

# ESG Lending

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## Abstract

The “ESG lending” market, where loan contract terms are contingent on borrower ESG performance (i.e., ESG-linked loans), or where loans are issued for specific green projects (i.e., Green loans), has grown exponentially from \$6 billion in 2016 to \$173 billion in 2019. Much of this growth is driven by ESG-linked loans which are widespread across various industries and well developed capital markets, especially in civil law countries. ESG-linked loans are issued in sizeable amounts by large and publicly listed borrowers, and are often structured through revolving credit facilities by large groups of syndicates led by reputable “ESG specialist” global banks, who keep tight relationships with borrowers. Green loans are smaller project finance vehicles, similar in format to green bonds, yet issued to mostly privately held borrowers. They do not tend to attract large cross-border syndicates. We find that ESG loans tend to be written by borrowers and lenders with superior ESG profiles ex-ante, and find no evidence that their ESG performances deteriorate ex-post after ESG loan issuance. Overall, our results indicate that borrowers capable of maintaining high ESG standards and lenders capable of coordinating and monitoring ESG loan contracts drive the emergence of ESG banking activities around the globe.

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

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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. 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.<sup>1</sup> This is especially surprising given that bank loans are the primary source of debt financing for firms around the world.<sup>2</sup> This paper fills this void by documenting and characterizing the growth of ESG lending around the world, which plays an increasingly important role in incentivizing borrower commitment to sustainability.

We define ESG lending as the issuance of 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 Thomson/Refinitiv DealScan data over the sample period from 2016 to May 2020, we document that ESG lending activity around the world has grown exponentially during recent years – from \$6 billion in 2016 to \$173 billion in 2019 – becoming an important segment of the global loan market and eclipsing the global green bond and sustainability-linked bond markets.<sup>3</sup> Among all ESG lending activity in 2019, \$140 billion, or 80%, was comprised of ESG-linked loans. The proliferation of these general purpose loans has spread ESG lending to a broader

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<sup>1</sup>For research highlighting how equity investors express ESG concerns at their portfolio companies, see [Krueger et al. \(2020\)](#), [Hartzmark and Sussman \(2019\)](#), [Dyck et al. \(2019\)](#), and [Dimson et al. \(2015\)](#). For research on use-of-proceeds based green bonds, see [Flammer \(2021\)](#) and [Tang and Zhang \(2020\)](#).

<sup>2</sup>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.

<sup>3</sup>According to [Flammer \(2021\)](#), total 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 of \$5.85 billion in size as of 2019. The ESG-linked loan market also continues to grow even after the COVID-19 pandemic crisis (see *Wall Street Journal*, “Deluge of debt is tied to carbon emissions and diversity”, Paul J. Davies, May 4, 2021). Since the second half of 2020, ESG-linked loan issuance (around \$240 billion) has dwarfed ESG-linked bond issuance (around \$18 billion).

set of industries beyond utilities, where a greater portion of green loan and green bond financing remains concentrated.<sup>4</sup>

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. This explanation implies, for example, that ESG-linked borrowers will tend to have high visibility and therefore strong incentives to satisfy stakeholder demands (e.g., large firms), and are also capable of delivering on their commitments to ESG (e.g., firms with superior ESG profiles). Another explanation is that firms 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. Under this explanation, there would be no (or at best tenuous) relation between ESG-linked lending and the actual ESG performance of borrowers and lenders. It is also possible that borrowers with limited access to financing may be compelled to subject themselves to higher ESG standards and the monitoring of pro-social lenders to lower their borrowing constraints. A corollary to this explanation is that firms with borrowing constraints (e.g., small firms) would constitute the borrowers in ESG-linked loans. 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 valid commitment device toward ESG issues.<sup>5</sup>

Starting with an examination of the geographical distribution of ESG lending, we find

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<sup>4</sup>Utilities account for 22% of the aggregate issuance amount of ESG-linked loans, compared to 56% and 32% of green loans and bonds, respectively.

<sup>5</sup>Our findings are also consistent with the motivations for issuing green bonds which have been documented by [Flammer \(2021\)](#).

that ESG-linked loans in particular have originated in 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. The difference in contracting environments under civil law (which are more stakeholder value oriented in the rules and regulations that dictate economic life and corporate behavior ex-ante) and common law (which tend to leave outcomes to market discretion while relying on the judicial system to remedy unfairness arising from potential exploitation ex-post) plays an important role in the development of an ESG contingent lending market as it does for CSR in general. On the other hand, green loans are no more widespread in some legal systems than others, but are more common in countries with stronger environmental regulations. Both ESG-linked and green loans, however, are supported by well-developed private credit markets.

We then conduct detailed analysis at the loan level. Based on careful matching analyses, we find that ESG-linked loans are larger in size compared to similar loans issued in the same country, industry, and year. The average deal size of ESG-linked loans is \$819.2 million, whereas a non-ESG loan deal is on average \$560.3 million which is 30% smaller in size. ESG-linked loans tend to be issued to larger, safer (i.e., investment grade), and publicly listed borrowers. While these loans are structured mainly through revolving credit facilities (i.e., 57% of all ESG-linked loan facilities) to facilitate enforcement of the ESG contingencies, their maturities tend to be longer than other loans of the same type. In contrast, green loans are not significantly larger than their matched non-green loan counterparts, although they tend to have longer maturities. The vast majority of green loans are project finance loans (i.e., 67% of all green loan facilities) issued to non-investment grade privately-held borrowers.

ESG-linked loans also tend to be syndicated by larger groups of lenders (i.e., 6.19 lead arrangers, on average), which are mainly comprised of cross-border lenders (i.e., 59% of all lead arrangers in the average ESG-linked deal) who are often reputable and specialized in ESG lending. These ESG-linked lenders also tend to have previous lending relationships with

the ESG-linked borrowers. Green loans also appear to attract marginally larger cross-border syndicates, but they are less likely to be originated by relationship banks.

To understand the real consequences of these ESG lending practices, we further investigate whether ESG loans are written by lenders and borrowers that have superior ESG profiles ex-ante, and/or whether the issuance of these loans affect firms' ESG performance ex-post. Using ESG performance information obtained from Thomson Reuters' Asset4 database, we find support for the former but not the latter. While we find significant and positive associations between the likelihood of ESG lending and the ESG scores of borrowers and lenders ex-ante, we do not find any evidence of deterioration in their scores ex-post. It is important to note, however, that the Asset4 ESG scores employed in this part of our analysis may capture aspects of ESG performance that are different from the specific key performance indicators used in ESG loan contracts. We therefore caution the reader in interpreting our results. Nevertheless, these results are at a minimum consistent with an effective commitment mechanism provided by ESG lending, where large borrowers and global lenders who have good ESG profiles ex-ante are able to commit to maintain high ESG standards demanded by various stakeholders through explicit ESG loan contracting.

Highlighting a novel and growing form of ESG contingent loan contracts, our study contributes to the burgeoning literature on investor ESG preferences along the capital structure spectrum. In particular, our findings fill an important gap in our understanding of how investors and firms contract on ESG-related issues in the vast lending market. Recent studies suggest that good ESG profiles provide firms with protection against downside risks associated with reputation, customer loyalty, or regulatory oversight (see [Hoepner et al., 2020](#); [Albuquerque et al., 2020, 2019](#); [Ding et al., 2020](#); [Lins et al., 2017](#)).<sup>6</sup> These risks also have important implications for creditors who lend money to corporations (see [Acharya et al., 2011](#); [Houston et al., 2010](#)), making it important to understand how lenders and borrowers contract around such risks, and whether ESG-linked loan contracts could mitigate them.

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<sup>6</sup>For example, [Bartram et al. \(2021\)](#) and [Krueger et al. \(2020\)](#) show that climate change regulations pose an important source of risk for firms.

While recent studies find evidence that corporate and lender ESG profiles play a role in the assortative matching of lending relationships or that ESG related tail events adversely affect the bargaining power of borrowers (see [Houston and Shan, 2021](#); [Anginer et al., 2021](#); [Shin, 2020](#); [Hauptmann, 2017](#)), our study is the first to document how loan contracts are written to specifically reflect and/or mitigate such concerns.

By analyzing the increasingly important ESG lending market, our study also compliments 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 firms to improve their overall sustainability profiles rather than achieve narrower objectives that are tied to specific projects. This departure from use-of-proceeds based ESG contracting helps democratize ESG contingent financing 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 specific purposes and earmarked for green or ESG improving projects, is inexorably limited to a narrower set of industries.

Importantly, our focus on lending enables us to examine the incentives of creditors and borrowers in the origination of ESG contingent financing by characterizing the structure of the loan syndicates and probing the nature of arms-length lending relationships. In this regard, we contribute to the literature on stakeholder ESG monitoring. In light of rising concerns of climate change and other ESG related risks, an increasingly rich literature explores how equity investors engage in active monitoring of the firm to improve its ESG profile (see [Naaraayanan et al., 2021](#); [Hoepner et al., 2020](#); [Dyck et al., 2019](#); [Barko et al., 2018](#); [Dimson et al., 2015](#)), and more generally whether investors value ESG when making investment decisions (see [Döttling and Kim, 2021](#); [Gibson et al., 2021](#); [Cao et al., 2020](#); [Gibson et al., 2020](#); [Ilhan et al., 2020](#); [Krueger et al., 2020](#); [Hartzmark and Sussman, 2019](#)). In this literature, significant focus is given to institutional equity investors due to their importance as monitors given the atomistic nature of minority shareholders. Bond market

investors are similarly dispersed, making it difficult for them to engage in effective and active monitoring of the issuer’s ESG standards, or for the econometrician to investigate their incentives. In our study, the availability of information about the composition of lenders in ESG loan syndicates as well as the ex-post ESG performance of both lenders and borrowers provides a unique opportunity to delineate the motivations for ESG contingent debt contracting.

In summary, our study helps shed light on the evolution of capital markets amid increasing emphasis on ESG, illuminating a previously unexplored segment of the global debt market, namely the corporate syndicated loan market. We find that ESG-linked loans tend to be syndicated by larger groups of reputable “ESG expert” banks that lend cross-border to large ESG-conscious borrowers with whom they share previous banking relationships, suggesting that borrowers and lenders write ESG loans in order to credibly signal their commitment to ESG issues. Our findings contribute to a more complete picture of how ESG concerns are reflected in arms’ length loan contracts, providing more texture to the fundamental understanding of sustainable investments (see [Pastor et al., 2020](#); [Pedersen et al., 2020](#); [Humphrey et al., 2020](#); [Oehmke and Opp, 2020](#)).

## 2 ESG Lending

We begin by providing an introduction to ESG lending and characterization of the typical ESG loan. There are broadly two types of ESG loans: *ESG-linked loans* and *green loans*. ESG-linked loans are general purpose loans with certain loan terms (typically loan pricing terms) that are tied to the ESG performance of the borrowing firm. 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

specific actions such as greenhouse gas (GHG) emissions or employee safety. Green loans, analogous to green bonds, are loans where the proceeds are earmarked exclusively to finance environmental and climate-friendly projects (e.g., renewable energy, biodiversity conservation, sustainable water and wastewater management, and carbon capture).

## 2.1 ESG-Linked Loans

ESG-linked loans are performance pricing debt contracts whose interest rates are linked to the borrower's performance on environmental, social and governance issues. The market for ESG-linked loans has grown steadily since early 2017 when Philips Electronics NV announced the first loan of this kind. It signed an agreement with a consortium of sixteen banks for a new EUR 1 billion revolving credit facility with an interest rate that is dependent on the company's year-on-year sustainability performance improvement. This innovative construction was created by Philips in collaboration with ING as the sustainability agent of the facility. The other banks in the consortium include 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. A key flexibility with sustainability linked loans is that loan proceeds can be used for non-green purposes, which broadens the scope for borrowers and debt investors 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, 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 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. The magnitude of this spread change is comparable 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+.

The terms of sustainability-linked loans need not be tied to third-party ESG ratings. ESG-linked loans also give borrowing firms the flexibility to tailor KPIs around more specific ESG objectives of the firms' 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 specific targets

regarding employee safety and greenhouse gas (GHG) emissions by 2025. The loan contract identified three measurable KPIs related to these objectives and yearly targets were set with respect to each KPI, 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* - a measure of greenhouse gas emission reductions the company is able to achieve from implementing energy efficiency and renewable energy customer projects.
- KPI#3: *GHG Intensity Target* - a measure of the company's own GHG emissions scaled by revenues.

Clearly, Johnson Controls was able to commit to specific 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 the unique features of ESG-linked loans that allow borrowers and lenders to engage in ESG contingent contracting with the flexibility both in terms of the purpose of the loan as well as commitments to specific sustainability objectives. These are marked departures from what has conventionally been available as instruments for green financing, for example, use-of-proceeds based green bonds where the capital raised could be used only for specific sustainable projects (e.g., renewable energy power plants, energy efficient 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 financial institutions active in the global syndicated loan market. The SLLP set out a framework based on the following five 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 verification 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](#)), a similar use-of-proceeds based green financing market has also developed in the loan market. Green loans, unlike ESG-linked loans, are loans that are borrowed to fund specific projects that have *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 as explained above, (2) process for project evaluation and selection, in which borrowers and lenders develop the criteria and policies to select underlying projects, (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 verified by auditors or independent ESG rating providers.

For example, Spanish pulp mills operator Ence Energia (BME:ENC) announced a EUR 66 million green loan financing 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 financed specifically 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

finance 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 Thomson/Refinitiv DealScan. For each and every loan in the database, DealScan assigns two market segment flags according to the definitions above – “ESG-linked loan” and “green loan.” Thomson/Refinitiv DealScan uses information from loan agreements, public media releases, and from discussions with lenders and borrowers to confirm such loan features. Using the DealScan market segment table, we classify a loan facility as an ESG-linked or green loan. We identify 381 ESG-linked loans that raised \$228 billion in total and 559 green loans that raised \$80 billion in total over the sample period from 2016 to 2020 (as of May).<sup>7</sup> In all of our analysis, continuous variables are winsorized at the 1% and 99% levels. In this section, we provide a brief summary of the distribution of these loans.

[Insert Table 1 here]

Table 1 describes the time-series trends of the issuance of ESG-linked and green loans. Global ESG lending activity totalled \$308 billion during the sample period. This is comparable in size to the green bond market, which raised total proceeds of \$301 billion from 2013 to 2018 according to [Flammer \(2021\)](#). Most of this lending consisted of ESG-linked loan issuance, amounting to \$228 billion. Both in terms of the dollar amount and number of loans, the size of the ESG lending market has grown exponentially since 2016 from \$5.6 billion to \$173 billion as of 2019, mostly driven by the increasing popularity of ESG-linked

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<sup>7</sup>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 Thomson Eikon. Bloomberg covers 400 ESG-linked loans which largely overlaps with DealScan. Thomson Eikon covers 628 ESG-linked and green loans combined, which are mostly subsumed by DealScan.

loans. The ESG-linked loan segment, which was non-existent prior to 2017, had grown to a \$140 billion market by 2019. ESG-linked loan issuance remained substantial even during the early half of 2020 when the global economy and financial markets were disrupted by the COVID-19 pandemic, amounting to \$37 billion.<sup>8</sup> The green loan market, which raised a total of \$80 billion over our sample period, grew rapidly as well from \$5.6 billion in 2016 to \$34 billion in 2019.

[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 May 2020. Since its introduction in 2017, ESG-linked 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]

We also document the cross-sectional distribution of ESG lending activities. Table 2 reports the distribution of ESG-linked and green loans over the sample period across the Fama-French 17 industries of borrowers. Overall, ESG lending is observed across a wide variety of industries. Importantly, the industry distribution of ESG-linked loan issuance is relatively wide-spread, unlike the high level of concentration of use-of-proceeds based green loan issuance within utilities. 56% of green loan issuance is concentrated in the utilities industry where environmental considerations are closely tied to firms' operations and projects, similar to what has been documented for green bonds by [Flammer \(2021\)](#). In sharp contrast, only 22% of ESG-linked loans are issued by firms in the utilities industry. In fact, setting aside the utilities industry, we find that the industrial distribution of ESG-linked loans is

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<sup>8</sup>Although not covered in the current version of our sample, there is documentation of continued growth in ESG lending since the second half of 2020 as well. According to the *Wall Street Journal*, "Deluge of debt is tied to carbon emissions and diversity" (Paul J. Davies, May 4, 2021), approximately \$240 billion of ESG-linked loans were issued during this period.

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 specific projects, while the terms of the loans 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 find that borrowers from western European countries are most prevalent in the ESG-linked loan market in terms of aggregate proceeds, with France, Spain, Netherlands, Germany, and Italy comprising 58% 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 firms to incorporate ESG considerations in their corporate policies. The United States and China, which are leading countries in the green bond market, lag behind Europe in the ESG-linked loan market.<sup>9</sup> While western European countries also rank highly in terms of green loan issuance, the United Kingdom, Japan, Australia, Hong Kong, and Singapore, 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 figure shows that the vast majority of ESG borrowers worldwide are incorporated in European countries. This is largely driven by the distribution of ESG-linked loans, as shown in the second figure. While substantially lagging behind Europe, companies in North America have obtained ESG-linked loans – for example in 2019 – to an extent comparable with the

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<sup>9</sup>According to [Flammer \(2021\)](#), Chinese firms ranked first in terms of aggregate green bond issuance during 2013-2018.

rest of world combined. On the other hand, the bottom figure 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 firms have been active borrowers in both the ESG-linked as well as 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 different countries. Panel A shows that ESG-linked loans started to emerge in 2017 across western Europe and in the United States. The growth in ESG-linked loan issuance thereafter has been swiftest in European countries such as France, Italy, and Spain, but has also quickly become widespread in other parts of the world such as the United States, United Kingdom, the rest of western and Scandinavian Europe, Asia, Australia, South America, and Russia. 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. Overall, European nations served as the cradle of the ESG lending market, which has spread across the world within the past few years.

In short, ESG lending, ESG-linked loans in particular, has grown rapidly in the past several years, spreading across diverse industries and prominently among western European borrowers. These preliminary findings guide our subsequent analysis to study the determinants and incentives of ESG lending. Our study is the first to provide novel documentation of the global emergence of ESG contingent lending activities.

## 4 Results

### 4.1 Institutions and ESG Lending Activity

We begin by investigating the cross-country determinants of ESG lending. To avoid confounding differences in general banking sector activities across countries, we compute “abnormal ESG-linked (green) loan shares” at the country level each year as the dependent variable that captures the intensity of ESG-linked (green) loan issuance in a country in excess of the country’s normal lending activity. Specifically, we take the difference between the country’s aggregate ESG linked (green) loan issuance activity 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.

[Insert Table 4 here]

To explain abnormal loan shares, we conduct a country-year level multivariate analysis in the spirit of [Djankov et al. \(2007\)](#), where we consider institutional differences 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), stringency and enforcement of environmental regulation (i.e., 1-very lax to 7-very stringent), and equity market development (i.e., total market capitalization to GDP) as key explanatory variables. We control for the logarithm of GDP and per-capita GDP growth. Private credit provision, equity market development, GDP, and per-capita GDP growth are 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. \(2020\)](#), we retrieve and compile information on the stringency and enforcement of environmental regulation from the World Economic Forum.

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 find that countries with common law



origins exhibit significantly less ESG-linked loan issuance activity than civil law countries. This is consistent with [Liang and Renneboog \(2017\)](#), who show that the country’s legal origin is an important determinant of the level of CSR investments made by its constituent companies, due to differences in firms’ contracting environments affected by the extent of stakeholder-centric rules and regulations. 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 findings, further highlighting the role of stakeholder oriented legal regimes in facilitating private contracts that induce commitment to such values. In contrast, we find no significant evidence that legal origins matter for the development of richer green loan markets, which are primarily project financing deals that are less indicative of commitment to broader ESG agendas.

For both ESG-linked and green loans, however, we find 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 effective institutions to support them, foster innovations in financial markets. These results remain significant even after we include all explanatory and control variables in kitchen-sink regressions in columns (7) and (14).

Overall, our results suggest that country-level legal origins and private credit markets are important determinants of ESG lending activity. 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 basic borrower and loan characteristics of ESG-linked and green loans, and further compare them against loans that do not have ESG contingent features but are otherwise comparable.

To do this, we start by identifying for ESG-linked or green loan deal(s), matched control deal(s) that do not include any ESG contingent facilities but are originated in the same year and country to borrowers from the same industry. We also match on whether the borrower is a privately held or publicly listed company. This loan package-level matching procedure yields 3,415 (5,756) matched deals for the 243 (267) ESG-linked (green) loan deals in our sample. 39 (16) ESG-linked (green) loan deals that have no match are dropped from the analysis.

[Insert Table 5 here]

We report results from univariate analysis in Table 5. Panel A of Table 5 shows that ESG-linked loan borrowers are significantly larger than non-ESG borrowers, nearly twice as large, as measured by their sales as of the time of the deal closure (i.e., average of \$12.1 billion vs. \$6.5 billion). Correspondingly, the deal size of ESG-linked loans are substantially larger than non-ESG loans as well (i.e., average of \$819.2 million vs. \$560.3 million). On the other hand, there is no such difference in size between green loan borrowers and their matched control firms – neither in terms of sales nor the magnitude of loan deals. Finally, comparing ESG-linked loans to green loans, rather than to their respective matched control group, we note that ESG-linked borrowers are larger in terms of sales and that the loans are larger in deal size as well. ESG-linked loan borrowers are also more likely to be publicly listed than green loan borrowers: 69% of ESG-linked loan borrowers are publicly-listed firms, whereas only 19% of green loan borrowers are.

Panel A also shows that ESG-linked loans are substantially more likely to be comprised entirely of revolving credit facilities and less likely to be comprised entirely of term loans

compared to the matched control sample. In fact, the majority of ESG-linked loan packages (i.e., 55.97%) are entirely composed of revolving credit tranches, whereas only a third of the control loans are structured this way. These statistics are consistent with the idea that revolving credit facilities, which unlike term loans are held by a more concentrated group of lenders, can facilitate effective contracting around commitments to sustainable practices by setting ESG related contingencies that can be monitored, enforced, and renegotiated with ease (see [Berlin et al., 2020](#)). In contrast, green loan packages are more likely to be comprised entirely of term loans compared to the matched control sample. This difference could be driven by the fact that green loans are more likely to be project finance deals, which typically contain longer maturity facilities.<sup>10</sup>

Overall, Panel A of Table 5 suggests that ESG-linked loans are obtained by firms that are large and economically important. As we show later, this finding is consistent with large and reputable firms borrowing on ESG contingent terms because they are more capable of safeguarding or enhancing their ESG profiles. Large firms, which are frequently national champions, have strong incentives to commit to such ESG-friendly practices, given their high visibility and correspondingly high demand from stakeholders.<sup>11</sup>

We further report our analysis of loan package composition and facility characteristics in Panel B of Table 5. Since the internal composition of loans could systematically vary with loan size, we impose package deal size as an additional matching criteria in this analysis to compare ESG-linked or green loans to other similar sized loans in our sample. Specifically, we match each ESG-linked or green loan package with a loan package in the matched sample reported in Panel A that also exhibits the closest deal size. After we impose the additional matching requirement, the number of packages in the control group are reduced to 229 for ESG-linked loans and 216 for green loans. Indicating that the match is effective, the differences in deal size between the ESG-linked or green loans and the control loans are

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<sup>10</sup>67% of green loan facilities are described in the DealScan database as project finance deals.

<sup>11</sup>Indeed, 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.

no longer statistically significant. Our final matched sample contains 333 (535) ESG-linked (green) loan facilities and 385 (412) matched non ESG-linked (non green) control facilities.<sup>12</sup>

We characterize ESG-linked (green) loan facilities (column 1 (5)) and compare them with non-ESG facilities in the control loan groups (column 2 (6)). We find that ESG-linked loan facilities are significantly larger than matched facilities (i.e., average facility size of \$598.1 million vs. \$416.5 million). Given that we match loan packages on deal size, the larger ESG-linked facility size is primarily driven by the fact that ESG-linked deals consist of fewer loan facilities (243 ESG-linked packages contain 333 ESG-linked facilities, whereas 229 control packages contain 385 facilities). While the differences in average loan maturities are not statistically significant, we find that ESG-linked loan facilities are significantly more likely to be revolving credit facilities and less likely to be term loans. This implies that ESG-linked loan facilities tend to have longer maturities controlling for the type of facility, which we confirm later in multivariate regression analysis. Consistent with the fact that the proceeds from ESG-linked loans can be used for general purposes, we find that only 3% of ESG-linked loan facilities are tied to project finance (i.e., 8% less likely than matched loans). Similarly, only 8% of ESG-linked loan facilities are leveraged loans (i.e., 10% less likely than matched loans), indicating that these loans are unlikely to be involved in mergers or recapitalizations. As evidence against a “constraint argument” where firms borrow on ESG-contingent terms to alleviate borrowing constraints, we also find that ESG-linked loans are more likely to be investment grade loans compared to non-ESG matched loans (i.e., 57% vs. 35%), indicating that ESG-linked borrowers are on average *less* credit-constrained. The fact that ESG-linked borrowers are larger in terms of sales at close (see Panel A) is also consistent with this notion.

These characteristics are unique to ESG-linked loan facilities and are distinct from green loans. Green loan facilities, on the other hand, are no larger than their matched counterparts and tend to have longer maturities. Importantly, the vast majority, or 67%, of green loan

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<sup>12</sup>ESG-linked or green loan deals rarely include non-ESG-linked or non-green credit facilities within such loan packages (i.e., only 22 (23) out of 355 (558) facilities in ESG-linked (green) loan deals were non-ESG-linked (non-green) facilities). We drop these non-ESG-linked and non-green facilities in our analysis.

facilities are project finance loans, a much higher fraction compared to matched (i.e., 37%) or ESG-linked (i.e., 3%) loan facilities. As the main purpose of green loans are to finance green projects specifically, only 3% of these facilities are leveraged loans. Only 6% of green loan facilities are investment grade, consistent with the fact that most green loan borrowers are privately held firms (unlike ESG-linked loan borrowers that are often publicly listed).

Overall, our examination of the borrowers, deals, and facilities in ESG lending contracts convey a preliminary message that ESG-linked loans are large in size, borrowed by economically important and reputable firms, and mostly consist of general purpose revolving credit facilities that facilitate the monitoring and enforcement of ESG contingent loan pricing. In contrast, green loans are borrowed mainly by privately held firms for project specific purposes in relatively small term loans. In the following section, we study the syndicate structure of ESG lenders.

### 4.3 Syndicate Structure

In this section, we explore the syndicate structure of ESG-linked and green loans, and provide early insights into the incentives of lenders who participate in the burgeoning ESG lending market.

We retrieve information on lenders from the DealScan database for the ESG-linked (green) loan facilities and the non-ESG control loan facilities matched on country, industry, year, borrower public-private status, and closest deal size (i.e., loan facilities from the sample used in Panel B of Table 5). 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 find information on 3,807 (4,144) lead arrangers for 329 (533) ESG-linked (green) loan facilities and 388 (430) non-ESG matched facilities.

We then examine the lender’s domicile in relation to the borrower’s domicile (i.e., foreign or domestic lender), the lender’s status as a prominent lender or an “expert” ESG lender (i.e., reputable or ESG-experienced lender), as well as the lender’s banking relationship with

the borrower (i.e., relationship or non-relationship lender). These are crucial aspects in ESG lending at the global scale. First, cross-country frictions – financial, regulatory, physical, or cultural – can play an important role in creating a 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 lenders tend to overcome such frictions can give useful insights regarding the ESG lending process and the future growth of this market. There may also be interaction effects between the cross-border supply of ESG lending and the lender’s global reputation or expertise as a specialized ESG lender. For example, lenders from countries with a strong ESG culture, or lenders with more experience making sustainability-conscious lending decisions, may be more capable of acting as a coordinating agent in ESG-linked loan contracts for borrowers looking to commit to ESG considerations in their corporate policies. Relationship lending is important for effective contracting and financing (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.

To explore these agendas, we classify lenders into groups. We first define *foreign lenders* as lead arrangers from countries other than the borrower’s country of incorporation. We define *reputable lenders* as the top 1% lenders in terms of total lending amount during the month the package is activated, and delineate ESG specialized lenders from non-expert lenders by flagging lead arrangers with ESG lending history in our sample as *ESG-experienced lenders*. We further identify a *relationship lender* as a bank that had any prior lending relationship with the borrower before the initiation of a loan.<sup>13</sup> Based on these definitions, we report the number and fraction of specific types of lenders comprising the syndicate of ESG-linked or green loans, and compare them against the matched non-ESG samples.

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<sup>13</sup>As documented in Bharath et al. (2007), there is no unanimously accepted measure of the presence of relationship lending. Our measure captures all lending history, which may overestimate the number of relationship banks. However, in untabulated analysis, our results are robust to defining a relationship bank over the previous five years from the loan activation date.

[Insert Table 6 here]

Table 6 presents these results. For each type of lead arranger, we report the average number of lenders for the ESG-linked and green loans as well as their matched counterparts, and the average fraction of lenders comprising the syndicate (in brackets). The first row of Table 6 documents that the average ESG-linked loan is syndicated by a significantly larger group of lenders than the average non-ESG loan (i.e., 6.19 vs. 4.83 lenders). ESG-linked loans are significantly more likely to have foreign lenders on the syndicate (i.e., lenders domiciled in different countries from borrowers), and in particular more foreign reputable lenders who are also experienced in ESG lending. Of the 6.19 lead arrangers in the average ESG-linked loan, 4.25 (i.e., 59% on average) are foreign lenders. Virtually all of these foreign lenders are reputable (i.e., 4.14 out of 4.25) and ESG-experienced (i.e., 3.88 out of 4.25). In contrast, of the 4.83 lead arrangers in the average non-ESG matched loan, only 2.89 (50% on average) are foreign lenders, almost none of whom have any experience in ESG lending (0.07 out of 4.83). These differences between the syndicate structure of ESG-linked and matched loans are statistically significant.

Green loans also have larger syndicates than their matched counterparts. However, although green loan syndicates consist of a larger number of foreign lenders, and foreign reputable lenders in particular, these differences are mostly driven by syndicate size. As a share of the overall syndicate, there are no significant differences along these dimensions compared to the matched group. However, ESG lending experience matters for green loans as much as it does for ESG-linked loans, as virtually all foreign lenders in green loans have such experience whereas no foreign lenders in the matched loans do.

Table 6 also shows that relationship lending plays a critical role in facilitating ESG-linked loan issuance. 79% (i.e., 4.93 out of 6.19) of all ESG-linked loan lead arrangers have previous lending relationships with the borrowers, compared to 62% of non-ESG matched loans. ESG lending experience again has a strong interactive effect. Almost all ESG-linked relationship lenders have previous ESG lending experience (i.e., 4.56 out of 4.93), whereas

relationship lenders in matched loans rarely have ESG lending experience. Relationship lending also punctuates the presence of foreign lenders in ESG-linked loan syndicates. Out of the 4.25 foreign lenders comprising the average ESG-linked loan syndicate, 3.25 are relationship lenders, double the number of foreign relationship lenders in the non-ESG matched deals. In contrast, green loan lenders are not more likely to be relationship lenders. However, ESG lending experience continues to be a significant factor in the structure of the green loan syndicate.

Overall, our analysis of the syndicate structure in ESG lending indicates that ESG-linked loans have larger syndicate size and tend to attract reputable global banks with previous lending relationships with the borrowers. These lenders also tend to be “experts” in ESG lending, procuring repeated business in ESG-linked loan origination. From a loan contracting point of view, this is consistent with the complexity of ESG-linked loans requiring specialized lenders to handle ESG-specific contract features. For instance, ESG-linked loans tend to have a dedicated “sustainability structuring agent”. 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 ESG-linked loans. While the differences in syndicate structure are generally less prominent for project-specific green loan syndicates, previous ESG lending experience of the lead arrangers is important to their decision to originate green loans as well.

#### **4.4 Multivariate Regressions: Determinants of ESG Lending**

Our preliminary results thus far indicate that ESG-linked loans are originated in large amounts by foreign reputable banks experienced in ESG lending, to economically large borrowers in other countries with whom they share previous lending relationships. These findings suggest that borrowers who are more visible to outside stakeholders willingly commit to better ESG practices through ESG loans as credible signals to safeguard their reputation, rather than to reduce their borrowing constraints by accepting ESG contingent performance



pricing contracts. The results also suggest that some lenders have strong appetites for originating these loans, to the extent that they specialize in such loans and are willing to issue them even to distant borrowers who operate outside their countries of domicile.

We corroborate these results in a cross-sectional multivariate analysis using the following ordinary least squares (OLS) specification.

$$\begin{aligned}
 Y_{i,j} = & \alpha + \beta_1 \cdot \text{PubliclyListed}_i + \beta_2 \cdot \text{Log}(\text{FacilityAmount}_j) + \beta_3 \cdot \text{Log}(\text{Maturity}_j) \\
 & + \beta_4 \cdot \text{Revolver}_j + \beta_5 \cdot \text{ProjectFinance}_j + \beta_6 \cdot \text{Log}(\#\text{LeadArranger}_j) \\
 & + \beta_7 \cdot \text{RelationshipLender}_j + \beta_8 \cdot \text{ForeignLender}_j \\
 & + \mathbf{I}(\text{Country} \times \text{FF17} \times \text{Year}) + \epsilon_{i,j}
 \end{aligned} \tag{1}$$

The dependent variable  $Y_{i,j}$  is a dummy variable indicating whether facility  $j$  issued by borrower  $i$  is an ESG-linked or green loan. Guided by the univariate analysis in Tables 5 and 6, we include as explanatory variables an indicator variable for whether the borrower is publicly listed, the facility amount and maturity, dummy variables indicating whether facility  $j$  is a credit revolver or project finance facility, number of lead arrangers in the syndicate, and the fractions of relationship and foreign lenders in the syndicate. We further control for country-by-industry-by-year fixed effects, where the industry grouping is based on Fama-French 17 industries. See more detailed definitions of these key variables in Appendix A. We conduct the analysis using the country-industry-year matched samples examined in Panel A of Table 5, which consist of 243 ESG-linked (267 green) loan packages and 3,415 (5,756) non-ESG matched loan packages.

[Insert Table 7 here]

Table 7 shows the results. Even after controlling for country-by-industry-by-year fixed effects, we find in Panel A that ESG-linked loans are more likely to be issued among publicly listed companies, larger in facility amounts, more likely to be comprised of revolving credit facilities, unlikely to be involved in project finance, and tend to have longer maturities (after

controlling for the facility’s revolver status). ESG-linked loan syndicates tend to have larger number of lead arrangers and are likely to consist of foreign banks and relationship banks. These relations, except for the effect of public listing status, are robust to including all of the explanatory variables in one kitchen sink regression. In our Appendix, we further report that these results are robust to logistic regression specifications.

Panel B reports the results for the green loan matched sample. Consistent again with our earlier univariate results, green loans stand in marked contrast to ESG linked loans along most dimensions. The only results that are consistent and robust to varying the specification and to the set of controls are that green loans tend to have longer maturities, are much less likely to include revolving credit facilities, but on the other hand are significantly more likely to be project financing loans.

Overall, these multivariate regressions complement our previous analysis and corroborate our interpretation that large borrowers and lenders have reputational interests in contracting on ESG performance, which boosts the supply and demand for ESG-linked lending.

## **4.5 Loan Issuance and ESG Performance**

A natural and important question to ask 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. 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 firm-level ESG scores from the Thomson/Refinitiv Asset4 database.

Thomson/Refinitiv gathers extensive publicly available information on ESG performance from companies’ annual reports, corporate websites, non-governmental organization (NGO) websites, stock exchange filings, CSR reports, news media, and etc. Their analysts process this rich information for a large set of firms around the world (most of which are publicly listed), assigning values corresponding to ten sub-categories under three major cat-

egories: 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 specific 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 firm, which indicates the company’s overall ESG performance based on all available public information.

The coverage of the Asset4 database constrains our country-industry-year matched sample to loans associated with only publicly listed borrowers and lenders. After manually matching our loan sample with the Asset4 ESG score database on borrower and lender company names, we are left with 311 ESG-linked, green, and non-ESG matched loans associated with 203 borrowers and 270 lenders.<sup>14</sup>

[Insert Table 8 here]

Based on this sample, we first test whether the previous year’s ESG scores of borrowers and lenders explain their tendencies to originate ESG loans – either ESG-linked or green loans – rather than non-ESG loans in the following year. The results from this cross-sectional analysis are reported in Table 8. The dependent variable is an indicator variable for whether a loan is an ESG-linked or green loan. We combine ESG-linked or green loans in this part of the analysis due to the small sample size of publicly listed green loan borrowers with valid ESG scores.<sup>15</sup> We regress the dependent variable on the borrower’s lagged ESG score, the

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<sup>14</sup>We match on company names because there are no common identifiers between the DealScan and Asset4 databases. To obtain a high quality name mapping, we first 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 finally conduct a thorough manual check through Google searches and Capital IQ corporate trees to confirm matches and further match any unmatched cases. The set of borrowers and lenders matched with Asset4 account for 57.67% (203 out of 352) and 80.12% (270 out of 337) 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 firm-year observations).

<sup>15</sup>As shown in Table 5, green loan borrowers are mostly privately held firms that are not covered by the Asset4 database.

average of the lead lenders' lagged ESG scores, and the interaction or difference between the borrower's and lenders' ESG scores as explanatory variables. We further include the facility amount, maturity, revolving credit facility status, project finance status, the number of lead arrangers, the fraction of relationship and foreign lenders in the syndicate, and country-by-industry-by-year fixed effects as control variables. Standard errors are clustered at the country level. Panels A and B each report results from OLS and logistic regressions, respectively.

We find that the borrower's ex-ante ESG score is strongly and positively associated with the probability of an ESG loan issuance, whereas the lender's ESG score is unrelated. A one point increase in the borrower's ESG score on a scale from one to a hundred is associated with a 1.3% higher likelihood of an ESG loan issuance (statistically significant at the 1% level), an approximately one-to-one correspondence. After controlling for the lender's ESG score and its interaction with the borrower's ESG score, the effect of the borrower's ESG score is even more palpable – a one point increase in the ESG score corresponds to an 8.5% greater likelihood of an ESG loan issuance. On the other hand, the association between ESG loan issuance and the lenders' average ESG score is not significant. These results are distinct from recent findings that borrowers and lenders with similarly high ESG ratings tend to form lending relationships or that poor ESG banks tend to seek lending business with good ESG borrowers (see [Houston and Shan, 2021](#); [Shin, 2020](#); [Hauptmann, 2017](#)). Our findings indicate that when commitments to ESG are explicitly written into loan contracts, the effects of ESG score differences between borrowers and lenders are largely driven by high ESG borrowers who willingly tie their loan terms to their ESG performance. Our results are robust and consistent whether we use linear probability models (Panel A) or logistic regressions (Panel B).

The fact that ESG loans tend to be issued to borrowers that already have superior ESG profiles and that lender ESG profiles play a limited role in the origination of such loans raises the question of whether these contractual commitment devices affect ex-post

ESG performance. If ESG loans served as credible signals to commitment to ESG-friendly practices, one would expect the superior ex-ante ESG profiles to be sustained after ESG loan issuance. On the other hand, a deterioration of ESG performance ex-post could be indicative of “greenwashing” prior to issuance. We investigate the effects of ESG loan issuance on future borrower and lender ESG performance by estimating a panel regression specification as follows.

$$\begin{aligned}
 ESG\ Score_{i,t} = & \alpha + \beta_1 \cdot ESG\ Borrower(Lender)_i \times PostLoanIssuance_{i,t} \\
 & + \beta_2 \cdot ESG\ Borrower(Lender)_i + \beta_3 \cdot PostLoanIssuance_{i,t} \quad (2) \\
 & + \mathbf{I}(Firm) + \mathbf{I}(Country \times Year) + \mathbf{I}(Industry \times Year) + \epsilon_{i,t}
 \end{aligned}$$

The dependent variable is either the ESG score or ES-only (i.e., environmental and social) score of the borrower or lender in a given year. The ES score is defined as the average of the environmental score and social score which are separately reported in Asset4.  $PostLoanIssuance_{i,t}$  is an indicator variable equal to one if the borrower (lender) had originated an ESG-linked or green loan during or prior to the given year, and zero otherwise.  $ESG\ Borrower(Lender)_i$  is a cross-sectional dummy variable indicating whether the borrower or lender originates an ESG-linked or green loan at any time throughout the entire sample period. We further control for firm, country-by-year, and industry-by-year fixed effects. The coefficient,  $\beta_1$ , captures a quasi difference-in-differences estimator that tests whether ESG borrowers or lenders experience differential changes in their ESG scores after originating an ESG-linked or green loan, compared to non-ESG borrowers or lenders. To estimate this model for borrowers and lenders separately, we construct two firm-year panel datasets, each consisting of 1,206 borrower-year observations and 842 lender-year observations, respectively. We retain the time-series of ESG scores collected from Asset4 for the borrowers or lenders that are matched with our DealScan sample during the period from 2012 to 2020.

[Insert Table 9 here]

Table 9 reports the results. Both for borrowers (Panel A) and lenders (Panel B), the coefficients for  $PostLoanIssuance_{i,t} \times ESG\ Borrower(Lender)_i$  are statistically insignificant. The effects of ESG lending on ESG performance remain insignificant after controlling for firm fixed effects, which subsume  $ESG\ Borrower(Lender)_i$ , and also when we focus on the environmental and social dimensions of ESG performance. However, virtually all of the differences in ESG performance between ESG loan firms and non-ESG loan firms are explained by their pre-issuance level differences. The coefficients on  $ESG\ Borrower(Lender)_i$  in columns (1) and (3) show that on average ESG borrowers have 11.883 (13.640) higher ESG (ES) scores than non-ESG borrowers. Likewise, ESG lenders' ESG (ES) scores are 13.744 (19.210) points higher than non-ESG lenders.

Taken together, we document potential selections in ESG lending arrangements, where large borrowers and reputable ESG-experienced foreign lenders – both pre-committed to high ESG standards – use ESG contingent loan contracts to credibly signal their commitment to maintain the high quality of their ex-ante ESG profiles. Indeed, the results indicate that while ESG borrowers and lenders have higher ESG ratings on average, ESG loan issuance itself has little to no impact on ex-post borrower or lender ESG performance. However, we acknowledge that broadly defined Asset4 ESG scores clearly have limitations as outcome variables with respect to the issuance of ESG loans whose terms are made contingent on specific and diverse key ESG performance indicators. Despite this caveat, these findings are at a minimum consistent with reputational incentives to safeguard ex-ante superior ESG profiles of large borrowers and global lenders playing a key role in ESG loan contracting.

## 5 Conclusion

In this paper, we provide the first comprehensive characterization of the ESG lending market, which has grown exponentially within the past five years. While our study examines an early sample, the ESG lending market has been reported to have continued its growth even after

the COVID-19 pandemic crisis, indicating that it is developing into an integral segment of the global loan market.<sup>16</sup>

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 specific 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-specific green bonds, an ESG financing 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 specifically earmarked for use in designated “green” projects.

We show that ESG lending markets have grown rapidly from \$6 billion in 2016 to \$173 billion in 2019. Most of this growth has been driven by the rise of ESG-linked loans, which is becoming one of the most important green financing sectors. Consistent with the general purpose nature of ESG-linked loans, they are relatively widespread across a variety of industries and less concentrated in, for example, the utilities sector, compared to use-of-proceeds based green loans (or bonds). While the ESG lending market overall is generally large in countries with robust private credit markets, ESG-linked loans are particularly popular in countries with civil law origins where economies are more stakeholder oriented and economic outcomes are more often based on interventions through rules and regulations rather than market discretion.

ESG-linked loans are generally issued among large publicly listed borrowers in large amounts, compared to other loans issued in the same country and industry in a given year. To facilitate enforcement of the ESG performance contingencies embedded in the contracts, these loans are structured mainly as revolving credit facilities. Yet, they tend to have longer

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<sup>16</sup>See *Wall Street Journal*, “Deluge of debt is tied to carbon emissions and diversity”, Paul J. Davies, May 4, 2021.

maturities compared to other revolvers. Green loans do not share these characteristics. They are distinctly more likely to be project financing loans compared to other types of loans. In sharp contrast to green loans, ESG-linked loans are rarely project finance vehicles, and are distinctly more likely to be originated by large bank syndicates, mostly comprised of foreign reputable lenders that are experienced in ESG lending and have previous lending relationships with borrowers.

Importantly, we find that both borrowers and lenders who have superior ESG profiles ex-ante, therefore pre-committed to ESG conscious practices, are more likely to self-select into ESG loan contracts. Furthermore, we find no evidence that the issuance of such loans affects borrowers' or lenders' ESG performance ex-post, based on Thomson/Refinitiv Asset4 ESG scores, indicating that they are indeed able to maintain their superior ESG performance. However, we remain cautious of the caveat that Asset4 scores may not precisely capture specific aspects of ESG performance that different ESG loans contract on. Nonetheless, we view this at least as suggestive evidence of reputational incentives to credibly signal commitment to ESG-conscious practices among borrowers and lenders who are active in global ESG lending activities.

Overall, our paper contributes to the burgeoning literature that studies how investors and firms contract on their financing agreements in ways that increasingly take into account stakeholder values. Our novel findings shed light on the relatively unexplored credit market, and show how the vast global syndicated loan market has developed mechanisms that internalize ESG-related reputational incentives of borrowers and lenders. There remains much room for richer and deeper analyses of this nascent but burgeoning segment of global banking – for example its evolution during and after the COVID-19 pandemic crisis. We hope to return to these questions in subsequent research.



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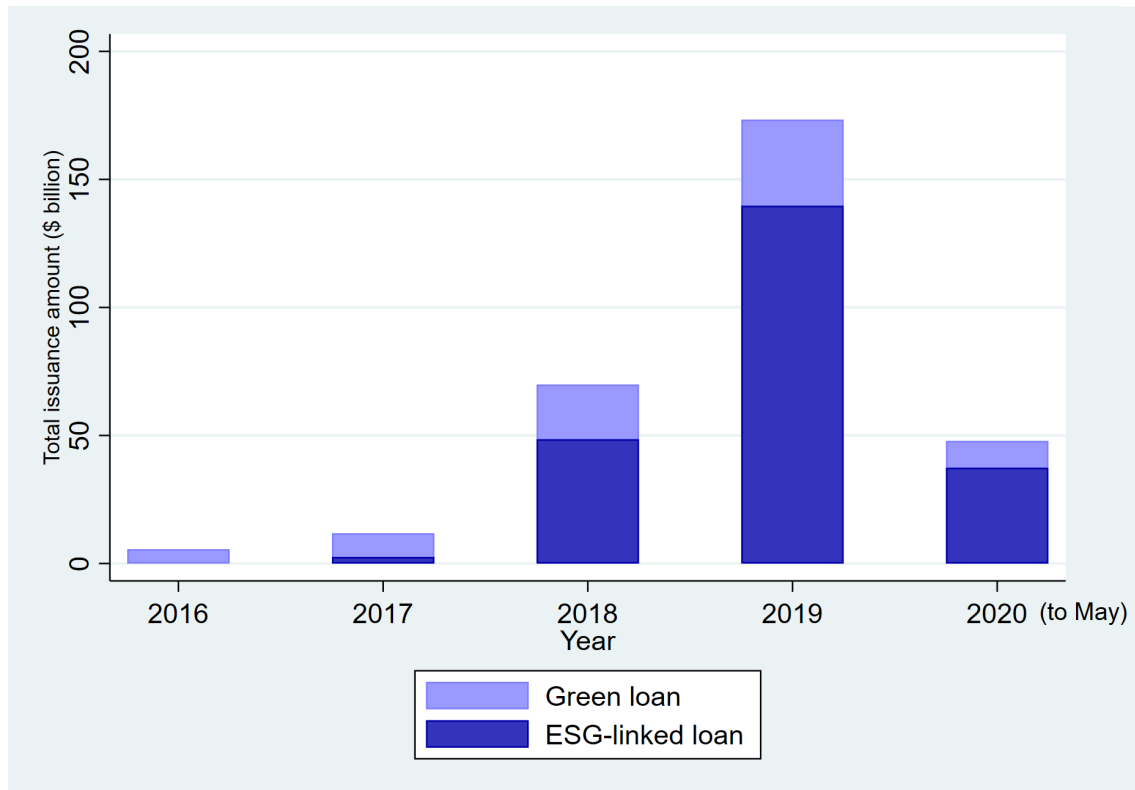
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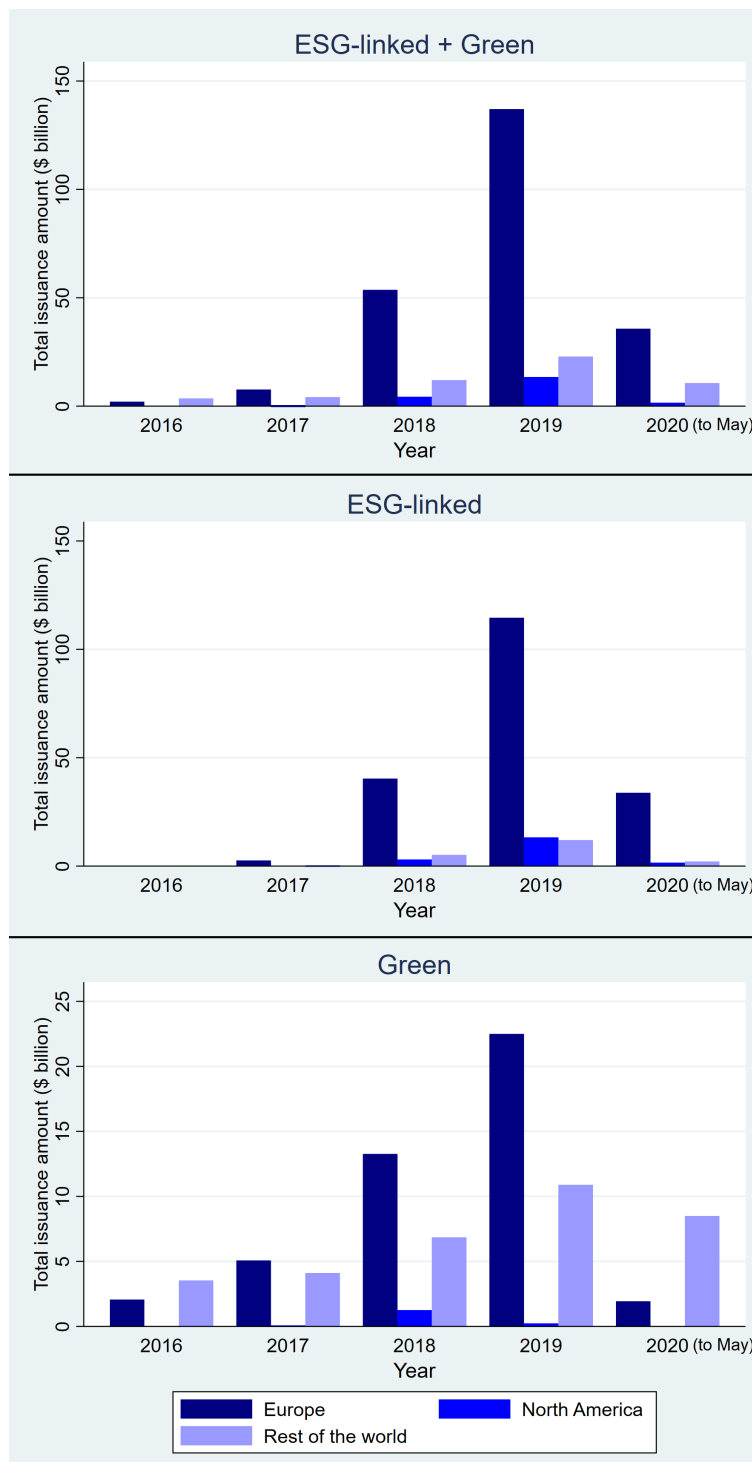
**Figure 1. ESG-linked and green loan issuance over time**

This figure illustrates the annual issuance amounts of ESG-linked and green loans during the sample period from 2016 to May 2020. The samples consists of 381 ESG-linked and 559 green loan facilities from Thomson/Refinitiv DealScan (DealScan, hereafter). In each bar, the dark and light areas indicate the total issuance amounts of ESG-linked and green loan facilities issued in each year, respectively.



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

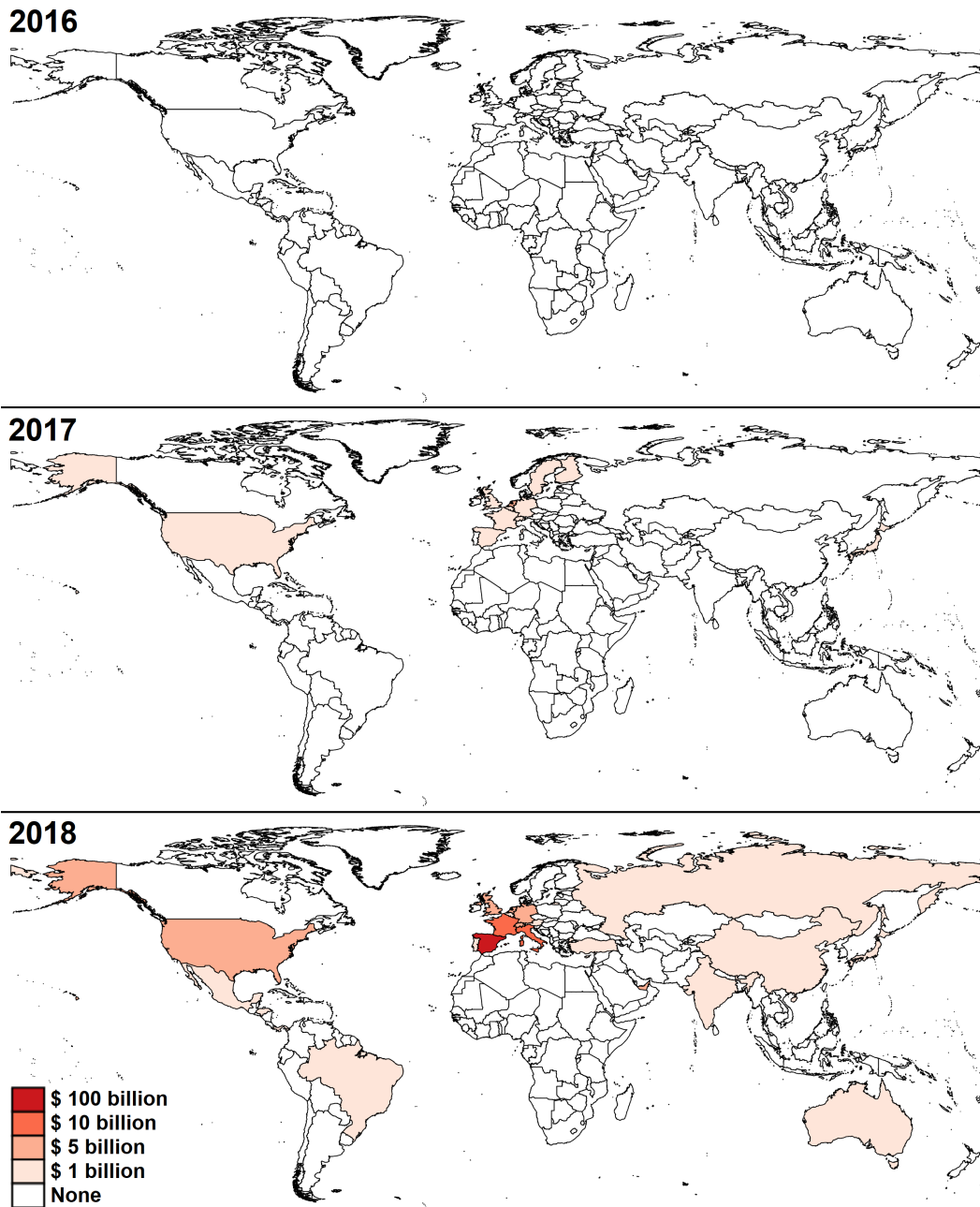
This figure presents the annual issuance amounts of ESG-linked and green loans by region from 2016 to May 2020. The sample consists of 381 ESG-linked and 559 green loan facilities in DealScan. For each year, the dark, medium, and light blue bars indicate the total issuance amounts of ESG-linked and green loan facilities issued in Europe, North America, and the rest of the world, respectively.



### Figure 3. Evolution of ESG lending around the world

This figure presents cross-country heat maps of annual ESG-linked (Panel A) and green (Panel B) loan issuance around the world from 2016 to May 2020. The samples consist of 381 ESG-linked and 559 green loan facilities in DealScan. The color density indicates the magnitude of the annual issuance amount since 2016: Lightest (none), light (up to \$1 billion), medium (up to \$5 billion), dark (up to \$10 billion), and darkest (up to \$100 billion). The issuance amount in 2020 is re-scaled by 12/5 due to data availability up to May in 2020. The year is noted in the top left corner of each map.

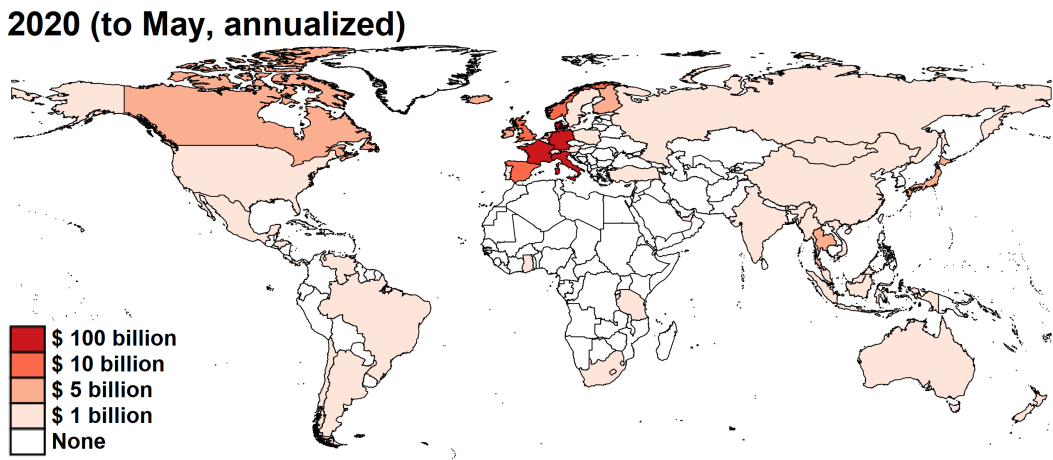
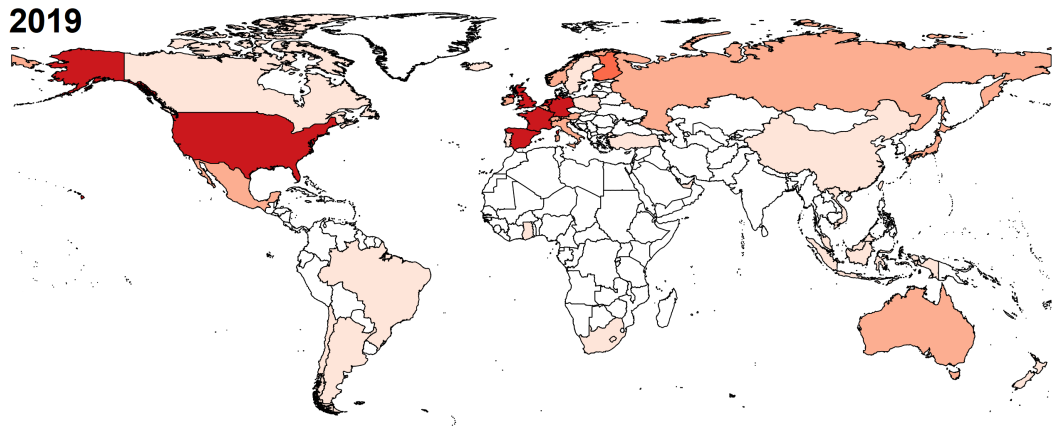
Panel A: ESG-linked loans



(continued)

Figure 3. Evolution of ESG lending around the world (continued)

Panel A: ESG-linked loans (continued)

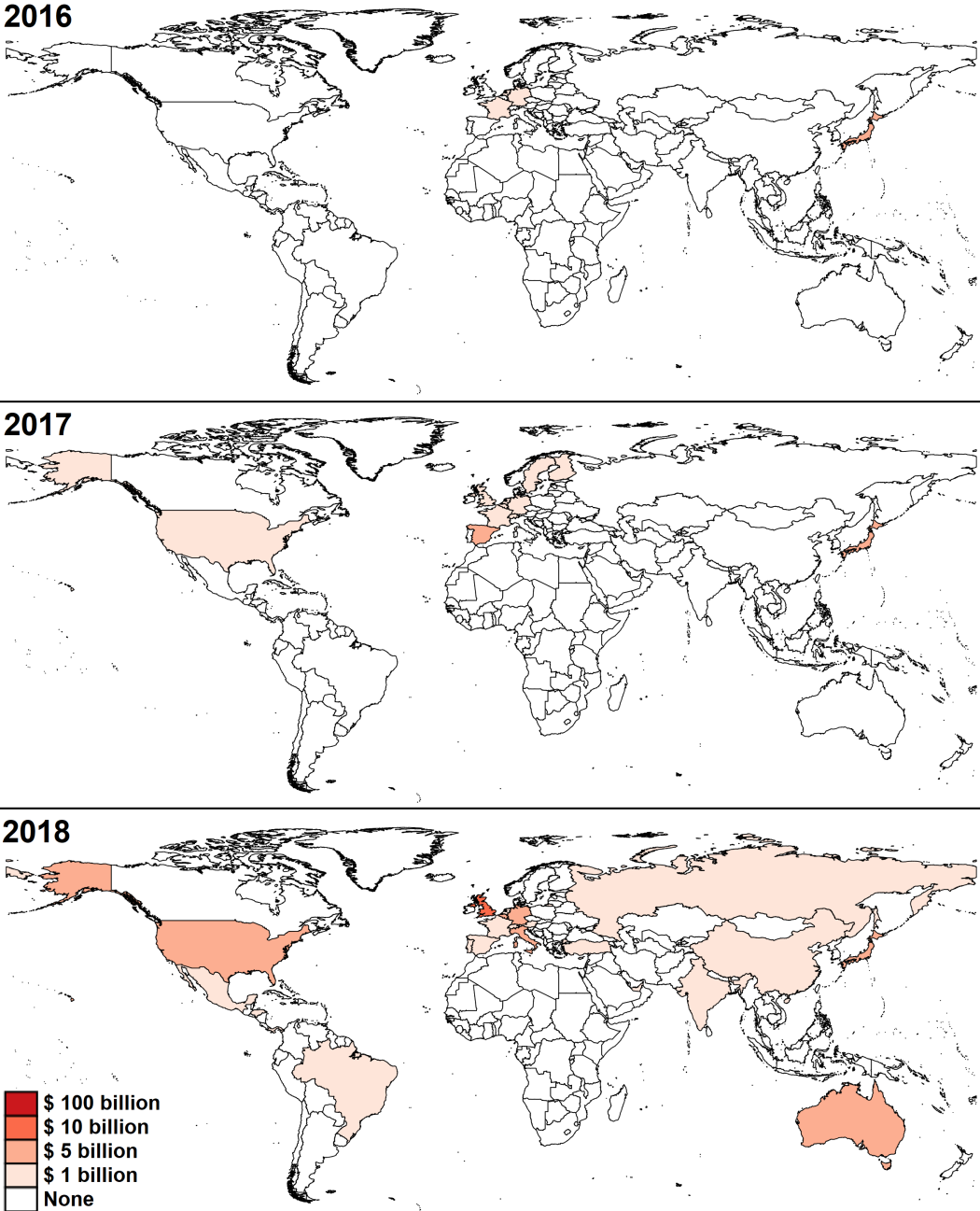


*(continued)*



Figure 3. Evolution of ESG lending around the world (continued)

Panel B: Green loans

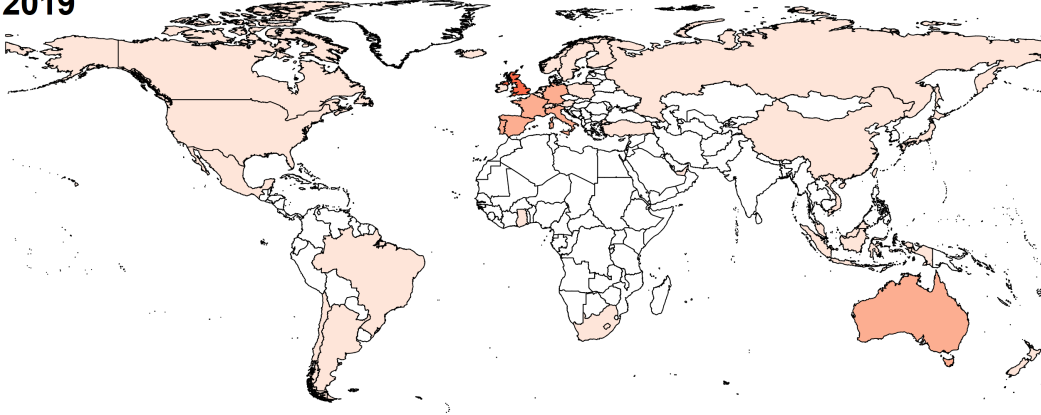


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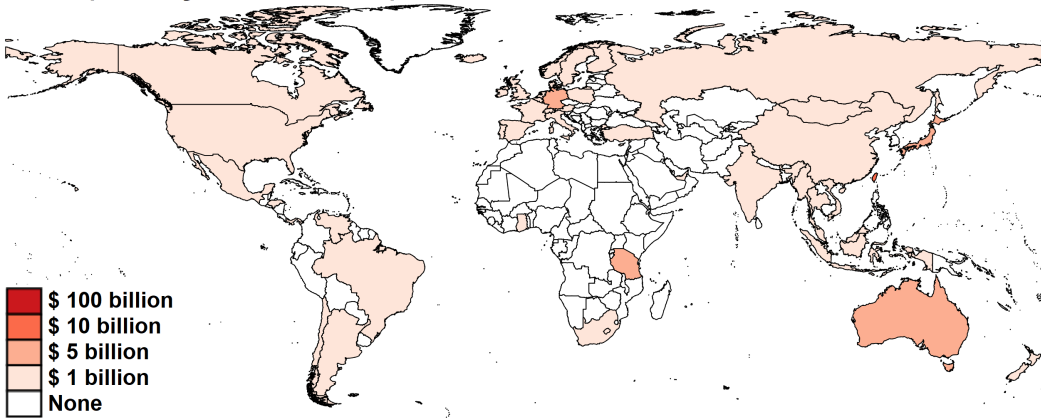
Figure 3. Evolution of ESG lending around the world (continued)

Panel B: Green loans (continued)

2019



2020 (to May, annualized)



**Table 1. ESG lending over time**

This table reports the total issuance amount and the number of ESG-linked and green loan facilities issued from 2016 to May 2020. The sample consists of 381 ESG-linked loans and 559 green loans obtained from DealScan. In 2020, the numbers are reported up to May.

Year	ESG-linked+Green loans		ESG-linked loans		Green loans	
	\$ billion	# facility	\$ billion	# facility	\$ billion	# facility
2016	5.59	99			5.59	99
2017	11.81	104	2.58	7	9.23	97
2018	69.89	178	48.53	60	21.36	118
2019	173.34	419	139.73	248	33.61	171
2020 (to May)	47.85	140	37.43	66	10.42	74
Total	308.48	940	228.27	381	80.21	559

**Table 2. ESG lending by industry**

This table reports the total issuance amount and the number of ESG-linked and green loan facilities issued in each industry of borrowers. The sample consists of 381 ESG-linked loans and 559 green loans issued from 2016 to May 2020. All loan data are obtained from DealScan. Industries are defined using Fama-French 17 industry classifications. % to total is the ratio of the total issuance amount in each industry to the total issuance amount across the entire sample.

Industry	ESG-linked + Green loans			ESG-linked loans			Green loans		
	\$ billion	% to total	# facility	\$ billion	% to total	# facility	\$ billion	% to total	# facility
Utilities	94.38	30.60	401	49.21	21.56	54	45.17	56.31	347
Banks, Insurance Companies, and Other Financials	50.73	16.45	169	32.99	14.45	66	17.74	22.12	103
Other	45.88	14.87	97	39.85	17.46	64	6.03	7.52	33
Transportation	20.88	6.77	51	16.94	7.42	31	3.94	4.91	20
Food	20.17	6.54	49	19.28	8.45	42	0.89	1.11	7
Construction and Construction Materials	14.82	4.80	41	12.31	5.39	30	2.51	3.13	11
Oil and Petroleum Products	14.25	4.62	15	13.90	6.09	7	0.35	0.44	8
Machinery and Business Equipment	11.04	3.58	35	9.66	4.23	22	1.38	1.72	13
Retail Stores	10.26	3.33	18	10.01	4.39	13	0.25	0.31	5
Chemicals	7.85	2.54	17	7.66	3.36	16	0.19	0.24	1
Drugs, Soap, Perfumes, Tobacco	5.65	1.83	3	5.65	2.48	3			
Steel Works Etc	4.66	1.51	8	4.64	2.03	7	0.02	0.02	1
Fabricated Products	3.34	1.08	6	3.34	1.46	6			
Automobiles	2.58	0.84	17	0.84	0.37	7	1.74	2.17	10
Consumer Durables	1.07	0.35	1	1.07	0.47	1			
Mining and Minerals	0.48	0.16	4	0.48	0.21	4			
Textiles, Apparel & Footwear	0.44	0.14	8	0.44	0.19	8			
Total	308.48	100.00	940	228.27	100.00	381	80.21	100.00	559

**Table 3. ESG lending by country**

This table reports the total issuance amount and the number of ESG-linked and green loan facilities by borrowers' country of incorporation. The sample consists of 381 ESG-linked loans and 559 green loans issued from 2016 to May 2020. The data are obtained from DealScan.

ESG-linked + Green loans			ESG-linked loans			Green loans		
Country	# facility	\$ billion	Country	# facility	\$ billion	Country	# facility	\$ billion
France	64	42.99	France	42	37.84	United Kingdom	52	14.70
Spain	107	39.62	Spain	61	33.63	Japan	200	10.90
United Kingdom	87	30.70	Netherlands	23	24.56	Spain	46	5.99
Netherlands	34	25.60	Germany	31	18.83	Australia	16	5.85
Germany	67	24.54	Italy	16	18.64	Germany	36	5.71
Italy	44	23.30	USA	18	16.62	France	22	5.15
USA	31	18.05	United Kingdom	35	16.00	Hong Kong	25	4.74
Japan	219	13.36	Ireland	5	6.16	Italy	28	4.66
Hong Kong	37	8.70	Finland	11	6.03	Singapore	21	3.87
Australia	23	8.37	Norway	6	5.40	Taiwan	13	3.47
Singapore	36	7.19	Switzerland	9	5.15	Portugal	3	2.00
Finland	15	7.12	Denmark	1	5.00	Belgium	12	1.97
Ireland	6	6.21	Hong Kong	12	3.96	Tanzania	4	1.64
Norway	8	5.72	Singapore	15	3.32	USA	13	1.43
Belgium	18	5.16	Belgium	6	3.19	Finland	4	1.09
Switzerland	9	5.15	Austria	12	2.57	Netherlands	11	1.04
Denmark	1	5.00	Australia	7	2.52	Luxembourg	8	1.01
Taiwan	14	3.53	Japan	19	2.46	Sweden	3	0.84
Luxembourg	13	3.14	UAE	4	2.19	India	3	0.61
Austria	15	2.69	Luxembourg	5	2.13	Mexico	3	0.60
UAE	6	2.44	Russia	7	2.10	Argentina	5	0.47
Russia	7	2.10	Iceland	4	1.54	Vietnam	5	0.42
Portugal	3	2.00	Cyprus	2	1.48	Norway	2	0.32
Mexico	5	1.71	Canada	1	1.20	UAE	2	0.25
Tanzania	4	1.64	Mexico	2	1.11	Venezuela	2	0.20
India	5	1.61	India	2	1.00	Brazil	2	0.18
Iceland	4	1.54	Brazil	2	0.80	Turkey	2	0.16
Cyprus	2	1.48	Poland	2	0.63	China	2	0.14
Canada	2	1.30	Indonesia	3	0.56	Austria	3	0.12
Brazil	4	0.98	Thailand	2	0.43	Canada	1	0.10
Sweden	7	0.97	Ghana	1	0.30	Chile	1	0.10
Poland	2	0.63	Malaysia	1	0.25	Honduras	2	0.10
Indonesia	3	0.56	Turkey	3	0.22	Mongolia	1	0.10
Thailand	4	0.53	China	3	0.17	Thailand	2	0.10
Argentina	5	0.47	Sweden	4	0.13	Panama	1	0.07
Vietnam	5	0.42	New Zealand	2	0.06	Ireland	1	0.05
Turkey	5	0.38	Taiwan	1	0.06	Myanmar	1	0.04
China	5	0.31	South Africa	1	0.03	Malaysia	1	0.02
Ghana	1	0.30						
Malaysia	2	0.27	Total	381	228.27	Total	559	80.21
Venezuela	2	0.20						
Chile	1	0.10						
Honduras	2	0.10						
Mongolia	1	0.10						
Panama	1	0.07						
New Zealand	2	0.06						
Myanmar	1	0.04						
South Africa	1	0.03						
Total	940	308.48						

**Table 4. Cross-country determinants of ESG lending activity**

This table reports country-level regressions of excess ESG lending activity on various country characteristics. The dependent variable “abnormal ESG-linked (green) loan shares” is the difference between the country’s aggregate ESG linked (green) loan issuance activity 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. Common law is an indicator variable equal to one if the country’s legal system is of English-origin, and zero otherwise. Private credit is domestic credit to the private sector, normalized as a percentage of the country’s GDP. Creditor right index is an integer ranging from 0 to 4, which counts how many of the following creditor protections the country has: (1) no automatic stay on assets; (2) secured creditors first paid; (3) restrictions for going into reorganization; (4) management does not stay in reorganization. We obtain the creditor right index as of 2002 from [Djankov et al., 2007](#). Stringency and enforcement of environmental regulation are variables ranging from 1 (very lax) to 7 (very stringent), which are obtained from the World Economic Forum. Equity market development is the ratio of total market capitalization to GDP (in percent). Log GDP is the natural logarithm of the country’s average GDP over 1995-2015. per-capita GDP growth is the country’s average per-capita GDP growth over 1995-2015. All continuous variables are winsorized at the 1% and 99% levels. Robust standard errors are reported in parenthesis. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Dependent variable:	Abnormal ESG-linked loan share					Abnormal green loan share								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Common law	-1.853** (0.883)						-2.541* (1.442)	-0.310 (0.482)						-0.718 (0.749)
Private credit		3.561*** (1.312)					5.543** (2.370)		3.251*** (0.662)					3.206** (1.231)
Creditor right index			0.309 (0.358)				0.302 (0.592)			0.341* (0.190)				0.321 (0.308)
Stringency of environmental regulation				0.460 (0.485)			0.446 (2.183)				0.465* (0.258)			0.399 (1.133)
Enforcement of environmental regulation					0.299 (0.460)		-0.823 (2.054)					0.441* (0.244)		-0.368 (1.067)
Equity market development						-0.200 (0.693)	-0.955 (0.839)						0.696* (0.363)	0.075 (0.436)
Log GDP	-0.224 (0.206)	-0.690*** (0.261)	-0.275 (0.212)	-0.411 (0.271)	-0.352 (0.260)	-0.482 (0.378)	-1.044** (0.431)	0.072 (0.113)	-0.337** (0.132)	0.035 (0.113)	-0.074 (0.144)	-0.053 (0.138)	0.010 (0.198)	-0.297 (0.224)
Per-capita GDP growth	-0.148 (0.213)	-0.097 (0.210)	-0.137 (0.218)	-0.110 (0.236)	-0.119 (0.237)	-0.207 (0.373)	-0.223 (0.373)	-0.098 (0.116)	-0.080 (0.106)	-0.122 (0.116)	-0.076 (0.126)	-0.080 (0.125)	-0.120 (0.195)	-0.103 (0.194)
Constant	6.474 (5.226)	15.714** (6.204)	6.635 (5.314)	8.716 (6.041)	7.988 (5.966)	13.045 (9.774)	26.371** (11.053)	-1.474 (2.853)	7.028** (3.129)	-1.213 (2.824)	0.149 (3.211)	-0.173 (3.165)	-0.346 (5.124)	5.270 (5.740)
N	122	122	122	113	113	82	79	122	122	122	113	113	82	79
R <sup>2</sup>	0.048	0.071	0.019	0.022	0.018	0.027	0.175	0.013	0.177	0.035	0.038	0.038	0.056	0.214

**Table 5. Univariate analysis of ESG loan characteristics**

This table presents univariate analysis of ESG loans and matched non-ESG loans. An ESG-linked (green) package is defined as a loan package containing at least one ESG-linked (or green) loan facility. In Panel A, we match each ESG-linked or green package to control packages that (1) have neither ESG-linked nor green loan facilities, (2) are issued in the same country, industry, and year, and (3) are issued to borrowers with the same public-private status. The matched sample consists of 243 ESG-linked (267 green) packages and 3,415 (5,756) non-ESG packages in the control group. Panel A reports the number of loan packages in the ESG-linked, green, and control package groups (i.e., # package), the average sales of borrowers in each package group at the time of closing of the loan deal (i.e., Sales at close (\$ million)), the average deal size of each package group (i.e., Deal size (\$ million)), the fraction of publicly listed borrowers in each package group (i.e., Public firms), differences between ESG-linked (green) and control packages as well as their p-values (i.e., Mean difference and P-value), and the fraction of packages that are comprised entirely of term loans (i.e., Only term loan A), entirely of revolving credit facilities (i.e., Only revolver), of both term loans and revolvers (i.e., Term loan A + Revolver), or of facilities other than term loans or revolvers (i.e., Others). In Panel B, we further match each ESG-linked or green package to control packages that have the closest deal size in addition to the matching criteria used in Panel A. For this matched set of loan packages, Panel B reports the number of packages and facilities in each group (i.e., # package and # facility), the average deal size of each package group (i.e., Deal size (\$ million)), the average dollar amount of facilities in each group (i.e., Facility amount (\$ million)), the average maturity of facilities in each group (i.e., Maturity (months)), the fraction of project financing facilities (i.e., Project finance), leveraged loan facilities (i.e., Leveraged), investment grade facilities (i.e., Investment grade), and the mean differences between ESG-linked (green) facilities and non-ESG (non-green) control facilities as well as their associated p-values (i.e., Mean difference and P-value). \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Package-level matching by country, industry, year, and public-private status								
	ESG-linked loans				Green loans			
	ESG-linked	Matched	Mean difference	P-value	Green	Matched	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# package	243	3,415			267	5,756		
Sales at close (\$ million)	12,083.37	6,540.26	5,543.10***	0.00	5,568.36	4,902.16	666.21	0.76
Deal size (\$ million)	819.20	560.29	258.91***	0.00	295.02	313.23	-18.21	0.58
Public firm	0.69	0.59	0.09***	0.00	0.19	0.18	0.01	0.74
Only term loan A	19.34%	31.48%			53.93%	38.48%		
Only revolver	55.97%	32.83%			11.61%	24.70%		
Term loan A + Revolver	11.11%	14.00%			10.86%	10.62%		
Others	13.58%	21.70%			23.60%	26.20%		

(continued)

**Table 5. Univariate analysis of ESG loan characteristics (continued)**

Panel B: Package-level matching by deal size, country, industry, year, and public-private status								
	ESG-linked loans				Green loans			
	ESG-linked	Matched	Mean difference	P-value	Green	Matched	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# package	243	229			267	216		
# facilities	333	385			535	412		
Deal size (\$ million)	814.59	673.24	141.35	0.13	292.18	283.86	8.32	0.83
Facility amount (\$ million)	598.11	416.53	181.58***	0.01	142.74	148.83	-6.09	0.68
Maturity (months)	62.30	65.16	-2.86	0.35	127.63	93.04	34.59***	0.00
Term loan A	0.28	0.39	-0.11***	0.00	0.63	0.52	0.11***	0.00
Institutional term loan	0.01	0.04	-0.04***	0.00	0.00	0.03	-0.02***	0.00
Revolver	0.57	0.37	0.19***	0.00	0.14	0.25	-0.11***	0.00
Project finance	0.03	0.11	-0.08***	0.00	0.67	0.37	0.30***	0.00
Leveraged	0.08	0.18	-0.10***	0.00	0.03	0.08	-0.05***	0.00
Investment grade	0.57	0.35	0.21***	0.00	0.06	0.14	-0.08***	0.00



**Table 6. Structure of ESG loan syndicates**

This table documents the syndicate structure of ESG-linked and green loans, in comparison to the syndicate structure of control non-ESG loans matched on country, industry, year, borrower public-private status, and deal size. For each group, the table reports the average number of lead arrangers in the loan syndicate (i.e., # lead arranger). The table further breaks down the lead arrangers into various categories, reporting the average number of lenders belonging to each category along with the corresponding share within the syndicate (in brackets). The categories include lenders who are from countries that are not the borrower’s country of incorporation (i.e., Foreign lender), who are in the top 1% of foreign lenders in terms of total lending amount during the package activation month (i.e., Foreign reputable lender), who are foreign lenders with prior ESG lending history according to DealScan (i.e., Foreign ESG-experienced lender), who has a prior lending relationship with the borrower (i.e., Relationship lender), who are relationship lenders who have prior ESG lending history (i.e., Relationship ESG-experienced lender), who are foreign relationship lenders, foreign non-relationship lenders, domestic relationship lenders, or domestic non-relationship lenders. The table also reports the differences between ESG-linked (or green) packages and their matched counterparts, along with the associated p-values (i.e., Mean difference and P-value). \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

	ESG-linked loans				Green loans			
	ESG-linked	Matched	Mean difference	P-value	Green	Matched	Mean difference	P-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# lead arranger	6.19	4.83	1.36***	0.00	4.70	3.81	0.89***	0.01
Foreign lender	4.25 [0.59]	2.89 [0.50]	1.36*** 0.09***	0.00 0.00	3.27 [0.44]	2.27 [0.43]	1.00*** 0.01	0.00 0.74
Foreign reputable lender	4.14 [0.52]	2.69 [0.40]	1.45*** 0.12***	0.00 0.00	3.16 [0.39]	2.14 [0.36]	1.02*** 0.03	0.00 0.28
Foreign ESG-experienced lender	3.88 [0.53]	0.07 [0.02]	3.81*** 0.51***	0.00 0.00	2.78 [0.36]	0.09 [0.02]	2.69*** 0.34***	0.00 0.00
Relationship lender	4.93 [0.79]	2.97 [0.62]	1.97*** 0.17***	0.00 0.00	1.16 [0.28]	1.02 [0.33]	0.14 -0.05*	0.30 0.08
Relationship ESG-experienced lender	4.56 [0.74]	0.08 [0.01]	4.48*** 0.73***	0.00 0.00	0.92 [0.22]	0.04 [0.02]	0.88*** 0.20***	0.00 0.00
Foreign relationship lender	3.25 [0.42]	1.70 [0.28]	1.55*** 0.14***	0.00 0.00	0.80 [0.15]	0.53 [0.12]	0.27** 0.03	0.01 0.15
Foreign non-relationship lender	1.00 [0.16]	1.19 [0.22]	-0.19 -0.05**	0.29 0.03	2.47 [0.30]	1.74 [0.31]	0.72** -0.02	0.01 0.48
Domestic relationship lender	1.68 [0.37]	1.27 [0.34]	0.42*** 0.03	0.00 0.31	0.36 [0.13]	0.49 [0.21]	-0.13 -0.08***	0.02 0.00
Domestic non-relationship lender	0.25 [0.05]	0.67 [0.17]	-0.42*** -0.12***	0.00 0.00	1.07 [0.43]	1.05 [0.36]	0.02 0.07**	0.78 0.02
Number of facilities	329	388			533	430		

**Table 7. Multivariate regressions: Determinants of ESG lending**

This table reports estimates from cross-sectional ordinary least squares (OLS) regressions at the loan facility level. In Panel A (Panel B), the sample consists of 333 (535) ESG-linked (green) loan facilities and 5,635 (9,217) matched non-ESG (non-green) loan facilities. We regress an indicator variable for whether the loan facility is an ESG-linked (Panel A) or green (Panel B) loan, on explanatory variables including a dummy variable for whether the borrower is a publicly listed firm (i.e., PubliclyListed), the natural logarithm of one plus the dollar amount issued in the loan facility (i.e., Log(FacilityAmount)), the natural logarithm of one plus the loan facility’s maturity in months (i.e., Log(Maturity)), a dummy variable indicating whether the loan facility is a revolving credit facility (i.e., Revolver), an indicator variable for whether the loan facility is a project financing vehicle (i.e., ProjectFinance), the natural logarithm of one plus the number of lead arrangers in the loan syndicate (i.e., Log(# LeadArranger)), the ratio of the number of relationship lenders to the total number of lead arrangers in the syndicate (i.e., RelationshipLender), and the ratio of the number of foreign lenders to the total number of lead arrangers in the syndicate (i.e., ForeignLender). Country-by-industry-by-year fixed effects are included in every regression, where industry grouping is based on the Fama-French 17 industry classifications. Country-by-year clustered standard errors are reported in parenthesis. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: ESG-linked loans									
	Dependent variable: I(ESG-linked loan)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PubliclyListed	0.056*** (0.017)								0.021 (0.014)
Log(FacilityAmount)		0.018*** (0.005)							0.009** (0.003)
Log(Maturity)			0.009*** (0.003)						0.019*** (0.005)
Revolver				0.056*** (0.016)					0.038*** (0.012)
ProjectFinance					-0.096*** (0.027)				-0.079*** (0.024)
Log(# LeadArranger)						0.054*** (0.015)			0.030** (0.011)
RelationshipLender							0.062*** (0.019)		0.043*** (0.014)
ForeignLender								0.064*** (0.021)	0.049** (0.020)
Constant	0.444*** (0.017)	0.387*** (0.031)	0.967*** (0.012)	0.444*** (0.016)	0.500 (0.000)	-0.112*** (0.032)	-0.028*** (0.009)	-0.036*** (0.012)	-0.191*** (0.050)
Country × Industry × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	5,927	5,927	5,597	5,927	5,927	5,352	5,352	5,352	5,201
Adj. R <sup>2</sup>	0.117	0.126	0.125	0.126	0.120	0.157	0.152	0.147	0.188

*(continued)*

**Table 7. Multivariate regressions: Determinants of ESG lending (continued)**

Panel B: Green loans									
	Dependent variable: I(Green loan)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PubliclyListed	0.019 (0.020)								0.017 (0.017)
Log(FacilityAmount)		0.003 (0.002)							0.002 (0.002)
Log(Maturity)			0.022*** (0.006)						0.012*** (0.004)
Revolver				-0.016* (0.008)					-0.000 (0.006)
ProjectFinance					0.150** (0.068)				0.155** (0.074)
Log(# LeadArranger)						0.045** (0.018)			0.036* (0.018)
RelationshipLender							-0.021 (0.014)		-0.009 (0.008)
ForeignLender								0.039*** (0.014)	0.002 (0.014)
Constant	0.250*** (0.000)	0.236*** (0.010)	0.292*** (0.025)	0.250 (0.000)	0.107 (0.064)	0.212*** (0.015)	0.251*** (0.000)	0.217*** (0.012)	0.155** (0.077)
Country × Industry × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	9,741	9,736	9,239	9,741	9,741	9,110	9,110	9,110	8,788
Adj. R <sup>2</sup>	0.246	0.246	0.260	0.246	0.276	0.259	0.253	0.254	0.297

**Table 8. Ex-ante ESG profiles and ESG lending**

This table presents estimates from cross-sectional regressions of ESG-linked or green loan issuance on the previous year’s borrowers’ or lenders’ ESG profiles measured by Asset4 ESG scores. The sample consists of 311 loan facilities comprised of ESG-linked or green loans and non-ESG facilities issued to borrowers who are matched to the Asset4 database. The dependent variable is an indicator equal to one if the facility is either an ESG-linked or green loan and zero otherwise. ESG score(borrower) is the borrower’s Asset4 ESG score measured in the year prior to the issuance of the loan. ESG score(lender) is the average Asset4 ESG score of all the lead arrangers in the syndicate of the loan measured in the year prior to the issuance of the loan. Country-by-industry-by-year fixed effects and control variables are included in every regression, where the control variables are the explanatory variables used in Table 7, such as Log(FacilityAmount), Log(Maturity), Revolver, ProjectFinance, Log(# lead arranger), RelationshipLender, and ForeignLender. Industry grouping is based on the Fama-French 17 industry classifications. Country-by-year clustered standard errors are reported in parenthesis. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Ordinary least squares (OLS) regressions					
	Dependent variable: I(ESG-linked or green loan)				
	(1)	(2)	(3)	(4)	(5)
ESG score(borrower)	0.013*** (0.005)		0.013*** (0.005)	0.085* (0.050)	
ESG score(lender)		-0.000 (0.015)	0.000 (0.015)	0.055 (0.042)	
ESG score(borrower) × ESG score(lender)				-0.001 (0.001)	
ESG score(borrower) – ESG score(lender)					0.011** (0.005)
Constant	-1.128*** (0.364)	-0.547 (1.354)	-1.159 (1.318)	-5.068 (3.186)	-0.056 (0.537)
Country × Industry × Year FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
N	311	311	311	311	311
Adj. R <sup>2</sup>	0.236	0.142	0.232	0.244	0.223
Panel B: Logistic regressions					
	Dependent variable: I(ESG-linked or green loan)				
	(1)	(2)	(3)	(4)	(5)
ESG score(borrower)	0.081** (0.039)		0.081** (0.039)	0.766* (0.399)	
ESG score(lender)		0.002 (0.069)	0.003 (0.081)	0.521 (0.325)	
ESG score(borrower) × ESG score(lender)				-0.009* (0.005)	
ESG score(borrower) – ESG score(lender)					0.066* (0.035)
Constant	-16.660*** (3.961)	-13.663** (6.230)	-16.914** (6.888)	-54.618** (24.854)	-10.672** (4.922)
Country × Industry × Year FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
N	228	228	228	228	228
Pseudo R <sup>2</sup>	0.309	0.238	0.309	0.331	0.297

**Table 9. Effects of ESG lending on subsequent ESG performance**

This table reports results from quasi difference-in-differences panel regressions of borrower (Panel A) and lender (Panel B) Asset4 ESG scores on a firm-invariant indicator variable equal to one if the borrower (lender) contracts an ESG-linked or green loan during the full sample period and zero otherwise (i.e., ESG Borrower (Lender)), an indicator variable equal to one if the current year is after the ESG-linked or green loan issuance year (or pseudo issuance year for matched firms) and zero otherwise (i.e., PostLoanIssuance), as well as their interaction term (i.e., ESG Borrower (Lender)  $\times$  PostLoanIssuance). The samples consist of 1,206 borrower-year observations (Panel A) and 842 lender-year observations (Panel B) where the borrowers and lenders are in the intersection of DealScan and Asset4. The sample period is from 2012 to 2020. Two dependent variables are used: The first dependent variable is the overall ESG score of borrowers or lenders in a given year. The second dependent variable is the ES (Environmental and social) score, which is defined as the average of the environmental and social scores reported in Asset4. Firm, country-by-year, and industry-by-year fixed effects are included. Firm clustered standard errors are reported in parenthesis. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: Borrower regressions				
Dependent variable:	ESG score		ES score	
	(1)	(2)	(3)	(4)
ESG Borrower $\times$ PostLoanIssuance	-2.199 (5.564)	-4.465 (2.838)	-4.112 (6.332)	-4.956 (3.107)
ESG Borrower	11.883*** (3.247)		13.640*** (3.767)	
PostLoanIssuance	0.641 (5.004)	3.348 (2.577)	4.489 (5.751)	5.200* (2.888)
Constant	57.901*** (12.262)	67.326*** (1.194)	54.777*** (14.568)	68.654*** (1.340)
Firm FE	N	Y	N	Y
Country $\times$ Year FE	Y	Y	Y	Y
Industry $\times$ Year FE	Y	Y	Y	Y
N	1,206	1,206	1,206	1,206
Adj. R <sup>2</sup>	0.199	0.891	0.237	0.905
Panel B: Lender regressions				
Dependent variable:	ESG score		ES score	
	(1)	(2)	(3)	(4)
ESG Lender $\times$ PostLoanIssuance	-11.741 (10.406)	0.038 (4.000)	-14.463 (13.008)	4.650 (5.844)
ESG Lender	13.744** (6.713)		19.210** (8.497)	
PostLoanIssuance	14.955 (10.125)	-1.564 (4.098)	16.092 (12.647)	-7.410 (5.874)
Constant	65.074*** (7.822)	70.332*** (1.834)	59.505*** (9.373)	74.849*** (2.071)
Firm FE	N	Y	N	Y
Country $\times$ Year FE	Y	Y	Y	Y
Industry $\times$ Year FE	Y	Y	Y	Y
N	842	842	842	842
Adj. R <sup>2</sup>	0.356	0.889	0.451	0.906

## Appendix A Variable definitions

Variable	Description	Data Source
Abnormal ESG-linked (green) loan shares	$\frac{ESG \text{ facility amount (Country)}}{ESG \text{ facility amount (World)}} - \frac{Non-ESG \text{ facility amount (Country)}}{Non-ESG \text{ facility amount (World)}}$ where the facility amounts are the sum over the period of 2016 to 2020 at the country level.	DealScan
Creditor right index	A categorical variable ranging from 0 to 4 depending on how many of the following regulations exist in the country, as of 2002: (1) No automatic stay on assets; (2) secured creditors are paid first; (3) restrictions on going into reorganization; (4) management does not stay in reorganization.	Djankov et al., 2007
Common law	An indicator variable equal to one if the country's legal system is of English-origin and zero otherwise.	Djankov et al., 2007
Private credit	Domestic credit to private sector as a percentage of GDP	World Bank Open Data
Stringency (Enforcement) of environmental regulation	From 1 (very lax) to 7 (very stringent).	World Economic Forum
Log GDP	The natural logarithm of the country's average GDP over 1995-2015.	World Bank Open Data
Per-capita GDP growth	The country's average per-capita GDP growth over 1995-2015.	World Bank Open Data
PubliclyListed	An indicator variable equal to one if the borrower is a publicly listed firm and zero otherwise.	DealScan
Log(FacilityAmount)	The natural logarithm of one plus the facility amount in \$ million.	DealScan
Log(Maturity)	The natural logarithm of one plus the maturity in months.	DealScan
Revolver	An indicator variable equal to one if the facility type is one of the following: "364-Day Facility", "Revolver/Line<1 Yr.", "Revolver/Line>= 1 Yr.", "Revolver/Term Loan", "Demand Loan", or "Limited Line".	DealScan
ProjectFinance	An indicator variable equal to one if the facility is a project financing vehicle.	DealScan
Log(# LeadArranger)	The natural logarithm of one plus the number of lead arrangers in the syndicates. A lender is designated a lead arranger if in DealScan the "LEADARRANGERCREDIT" indicator equals "Yes" or the "LENDERROLE" variable includes one of the following strings: "Admin agent", "Agent", "Arranger", "Bookrunner", "Coordinating arranger", "Lead arranger", "Lead bank", "Lead manager", "Mandated arranger", or "Mandated Lead arranger" (see Cai et al., 2018).	DealScan
RelationshipLender	$\frac{\text{The number of relationship lead arrangers}}{\text{The total number of lead arrangers in the syndicate}}$ The fraction of lenders with previous lending relationships with the borrower in the syndicate.	DealScan
ForeignLender	$\frac{\text{The number of foreign lead arrangers}}{\text{The total number of lead arrangers in the syndicate}}$ The fraction of lenders domiciled in countries different from the borrower's domicile in the syndicate.	DealScan

(continued)

## Appendix A Variable definitions (continued)

Variable	Description	Data Source
ESG score(borrower)	The borrower's ESG score measured in the year prior to the issuance of the loan.	Asset4
ESG score(lender)	The average ESG score of all the lead arrangers in the syndicate of the loan measured in the year prior to the issuance of the loan.	Asset4
PostLoanIssuance	An indicator variable equal to one if the borrower (lender) had originated an ESG-linked or green loan during or prior to the given year, and zero otherwise.	DealScan
ESG Borrower (ESG Lender)	A cross-sectional dummy variable equal to one if the borrower or lender originates an ESG-linked or green loan at any time throughout the entire sample period.	Asset4

## Appendix B Supplementary Tables

**Table B1. Logistic regressions: Determinants of ESG lending**

This table reports estimates from cross-sectional logistic regressions at the loan facility level. In Panel A (Panel B), the sample consists of 5,927 (9,741) facilities including 243 ESG-linked (267 green) packages and 3,415 (5,756) non-ESG (non-green) matched control packages. We regress an indicator variable for whether the loan facility is an ESG-linked (Panel A) or green (Panel B) loan, on explanatory variables including a dummy variable for whether the borrower is a publicly listed firm (i.e., PubliclyListed), the natural logarithm of one plus the dollar amount issued in the loan facility (i.e., Log(FacilityAmount)), the natural logarithm of one plus the loan facility's maturity in months (i.e., Log(Maturity)), a dummy variable indicating whether the loan facility is a revolving credit facility (i.e., Revolver), an indicator variable for whether the loan facility is a project financing vehicle (i.e., ProjectFinance), the natural logarithm of one plus the number of lead arrangers in the loan syndicate (i.e., Log(# LeadArranger)), the ratio of the number of relationship lenders to the total number of lead arrangers in the syndicate (i.e., RelationshipLender), and the ratio of the number of foreign lenders to the total number of lead arrangers in the syndicate (i.e., ForeignLender). Country-by-industry-by-year fixed effects are included in every regression, where industry grouping is based on the Fama-French 17 industry classifications. Country-by-year clustered standard errors are reported in parenthesis. \*, \*\*, and \*\*\* denote significance levels of 10%, 5%, and 1%, respectively.

Panel A: ESG-linked loans									
	Dependent variable: I(ESG-linked loan)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PubliclyListed	1.271*** (0.291)								0.488* (0.284)
Log(FacilityAmount)		0.409*** (0.071)							0.221** (0.105)
Log(Maturity)			0.262*** (0.098)						0.817*** (0.122)
Revolver				1.220*** (0.199)					0.906*** (0.226)
ProjectFinance					-2.566*** (0.801)				-2.301*** (0.795)
Log(# LeadArranger)						1.098*** (0.185)			0.430** (0.219)
RelationshipLender							1.749*** (0.373)		1.233*** (0.384)
ForeignLender								1.509*** (0.389)	1.121 (0.749)
Constant	-1.271*** (0.291)	-2.578*** (0.450)	-4.853*** (0.392)	-1.220*** (0.199)	0.000 (0.000)	-6.380*** (0.573)	-5.444*** (0.543)	-5.524*** (0.483)	-12.554*** (0.757)
Country × Industry × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	5,925	5,925	5,326	5,925	5,925	5,114	5,114	5,114	4,729
Pseudo R <sup>2</sup>	0.203	0.228	0.205	0.226	0.213	0.253	0.251	0.233	0.330

*(continued)*



**Table B1. Logistic regressions: Determinants of ESG lending (continued)**

Panel B: Green loans									
	Dependent variable: I(Green loan)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PubliclyListed	0.604 (0.503)								0.825 (0.586)
Log(FacilityAmount)		0.088 (0.058)							-0.128* (0.074)
Log(Maturity)			0.505*** (0.076)						0.253** (0.099)
Revolver				-0.570** (0.259)					-0.531*** (0.199)
ProjectFinance					3.138*** (0.809)				3.065*** (0.859)
Log(# LeadArranger)						1.100*** (0.264)			1.071*** (0.316)
RelationshipLender							-0.762 (0.467)		-0.330 (0.383)
ForeignLender								1.279*** (0.358)	1.099** (0.499)
Constant	-1.099 (0.000)	-1.465*** (0.242)	-2.598*** (0.324)	-1.099*** (0.000)	-4.171*** (0.806)	-2.052*** (0.233)	-1.081*** (0.010)	-2.244*** (0.331)	-5.720*** (0.749)
Country × Industry × Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	9,731	9,726	8,804	9,731	9,731	9,029	9,029	9,029	8,354
Pseudo R <sup>2</sup>	0.335	0.335	0.356	0.337	0.404	0.371	0.354	0.358	0.460