table 11, we choose ESG-linked loan announcement dates from Factiva searches of keywords (\ESG" or \environmental" or \social" or \governance" or \sustainability" or \green") and (\credit" or \loan" or \borrow"). We retain news dates that correspond to between 6 months before and 2 months after the facility start date in DealScan (see Maskara and Mullineaux, 2011). We manually narrow down these search results based on borrower company names and the content of the news articles. We nally select announcement dates as the news dates of articles where the reported loan terms (e.g., loan facility amount, maturity) match those recorded in DealScan, or the earliest news date reporting the issuance of a sustainability loan if detailed loan terms are not reported.

with varying statistical signi cance. The CARs in other intervals outside the event windows are small and insigni cant, nor any di erent between the two groups of loans, indicating that the results are not due to spurious trends around the loan announcement dates.

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

5 Conclusion

In this paper, we provide the rst comprehensive characterization of the ESG lending market, which has grown exponentially within the past six years. ESG-linked (or equivalently termed sustainability-linked) loans are general purpose loans with loan terms that are contractually tied to the borrower's ESG performance ex-post. These loans need not be used for speci c green projects, enabling borrowers and lenders to tailor the contractual ESG contingencies to a broad array of potential ESG performance metrics, such as third party ratings, greenhouse gas emissions, labor safety, and more. This unique feature of ESG-linked loans stands apart from project-speci c green bonds, an ESG nancing market that has received relatively more attention from academics and practitioners in recent years. Contracts similar to green bonds have developed in the lending market as well, namely green loans, whose proceeds are speci cally earmarked for use in designated \green" projects.

We show that the ESG lending market has grown rapidly, driven by the rise of ESG-linked loans, which is becoming one of the most important green nancing sectors. Consistent with the general purpose nature of ESG-linked loans, they are relatively widespread across a variety of industries compared to use-of-proceeds based green loans (or bonds). While

ESG lending markets are generally large in countries with robust private credit markets or stringent environmental regulations, ESG-linked loans are especially popular in countries with civil law origins where economic outcomes are often based on stakeholder oriented interventions through rules and regulations rather than market discretion.

ESG-linked loans are generally issued among large publicly listed borrowers in large amounts. These loans are structured mainly as revolving credit facilities, yet have longer maturities compared to other revolvers, indicating that these deals arise primarily out of preexisting banking relationships. Consistent with this idea, ESG-linked loans are distinctly more likely to be originated by large syndicates that are comprised of banks with whom borrowers have previous lending relationships. In contrast, green loans are more likely to be smaller project nancing term loans issued to privately held rms. ESG loans in general have larger syndicates comprised of global reputable banks, indicating that lenders have reputational incentives to signal good ESG practices.

However, while we nd that both borrowers and lenders who have superior ESG pro les ex-ante are more likely to self-select into ESG loan contracts, we nd no evidence that the issuance of such loans positively a ects borrowers' or lenders' ESG performance ex-post. To the contrary, we nd that borrower ESG scores deteriorate after ESG loan issuance, especially for ESG-linked loans where the quality of disclosure regarding the contractual details of the ESG-related KPI is poor, suggestive of greenwashing practices. Consistent with investor vigilance against such practices, we nd that stock markets react positively to public announcements of ESG-linked loan issuance only when KPI disclosure quality is high.

Overall, our paper contributes to the burgeoning literature that studies how investors and rms contract on their nancing agreements in ways that increasingly take into account stakeholder values. Our novel ndings shed light on the relatively unexplored credit market, and show how the vast global syndicated loan market has developed mechanisms that internalize ESG-related concerns among borrowers and lenders. However, our ndings raise concerns of the transparency and e ectiveness of such contracts in facilitating real and pos-

itive improvements in corporate ESG practices. There remains much room for richer and deeper analyses of this nascent but burgeoning segment of global banking.

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

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

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

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