

# **“Glossy Green” Banks: The Disconnect Between European Banks’ Sustainability Reporting and Lending Activities**

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## **ABSTRACT:**

We study the relation between banks’ environmental reporting and lending activities. We create a proxy for environmental-themed disclosures using content analysis on banks’ investor reports. Taking advantage of granular loan-level data from a euro-area credit registry, we show that banks with extensive environmental disclosures lend more to brown borrowers and do not provide more credit to firms in green industries. We find that these results are not driven by banks’ financing of brown borrowers’ transition to greener technologies. Instead, these banks lend to the weakest borrowers in brown industries, especially if they have low capital adequacy. Our results suggest that European banks overemphasize their climate goals and credentials, but continue to be tied to their established credit relationships with polluting borrowers.

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## 1. Introduction

Over the past decade, regulators and other stakeholders have increasingly recognized climate change as an important financial risk and demanded firms to accelerate sustainability investments for mitigating their negative impact (e.g., Sustainability Accounting Standards Board [SASB] 2017; European Commission [EC] 2017; United Nations [UN] 2021). In response to the rising institutional pressures, firms have rapidly initiated voluntary disclosures of their environmental activities and footprint (Rouen et al., 2022).<sup>1</sup> Yet, calls over the credibility of environmental-themed disclosures grow louder, voicing concerns about firms often making unsubstantiated claims regarding their positive environmental impact to legitimize their business model and symbolically comply with the new institutional demands (e.g., EC 2019). The findings of empirical research on this topic remain overwhelmingly mixed, primarily due to the use of diverse environmental metrics, lack of granular data on firms' investments and empirical challenges in capturing misleading disclosures (Grewal and Serafeim 2020; Christensen et al. 2021).

In this paper, we provide novel insights on this issue by examining the relevance and credibility of the sustainability disclosures by European banks. A study of banks' environmental reporting practices is relevant for several reasons. Following the Paris Agreement in 2016, European legislators have highlighted the important stewardship role of banks in enhancing social and economic welfare through financing "green" investments and guiding the transition to a carbon-neutral economy (e.g., EC 2021; UN Environment Programme Finance Initiative [UNEP-FI] 2022). Such policies are particularly important since banks are the primary source of external finance for firms in the European Union (EU). Importantly, sustainability reporting is now considered pivotal to the effective measurement

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<sup>1</sup> To exemplify, in a survey by KPMG (2020), the proportion of firms reporting on sustainability has grown worldwide from 41% in 2005 to 80% in 2020, reaching a 96% reporting rate among the largest firms.

and management of banks' environmental strategies, with recent surveys pointing to the lack of transparent and consistent sustainability disclosures (European Central Bank [ECB] 2022). This institutional shift within the EU stands in sharp contrast to other constituencies, including the U.S., where central banks and other regulatory bodies remain agnostic with respect to the banks' role in green financing and the importance of relevant information dissemination.<sup>2</sup>

However, the credibility of European banks' environmental claims has not always withstood regulatory scrutiny. For instance, the SEC, the U.S. Department of Justice, and the Germany's Federal Financial Supervisory Authority, BaFin, recently initiated an investigation of Deutsche Bank's asset-management arm, DWS Group, for overstating the amount of investments using ESG criteria in its annual report. An internal assessment revealed no evidence of verifiable sustainability metrics that DWS supposedly applied in investment decisions.<sup>3</sup> Concerns that banks' unsubstantiated claims over sustainable policies extend beyond the asset management arms to the more opaque corporate lending operations are therefore warranted.

Moreover, examining greenwashing within the European banking sector offers several empirical advantages. First, unlike corporations that typically hold a diverse portfolio of assets, the majority of a bank's balance sheet includes a single asset category, i.e., loans. In large European banks, loans constitute on average 60% of their asset.<sup>4</sup> Second, European banks must report in central credit registries detailed granular data on new loans and credit exposures. These features allow us to directly classify a substantial proportion of bank assets based on environmental-related loan portfolio allocation.

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<sup>2</sup> Giles, C., and D. Mosolova, Jan. 12 2023, "How do the Federal Reserve and the ECB differ on tackling climate change?", Financial Times, <https://on.ft.com/3iyvJL9>.

<sup>3</sup> Kowsmann, P., and K. Brown, Aug. 1 2021, "Fired Executive Says Deutsche Bank's DWS Overstated Sustainable-Investing Efforts", Wall Street Journal, <https://www.wsj.com/articles/fired-executive-says-deutsche-banks-dws-overstated-sustainable-investing-efforts-11627810380>.

<sup>4</sup> The ratio of gross loans to total assets is estimated over the 2014-2020 period for a sample of systemic European banks based on FINREP financial data.

The relationship between a bank's lending activities and its reported environmental objectives is ex-ante unclear. On the one hand, banks with stronger commitment to environmental lending policies may select to disclose more environmental-themed information to signal their competitive sustainability strategy to the stakeholders and increase market value (Diamond and Verrecchia 1991). This is because environmental disclosures will allow banks to establish a reputation for environmental and social consciousness, which is shown to be associated with customers' loyalty and lower cost of capital (e.g., Dhaliwal et al., 2011; Albuquerque et al., 2019).

On the other hand, recent studies suggest that firms may select to report only positive sustainability actions and withhold information about negative ones to enhance their public image by misleading investors, customers, and regulators. To exemplify, firms with larger gender pay gaps are shown to disclose more information on gender diversity (Huang and Lu 2022; Baker et al., 2022). Extensive sustainability disclosures are often associated with analysts' lack of consensus and ESG rating disagreements (Dhaliwal et al., 2012; Christensen et al., 2022). These findings further support concerns that voluntary sustainability disclosures may provide questionable portrayals of banks' environmental and social profile.

To test our predictions, we employ granular data on commercial loans issued by 101 systemic banks in the Euro Area over the 2014-2020 period. Specifically, we obtain loan-level information from Anacredit (AC), a credit registry recently launched by the European System of Central Banks. AC allows us to capture the flow of banks' credit exposures over time with minimal reporting bias. We classify new loans and credit exposures as "green" or "brown" based on the volume of greenhouse gas (GHG) emissions in the borrower's industry and country over a year. In some of our tests, we focus on a smaller sample of borrowers for which we can directly observe firm-level scope 1 and 2 emissions.

We measure the extent of banks' environmental disclosures in the reports that banks commonly use to communicate their sustainability actions (e.g., sustainability reports, annual reports) based on a dictionary of climate-information-related keywords. Our environmental disclosure proxy exhibits a positive association with: (i) a country's environmental risk and social attention towards sustainability topics (e.g., Ioannou and Serafeim, 2012, 2017; Baldini et al. 2018), (ii) a bank's reputation, environmental score ratings and disclosure ratings (e.g., Serafeim 2014; Basu et al. 2022; Christensen et al. 2022), and (iii) a bank's green bond underwriting. These findings indicate that our measure effectively captures the extent to which a bank stresses environmental goals in its communication to investors. Importantly, we show that in sentences related to our environmental keywords, banks commonly discuss about their lending and financing strategies and how their credit decisions facilitate the achievement of climate goals.<sup>5</sup>

Our findings suggest that banks that emphasize their "green" credentials in their disclosures extend more credit to borrowers in brown industries and borrowers with higher emissions in general. We further show that the disconnect between banks' environmental reporting and brown lending is not offset by a greater lending activity in green sectors, suggesting that disclosures exaggerate the banks' effort to offset their total carbon footprint. One possibility is that banks with extensive environmental disclosures continue to lend to borrowers in brown industries to facilitate their transition to greener technologies, which are typically capital-intensive and may require large amounts of credit. However, we find no evidence that firms in brown industries that receive credit from these banks are more likely to invest in R&D and fixed assets relative to other firms in their industries, suggesting that transition lending is unlikely to influence our conclusions.

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<sup>5</sup> An important underlying assumption is that banks should primarily fulfil their climate goals through their lending operations rather than initiatives banks engage in to reduce their carbon footprints (e.g., decrease GHG emissions or water consumption). The plausibility of our assumption is supported by the fact that SASB does not classify a bank's environmental impact through its business operations as material (SASB 2022).

We next examine banks' effort to rebalance their loan portfolios towards green (or less brown) borrowers. We indeed provide evidence that high environmental reporters are less likely to initiate new credit relationships with borrowers in brown sectors. Interestingly, though, banks with extensive environmental disclosures tend to extend more loans to brown borrowers with which they have stronger relationships, as measured by the proportion of outstanding loans they extended in the past. We also find no evidence that banks that emphasize their climate agenda are more likely to establish new credit relationships with green borrowers. As a result, we find that the increase in the credit exposure to brown sectors is higher for this group of banks. Overall, our evidence suggests that bank relationships and previous exposures limit the role that banks can play in financing the climate transition. In this respect, our findings are consistent with De Haas and Popov (2022) and Degryse et al. (2022) who show that debt financing can slow the transition to a greener economy.

In supplemental analyses, we document that the discrepancies between environmental disclosures and the environmental impact of lending decisions are likely driven by banks' propensity to continue lending to financially unhealthy brown borrowers (zombies). This is because zombie borrowers have typically fewer financing alternatives, and thus terminating lending relationships would force banks to realize credit losses, therefore, discuss and explain their exposures to brown industries. The fact that discrepancies between actual lending decisions and the environmental profiles that banks attempt to project emerge especially for weaker borrowers in brown industries suggest that relationships with zombie firms make particularly hard for banks to reduce their environmental impact.

Finally, we show that large banks boost their environmental profiles even if they provide large amounts of credit to borrowers in brown industries, potentially because these banks are under greater pressure by stakeholders to legitimize their operations and lending choices. We further find that banks with low capital adequacy are more likely to continue lending to brown

borrowers but overemphasize their carbon credentials, consistent with the fact that these banks that have particularly strong incentives to avoid reporting credit losses and engage in zombie lending (Peek and Rosengren, 2005; Giannetti and Simonov, 2013). Last, mandatory sustainability reporting and the use of an external auditor do not appear to influence the relation between environmental-themed disclosures and brown lending, potentially because climate disclosures are not easily verifiable or standardized to be effectively audited or regulated.

Our paper makes several important contributions to the literature. First, we contribute to a flourishing literature on the environmental practices and decarbonization process in the banking sector. While European banks have overwhelmingly adopted climate-related goals following the Paris agreement (Reghezza et al., 2021), the evidence on whether banks can develop a credible reputation for greener lending policies is mixed. For instance, Basu et al. (2022) find no association between banks' social score rating and mortgage issuance in poor localities in the U.S., while Houston and Shan (2022) show that banks with a high ESG rating are more likely to engage with borrowers of similar ESG risk. Similarly, Peydro and Kacperczyk (2022) and Degryse et al. (2021) show that banks that become members of initiatives, such as the Science Based Targets Initiative and the United Nations Environment Programme Finance Initiative, extend more syndicated loans to greener borrowers at lower prices. However, Popov and Laeven (2022) find that banks extend more syndicated loans in fossil and fuel industries after the adoption of carbon taxes in their domestic country. To the best of our knowledge, we are the first to explore banks' environmental disclosures and their association with their lending practices. In addition, existing literature mostly relies on large exposures or syndicated loans. We consider the evolution of banks' entire loan portfolios and the extent to which this is consistent with banks' environmental disclosures.

Second, we add to prior research on the accuracy of sustainability disclosures, which has offered mixed evidence primarily due to reliance on small samples and the empirical challenges

in capturing sustainability investments and outcomes for nonfinancial corporations (e.g., Cho and Patten 2007; Cho et al. 2012; Hummel and Schlick 2016; Marquis et al. 2016; Khan et al. 2016; Grewal et al. 2019). Taking advantage of banks' granular loan-level reporting in a credit registry, we are able to observe the lending policies across "brown" and "green" borrowers and find that they do not reflect banks' environmental disclosures.

Third, although firms increasingly promote the integration of sustainability goals in their business models (e.g., Hart and Zingales 2017; Rajan et al. 2022; Serafeim 2022), recent studies employing granular data show that firms often exaggerate over their sustainability credentials. Most notably, Kim and Yoon (2022), Gibson et al. (2022) and Raghunandan and Rajgopal (2022) find that funds with an ESG mandate fail to make sustainable investment choices. We contribute to this research by providing novel insights from the banking sector. Our results also imply that the ESG rating shortcomings highlighted in previous literature (e.g., Berg et al. 2021; Serafeim and Yoon, 2022a; Serafeim and Yoon, 2022b; Christensen et al., 2022) can be at least partially attributed to their reliance on firms' inadequate and unsubstantiated disclosures.

Lastly, we add to the emerging literature that examines the effect of banks and debt products on advancing firms' sustainability objectives. Focusing on debt contracting, a few studies show that sustainability-linked debt (i.e., debt with interest rate linked to sustainability metrics) can incentivize borrowing firms to enhance their ESG performance (Kim et al. 2022; Berrada et al. 2022; Dursun-de Neef et al. 2022). However, others show that lenders often contract on immaterial and unambitious sustainability targets (Loumiotis and Serafeim 2022). We add to the debate on the stewardship role of banks in guiding and promoting the transition to a sustainable economy by showing that banks often oversell their stated climate objectives.



## 2. Data Sources and Main Variables

### 2.1. Bank Lending Policies

We focus on the credit exposures and new loan issuance to “brown” industries by large banks in the Eurozone countries. Our initial sample includes 115 systemic financial institutions subject to the Single Supervisory Mechanism (SSM). We eliminate nine banks with headquarters in the USA and Canada, for which the lending activities described in the investor reports primarily concern non-European borrowers, and are not covered in our credit registries.<sup>6</sup> We retain European banks with headquarters outside the Eurozone (e.g., Barclays, HSBC, UBS), because a significant proportion of their loan portfolio pertains to Eurozone borrowers and is extended by subsidiaries included in the Eurozone credit registries.<sup>7</sup> We further exclude two nonbank systemic lenders (e.g., Volkswagen Bank, Renault Crédit International); two banks solely catering to private clients and mortgage borrowers (e.g., Precision Capital and CRH, respectively); and one financial holding of a systemic bank (Raiffeisenbankengruppe OÖ Verbund). Our final sample includes 101 systemic banks (96 unique parent banks) as reported in Appendix A.

We study banks’ lending activities by obtaining loan-level data from Anacredit (AC), a novel credit register launched by the European System of Central Banks in 2018 that offers confidential information on commercial loans outstanding on a monthly basis. Specifically, AC covers granular data on borrower characteristics (e.g., industry, location, size), loan terms (e.g., amount, maturity, interest rate, issuance date) and performance (e.g., delinquency). An important advantage of AC over national banks’ credit data repositories is the harmonization of loan-level information across different countries and the enhancement of the data collection

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<sup>6</sup> These banks include: The Bank of New York Mellon (identified as systemic in Belgium), Goldman Sachs Europe (Germany), J.P. Morgan (Germany and Luxemburg), Morgan Stanley (Germany), State Street (Germany), Bank of America (Ireland), Citibank (Ireland) and RBC (Luxemburg).

<sup>7</sup> Our results are overall robust to excluding these banks from our sample (untabulated).

process.<sup>8</sup> Another important empirical advantage is that data granularity in AC allows us to capture the *flow* of banks' credit exposures over time, as well as changes in lending policies. We can also explore detailed borrower characteristics to explain potential lending activity deviations from banks' reported sustainability agenda.

In our empirical analysis, we employ a sample of newly issued loans over the 2014-2020 period. The median loan maturity is approximately four years (log-transformed summary statistic is reported in Table 1, Panel D), thus, extending our sample's time-series to include loans issued post 2014 still allows us to capture most of the banks' lending activity during this period.<sup>9</sup>

## *2.2 Green and Brown Industries*

We proxy for the environmental impact of banks' lending decisions using greenhouse gas (GHG) emissions data at the industry (NACE 2)-country-year level retrieved from Eurostat over the 2014-2020 period. We standardize emissions using the industry's value added in order to account for the fact that industry size differs across countries.

We classify as "brown" ("green") industries that rank in the upper (bottom) quintile of the industry-adjusted GHG emission measure's distribution. Based on this methodology, Agriculture, Mining and Quarrying, Manufacturing, Electricity and Gas Supply, Water Supply and Waste Management and Transportation and Storage are categorized as brown industries, while Construction, Accommodation and Food Services, Information and Communication, Real Estate Activities, Education, Professional Services and Recreation Activities and Healthcare Services are considered green industries. In our primary analyses, we focus on whether banks' environmental disclosures map their lending activity in brown industries, since

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<sup>8</sup> The preparatory phase of the data collection and compliance monitoring was repeated biannually over the June 2012- December 2017 period.

<sup>9</sup> To mitigate the concern that extending the sample's time-series influences our primary findings, we replicate the analyses by focusing on loans issued over the 2018-2020 period, i.e., after the initiation of banks' monthly reporting to AC. Our results continue to hold (see Internet Appendix Table IA.I).

this association can arguably more objectively indicate greenwashing. However, in supplemental tests, we show that our conclusions are invariant when we consider loans to green industries.

To mitigate concerns that heterogeneity in the level of pollution across firms within a sector affects our results, we also obtain firm-level GHG emissions from Urgentem. The Urgentem Carbon Dataset covers the full spectrum of Scope 1, 2 and 3 emissions reported by more than 6,000 global companies at a consolidated level. Scope 1 and 2 emissions are produced by a firm directly through its activities and by purchasing electricity and energy, respectively. They can be measured much more objectively than scope 3 emissions that are an estimate of the emissions of a firm's suppliers. We thus use as an alternative proxy for a borrower's "brownness" the ratio of scope 1 and 2 GHG emissions to total sales.

### *2.3 Banks Sustainability Reporting*

We construct our proxy for environmental disclosures by collecting the investor reports of the sample banks for the 2014-2020 period. Investor reports commonly discuss firms' environmental activities, including annual, sustainability, nonfinancial information, and integrated reports.<sup>10</sup> Absent a central repository of European firms' reports, similar to EDGAR in the US, we retrieve investor reports from banks' websites at the time of the data collection process (February-May 2021). We obtain any missing banks' reports from the Corporate Register, which includes a large report directory of international firms. Despite our best efforts, our sample does not include documents that cannot be downloaded from banks' websites (or that are not covered by the Corporate Register). We posit that this restriction likely biases us

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<sup>10</sup> Sustainability reports are usually separate documents to annual reports, where firms communicate their environmental, social and governance activities. These reports can also be filed as part of firms' annual reports. In many European countries, sustainability reporting is mandatory. Nonfinancial reports include disclosures of firms' nonfinancial performance (e.g., innovation, brand value), further providing information on firms' sustainability initiatives. Finally, using integrated reporting, firms produce one report (instead of many standalone reports) where they communicate to investors value creation through financial, environmental and social capital ("triple-bottom line").

against constructing a relevant proxy for banks' environmental disclosures that can be further validated.

Moreover, while banks' reports are mostly prepared at the parent level, many of the systemic financial institutions in our sample are bank subsidiaries (Appendix A). We collect reports at the parent level when subsidiary reporting is unavailable. In these cases, we assume that a bank's consolidated disclosures on environmental strategies are aligned across its subsidiaries, so that investors can make informed decisions about a bank's overall environmental profile. Excluding these financial institutions from the analyses would leave our results qualitatively unchanged.

Further, the majority of the reports are written in English, which facilitates the consistency of the textual analysis procedures and dictionary selection. We exclude 88 reports that are provided only in the language of the bank's country of incorporation to avoid challenges arising from translating the dictionary used in the textual analysis to different languages.

Panel A of Table 1 includes descriptive statistics of the reports used in the textual analysis. Our final sample of documents includes 623 annual reports, 273 sustainability reports, 57 integrated reports, and 61 nonfinancial reports. In 220 filings, the sustainability report was included as part of a bank's annual report. We further collect other less lengthy and more tailored disclosures (383 documents) that banks commonly use to communicate their sustainability efforts and performance (e.g., sustainability facts and figures, climate change report, report on greenhouse gas emissions, impact report, responsible investments report). These filings may be disclosed together with or instead of a sustainability report. Collectively, we process 1,397 documents to construct our proxy for banks' environmental disclosures.

#### *2.4. Textual Analysis and the Environmental Disclosure Variable*

Our environmental disclosure measure is based on climate-related keywords in banks' reports. Following Li (2010), we develop a dictionary tailored to capture environmental

reporting choices within the banking context. We therefore read 50 documents to determine repeating patterns in the words and phrases that banks commonly use to communicate their environmental activities. We further rely on the definitions of relevant sustainability topics included in RepRisk—a database containing media coverage of firms’ sustainability risks—and in the Materiality Map developed by the Sustainability Accounting Standards Board (SASB).<sup>11</sup>

Our dictionary of environmental-information-related keywords includes words and phrases related to energy use (e.g., “oil”, “renewables”, “natural gas”, “coal”), emissions (e.g., “CO2”, “carbon”, “emission”, “laughing gas”), biodiversity (e.g., “biodiversity”, “forest”, “coral”), and activities commonly consider to affect pollution (e.g., “car”, “building certificate”, “pollute”, “waste”).<sup>12</sup> We reduce all keywords to their stems before performing the textual analysis of banks’ documents. The full list of environmental keywords is reported in Appendix C. Examples of banks’ disclosures of their environmental activities are provided in Appendix D.

We define *Environmental disclosures* as the ratio of environmental-information-related keywords in a bank’s documents reported over a year to the total number of words in these documents (excluding stop-words, such as “and,” “a,” and “by”). The mean value of *Environmental disclosures* is about 1.2% (Panel B of Table 1), ranging from 0.9% when measured in banks’ annual reports to 3% and 5% for sustainability and other reports, respectively (Panel A).<sup>13</sup> Figure 1 shows that the volume of environmental disclosures

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<sup>11</sup> SASB offers detailed guidelines on important sustainability topics that firms across different sectors are expected to disclose in their investor reports: <https://www.sasb.org/standards/materiality-map/>.

<sup>12</sup> We exclude the keyword “environmental” as vaguely describing underlying indicators of banks’ specific environmental activities, and thus, potentially biasing our analysis in favor of finding evidence consistent with banks’ greenwashing. Our dictionary is similar to the ones employed in prior studies that examine attributes of firms’ environmental disclosures (e.g., Chou and Kimbrough, 2020; Baz et al., 2021).

<sup>13</sup> These descriptive statistics are consistent with the fact that firms commonly use annual reports to communicate their financial performance and alternative reporting to disclose their environmental actions. We note that the variable’s low mean value is primarily driven by our keyword-based textual procedure choices, i.e., we focus on specific words rather than the expanded text around these keywords, in which banks presumably discuss

increases by about 27% over our sample period, in line with firms increasing focus on climate topics (Ioannou and Serafeim, 2012; Rouen et al., 2022).

Figure 2 reports the words that banks most frequently employ in sentences with at least one environmental disclosure keyword. We show that banks commonly discuss their climate footprint in conjunction with their “finance” activities and “loan” decisions to portray their active contribution to a sustainable economy. They may further occasionally discuss other aspects of their environmental activities, for instance, emphasizing their direct emissions or their asset management activities. Our objective is to explore whether banks’ claims of sustainability performance with respect to any of these activities are reflected in greener lending policies, or if rather banks use sustainability performance in one dimension to cover environmentally poor loan choices. That is, we test whether by selectively disclosing positive environmental information on any of their activities banks aim to greenwash their loan portfolios.

### **3. Validation of the Environmental Disclosure Proxy**

To further evaluate whether our environmental disclosure proxy captures how a bank portrays its environmental credentials to investors, we examine its association with countries’ social norms and banks’ financial performance, environmental ratings, and green bond issuance. Prior studies show that national ideologies and social values can explain firms’ commitment to sustainability, and thus, are instrumental to the disclosures of ESG-related information (e.g., Jackson and Apostolakou, 2010; Ioannou and Serafeim, 2012; Ioannou and Serafeim, 2017; Baldini et al., 2018). Building on this work, we expect that banks domiciled in countries with stronger public attention towards sustainability topics will be pressured to commit to more extensive environmental disclosures. Relatedly, banks in countries facing

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environmental topics. This approach has been widely adopted in prior studies employing textual analysis (e.g., Matsumoto et al., 2011; Brochet et al., 2015; Bozanic et al., 2018; Campbell et al., 2019).

relatively higher environmental risk exposure will likely report more environmental-related information that can help investors assess the risk in their normal operations (e.g., Dhaliwal et al., 2011; Dhaliwal et al., 2012; Grewal et al., 2019).

To test our predictions, we employ data from the European Social Survey to capture differences in societal pressure between the countries of the sample banks' headquarters. Specifically, we define a proxy for country-level *Activism* as the percentage of respondents that claim that they would boycott a product, take part in lawful public demonstrations, sign petitions, and post political comments online. We also define a proxy for interest in environmental and social issues in a given country based on the percentage of people responding that it is important: i) to care for the environment; ii) to behave properly; iii) that people are treated equally and have equal opportunities (*Socioeconomic beliefs*) during a year. Variables are defined in detail in Appendix B. In addition, using the World Bank ESG data, we define an indicator variable for whether a bank's headquarters country is classified as high environmental risk using ESG country scores (*High Env risk country*). Details on the methodology for classifying a country as high environmental risk are included in Appendix E. In column 1 of Table 2, consistent with our expectations, we find that banks in countries with greater social activism and environmental risk exposures are more likely to provide extensive environmental disclosures in their reporting.

Moreover, we expect that more visible and reputable banks disclose a greater volume of environmental-related information (e.g., Serafeim, 2014). We measure a bank's reputation using several proxies for size and financial performance, including the natural logarithm of total assets (*Total assets*), the ratio of Tier 1 capital to total assets (*Tier 1 capital*), and the ratio of operating income to gross loans (*ROA*). We also control for a bank's financial vulnerability using the ratio of total debt to total assets (*Leverage*). Data on banks' financial performance are obtained from FINREP.

Finally, we conjecture that our proxy for environmental disclosures will be positively associated with banks' voluntary adoption of sustainability reporting standards, which commonly signals a higher commitment towards sustainability initiatives. We thus consider whether a bank prepares its sustainability reporting under the Global Reporting Initiative Standards (*GRI standards*) and whether a bank has adopted integrated reporting (*Integrated reporting*).<sup>14</sup>

In column 2 of Table 2, our environmental disclosure proxy is positively associated with the likelihood of GRI sustainability reporting, however, we document only weak evidence of a link between our disclosure measure and banks' financial performance. *Tier 1 capital* and *ROA (Leverage)* are positively related to *Environmental disclosures* in two (three) out of six specifications. This is likely attributed the fact that we focus on systemic banks that are on average very large and reputable, and thus, financial performance is unlikely to explain variation in sustainability disclosures within this sample.

Third, prior studies have documented the influence of the volume of firms' sustainability disclosures on ESG ratings (e.g., Basu et al., 2022; Christensen et al., 2022). We thus posit that environmental disclosures should be positively related to environmental scores provided by reputable rating agencies, such as MSCI (*MSCI Env score*) and Sustainalytics (*Sustainalytics Env score*). Related, our proxy should be further associated with the environmental disclosure score by Bloomberg that captures the availability of climate-related information by firms (*Bloomberg Env score*). The mean MSCI and Sustainalytics environmental scores of the sample banks are 5.4 and 66.8, respectively; the mean Bloomberg environmental disclosure score is 38.3. These values are higher than the mean respective scores reported in other studies (e.g., Berg et al., 2022; Christensen et al., 2022), consistent with the size and reputation of the

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<sup>14</sup> GRI standards offer modular, detailed guidelines that help firms standardize their measurement and disclosure of performance metrics with respect to material sustainability topics. GRI is an international independent organization, and its sustainability reporting standards have been widely adopted by more than 10,000 companies in 100 countries.



systemic banks of our sample. In Table 2 (columns 3-5), we document a positive and statistically significant association between *Environmental disclosures* and the measures of banks' environmental ratings (the coefficients on *MSCI Env score* and *Sustainalytics Env score* are statistically significant at the 10% level).<sup>15</sup> Importantly, this finding reaffirms our argument that sample banks on average disclose favorable information about their environmental activities and that the *Environmental disclosures* variable mostly captures positive news about banks' sustainability strategies.

We further validate this argument by investigating the association between our disclosure proxy and the likelihood of a bank being included in the list of the 100 most sustainable firms, globally assessed by Corporate Knights (*ESG Corporate Knights*). We continue to find a positive association between *Environmental disclosures* and banks' sustainability reputation (column 6), collectively suggesting that our measure also captures sustainability activities that banks report to their investors.

Last, we recognize the concern that the *Environmental disclosures* variable may primarily incorporate information about initiatives that the banks undertake to reduce their climate footprint (e.g., decrease their greenhouse gas emissions), and thus, is potentially unrelated to banks' lending activities to green or brown sectors. We thus investigate the association between *Environmental disclosures* and banks' involvement in green bond issuance as underwriters. Green bonds (i.e., bonds with a use-of-proceeds requirement towards environmental projects) have evolved into a significant asset class that reputable and visible companies frequently employ to finance their sustainability strategies (e.g., Flammer, 2021; Lu, 2021; Baker et al.,

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<sup>15</sup> Given the positive association between *Environmental disclosures* and banks' environmental scores, a potential criticism is that our research question on banks' greenwashing could be addressed by using ESG ratings instead of developing a new keyword-based textual proxy for environmental reporting. A concern with this approach is that it can bias our analyses in favor of finding results consistent with greenwashing, considering recent studies documenting the flawed and opaque rating methodologies that often fail to capture underlying ESG actions (e.g., Raghunandan and Rajgopal, 2021; Berg et al., 2022). Our textual proxy is directly derived from banks' investor reports, thus, is not subject to these criticisms.

2022). Therefore, the greater transparency of the public debt market offers limited opportunities for banks to misrepresent their green bond underwriting. We measure green bond issuance by the ratio of annual green bond volume a bank underwrites to bank's total assets (*Green bond issuance*). Data on green bond issuance are obtained from Bloomberg. We document a positive association between *Environmental disclosures* and *Green bond issuance* (column 7), suggesting that our proxy further captures banks' disclosures of environmental stewardship.

Collectively, the findings validate our environmental disclosure proxy and are consistent with banks disclosing favorable information about their environmental-related activities to investors.

#### **4. Environmental Reporting and Environmental Industry Exposures**

##### *4.1 Research methodology*

We study whether banks with more extensive environmental disclosures have indeed greener lending policies. On the one hand, banks may use public reports to communicate their environmental strategies and build a reputation with stakeholders. In this case, we would expect a negative association between environmental disclosures and banks' credit exposures to brown industries. On the other hand, banks may only report positive sustainability actions and withhold negative information to enhance their public image. Banks holding a significant brown loan portfolio may even overemphasize their environmental strategy of transitioning to green sectors and disclose forthcoming climate-related policies to provide a portrayal of environmental stewardship and appease investors. In this case, we expect no significant relationship, or even a positive association, between environmental reporting and banks' credit exposures to brown industries, indicating that banks engage in greenwashing.

Using AC data on new loan issuance, we estimate an ordinary least squares (OLS) model where the dependent variable is the logarithm of new loans' amount, issued by bank  $b$  during year  $t$  to firm  $f$  in industry  $i$ , in country  $c$ ,  $Loan\ amount_{f,b,i,c,t}$ :<sup>16</sup>

$$Loan\ amount_{f,b,i,c,t} = \alpha + \beta_1(Brown_{i,c,t} \times High\ Environmental\ Reporter_{b,t}) \\ + \beta_2 High\ Environmental\ Reporter_{b,t} + \gamma \mathbf{X}_{b,t} + \delta_{i,c,t} + \mu_b + \epsilon_{f,b,i,c,t},$$

Model (1)

The variable of interest is the interaction term  $Brown_{i,c,t} \times High\ Environmental\ Reporter_{b,t}$ .  $High\ Environmental\ Reporter_{b,t}$  is an indicator variable of whether bank's ( $b$ ) *Environmental disclosures* ranks in the upper quintile of the variable's distribution during year  $t$ , and  $Brown_{i,c,t}$  is an indicator variable of whether the ratio of carbon emissions to gross value added of industry  $i$  in country  $c$  ranks in the upper quintile of the variable's distribution across all industries of a country during year  $t$ . We would expect that  $\beta_1 < 0$  if banks with more extensive environmental disclosures indeed engage in greener lending practices.

The vector  $\mu_b$  denotes bank fixed effects and the matrix  $\mathbf{X}_{b,t}$  includes time-varying bank controls. While in some specifications, we control for bank's size, leverage, profitability, and tier 1 capital, in other specifications, we include interactions of bank and time fixed effects thus controlling non-parametrically for time-varying bank characteristics and bank shocks. We further saturate the equation with different sets of fixed effects to control for shocks to the demand for credit of firms in industries with different level of emissions. Specifically, following Acharya et al. (2018) and Degryse et al. (2019), we report specifications where we include interactions of country, industry, and year fixed effects ( $\delta_{i,c,t}$ ), which allow us to identify the supply of credit if shocks affect firms based on industry and location. In alternative specifications, we include interactions of firm and time fixed effects (Khwaja and Mian, 2008)

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<sup>16</sup> These estimates are obtained considering multiple loans from a given bank during a year.

and identify the supply of credit from firms with multiple relationships. The high-dimensional fixed effects also ensure that our results are not driven by differences in national supervisory and enforcement measures that may potentially affect bank disclosures and greenwashing practices. Thus, the coefficient  $\beta_1$  captures the extent to which banks credit decisions are associated with borrowers' emissions after controlling for the borrowers' demand for credit.

#### *4.2 Primary findings*

We report the results of Model 1 in Table 3. In Panel A, across all specifications, we show that banks classified as high environmental reporters grant more credit to borrowers in brown industries. The findings are robust when we include various sets of fixed effects to control for shocks in credit demand, differences in credit supply across countries and time-varying banks' or borrower's features. In terms of economic magnitudes, to exemplify, the estimate in column 5 suggests that high environmental reporters extend 5.3% more credit to firms in brown industries compared to other banks. In Panel B, we consider loans to borrowers in green industries. We find no evidence that emphasizing the environment in public reporting is associated with greener lending practices. Thus, banks do not appear to compensate their brown loans by lending to firms in green industries. Collectively, these findings are suggestive of greenwashing.

An important concern is that these results may be influenced by the measurement of borrowers' emissions at the industry (NACE 2)-country-year level. Although our empirical approach allows us to include small private companies in the analyses, we do not capture differences between borrowers within the same industry. For this reason, we further employ the volume of a borrower's annual scope 1 and 2 GHG emissions, standardized by total sales. Despite that sample size dramatically decreases since granular emission data are primarily reported for large firms, we continue to find that banks with extensive environmental disclosures extend more credit to borrowers with higher emissions, when controlling for credit

demand using interactions of country, industry and year fixed effects (columns 2 and 3). Specifically, an increase by one standard deviation in the intensity of borrower's GHG emissions is associated with an approximately 16% higher lending by high environmental reporters compared to other banks. We do not observe any statistically significant differences in lending to borrowers with high emissions by banks with extensive environmental disclosures in the other specifications. Although the statistically insignificant estimates on  $\beta_1$  in columns 4 and 5 are likely attributed to low cross-sectional variation when focusing on borrowers with multiple lending relationships, these estimates suggest that banks with more extensive environmental disclosures, if anything, grant more credit to polluting borrowers. Collectively, these findings provide evidence that high environmental disclosures are far from being associated with greener, or less brown, lending policies.

#### *4.3 The extensive margin of bank lending*

Our results so far focus on the intensive margin of banks' credit decisions. However, banks that aim to achieve greener loan portfolios may avoid starting relationships with brown borrowers and even terminate relationships with borrowers in brown industries. We examine the extensive margin of banks' lending activities using Model (1) and the following dependent variables: (i) an indicator variable of whether a bank-firm relationship that did not exist in year  $t-1$  is established in year  $t$  (*Entry*); (ii) an indicator variable of whether a loan is not renewed and the bank-firm relationship from period  $t-1$  ceases to exist in period  $t$  (*Exit*). All other model specifications and control variables are similar to Model (1).

We report the results of the extensive margin of banks' lending in Table 5. In Panel A, we examine the initiation of new lending relationships and provide some evidence consistent with the interpretation that high environmental reporters try to reduce new lending exposures to brown borrowers (our results are statistically significant in three out of five specifications). Specifically, when we control for a bank's propensity to establish new credit relationships in a

given year (with interactions of bank and year fixed effects) and borrower demand (either using interactions of industry, country, and year fixed effects or interactions of firm and time fixed effects), we show that high environmental reporters are less likely to initiate credit relationships with borrowers in brown industries.<sup>17</sup>

In Panel B, we investigate whether high environmental reporters are more likely to terminate existing credit relationships with brown borrowers. In columns 2 and 3, we document that banks with extensive environmental disclosures are less likely to terminate relationships with borrowers in brown industries. However, this result becomes statistically insignificant in columns 4 and 5 when we include interactions of firm and time fixed effects to isolate the effect of borrowers with multiple relationships. This evidence indicates that banks are less likely to terminate relationships with borrowers that do not rely on other lenders and suggests that credit relationships limit banks' ability to reduce the environmental impact of their portfolios. As a result, banks with higher environmental disclosures may end up extending more credit to borrowers in brown industries than other banks. Thus, banks' reluctance to effectively terminate existing credit relationships with brown borrowers potentially attenuates the effect of the fewer new relationships in brown sectors on the overall greenness of banks' portfolios.

#### *4.4 Changes in credit exposures to brown industries*

In our primary findings on the intensive margin of bank lending, we show that banks do not reduce the size of the loans to firms in polluting industries or increase the credit they extend to borrowers in green industries. However, a significant caveat is that rejections of loan applications are unobservable to us. Since there is evidence that banks that emphasize the environment in their public reports partially adjust their portfolios on the extensive margin by

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<sup>17</sup> In Appendix Table IA.II, we do not observe any differential propensity to start relationships with borrowers in green industries.

not establishing relationships with borrowers in brown industries, we could erroneously conclude greenwashing.

We attempt to mitigate this concern by examining changes in new lending activities and credit exposures to brown borrowers. To do so, we aggregate observations at the bank-industry-country level and estimate an ordinary least squares (OLS) model where the dependent variable is a bank's  $b$  share of outstanding credit to industry  $i$  in country  $c$  during year  $t$  out of all bank  $b$  outstanding credit during that year,  $Credit\ share_{b,i,c,t}$ . All other model specifications are similar to Model (1).

$$\begin{aligned}
 Credit\ share_{b,i,c,t} = & \alpha + \beta_1(Brown_{i,c,t} \times High\ Environmental\ Reporter_{b,t}) \\
 & + \beta_2 High\ Environmental\ Reporter_{b,t} + \gamma \mathbf{X}_{b,t} + \delta_{i,t} + \nu_{c,t} + \mu_b + \epsilon_{b,i,c,t},
 \end{aligned}$$

Model (2)

We report the results of this test in Table 6. The findings suggest that the lower probability of establishing relationships with brown borrowers has limited effects on the overall greenness of the bank's loan portfolio. In the aggregate, high environmental reporters appear to extend more credit to brown industries. This appears to be the case even when we control for bank-specific shocks indicating that the composition of the bank loan portfolios varies in a way that is not congruent with the bank's environmental disclosures. The estimates are also robust when we control for the demand shocks experienced by banks' clients including interactions of industry and year fixed effects and of country and year fixed effects.

Overall, these results support the conclusion that, banks on average make unsubstantiated claims about their climate agenda, i.e., environmental statements that do not reflect their lending strategies across brown and green sectors. We next investigate why banks have environmental disclosures that do not appear to reflect their lending policies.

#### 4.5 Funding the transition to greener technologies in brown industries

The lending policies of banks with more extensive environmental disclosures may not indicate greenwashing if banks lend to borrowers in brown industries to favor their transition to technologies with lower emissions. In a relatively short time series, it is hard to evaluate this conjecture ex post by testing whether brown borrowers that obtain loans from banks with more extensive environmental disclosures end up decreasing their emissions. However, we can use the insight that switching to greener technologies requires high investment and R&D. We thus test whether high environmental reporters lend more to borrowers that invest more and make more R&D than other firms in their industries. Such behavior can be therefore considered as banks' attempt to switch to and finance the transition to greener technologies.

We measure the transition channel using the following variables estimated at the borrower-year level: (i) R&D to total assets; (ii) intangible assets to total assets; and (iii) change in fixed assets to total assets. Financial data are obtained from Orbis. We define indicator variables of whether a borrower's ratio values rank in the top quartile of the respective variables' distribution across the firms in the same industry (NACE 2). The extent to which high environmental reporters finance the transition to greener technologies, we expect that their brown borrowers are more likely to engage in R&D, intangibles or capital expenditures. We test our prediction by augmenting Model (1) with the respective indicator variables (*Proxy*) and the interactions *High env. reporter* x *Proxy* and *High env. reporter* x *Brown* x *Proxy*. The variable of interest is the triple interaction between high environmental reporter, borrower brownness and the proxy for transition financing.

In Table 7, across all specifications, we find no evidence that high environmental reporters are more likely to support transition financing, when proxied for borrowers' intangibles (columns 3 and 4) and capital expenditures (columns 5 and 6). If anything, high environmental reporters are less likely to lend to firms in brown industries that have larger R&D expenditures,



as indicated by the negative and statistically significant coefficient of the triple interaction variable in column 2.

The findings can be potentially influenced by our sample's short time-series, with transition financing not necessarily leading to greater intangible or capital investments relative to industry peers financed by other banks within the past few years. However, such behavior may likely indicate that high environmental reporters are not willing to closely monitor and effectively pressure borrowers to invest in green projects. At the very minimum, these banks are expected to employ contractual mechanisms to exercise control, influence and discipline brown borrowers' climate policies. Specifically, creditors could threaten firms not to renew the loans if environmental targets are not met. In Table 8, we test whether high environmental reporters extend loans of shorter maturity to borrowers in brown industries, using Model (1) and a dependent variable defined as the natural logarithm of number of days till maturity (*Loan Maturity*). We find no evidence that this is the case. On average, the maturity of loans extended by high environmental reporters to borrowers in brown industries does not differ from that of other banks. This evidence suggests that high environmental reporters do not use loan maturity to monitor brown borrowers and spur change.

Collectively, the results reported in Table 7 and 8 do not support the conjecture that banks with more extensive environmental disclosures attempt to favor the transition to greener technologies of borrowers in brown industries.

## **5. Supplemental analyses**

### *5.1 Zombie lending and the brownness of banks' portfolios*

In Section 4.3., we show that the "green-labeling" of banks' sustainability reporting can be driven by their reluctance to discontinue established credit relationships with brown borrowers, which is likely not clearly explained and captured in these reports. We further examine banks' incentives that likely explain such credit decisions. We expect that when brown lending is

associated with unprofitable firms that lack alternative financing options (i.e., “zombies”), banks may prefer to sustain lending relationships to avoid realizing credit losses (e.g., Peek and Rosengren, 2005; Giannetti and Simonov, 2013). Thus, high environmental reporters’ zombie lending activity may drive the continuing financing of brown sectors, and in turn, restrict them from enhancing their loan portfolios’ carbon footprint.

We employ several proxies to define “zombie” borrowers: (i) an indicator variable of whether borrower’s ROA (net income to total assets) ranks in the bottom quartile of the variable’s distribution within the same industry (NACE 2); (ii) an indicator variable of whether borrower’s productivity (sales per employee) ranks in the bottom quartile of the variable’s distribution within the same industry (NACE 2); and (iii) an indicator variable of whether borrower’s leverage (debt to total assets) ranks in the top quartile of the variable’s distribution within the same industry (NACE 2). We augment Model (1) with the respective indicator variables (*Proxy*) and the interactions *High env. reporter* x *Proxy* and *High env. reporter* x *Brown* x *Proxy*. The variable of interest is the triple interaction between high environmental reporter, borrower brownness and the proxy for zombie lending. All other specifications are similar to Model (1).

Table 9 reports the results of the tests. In five out of six specifications, we show that the high environmental reporters are more likely to extend credit to brown sectors when borrowers have low profitability (columns 1 and 2), low productivity (columns 3 and 4) and high leverage (columns 7 and 8). This evidence is consistent with the interpretation that high environmental reporters try to window-dress their credit exposure to obsolete brown borrowers to avoid realizing credit losses, which would pressure them to disclose and discuss their financing relationships with these industries. Not only are these borrowers the least likely to have the operational and financial capacity to transition to greener technologies, but they are also more likely to experience financial distress if their bank relationships are terminated. Thus,

sustaining credit relationships with “zombie” brown borrowers is likely one important mechanism that high environmental reporters leverage to hide their brown exposure and overstate their environmental objectives at the detriment of the long-term carbon footprint of their loan portfolios.<sup>18</sup>

### *5.2 Cross-sectional differences in institutional and bank-specific characteristics*

Finally, we examine whether the association between environmental reporting and banks’ lending activities in brown industries is influenced by institutional and bank-specific characteristics. We consider several factors that could attenuate banks’ propensity to include unsubstantiated claims in their environmental disclosures, such as whether sustainability reporting is mandatory in a bank’s country of headquarters and whether lending incurs following the Paris Agreement on Climate Change. We expect that mandatory reporting and the new agreement raise regulatory and public awareness towards climate-related issues, and in turn, stakeholders’ scrutiny on banks’ environmental disclosures. Thus, both developments likely restrict banks’ greenwashing practices. Moreover, using a public accounting firm to audit banks’ environmental claims could also improve disclosure accuracy and verifiability.

In Table 10, using the introduction of sustainability reporting rules at the country-year level defined in Krueger et al. (2021), we find no evidence that mandatory reporting can mitigate the opportunistic use of environmental disclosures (column 1). Similarly, although the volume of environmental disclosures increases post- Paris Agreement (Figure 1), we document that the content of such disclosures fails to qualitatively capture underlying lending practices (column 2). In addition, we show that the use of an external auditor does not materially enhance the credibility of sustainability report (column 3), in line with recent studies suggesting that auditors potentially have limited expertise of and experience in evaluating sustainability

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<sup>18</sup> Consistent with this view, in untabulated analyses, we find some evidence that high environmental reporters tend to lend more to borrowers in brown industries if their credit exposure to these firms is higher relative to other banks.

disclosures (Aobdia and Yoon, 2022). Collectively, these results are consistent with the view that environmental disclosures are inherently hard to compare and standardize, thus, cannot be easily regulated or verified by auditors. Therefore, banks can boost their environmental profiles by performing selective environmental disclosures, and for instance stress their involvement in the issuance of green bonds and financing of a few green projects, while large chunks of their loan portfolios continue to consist of credit to brown industries.

Finally, we examine whether a bank's reputation proxied by its size (total assets) and capital adequacy (Tier 1 capital ratio) likely enhances the credibility of environmental disclosures. Contrary to our expectations, it appears that large banks with more extensive environmental disclosures extend more credit to borrowers in brown industries (column 4). This evidence lends support to the argument that large banks having higher visibility may be more subject to institutional pressures to integrate climate goals in their strategy, and thus, may overemphasize their stewardship role to their investors. Moreover, we find that high environmental reporters with low capitalization extend larger loans to borrowers in brown industries (column 5), which is consistent with our findings of "zombie" lending in Section 5.1. These banks may have stronger incentives to engage in loan evergreening in order not to report, disclose and discuss credit losses with respect to their exposures to brown industries (e.g., Peek and Rosengren, 2005; Giannetti and Simonov, 2013).

## **6. Conclusions**

In response to the rising institutional pressures towards the green economy transition, banks have committed to integrate a climate-focused financing agenda into their business model. To legitimize their economic and social role, banks have substantially increased the volume of sustainability reporting to inform stakeholders over their environmental goals and initiatives. However, many industry commentators raise concerns regarding the extent to which these disclosures include unsubstantiated claims of banks' sustainability strategies and potentially

serve as publicity tools. We provide preliminary evidence on this issue by taking advantage of novel granular loan-level data reported to the ECB by 101 systemic Eurozone banks.

Using banks' investor reports and a dictionary of climate-related keywords and phrases, we develop a textual-based proxy of banks' environmental disclosures. We find a positive association between banks' environmental disclosures and lending to brown industries. We control for a battery of fixed effects in our specifications to alleviate the concern that our findings are influenced by national supervisory pressures or shocks to credit demand. We further show that this disconnect between brown lending and environmental disclosures is not mitigated by a higher lending volume to firms in green sectors. Further, although banks that emphasize environmental performance are less likely to initiate new credit relationships with brown borrowers, these banks are also less likely to cut down ties with borrowers in brown sectors, thus, eventually increasing their credit exposure to polluting industries. Finally, we find that high environmental reporters are more likely to keep lending to financially unhealthy brown borrowers to avoid realize credit losses, thus, discuss and disclose their exposure to these sectors.

Our paper offers timely evidence to the ongoing debate of greenwashing. In a recent survey of various business sectors by the EC and national consumer protection authorities, forty-two percent of firms' green claims are found to be deceptive and misleading.<sup>19</sup> Since 2018, European regulators have implemented a round of sweeping reforms to facilitate sustainable financing products and comparable, transparent sustainability disclosures (e.g., Reg. 2020/852; Reg. 2019/2088). Our results suggest that greenwashing practices in the banking sector persist following these regulatory initiatives and pressures. Features of banks' business models, such as relationship lending, appear to hinder the effective transition to a green lending strategy and

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<sup>19</sup> European Commission, "Screening of websites for 'greenwashing': half of green claims lack evidence", January 28 2021 ([https://ec.europa.eu/commission/presscorner/detail/en/ip\\_21\\_269](https://ec.europa.eu/commission/presscorner/detail/en/ip_21_269)).

are accentuated by zombie lending and banks' aversion to recognize losses. In addition, lack of granular data likely exacerbates the problem, as we show that reporting characteristics map to banks' underwriting activities in the more transparent bond market but fail to describe banks' loan portfolios. Our paper thus highlights the important role of granular data availability and institutional characteristics in better understanding and identifying unsubstantiated disclosures.

## References

- Acharya, V. V., Eisert, T., Eufinger, C., Hirsch, C., 2018. Real effects of the sovereign debt crisis in Europe: Evidence from syndicated loans. *Review of Financial Studies* 31, 2855–2896.
- Albuquerque, R., Y. Koskinen, and C. Zhang. 2019. Corporate social responsibility and firm risk: Theory and empirical evidence. *Management Science* 65 (10): 4451–4469.
- Aobdia, D., and A. Yoon, 2022. Do auditors understand the implications of ESG issues for their audits? Evidence from financially material negative ESG incidents. *Working paper*.
- Baker, M., D. Bergstresser, G. Serafeim, and J. Wurgler. 2022. The Pricing and Ownership of U.S. Green Bonds. *Annual Review of Financial Economics* forthcoming.
- Baker, A., D. F. Larcker, C. McClure, D. Saraph, and E. Watts. 2022. Diversity Washing Stanford University Graduate School of Business Research Paper No. 4298626, Available at SSRN: <https://ssrn.com/abstract=4298626>
- Baldini, M., L. D. Maso, G. Liberatore, F. Mazzi, and S. Terzani. 2018. Role of Country- and Firm-Level Determinants in Environmental, Social, and Governance Disclosure. *Journal of Business Ethics* 150: 79–98.
- Basu, S., J. Vitanza, W. Wang, and X. Zhu, 2022. Walking the Walk? Bank ESG Disclosures and Home Mortgage Lending. *Review of Accounting Studies* forthcoming.
- Baz, S., L. Cathcart, A. Michaelides, and Y. Zhang. 2021. Climate Regulatory Exposure: Evidence from Stock Returns. *Working paper*.
- Berg, F., J. Kölbel, and R. Rigobon. 2022. Aggregate Confusion: The Divergence of ESG Ratings. *Review of Finance* 26(6): 1315–1344.
- Berrada, T., L. Engelhardt, R. Gibson, and P. Krueger. 2022. The Economics of Sustainability Linked Bonds. *Working paper*.
- Bolton, P., and M. T. Kacperczyk, 2021. Do Investors Care about Carbon Risk? *Journal of Financial Economics* 142 (2): 517-549.
- Bozanic, Z., D. Roulstone, and A. V. Burshik. 2018. Management Earnings Forecasts and Other Forward-Looking Statements. *Journal of Accounting and Economics* 65 (1): 1–20.

- Brochet, F., M. Loumioti, and G. Serafeim. 2015. Speaking of the short-term: disclosure horizon and managerial myopia. *Review of Accounting Studies* 20: 1122–1163.
- Campbell, D., M. Loumioti, and R. Wittenberg-Moerman. 2019. Making sense of soft information: interpretation bias and loan quality. *Journal of Accounting and Economics* 68 (2-3): 101240.
- Cheng, B., I. Ioannou, and G. Serafeim. 2014. Corporate Social Responsibility and Access to Finance. *Strategic Management Journal* 35 (1): 1–23.
- Cho, C. H., and D. M. Patten, 2007. The role of environmental disclosures as tools of legitimacy: A research note. *Accounting, Organizations and Society* 32 (7/8): 639–647.
- Cho, C. H., R. P. Guidry, A. M. Hageman, and D. M. Patten, 2012. Do actions speak louder than words? An empirical investigation of corporate environmental reputation. *Accounting, Organizations and Society* 37 (1): 14–25.
- Chou, C. and S. O. Kimbrough. 2020. Talking about Climate Change: What Are Enterprises Saying in Their SEC filings? *Working paper*.
- Christensen, D., G. Serafeim, and A. Sikochi. 2022. Why Is Corporate Virtue in the Eye of the Beholder? The Case of ESG Ratings. *Accounting Review* 97 (1): 147–175.
- Christensen, H. B., L. Hail, and C. Leuz, 2021. Mandatory CSR and Sustainability Reporting: Economic Analysis and Literature Review. *Review of Accounting Studies* 26: 1176–1248.
- De Haas, R., and A. Popov, 2019. Finance and Carbon Emissions. *Economic Journal*, forthcoming.
- Degryse, H., Goncharenko, R., Theunisz, C., and T. Vadasz, 2021. When Green Meets Green. CEPR Discussion Paper 16536.
- Degryse, H., Roukny, T., and J. Tielens, 2020. Banking Barriers to the Green Economy. National Bank of Belgium Working Paper Research 391.
- Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., Schepens, G., 2019. Identifying credit supply shocks with bank-firm data: Methods and applications. *Journal of Financial Intermediation* 40, 1–15.
- Dhaliwal, D.S., O.Z. Li, A. Tsang, and Y.G. Yang, 2011. Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting. *The Accounting Review* 86 (1): 59–100.



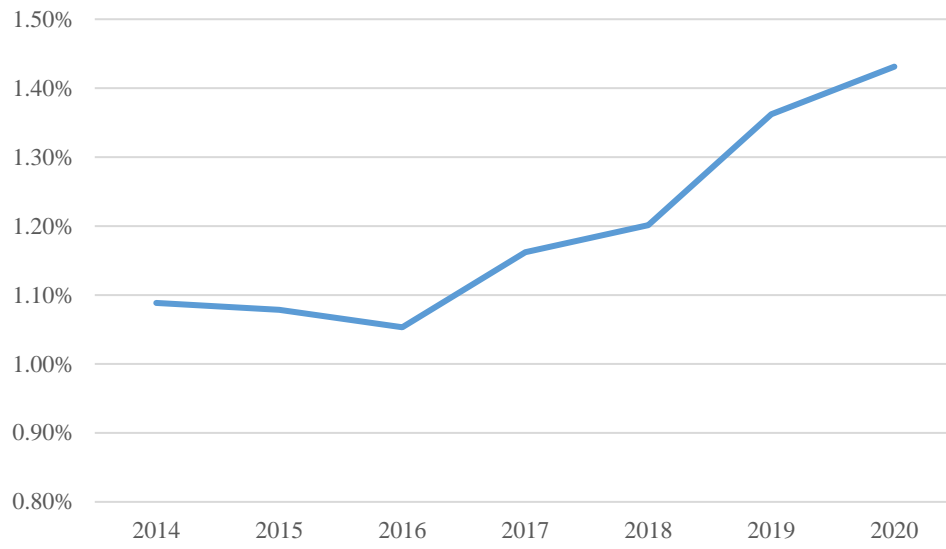
- Dhaliwal, D.S., S. Radhakrishnan, A. Tsang, and Y.G. Yang, 2012. Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review* 87 (3): 723–759.
- Diamond, D.W., and R.E. Verrecchia, 1991. Disclosure, liquidity, and the cost of capital. *The Journal of Finance* 46 (4): 1325–1359.
- Dursun-de Neef, O. H., S. Ongena, and G. Tsonkova. 2022. Green versus sustainable loans: The impact on firms' ESG performance. *CEPR Working paper*.
- European Central Bank (ECB), March 2022. Supervisory assessment of institutions' climate-related and environmental risks disclosures. [https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.ECB\\_Report\\_on\\_climate\\_and\\_environmental\\_disclosures\\_202203~4ae33f2a70.en.pdf](https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.ECB_Report_on_climate_and_environmental_disclosures_202203~4ae33f2a70.en.pdf).
- European Commission (EC), June 16, 2017. Commission guidelines on non-financial reporting. [https://finance.ec.europa.eu/publications/commission-guidelines-non-financial-reporting\\_en](https://finance.ec.europa.eu/publications/commission-guidelines-non-financial-reporting_en).
- European Commission (EC), Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector PE/87/2019/REV/1, <http://data.europa.eu/eli/reg/2019/2088/oj>.
- European Commission (EC), March 8 2018. Commission action plan on financing sustainable growth. [https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth\\_en](https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth_en).
- Flammer, C. 2021. Corporate green bonds. *Journal of Financial Economics* 142 (2): 499–516.
- Giannetti, M., and A. Simonov. 2013. On the real effects of bank bailouts: Micro evidence from Japan. *American Economic Journal: Macroeconomics* 5:135–67
- Gibson, R., S. Glossner, P. Krueger, P. Matos, and T. Steffen, 2022. Responsible Institutional Investing Around the World. *Review of Finance forthcoming*.
- Grewal, J., and G. Serafeim, 2020. Research on Corporate Sustainability: Review and Directions for Future Research. *Foundations and Trends in Accounting* 14 (2): 73–127.
- Grewal, J., E. J. Riedl, and G. Serafeim, 2019. Market Reaction to Mandatory Nonfinancial Disclosure. *Management Science* 65 (7): 3061–3084.

- Hart, O., and L. Zingales, 2017. Serving shareholders doesn't mean putting profit above all else. *Harvard Business Review* 12:2–6.
- Houston, J. F., and H. Shan, 2022. Corporate ESG Profiles and Banking Relationships. *Review of Financial Studies* 35 (7): 3373–3417.
- Huang, J., and S. Lu, 2022. ESG Performance and Voluntary ESG Disclosure: Mind the (Gender Pay) Gap. *Working paper*.
- Hummel, K., and C. Schlick, 2016. The relationship between sustainability performance and sustainability disclosure – Reconciling voluntary disclosure theory and legitimacy theory. *Journal of Accounting and Public Policy* 35 (5): 455–476.
- Ioannou, I., and G. Serafeim, 2012. What drives corporate social performance? The role of national-level institutions. *Journal of International Business Studies* 43 (9): 834–864.
- Jackson, G., and A. Apostolakou, 2010. Corporate social responsibility in Western Europe: An institutional mirror or substitute? *Journal of Business Ethics* 94 (3): 371–394.
- Kacperczyk, M. T., and J.-L. Peydro, 2021. Carbon emissions and the bank-lending channel. Available at SSRN 3974987.
- Khan, M., G. Serafeim, and A. Yoon, 2016. Corporate Sustainability: First Evidence on Materiality. *Accounting Review* 91 (6): 1697–1724.
- Khwaja, A. I., and A. Mian, 2008. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. *American Economic Review* 98 (4): 1413–1442.
- Kim, S., and A. Yoon, 2022. Analyzing Active Fund Managers' Commitment to ESG: Evidence from the United Nations Principles for Responsible Investment. *Management Science* forthcoming.
- Kim, S., N. Kumar, j. Lee, and J. Oh, 2022. ESG Lending. *Working paper*.
- KPMG, December 2020. The time has come: The KPMG Survey of Sustainability Reporting. [https://assets.kpmg/content/dam/kpmg/be/pdf/2020/12/The\\_Time\\_Has\\_Come\\_KPMG\\_Survey\\_of\\_Sustainability\\_Reporting\\_2020.pdf](https://assets.kpmg/content/dam/kpmg/be/pdf/2020/12/The_Time_Has_Come_KPMG_Survey_of_Sustainability_Reporting_2020.pdf).
- Krueger, P., Z. Sautner, and L. T. Starks, 2020. The importance of climate risks for institutional investors. *Review of Financial Studies* 33 (3): 1067–1111.
- Krueger, P., Z. Sautner, D. Y. Tang, and R. Zhong, 2021. The Effects of Mandatory ESG Disclosure Around the World. *Working paper*.

- Leuz, C., and P.D. Wysocki, 2016. The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research* 54 (2): 525–622.
- Li, F., 2010. Textual analysis of corporate disclosures: A survey of the literature. *Journal of Accounting Literature* 29: 143–165.
- Loumioti, M., and G. Serafeim, 2022. Issuance and Design of Sustainability-linked Loans. *Working paper*.
- Lu, S. 2021. The Green Bonding Hypothesis: How do Green Bonds Enhance the Credibility of Environmental Commitments. *Working paper*.
- Lyon T.P., and J.W. Maxwell, 2011. Greenwash: Environmental disclosure under threat of audit. *Journal of Economics and Management Strategy* 20 (1): 3–41.
- Marquis, C., M.W. Toffel, and Y. Zhou, 2016. Scrutiny, norms, and selective disclosure: A global study of greenwashing. *Organization Science* 27 (2): 483–504.
- Matsumoto, D., M. Pronk, and E. Roelofsen, 2011. What Makes Conference Calls Useful? The Information Content of Managers' Presentations and Analysts' Discussion Sessions. *Accounting Review* 86 (4): 1383–1414.
- Peek, J., and E. S. Rosengreen, 2005. Unnatural selection: Perverse incentives and the allocation of credit in Japan. *American Economic Review* 95:1144–66.
- Raghunandan, A. and S. Rajgopal, 2022. Do ESG Funds Make Stakeholder-Friendly Investments? *Review of Accounting Studies forthcoming*.
- Rajan, R., P. Ramella, and L. Zingales, 2022. What Purpose Do Corporations Purport? Evidence from Letters to Shareholders. *Working Paper*.
- Rouen, E., K. Sachdeva, and A. Yoon, 2022. The Evolution of ESG Reports and the Role of Voluntary Standards. *Working paper*.
- SASB. 2022. Climate Risk Technical Bulletin.
- Serafeim, G. December 2014. Turning a Profit While Doing Good: Aligning Sustainability with Corporate Performance. Governance Studies, The Initiative on 21st Century Capitalism, No. 19, Brookings Institution.
- Serafeim, G., 2022. Purpose + Profit: How Business Can Lift Up the World. New York: HarperCollins Leadership.

- Serafeim, G., and A. Yoon, 2022a. Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Review of Accounting Studies*, forthcoming.
- Serafeim, G., and A. Yoon, 2022b. Which Corporate ESG News Does the Market React To? *Financial Analysts Journal* 78 (1): 59–78.
- Sustainability Accounting Standards Board (SASB), June 29, 2017. Supporting the Work of the TCFD. <https://www.sasb.org/blog/supporting-work-tcfd/>.
- United Nations, August 9, 2021. Secretary-General Calls Latest IPCC Climate Report ‘Code Red for Humanity’, Stressing ‘Irrefutable’ Evidence of Human Influence. <https://www.un.org/press/en/2021/sgsm20847.doc.htm>
- UNEP-FI, 2022. How to align with the Paris Agreement: A Resource Note for Banking Associations and Banks. <https://www.unepfi.org/wordpress/wp-content/uploads/2022/06/How-align-with-the-Paris-Agreement-a-resource-note-for-banking-associations-and-banks-30062022.pdf>.

**Figure 1. Environmental disclosures over time.**



The figure plots the mean *Environmental disclosure* in our sample over time.



## Table 1. Descriptive statistics

The table reports descriptive statistics pertaining to the validation tests of banks' environmental disclosure proxy. Panel A reports the number of documents used to estimate the proxy for banks' environmental disclosures. Panel B reports the summary statistics for the variables of bank characteristics. Panel C reports the Spearman correlation matrix of selected variables. The values of continuous variables are winsorized at 1% and 99%. Variables are defined in Appendix B. \*\*\*,\*\* and \* denote significance at the 1%, 5% and 10%, respectively.

### Panel A. Banks' reports by year.

Report type	Number of reports	Mean total wordcount	Mean environmental wordcount
Annual report	623	81,584	700
Integrated report	57	28,257	414
Nonfinancial report	61	17,411	466
Other	383	3,895	199
Sustainability report	273	17,199	509
<b>Total</b>	<b>1,397</b>	<b>42,760</b>	<b>503</b>

### Panel B. Summary statistics of banks' characteristics.

	Obs.	Mean	S.D.	Q1	Median	Q3
<i>Environmental disclosures</i>	660	0.012	0.006	0.008	0.011	0.014
<i>GRI standards</i>	660	0.407	0.491	0.000	0.000	1.000
<i>Integrated reporting</i>	660	0.104	0.305	0.000	0.000	0.000
<i>Bloomberg Env score</i>	365	38.252	14.298	31.25	41.964	47.321
<i>ESG Corporate Knights</i>	660	0.052	0.221	0.000	0.000	0.000
<i>Green bond issuance</i>	660	0.032	0.142	0.000	0.000	0.001
<i>MSCI Env score</i>	487	5.348	2.216	3.625	5.600	7.000
<i>Sustainalytics Env score</i>	477	66.806	18.139	52.884	69.577	78.889
<i>Leverage</i>	660	0.924	0.033	0.911	0.925	0.944
<i>ROA</i>	660	0.031	0.024	0.020	0.028	0.040
<i>Total assets</i>	660	25.004	1.544	24.096	24.925	26.056
<i>Tier 1 capital</i>	660	0.166	0.088	0.134	0.155	0.177
<i>Activism</i>	471	0.195	0.078	0.125	0.188	0.257
<i>Socioeconomic beliefs</i>	471	0.658	0.074	0.623	0.646	0.685
<i>High Env risk country</i>	471	0.329	0.470	0.000	0.000	1.000

**Panel C. Spearman correlation matrix.**

	Obs.= 367	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) <i>Environmental disclosures</i>		1.000										
(2) <i>GRI standards</i>		0.175***	1.000									
(3) <i>Integrated reporting</i>		0.071	0.012	1.000								
(4) <i>Bloomberg Env score</i>		0.310***	0.004	0.171***	1.000							
(5) <i>ESG Corporate Knights</i>		0.170***	0.002	-0.028	0.201***	1.000						
(6) <i>Green bond issuance</i>		0.227***	0.151***	0.107**	0.259***	0.329***	1.000					
(7) <i>MSCI Env score</i>		0.259***	0.141***	0.309***	0.223***	0.238***	0.443***	1.000				
(8) <i>Sustainalytics Env score</i>		0.279***	0.173***	0.226***	0.407***	0.313***	0.471***	0.460***	1.000			
(9) <i>Leverage</i>		-0.094*	-0.155***	0.201***	-0.024	0.023	0.017	0.294***	0.114**	1.000		
(10) <i>ROA</i>		0.039	-0.017	-0.107**	0.247***	-0.017	-0.052	-0.125**	0.060	-0.374***	1.000	
(11) <i>Total assets</i>		-0.079	-0.125**	0.163***	0.165***	0.098*	-0.008	0.273***	0.098*	0.455***	0.059	1.000
(12) <i>Tier 1 capital</i>		0.268***	0.210***	-0.018	-0.042	0.077	0.146***	0.149***	0.136**	-0.187***	0.130**	-0.327***



**Panel D. Summary statistics of loan-level data.**

	Obs.	Mean	S.D.	Q1	Median	Q3
<i>Loan Amount</i>	3,058,259	10.96	1.54	9.21	10.82	11.85
<i>Loan Maturity</i>	3,030,509	6.84	1.24	6.08	7.20	7.67
<i>High env. reporter</i>	3,058,259	0.10	0.30	0	0	0
<i>Brown</i>	3,058,259	0.15	0.35	0	0	0
<i>Leverage</i>	3,058,259	0.91	0.031	0.89	0.91	0.93
<i>ROA</i>	3,058,259	0.033	0.011	0.027	0.034	0.037
<i>Total assets</i>	3,058,259	25.0	1.65	23.8	24.9	26.6
<i>Tier 1 capital</i>	3,058,259	0.17	0.03	0.15	0.17	0.19
<i>GHG emissions (Urgentem)</i>	3,750	105.5	173.8	19.5	32.4	73.8

**Table 2. Validation tests.**

The table reports the results of the analyses on the relation between banks' environmental disclosures and financial and environmental performance. Across all specifications, the dependent variable is *Environmental disclosures*, defined as the percentage of the ratio of environmental-related keywords to total number of words (excluding stop-words). All other variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Country and year fixed effects are included but not tabulated. OLS regressions are used to estimate the models, with standard errors reported in parentheses. Standard errors are corrected for heteroskedasticity and clustered at the country (specification I) or bank (Specifications II-VII) level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Variable	<i>Environmental disclosures</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Activism</i>	3.602*** (0.506)						
<i>Socioeconomic beliefs</i>	0.213 (0.446)						
<i>High Env risk country</i>	0.356*** (0.118)						
<i>GRI standards</i>		0.183*** (0.057)	0.168** (0.066)	0.129* (0.072)	0.146** (0.064)	0.184*** (0.057)	0.174*** (0.057)
<i>Integrated reporting</i>		0.206 (0.134)	0.041 (0.114)	0.146 (0.135)	0.055 (0.090)	0.226* (0.136)	0.173 (0.137)
<i>Leverage</i>		2.105 (1.743)	4.690*** (1.708)	4.415** (2.138)	3.504** (1.673)	2.173 (1.728)	2.043 (1.673)
<i>ROA</i>		2.000 (1.209)	0.741 (1.746)	0.826 (2.957)	-2.491 (1.597)	1.965* (1.168)	2.064* (1.223)
<i>Total assets</i>		0.024 (0.031)	0.011 (0.035)	-0.011 (0.035)	-0.032 (0.033)	0.014 (0.029)	0.034 (0.031)
<i>Tier 1 capital</i>		1.244 (1.127)	2.670*** (0.834)	2.721*** (0.805)	1.166 (1.070)	1.313 (1.126)	1.293 (1.117)
<i>MSCI Env score</i>			0.031* (0.019)				
<i>Sustainalytics Env score</i>				0.005* (0.003)			
<i>Bloomberg Env score</i>					0.013*** (0.003)		
<i>ESG Corporate Knights</i>						0.264*** (0.096)	
<i>Green bond issuance</i>							0.622*** (0.186)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes
<i>Obs.</i>	Country	Bank	Bank	Bank	Bank	Bank	Bank
<i>R</i> <sup>2</sup>	21.07%	39.30%	42.68%	41.06%	41.47%	40.02%	40.14%

**Table 3. Banks' Environmental Disclosures and New Loans to Green and Brown Industries**

The table reports the results of the tests on the association between banks' environmental disclosures and the volume of new loans to borrowers in different industries during a year. In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). In Panel A (B), *Brown (Green)* is an indicator variable of whether a firm belongs to an NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top (bottom) quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

*Panel A. Brown Industries*

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.0740 (0.0582)	-0.0968*** (0.0300)		-0.0177 (0.0173)	
Brown	-0.186*** (0.0323)				
High env. reporter x Brown	0.129** (0.0510)	0.0878** (0.0372)	0.0978*** (0.0282)	0.0715** (0.0321)	0.0538* (0.0284)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	2,231,059	3,058,259	3,058,180	636,717	636,085
R <sup>2</sup>	0.712	0.206	0.213	0.799	0.803

*Panel B. Green industries*

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.0409 (0.0609)	-0.0855** (0.0356)		-0.00326 (0.0245)	
Green	-0.0282 (0.0285)				
High env. reporter x Green	-0.0674 (0.0512)	-0.00839 (0.0445)	-0.00487 (0.0341)	-0.0239 (0.0701)	-0.0121 (0.0601)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	2,231,059	3,058,259	3,058,180	636,717	636,085
R <sup>2</sup>	0.712	0.206	0.213	0.799	0.803

**Table 4. Measuring Borrower Level Emissions**

The table reports the results of the tests on the association between banks' environmental disclosures and the volume of new loans to brown borrowers. Brownness is defined using borrower-level emissions based on Urgentem data during a year. *GHG emissions* denotes the borrower's pollution intensity estimated as the ratio of the sum of Scope 1 and 2 GHG emissions to total sales. In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High envir. reporter	0.0465 (0.147)	-0.195 (0.182)		-0.0845 (0.148)	
GHG emissions	-0.000511 (0.000356)	0.0000872 (0.0000686)	0.0000654 (0.0000747)		
High envir. reporter x GHG emissions	-0.000466 (0.000337)	0.000920** (0.000369)	0.000969*** (0.000346)	0.000213 (0.000336)	0.000180 (0.000272)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	3,750	3,621	3,438	2,976	2,770
R <sup>2</sup>	0.651	0.539	0.576	0.789	0.807

**Table 5. The Extensive Margin of Bank Lending and Environmental Disclosures**

The table reports the results of the tests on the extensive margin of banks' credit decisions. In Panel A, the dependent variable *Entry* is a binary variable equal to one if a bank-firm relationship that did not exist in year  $t-1$  is established in year  $t$ , and zero for any relationship that existed in year  $t-1$ . In Panel B, the dependent variable *Exit* is defined as one if the loan is not renewed and the bank-firm relationship from period  $t-1$  ceases to exist in period  $t$ , and zero otherwise. In both Panels, *Brown* is an indicator variable of whether a firm belongs to a NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

*Panel A. New Relationships*

	Entry				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	0.130* (0.0732)	0.104 (0.0684)		0.143* (0.0795)	
Brown	-0.00200 (0.0145)				
High env. reporter x Brown	-0.00863 (0.0229)	-0.00656 (0.0140)	-0.0319*** (0.00863)	-0.0131 (0.0272)	-0.0450** (0.0182)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Bank-Time FE	No	No	Yes	No	Yes
Firm-Time FE	No	No	No	Yes	Yes
N	297,819	301,974	301,820	296,196	295,949
R <sup>2</sup>	0.0735	0.0271	0.0611	0.0938	0.140

*Panel B. Relationship Termination*

	Exit				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	0.00121 (0.0212)	-0.00691 (0.0222)		-0.0345 (0.0256)	
Brown	0.000448 (0.00498)				
High env. reporter x Brown	-0.0114 (0.00845)	-0.0348** (0.0165)	-0.0120*** (0.00396)	-0.00920 (0.00907)	-0.00636 (0.00869)
Bank controls	Yes	Yes	Yes	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Bank-Time FE	No	No	Yes	No	Yes
N	215,957	573,144	573,116	137,939	137,800
R <sup>2</sup>	0.478	0.0562	0.0614	Yes	Yes

**Table 6. Bank-level change of financing to brown industries**

The table reports the results of the tests on the association between banks' environmental disclosures and the change in credit exposures to brown industries. The analyses are at the bank-industry-country-year level. In Columns (1)-(3), the dependent variable is the natural logarithm of the volume of new loans extended by a bank to all borrowers in the same NACE-2 industry  $i$  in country  $c$  in year  $t$  (*Loan amount*). In Columns (4)-(6), the dependent variable is the ratio of a bank's annual loan volume to a NACE-2 industry  $i$  in country  $c$  in year  $t$ , deflated by the total value of loans issued over a year (*Credit share*). *Brown* is an indicator variable of whether a firm belongs to an NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

	Loan amount			Credit share		
	(1)	(2)	(3)	(4)	(5)	(6)
High env. reporter	-0.107 (0.0713)	-0.0994 (0.0612)		-0.00107 (0.00104)	-0.000302 (0.00146)	
Brown	-0.0874*** (0.0301)	-0.115** (0.0521)	-0.118** (0.0530)	-0.00333*** (0.000845)	-0.00217 (0.00158)	-0.00331** (0.00150)
High env. reporter x Brown	0.137** (0.0661)	0.182** (0.0740)	0.182** (0.0756)	0.0135*** (0.00346)	0.00958*** (0.00355)	0.00759** (0.00357)
Bank controls	Yes	Yes	-	Yes	Yes	-
Bank FE	Yes	Yes	-	Yes	Yes	-
Industry FE	Yes	-	-	Yes	-	-
Time FE	Yes	-	-	Yes	-	-
Country FE	Yes	-	-	Yes	-	-
Country-Time FE	No	Yes	Yes	No	Yes	Yes
Industry-Time FE	No	Yes	Yes	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	No	Yes
N	87,157	87,152	87,061	87,157	87,152	87,061
R <sup>2</sup>	0.570	0.584	0.605	0.354	0.363	0.357



**Table 7. Environmental Disclosures and the Funding of Transition to Greener Technologies**

The table reports the results of the tests on whether the association between banks' environmental disclosures and the volume of new loans to brown borrowers is explained by banks' financing the transition to greener technologies. We use three proxies for the transition channel. In columns (1) and (2), we use an indicator variable of whether a borrower's ratio of R&D to total assets ranks in the top quartile of the variable's distribution across the firms in the same NACE 2 industry over a year. In columns (3) and (4), we use an indicator variable of whether a firm's ratio of intangible assets to total assets ranks in the top quartile of firms in the same industry (NACE-2) over a year. In columns (5) and (6), we use an indicator variable of whether a firm's ratio of change in fixed assets to total assets ranks in the top quartile of firms in the same industry (NACE-2) over a year. In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). *Brown* is an indicator variable of whether a firm belongs to a NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Proxy	Loan Amount					
	R&D		Intangibles		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
High env. reporter x Brown	0.0942*** (0.0280)	0.0645** (0.0310)	0.0930*** (0.0303)	0.0762*** (0.0279)	0.0741** (0.0303)	0.0642* (0.0351)
High env. reporter x Proxy	0.104 (0.340)	0.310* (0.162)	0.189*** (0.0548)	0.00774 (0.0231)	0.00495 (0.0447)	-0.00475 (0.0201)
High env. reporter x Brown x Proxy	-0.875 (0.630)	-0.512*** (0.196)	0.0196 (0.0506)	-0.0559 (0.0517)	0.0657 (0.0416)	0.0131 (0.0387)
Industry-Country-Time FE	Yes	-	Yes	-	Yes	-
Firm-Time FE	No	Yes	No	Yes	No	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,803,573	524,849	1,788,060	523,605	1,684,650	511,096
R <sup>2</sup>	0.218	0.799	0.217	0.799	0.221	0.798

**Table 8. Loan Maturity**

The table reports the results of the tests on the association between banks' environmental disclosures and the repayment horizon of new loans to brown borrowers. In all specifications, the dependent variable is the natural logarithm of the original maturity of new loans extended by a bank to a given borrower during a year (*Loan maturity*). As a firm may have multiple loans granted by the same bank in a year, *Loan maturity* is computed the weighted average of the loan maturity at the bank-firm-time level using loan sizes as weights. *Brown* is an indicator variable of whether a firm belongs to a NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

	Loan Maturity				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.0999 (0.0945)	-0.118** (0.0481)		-0.0527 (0.0587)	
Brown	-0.116*** (0.0389)				
High env. reporter x Brown	0.0726 (0.0883)	0.0310 (0.0319)	0.0454* (0.0261)	0.0143 (0.0305)	0.0108 (0.0254)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	2,219,652	3,030,509	3,030,430	632,827	632,198
R <sup>2</sup>	0.551	0.254	0.271	0.674	0.681

**Table 9. The Environmental Impact of Zombie Lending**

The table reports the results of the tests on whether the association between banks' environmental disclosures and the volume of new loans to brown borrowers is explained by zombie financing. The table examines three proxies for the zombie lending channel. In columns (1) and (2), we use an indicator variable of whether a firm's net income to total assets ratio ranks in the bottom quartile of firms in the same NACE 2 industry over a year (*Low ROA*). In columns (3) and (4), we use an indicator variable of whether a firm's sales to employees ratio ranks in the bottom quartile of firms in the same NACE 2 industry over a year (*Low Sales to employee*). In columns (5) and (6), we use an indicator variable of whether a firm's total debt to total assets ratio ranks in the top quartile of firms in the same NACE 2 industry over a year (*High Leverage*). In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). *Brown* is an indicator variable of whether a firm belongs to a NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Proxy:	Loan amount					
	Low ROA		Low Sales to employee		High Leverage	
	(1)	(2)	(3)	(4)	(5)	(6)
High env. reporter x Brown	0.0234 (0.0237)	0.00454 (0.0363)	0.0373 (0.0336)	0.0526 (0.0385)	0.0730** (0.0352)	0.0214 (0.0346)
High env. reporter x Proxy	0.0200** (0.00905)	0.0298* (0.0153)	0.000330 (0.0633)	0.00431 (0.0401)	-0.0411 (0.0512)	0.0383 (0.0521)
High env. reporter x Brown x Proxy	0.0813*** (0.0239)	0.0730* (0.0416)	0.171** (0.0778)	0.0537** (0.0170)	0.00909 (0.0520)	0.0960* (0.0545)
Industry-Country-Time FE	Yes	-	Yes	-	Yes	-
Firm-Time FE	No	Yes	No	Yes	No	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1,618,927	511,323	1,307,102	486,491	1,697,536	512,312
R <sup>2</sup>	0.212	0.798	0.225	0.795	0.219	0.799

**Table 10. Cross-sectional differences in institutional and bank-specific characteristics**

The table reports the results of the tests on whether the association between banks' environmental disclosures and lending to borrowers in green industries is influenced by institutional and bank characteristics. In column (1), *Mandatory sustainability reporting* is an indicator variable of whether a loan was originated in a country that mandated sustainability reporting in year  $t$ . In column (2), *Post Paris agreement* is an indicator variable of whether a loan was issued post 2017. In column (3), *Audited sustainability report* is an indicator variable of whether a borrower's sustainability report is audited by an external reviewer or auditor. In column (4), *Large bank* is an indicator variable of whether a bank's total assets rank in the top quartile of the variable's distribution. In column (5), *Low Tier 1 capital* is an indicator variable of whether a bank's tier 1 capital adequacy ratio ranks in the bottom quartile of the variable's distribution. In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). *Brown* is an indicator variable of whether a firm belongs to an NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

Factor:	Loan amount				
	Mandatory sustain. reporting (1)	Post Paris agreement (2)	Audited sustain. report (3)	Large bank (4)	Low Tier 1 capital (5)
High env. reporter x Brown	0.0916 (0.0947)	0.000154 (0.0463)	0.0365 (0.0307)	-0.105 (0.0961)	0.0156 (0.0391)
High env. reporter x Brown x Factor	-0.0379 (0.0999)	0.0585 (0.0548)	0.0237 (0.0452)	0.159* (0.0947)	0.0662* (0.0278)
Bank-Time FE	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	Yes	Yes	Yes	Yes
N	636,085	636,085	636,085	636,081	636,085
R <sup>2</sup>	0.803	0.803	0.803	0.803	0.803

## Appendix A. List of sample systemic banks.

	<b><u>Belgium</u></b>		<b><u>Greece</u></b>
1	AXA Bank Belgium SA ; AXA Bank Belgium NV	30	Alpha Bank AE
2	Banque Degroof Petercam SA ; Bank Degroof Petercam NV	31	Eurobank Ergasias S.A.
3	Belfius Banque SA ; Belfius Bank NV ; Belfius Bank SA	32	National Bank of Greece S.A.
4	Dexia SA	33	Piraeus Bank S.A.
5	Investeringsmaatschappij Argenta NV ; Société d'investissements Argenta SA ; Investierungsgesellschaft Argenta AG		
6	KBC Group NV		
	<b><u>Germany</u></b>		<b><u>Spain</u></b>
7	Aareal Bank AG	34	ABANCA Holding Financiero S.A.
8	Bayerische Landesbank	35	Banco Bilbao Vizcaya Argentaria, S.A.
9	COMMERZBANK Aktiengesellschaft	36	Banco de Crédito Social Cooperativo, S.A.
10	DekaBank Deutsche Girozentrale	37	Banco de Sabadell, S.A.
11	Deutsche Apotheker- und Ärztebank eG	38	Banco Santander, S.A.
12	Deutsche Bank AG	39	Bankinter, S.A.
13	Deutsche Pfandbriefbank AG	40	BFA Tenedora De Acciones S.A.U.
14	DZ BANK AG Deutsche Zentral-Genossenschaftsbank	41	CaixaBank, S.A.
15	Erwerbgesellschaft der S-Finanzgruppe mbH & Co. KG	42	Ibercaja Banco, S.A.
16	HASPA Finanzholding	43	Kutxabank, S.A.
17	Hamburg Commercial Bank AG	44	Liberbank, S.A.
18	Landesbank Baden-Württemberg	45	Unicaja Banco, S.A.
19	Landesbank Hessen-Thüringen Girozentrale		<b><u>France</u></b>
20	Münchener Hypothekbank eG	46	BNP Paribas S.A.
21	Norddeutsche Landesbank -Girozentrale-	47	BPCE S.A.
22	UBS Europe SE	48	Bpifrance S.A. (Banque Publique d'Investissement)
	<b><u>Estonia</u></b>	49	Confédération Nationale du Crédit Mutuel
23	AS SEB Pank	50	Crédit Agricole S.A.
24	Luminor Holding AS	51	HSBC France
25	Swedbank AS	52	La Banque Postale
	<b><u>Ireland</u></b>	53	SFIL S.A.
26	AIB Group plc	54	Société Générale S.A.
27	Bank of Ireland Group plc		<b><u>Italy</u></b>
28	Barclays Bank Ireland PLC	55	Banca Carige S.p.A. - Cassa di Risparmio di Genova e Imperia
29	Ulster Bank Ireland Designated Activity Company	56	BANCA MONTE DEI PASCHI DI SIENA S.p.A.
		57	Banca Popolare di Sondrio, Società Cooperativa per Azioni
		58	Banco BPM S.p.A.

**Appendix A (Continued)**

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<b><u>Italy</u></b>		<b><u>Austria</u></b>
BPER Banca S.p.A.	86	BAWAG Group AG
Cassa Centrale Banca - Credito Cooperativo Italiano S.p.A.	87	Erste Group Bank AG
Credito Emiliano Holding S.p.A.	88	Raiffeisen Bank International AG
Iccrea Banca S.p.A. - Istituto Centrale del Credito Cooperativo	89	Sberbank Europe AG
Intesa Sanpaolo S.p.A.	90	Volksbank Wien AG
Mediobanca - Banca di Credito Finanziario S.p.A.		<b><u>Portugal</u></b>
UniCredit S.p.A.	91	Banco Comercial Português, SA
Unione di Banche Italiane Società per Azioni	92	Caixa Geral de Depósitos, SA
<b><u>Cyprus</u></b>	93	LSF Nani Investments S.à.r.l.
Bank of Cyprus Holdings Public Limited Company		<b><u>Slovenia</u></b>
Hellenic Bank Public Company Limited	94	Biser Topco S.à.r.l.
RCB Bank LTD	95	Nova Ljubljanska Banka d.d. Ljubljana
<b><u>Latvia</u></b>		<b><u>Slovakia</u></b>
AS SEB banka	96	Slovenská sporiteľňa, a.s.
Swedbank AS	97	Tatra banka, a.s.
<b><u>Lithuania</u></b>	98	Všeobecná úverová banka, a.s.
AB SEB bankas		<b><u>Finland</u></b>
Swedbank, AB	99	Kuntarahoitus Oyj
Akcinė bendrovė Šiaulių bankas	100	Nordea Bank Abp
<b><u>Luxembourg</u></b>	101	OP Osuuskunta
Banque et Caisse d'Épargne de l'Etat, Luxembourg		
Banque Internationale à Luxembourg S.A.		
<b><u>Malta</u></b>		
Bank of Valletta plc		
HSBC Bank Malta p.l.c.		
MDB Group Limited		
<b><u>The Netherlands</u></b>		
ABN AMRO Bank N.V.		
BNG Bank N.V.		
Coöperatieve Rabobank U.A. de Volksbank N.V.		
ING Groep N.V.		
Nederlandse Waterschapsbank N.V.		

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## Appendix B. Variable definitions.

Variables	Variable definitions
<b>Bank disclosure characteristics</b>	
<i>Environmental disclosures</i>	The ratio of environmental-related keywords to total number of words (excluding stop-words). The wordcount is estimated across bank's annual and sustainability reports.
<i>GRI standards</i>	Binary variable equal to one if a bank prepares the sustainability reporting under the Global Reporting Initiative Standards, zero otherwise.
<i>Integrated reporting</i>	Binary variable equal to one if a bank issues an Integrated Report, zero otherwise.
<b>Bank sustainability performance</b>	
<i>Bloomberg Env score</i>	Bank's Environmental disclosure score provided by Bloomberg.
<i>ESG Corporate Knights</i>	Binary variable equal to one if a bank is included in ESG Corporate Knights' short-list of top ESG performers, zero otherwise.
<i>Green bond issuance</i>	The ratio of the annual green bond volume a bank underwrites to bank's total assets. Green bond issuance volume is obtained by Bloomberg.
<i>MSCI Env score</i>	Bank's environmental pillar score provided by MSCI.
<i>Sustainalytics Env score</i>	Bank's mean environmental score provided by Sustainalytics. Environmental score is the mean of (e1.1 +e1.2 +e1.3 +e1.4 +e1.5 +e1.6 +e1.7 +e1.7.0 +e1.8 +e1.9 +e1.10 +e1.11 +e1.12 +e2.1 +e2.2 +e2.3 +e3.1.10 +e3.1.11 +e3.1.15). We focus on these sustainability indices, for which sample banks have less than 50 percent missing variable values.
<b>Bank financial performance</b>	
<i>Leverage</i>	Total debt to total assets.
<i>ROA</i>	Operating income to gross loans.
<i>Total assets</i>	The natural logarithm of total assets (in Euro).
<i>Tier 1 capital</i>	Tier 1 capital to total assets.
<b>Country ESG characteristics</b>	
<i>Activism</i>	The mean value of the percentage of people boycotting a product (bctprd), protesting in a lawful public demonstration (pbldmn), signing a petition (sgnptit) and posting a political comment online (pstplonl) within a bank's HQ country-year. Data are derived from the European Social Survey. For country-years with missing data, the most recent value was used.
<i>Socioeconomic beliefs</i>	The mean value of the percentage of people suggesting that it is important: i) to care for the environment (impenv<=2); ii) to behave properly (ipbhprp<=2); iii) that people are treated equally and have equal opportunities (ipeqopt<=2) within a bank's HQ country-year. Data are derived from the European Social Survey. For country-years with missing data, the most recent value was used.

*High Env risk country* Binary variable equal to one if a bank's HQ country is classified as high Environmental risk using World Bank's ESG country scores, zero otherwise. Details on the methodology of classifying a country as high Environmental risk are included in the Appendix E.

### **Anacredit loan variables**

*Loan Amount* The natural logarithm of the amount of new loans granted by a bank to a given borrower during a year.

*Loan Maturity* The natural logarithm of the original maturity of new loans extended by a bank to a given borrower during a year. As a firm may have multiple loans granted by the same bank in a year, *Loan maturity* is computed the weighted average of the loan maturity at the bank-firm-time level using loan sizes as weights.

*Exposure* A share of credit a firm  $f$  receives from bank  $b$  as a share of the firm's total bank credit outstanding.

### **Brown/ Green industries and firms**

*Brown* Binary variable that takes the value of 1 if the firm belongs to the NACE-2 industry for which the ratio of greenhouse gas (GHG) emissions to gross value added ranks in the top quintile of all industries in a respective reporting country during year  $t$ , and 0 otherwise.

*Green* Binary variable that takes the value of 1 if the firm belongs to the NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the bottom quintile of all industries in a respective reporting country during year  $t$ , and 0 otherwise.

*GHG emissions* The borrower's pollution intensity measured as the sum of Scope 1 and 2 GHG emissions as a share of total revenues. Source: Urgentem.

### **Firm characteristics (Orbis)**

*R&D* Firm's ratio R&D to total assets.

*Intangibles* Firm's ratio of intangible assets to total assets

*Investment* Firm's ratio of a change in fixed assets to total assets

*ROA* Firm's reported return on assets. Orbis variable. (Net Income divided by its average Total Assets)

*Sales to employee* The natural logarithm of the firm's sales divided by the number of employees.

*Leverage* Firms' total debt to total assets

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## Appendix C. Environmental-related keywords.

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(1)	agriculture	(31)	energy	(61)	paper
(2)	air quality	(32)	energy star	(62)	petrol
(3)	air travel	(33)	equator	(63)	pfc
(4)	animal	(34)	farmer	(64)	photovoltaic
(5)	asbesto	(35)	fish	(65)	plastic
(6)	automobile	(36)	forest	(66)	pollute
(7)	automotive	(37)	fracking	(67)	recycle
(8)	biodiversity	(38)	fuel	(68)	renewables
(9)	building	(39)	glass	(69)	sea
(10)	building certificate	(40)	gmo	(70)	sf6
(11)	business travel	(41)	grabbing	(71)	silicium
(12)	car	(42)	green	(72)	solar
(13)	carbon	(43)	habitat	(73)	sox
(14)	cement	(44)	heat	(74)	soy
(15)	certified building	(45)	hfc	(75)	sugar
(16)	ch4	(46)	hydro	(76)	sulphuric
(17)	chemicals	(47)	land	(77)	temperature
(18)	circular	(48)	laughing gas	(78)	transport
(19)	climate	(49)	leed	(79)	tree
(20)	co2	(50)	metal	(80)	uranium
(21)	coal	(51)	methane	(81)	vehicle
(22)	commute	(52)	mines	(82)	waste
(23)	coral	(53)	mining	(83)	water
(24)	corporate travel	(54)	mountain	(84)	weather
(25)	diesel	(55)	n2o	(85)	wind
(26)	drill	(56)	natural gas	(86)	wood
(27)	ecosystem	(57)	natural resource		
(28)	electric	(58)	nuclear		
(29)	emission	(59)	ocean		
(30)	endangered	(60)	oil		

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## Appendix D. Example of banks' disclosures on environmental issues.

In this section, we list some examples from banks' annual filings to illustrate how our dictionary captures disclosures on environmental activities.

### ING Group (Annual Report 2020)

ING's power generation portfolio continues to outperform the market and both the International Energy Agency's sustainable development scenario (SDS) and the OECD scenario. In the 12 months measured in the Terra report, ING reduced its direct exposure to **coal**-fired power plants by 43 percent (in line with our commitment to reduce it to close to zero by the end of 2025) and increased financing for **renewable energy** generation by €1.19 billion. Other sectors face more challenges, such as the residential mortgage sector. There we encounter a shortage of accurate data to measure progress and a general lack of homeowner action. (...) (One of the targets) is our aim to reduce financing to upstream **oil** and **gas** by 19 percent by 2040 from 2019 levels. We'll align this portfolio both by decreasing exposure and engaging with clients to help them shift to low-**carbon** technology. The measurement is based on three indicators: **emission** intensity, an absolute reduction in financing and a relative transition of the financing mix from high-**carbon** to low-**carbon** and **renewable** energy. This target is also aligned with the SDS scenario, which is not static. If more or quicker action is needed and this scenario is adjusted, our target will adjust accordingly.

### Credit Agricole (2020 Annual Report, pg. 61-62)

Propose a range of green offers for the climate transition of Corporate and individual customers

LCL's climate transition offers:

"Sustainable City – **Green** Mobility" consumer loans are designed to finance the purchase of new or used **vehicles** (including pre-financing of the environmentally friendly **car** grant) that produce few or no **polluting emissions**. Loan amounts vary between €3,000 and €75,000, which makes it possible to purchase to a wide range of **vehicles**.

"Impact financing": for its SME and mid-cap customers, LCL structures and arranges "Impact Financing" ("**Green** Loans" and "Sustainability- Linked Loans"), which are loans or credits whose margin is indexed to ESG performance criteria specific to the company being financed. This offer allows our customers to align their CSR strategy with their financing and, if they achieve their targets, to benefit from a subsidised rate (...) The LCL SmartBusiness programme is designed to support business customers (SMEs, mid-caps, key accounts) with major changes, in particular by promoting the **energy** transition with Greenflex, providing advice on **energy** transition, environmental and societal issues, joining forces with Voltalia through electricity contracts (CPPA), which bring added value to the heart of our customers' business, and with Global **Climate** Initiatives to measure and reduce the environmental footprint. (...)

Farmers also play an essential role in preserving **biodiversity**. Birds and insects in **agricultural** environments, especially pollinators, are key indicators of agro-ecosystem health and are essential for **agricultural** production and food security. As the leading banker to farmers and **foresters**, the Crédit Agricole Group supports farmers in these initiatives and works to preserve and develop **forest** areas in France and abroad, since 80% of the earth's **biodiversity** is found in forests.

## Appendix E. Constructing the *High Env risk country* variable

The steps to construct the proxy for *High Env risk country* are described as follows:

1. We retrieve country-year environmental indicators using the World Bank’s ESG Data Draft dataset:

<https://datacatalog.worldbank.org/dataset/environment-social-and-governance-data>

2. We focus on the following indicators that are relevant and mostly populated across our sample European countries:

A. Natural resource depletion (NY.ADJ.DRES.GN.ZS)
B. CO2 emissions (EN.ATM.CO2E.PC)
C. Methane emissions (EN.ATM.METH.PC)
D. Nitrous oxide emissions (EN.ATM.NOXE.PC)
E. PM2.5 air pollution (EN.ATM.PM25.MC.M3)
F. Terrestrial and marine protected areas (ER.PTD.TOTL.ZS)
G. Renewable energy consumption (EG.FEC.RNEW.ZS)

3. Within the sample countries, we rank by year individual Environmental indices (A-G) in quintiles.
4. We estimate mean Environmental quintile ranks (*Environmental quintile rank\_negative*: for indices A- E, and *Environmental quintile rank\_positive*, for indices F-G, separately, since the former indicate a negative climate footprint whereas the latter a positive one)
5. Lastly, we create the binary variable *High Env risk country* which equals one if the *Environmental quintile rank\_negative* takes the values of 4 or 5, or the *Environmental quintile rank\_positive* takes the values of 1 or 2, zero otherwise.

## Internet Appendix.

### Supplementary Findings

#### Table IA.I. New Loans Analysis. Robustness using post 2018 period

The table reports the results of a robustness test of the Baseline analyses in Table 3 using a shorter time window (loans originated post 2018). In all specifications, the dependent variable is the natural logarithm of the amount of new loans extended by a bank to a given borrower during a year (*Loan amount*). In Panel A (B), *Brown (Green)* is an indicator variable of whether a firm belongs to an NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the top (bottom) quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

#### Panel A. Brown Industries

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.152 (0.112)	-0.144*** (0.0413)		-0.0518 (0.0392)	
Brown	-0.0697 (0.0535)				
High env. reporter x Brown	0.000941 (0.0445)	0.0784** (0.0349)	0.113*** (0.0317)	0.0594* (0.0320)	0.0587* (0.0308)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	1,059,932	1,801,861	1,801,813	477,743	477,511
R <sup>2</sup>	0.780	0.192	0.196	0.787	0.790

*Panel B. Green industries*

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.136 (0.110)	-0.139*** (0.0481)		-0.0419 (0.0462)	
Green	0.0324 (0.0475)				
High env. reporter x Green	-0.0651* (0.0387)	0.0146 (0.0470)	0.000394 (0.0461)	-0.0118 (0.0688)	-0.0167 (0.0703)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	1,059,932	1,801,861	1,801,813	477,743	477,511
R <sup>2</sup>	0.780	0.192	0.196	0.787	0.790

**Table IA.II. The Extensive Margin of Bank Lending and Environmental Disclosures: Green Industries**

The table reports the results of the tests on the extensive margin of banks' credit decisions. In Panel A, the dependent variable *Entry* is a binary variable equal to one if a bank-firm relationship that did not exist in year  $t-1$  is established in year  $t$ , and zero for any relationship that existed in year  $t-1$ . In Panel B, the dependent variable *Exit* is defined as one if the loan is not renewed and the bank-firm relationship from period  $t-1$  ceases to exist in period  $t$ , and zero otherwise. In both Panels, *Green* is an indicator variable of whether a firm belongs to a NACE-2 industry for which the ratio of GHG emissions to gross value added ranks in the bottom quintile of the ratio's distribution across all industries in the firm's country during a year. *High Environmental reporter* is an indicator variable of whether a bank's environmental disclosures rank in the top quintile of the variable's distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix B. Fixed effects and bank controls are included as indicated, but not tabulated. Dash (-) symbol refers to the fact that the controls/fixed effects are not applicable as they are nested in different (higher-order) fixed effects. OLS regressions are used to estimate the models. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% (two-sided) levels, respectively.

*Panel A. New Relationships*

	Entry				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	0.126*	0.100		0.137*	
	(0.0741)	(0.0688)		(0.0810)	
Green	-0.0195				
	(0.0231)				
High env. reporter x Green	0.0125	0.0100	0.00525	0.0152	0.00481
	(0.0186)	(0.0169)	(0.0122)	(0.0196)	(0.0140)
Bank controls	Yes	Yes	-	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Bank-Time FE	No	No	Yes	No	Yes
Firm-Time FE	No	No	No	Yes	Yes
N	297,819	301,974	301,820	296,196	295,949
R <sup>2</sup>	0.0736	0.0271	0.0611	0.0938	0.140

*Panel B. Relationship Termination*

	Exit				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	0.00394 (0.0223)	-0.0107 (0.0228)		-0.0346 (0.0271)	
Green	0.0161 (0.00987)				
High env. reporter x Green	-0.00478 (0.0122)	-0.00187 (0.00504)	0.00186 (0.00459)	-0.00363 (0.0101)	-0.000357 (0.00780)
Bank controls	Yes	Yes	Yes	Yes	-
Bank FE	Yes	Yes	-	Yes	-
Firm FE	Yes	No	No	-	-
Time FE	Yes	-	-	-	-
Industry-Country-Time FE	No	Yes	Yes	-	-
Bank-Time FE	No	No	Yes	No	Yes
N	215,957	573,144	573,116	137,939	137,800
R <sup>2</sup>	0.478	0.0561	0.0614	0.499	0.503