

“Glossy Green” Banks: The Disconnect Between Environmental Disclosures and Lending Activities

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ABSTRACT:

We study the relation between banks’ environmental disclosures and lending activities. 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. These results are not driven by banks’ financing of brown borrowers’ transition to greener technologies. Instead, banks lend to the weakest borrowers in brown industries, especially if they have low capital adequacy. Our results suggest that banks overemphasize their climate goals and credentials while continuing their relationships with polluting borrowers.

Keywords: financial institutions, greenwashing, sustainability reporting, credit exposure, zombie lending

JEL classification: G11, G15, G21

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1. Introduction

Banks are often expected to play a crucial role in financing green investments and guiding the transition to a carbon-neutral economy (e.g., EC 2018; UN Environment Programme Finance Initiative [UNEP-FI] 2022). In response to these institutional pressures, banks have increasingly emphasized their stewardship for achieving sustainability and climate goals, following a trend towards increasing voluntary disclosure of environmental activities and footprint (e.g., Grewal and Serafeim 2020; Christensen et al. 2021).¹ However, policymakers have raised concerns about the credibility of banks' environmental disclosures, which have not always withstood regulatory scrutiny (see, e.g., ECB, 2022).²

This paper provides the first analysis of the credibility of banks' environmental disclosures, demonstrating that features of banks' business models limit the relevance of their disclosures and the role that banks can play in guiding the transition to a green economy. Our results support concerns that banks may emphasize sustainability performance on one dimension of their business to cover up poor performance on other, potentially more important, ones, thus engaging in greenwashing as defined by the Sustainability Accounting Standard Board (SASB).³

Banks have an incentive to enhance their environmental and social profile, because sustainability has been associated with customers' loyalty and lower cost of capital (e.g., Dhaliwal et al., 2011; Albuquerque et al., 2019). It remains an empirical question whether banks can credibly communicate to the public how green their lending policies are (Diamond

¹ 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.

² For instance, the SEC, the U.S. Department of Justice, and Germany's Federal Financial Supervisory Authority, BaFin, recently fined Deutsche Bank's asset-management arm, DWS Group, for overstating investments using ESG criteria in its annual report. 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>.

³ See <https://www.barrons.com/articles/some-firms-are-painting-their-problems-green-investors-should-see-through-it-51633645059>

and Verrecchia 1991) or if instead they selectively report positive sustainability actions and withhold information about negative ones by misleading investors, customers, and regulators.

To address this question, we focus on euro area banks for several reasons. First, legislators in the European Union (EU) have been pioneer in addressing climate change, emphasizing the stewardship role of banks for the transition, and calling for greater transparency of financial institutions environmental impact (e.g., European Commission [EC] 2018; UN Environment Programme Finance Initiative [UNEP-FI] 2022).⁴ Second, euro area banks report detailed information on new loans and credit exposures in credit registries, allowing us to directly classify the environmental impact of banks' loans and evaluate the extent to which a bank's lending policies reflect the emphasis on the environment in their disclosures.

Specifically, we collect data on commercial loans issued by 553 banks in the Euro Area from Anacredit (AC), a credit registry recently launched by the European System of Central Banks and classify borrowers as green or brown based on the volume of greenhouse gas (GHG) emissions in their 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.

Banks' environmental disclosures in the reports commonly used to communicate sustainability actions (e.g., sustainability reports, annual reports) as captured by our dictionary of climate-information-related keywords are positively associated 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

⁴ 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>.

investors and its environmental sustainability profile. The disclosures also appear to reflect the most sustainable aspects of a bank's business, such as bond underwriting.

However, we find that banks that portray their activities as more sustainable extend more credit to borrowers in brown industries and borrowers with higher emissions in general. We further show that the disconnect between banks' environmental disclosures and brown lending is not offset by a greater lending activity in green industries, suggesting that disclosures exaggerate banks' environmental stewardship.

One possibility is that banks with extensive environmental disclosures lend to borrowers in brown industries to facilitate their transition to greener technologies, which are typically capital-intensive and require large amounts of credit. However, we find no evidence that firms in brown industries that receive credit from high-environmental-disclosure banks invest in R&D or fixed assets more than other firms in their industries, suggesting that transition lending is unlikely to drive our findings. We reach a similar conclusion if we identify borrowers with well-defined plans to reduce their carbon emissions through the Science Based Target Initiative (SBTi). Specifically, we compare lending to similarly-sized brown firms with and without science-based emission targets and find no evidence that firms with clearly-defined plans to reduce carbon emissions obtain more funding from banks with more extensive environmental disclosures. These results indicate that these banks are unlikely to engage in transition lending. We also find no evidence that past environmental disclosures predict a decrease in lending to brown industries.

Interestingly, even though banks with more extensive environmental disclosures do not exhibit a lower propensity to issue brown loans, they are less likely to start new relationships with brown borrowers. Instead, 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. In addition, these banks tend to

fund borrowers in brown industries, especially if they are less profitable, have low productivity, and lower interest coverage ratio. The discrepancies between actual lending decisions and the environmental profiles banks aim to project thus appear to be accentuated by banks' propensity to continue lending to financially unhealthy brown borrowers. These zombie borrowers have typically fewer financing alternatives. Thus, terminating the relationships would force banks to realize credit losses and therefore to discuss and explain their exposures to brown industries, suggesting that relationships with zombie firms make particularly hard for banks to reduce their environmental impact.

Consistent with this hypothesis, we find that the discrepancies between environmental disclosures and the environmental impact of lending decisions are particularly pronounced for banks with low capitalizations, that is, the banks that have particularly strong incentives to engage in zombie lending (Peek and Rosengren, 2005; Giannetti and Simonov, 2013).

Overall, these findings suggest 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 (2023) and Degryse et al. (2023), who show that debt financing can slow the transition to a greener economy.

Finally, we show that large banks, which arguably are under greater pressure by stakeholders to legitimize their operations and lending choices, are particularly inclined to boost their environmental profiles, even if they provide large amounts of credit to borrowers in brown industries. 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., 2022), 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 in syndicated loans with borrowers of similar ESG risk. Similarly, Kacperczyk and Peydro (2022) and Degryse et al. (2023) 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, Laeven and Popov (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, which are more visible and potentially less subject to greenwashing. We consider the evolution of banks' entire loan portfolios, including loans to smaller borrowers, which are opaque and therefore less likely to affect banks' reputation.

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; Huang and Lu 2022; Baker et al., 2022). Taking advantage of banks' granular loan-level reporting in a credit registry, we can observe lending to brown and green borrowers and find that it does 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 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., Dhaliwal et al., 2012; 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 loans to corporate borrowers issued by large banks in the Eurozone. 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.⁵ 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.⁶ 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 553 banks (96 unique parent banks).

We obtain loan-level data from Anacredit (AC), a credit register launched by the European System of Central Banks in 2018 that offers confidential information on commercial loans outstanding. Specifically, AC covers 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. All banks report any loan provided to firms if the exposure to the borrower exceeds EUR 25,000.

The data granularity in AC allows us to capture any changes in lending policies through the *flow* of banks' credit over time. Specifically, in our empirical analysis, we employ a sample of newly issued loans over the 2014-2020 period. Since the median loan maturity is approximately four years (see Table 1, Panel C, where maturity is reported in days), extending our sample's time-series to include loans issued post 2014 allows us to capture most of the banks' lending activity during this period.⁷ Our measure of new loans to a borrower includes

⁵ 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).

⁶ Our results are overall robust to excluding these banks from our sample (untabulated).

⁷ 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.II).

all facilities a bank has granted to a borrower during a year with the exception of credit lines, because drawn credit lines reflect the borrower's demand as well as the supply of credit.

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 that country and year 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 for GHG emissions relative to the industry's value added. Based on this methodology, examples of brown industries include Crop and animal production, hunting and related service activities, Manufacture of coke and refined petroleum products, Electricity, gas, steam and air conditioning supply, Land transport and transport via pipelines, Air travel etc. On the other hand, examples of green industries include Manufacture of electrical equipment, Wholesale trade, except of motor vehicles and motorcycles, Real estate activities, Legal and accounting activities, Architectural and engineering activities; technical testing and analysis, Advertising and market research, Human health activities, etc.

In our primary analyses, we focus on whether banks' environmental disclosures reflect their lending activity in brown industries, since 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 intensity ratio of scope 1 and 2 GHG emissions to its total revenues.

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 sustainability, nonfinancial information, and integrated reports.⁸ 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 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. 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

⁸ 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").

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 SASB.⁹

⁹ 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/>.

Our dictionary of environmental-information-related keywords includes non-directional words and phrases related to energy use and waste management (e.g., “oil”, “renewables”, “natural gas”, “coal”, “nuclear”, “paper”), emissions (e.g., “CO2”, “carbon”, “emission”, “laughing gas”), biodiversity (e.g., “biodiversity”, “forest”, “coral”), activities commonly consider to affect pollution (e.g., “car”, “building certificate”, “pollute”, “waste”, “fracking”, “grabbing”), or that may have negative ecological consequences (“gmo”).¹⁰ 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 B. Examples of banks’ disclosures of their environmental activities are provided in Appendix C.

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 0.85% (Panel B of Table 1).¹¹ Figure 1 shows that the volume of environmental disclosures 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. Banks commonly discuss their climate footprint in conjunction with their “finance” activities and “loan” decisions to portray their active contribution to a sustainable economy. Furthermore, they occasionally discuss the environment in connection to climate “risk”. In these cases, as illustrated by the disclosures of

¹⁰ 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).

¹¹ 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 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).

Commerzbank in Appendix C, banks, which are not obliged to disclose these risks in the eurozone, discuss the policies aiming to decrease their exposures. Finally, banks 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 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 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 A. 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 D. 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*).¹²

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 Total Assets (ROA and Leverage)* are positively related to *Environmental disclosures* in two (three) out of six specifications.

Third, prior studies have documented the association between the volume of firms' sustainability disclosures and 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 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).¹³ Importantly, this

¹² 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.

¹³ 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.,

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., 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*

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.

(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.

Figure 3 provides some evidence on how the extent of the environmental disclosures relate to the emissions of the banks' borrowers. In Panel A, we relate our environmental disclosures proxy to the proportion of loans to brown industries of a bank. In Panel B, we subtract from the proportion of brown loans of a bank, the average proportion of outstanding brown loans of other banks in the country during the same year. It is evident that banks with more extensive environmental disclosures have a larger proportion of outstanding loans to brown industries.

While this is suggestive of greenwashing, in what follows we explore whether high environmental reporters are changing the composition of their loan portfolios by focusing on new loan issuance the characteristics of the borrowers.

4. Environmental Disclosures and Bank Lending Policies

4.1 Methodology

We study whether banks with more extensive environmental disclosures issue greener loans. 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. As Figure 3 may suggest, 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 the following empirical 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 , $Loan\ amount_{f,b,i,c,t}$:

$$Loan\ amount_{f,b,i,c,t} = \alpha + \beta_1(Brown_{i,c,t} \times High\ Environmental\ Reporter_{b,t}) + \beta_2 High\ Environmental\ Reporter_{b,t} + \gamma \mathbf{X}_{b,t} + \delta_{i,c,t} + \mu_b + \epsilon_{f,b,i,c,t} \quad (1)$$

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 rank 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 is 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 μ_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 shocks affecting the bank's supply of credit. 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 and identify the supply of credit from firms with multiple relationships (Khwaja and Mian, 2008). The high-dimensional fixed effects also ensure that our results are not driven by differences in country specialization or national supervisory and enforcement measures, which may potentially affect bank disclosures and greenwashing practices. Thus, the coefficient β_1 captures the extent to which banks credit decisions are associated with borrowers' emissions after controlling for the borrowers' demand for credit.

4.2 Main findings

Table 3 reports the main findings. In Panel A, we show that banks classified as high environmental reporters grant more credit to borrowers in brown industries. In terms of economic magnitudes, the estimate in column 5 suggests that high environmental reporters extend 3.6% 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.

Importantly, the results in Table 3 cannot be interpreted to depend on the fact that brown industries experience positive demand shocks in some countries or that some banks are able to expand their credit supply to a larger extent because the interactions of industry, country and year fixed effects or firm and year fixed effects absorb shocks to credit demand, while the interaction of bank and year fixed effects absorb shocks to banks' credit supply.

4.3 Alternative Proxies for Brown Borrowers and High Environmental Reporters

Collectively, the findings in Table 3 are suggestive of greenwashing, but concerns may arise regarding what our proxy for high environmental reporters captures. For instance, environmental disclosures could discuss future actions banks will take to enhance their

environmental profiles. In this respect, environmental disclosures should be reflected only in future lending policies. We thus use lags of the *High environmental reporter* dummy to test whether banks that previously stressed the environment subsequently adopt greener lending policies. Table IA.IV in the internet appendix reports results for the three-year lag of the *High environmental reporter* dummy.¹⁴ The estimates mirror those in Panel A of Table 3.

We also consider that extensive environmental disclosures may discuss the banks' exposure to brown industries and the consequent risk. In this respect, the banks' environmental disclosures may not portray environmental consciousness and sustainability. While our validation tests suggest that this is unlikely, to further mitigate this concern, we conjecture that disclosures aiming to portray a bank as environmentally and socially conscious are likely to have positive sentiment. We thus construct a measure of sentiment of the environmental disclosures following by Hassan, Hollander, Van Lent, and Tahoun (2019). Specifically, we condition on proximity of our environmental vocabulary words to positive and negative words, identified from Loughran and McDonald's (2011) dictionary of words related to sentiment in financial texts. Our proxy for the sentiment of environmental disclosures is then defined as:

$$Sentiment_{i,t} = \frac{\sum_b^{B_{i,t}} \{I[b \in S \setminus N] \times \sum_{c=b-10}^{b+10} S(c)\}}{B_{i,t}},$$

where $S(c)$ is a function that assigns a value of +1 if word c is associated with positive sentiment and a value of -1 if word c is associated with negative sentiment; $S(c)$ takes value zero otherwise. $\sum_{c=b-10}^{b+10} S(c)$ calculates the net sentiment among the ten words surrounding any word in our environmental vocabulary.

Table IA.V in the internet appendix defines high environmental reporters as those whose disclosures have sentiment in the top quintile during a year. These banks are the least likely to discuss the risks arising from their exposures to brown industries. Even though the measure of

¹⁴ For this test, we perform the textual analysis of banks' reports starting from 2011 in order not to lose observations.

sentiment is noisy because the positive and negative words have not been explicitly defined for environmental disclosures, the results are qualitatively similar to those in Panel A of Table 3. While we lose significance in columns 3 and 4, it is comforting that the most conservative specifications in which we consider how different banks extend credit to the same borrowers remain statistically and economically significant.

We also consider how robust our results are to the definition of brown borrowers. An important concern is that we measure 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 employ the volume of a borrower's annual scope 1 and 2 GHG emissions, standardized by total sales.

Table 4 summarizes the results. Despite that sample size dramatically decreases since granular emission data are available only 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 30% 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 β_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. Thus, 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 for whether one of the bank relationships of a firm did not exist in year $t-1$ and is established in year t (*Entry*); (ii) an indicator variable for 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 Table 3.

We report the results on the extensive margin of banks' lending in Table 5. In Panel A, we examine the initiation of new lending relationships. The evidence is consistent with the interpretation that high environmental reporters try to reduce new lending exposures to brown borrowers (our results are statistically significant in two 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), high environmental reporters appear to be less likely to initiate credit relationships with borrowers in brown industries.¹⁵

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. While this result remains statistically significant in column 4 when we include interactions of firm and time fixed effects to isolate the effect of borrowers

¹⁵ In Appendix Table IA.VI, we do not observe any differential propensity to start relationships with borrowers in green industries.

with multiple relationships, it becomes statistically insignificant in column 5 when we include additional interactions of bank and year fixed effects. 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, banks that emphasize the environment in their public reports partially adjust their portfolios on the extensive margin by not establishing relationships with borrowers in brown industries.

To evaluate how banks' lending policies affect their credit exposures to brown borrowers, we aggregate observations at the bank-industry-country-year 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, $Credit\ share_{b,i,c,t}$. We estimate the following equation:

$$\begin{aligned}
 Credit\ share_{b,i,c,t} = & \alpha + \beta_1(Brown_{i,c,t} \times High\ Environmental\ Reporter_{b,t}) \\
 & + \beta_2 High\ Environmental\ Reporter_{b,t} + \gamma \mathbf{X}_{b,t} + \delta_{i,t} + \nu_{c,t} + \mu_b + \epsilon_{b,i,c,t}
 \end{aligned}
 \tag{2}$$

Table 6 reports the results. 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 make 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 would be consistent with banks' attempt to fund the transition to greener technologies.

We obtain financial data from Orbis and construct the following borrower-year level variables: (i) R&D to total assets; (ii) intangible assets to total assets; and (iii) change in fixed assets to total assets. We define indicator variables for whether a borrower ranks in the top

quartile of the respective variables' distribution across the firms in the same industry (NACE 2). If high environmental reporters finance the transition to greener technologies, we expect that their brown borrowers are more likely to engage in R&D or have high 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, 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.

A limitation of using financial data is that we cannot distinguish between green and brown investment. To address the concern that our test has too low power to identify the borrowers that invest in transition technologies, we exploit SBTi data. Some companies set clearly-defined science-based targets to reduce their greenhouse gas emissions by adhering to the SBTi. We obtain the list of companies that become signatories of the SBTi in different years from the SBTi website. We match the list with AnaCredit and compare bank lending to similarly sized-companies in the same NACE-2 industry with and without emission targets. We consider a firm to have committed to decrease its carbon emissions if the firm has adhered to the SBTi in the past or does so within the next year.¹⁶ Similar to the analysis with Orbis data, our coefficient of interest is a triple interaction between high environmental reporter, borrower brownness, and the dummy identifying borrowers that are SBTi signatories. The results in

¹⁶ Our results are robust to the time-invariant dummy construction that considers all SBTi commitments at any point in time.

Columns 7 and 8 are consistent with our earlier findings: We do not find any evidence that banks with more extensive environmental disclosures attempt to favor the transition to greener technologies of borrowers in brown industries by extending more credit to firms with clearly defined emission targets.

4.6 Environmental disclosures and loan contractual features

While banks with more extensive environmental disclosures extend large amount of credit to brown borrowers, they could use contract features to discipline them. For instance, banks could provide loans at higher interest rates to brown borrowers. This would not only increase the borrowers' cost of capital thus hampering their ability to invest, but it would also be a sign of high environmental reporters' reluctance to lend to borrowers in brown industries.

In Panel A of Table 8, we test whether high environmental reporters extend loans with higher interest rates to borrowers in brown industries. We find no evidence that this is the case. Borrowers in brown industries do not pay higher interest rates for loans from banks with extensive environmental disclosures. Interesting though, in column 1, where the coefficient on the brown industry dummy is not absorbed by the fixed effects, we find that borrowers in brown industries pay higher interest rates, indicating that our proxy indeed captures transitions risks, which banks on average price when they issue new loans.

We also test whether banks with more extensive environmental disclosures extend loans with shorter maturity to borrowers in brown industries. Short maturity allows lenders to exercise control, as banks can threaten firms not to renew the loans if environmental or other targets are not met. In Panel B of Table 8, we test whether high environmental reporters extend loans with 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 that on average, the maturity of loans extended by high environmental reporters to borrowers in brown industries does not differ from that of other banks. Thus, high

environmental reporters do not appear to use loan maturity to monitor brown borrowers and spur change.

Overall, the contractual features of the loans reveal no reluctance of high environmental reporters to fund borrowers in brown industries.

5. Why Do Banks Lend to Brown Borrowers?

5.1 Zombie lending and the brownness of banks' portfolios

Our results in Section 4.3. suggest that the discrepancies between banks environmental disclosures and lending policies emerge because banks are reluctant to discontinue established credit relationships with brown borrowers. Column 1 and 2 of Table 9 provides further support to this conjecture. We test whether high environmental reporters extend more credit to borrowers in brown industries if they have extended a larger proportion of the borrower's outstanding loans in the past. This variable that we label *Exposure* not only captures how close the relationship of a bank is with a given borrower, but also that such a bank refusal to extend a loan would have the largest negative consequence for the bank itself, as the bank is the most the exposed to the borrower. Consistent with the idea that the bank internalizes the negative effect of not extending liquidity to these borrowers, we find that the coefficient on the triple interaction term between *Brown*, *High Environmental Reporter*, and *Exposure* is positive and significant in column 1. The coefficient is positive but statistically insignificant in column 2, indicating that we lose power when we concentrate on borrowers that receive loans from multiple banks during a year. This may indicate that only the high-environmental-reporting banks with the largest exposures extend loans to brown borrowers.

In the rest of the table, we explore a mechanism for why preexisting relationships with the borrowers appear to be so important. Banks are expected to have particularly strong incentives to extend credit to borrowers in brown industries, if these firms are unprofitable and lack

alternative financing options. In these cases, banks may prefer to renew loans to existing unprofitable borrowers, which are commonly referred to as zombie, in order to avoid realizing credit losses (e.g., Peek and Rosengren, 2005; Giannetti and Simonov, 2013). Thus, high environmental reporters' zombie lending may drive the continuing financing of brown industries, and in turn, restrict banks from reducing their loan portfolios' carbon footprint.

We employ several proxies to define “zombie” borrowers: (i) an indicator variable for whether a 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 for whether a 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 for whether a borrower's interest coverage ratio (EBIT to interest expense) ranks in the bottom 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 borrower.

Table 9 reports the results of these tests. In four 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 3 and 4), low productivity (columns 5 and 6) and low interest coverage ratio (columns 7 and 8). This evidence is consistent with the interpretation that high environmental reporters renew loans 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 low-quality brown 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.

If zombie lending indeed helps to explain greenwashing, banks with low capitalizations should exhibit an even larger disconnect between environmental disclosures and lending policies in order not to report, disclose and discuss credit losses and exposures to brown industries (e.g., Peek and Rosengren, 2005; Giannetti and Simonov, 2013). Furthermore, by exploiting the cross-section of banks, we find that high environmental reporters with low capitalizations extend larger loans to borrowers in brown industries (column 1 of Table 10) which fully supports our conjecture that zombie lending helps to explain the low informativeness of banks' environmental disclosures.

Overall, these findings suggest that relationships with "zombie" brown borrowers help to explain why high environmental reporters hide their brown exposure and overstate their environmental objectives at the detriment of the long-term carbon footprint of their loan portfolios.

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

We also examine whether a bank's visibility proxied by its size (total assets) can enhance the credibility of environmental disclosures. It appears that large banks with more extensive environmental disclosures extend more credit to borrowers in brown industries (column 2). This evidence suggests 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 without changing their lending policies. It also indicates that the credibility of environmental disclosures and the extent to which these are reflected in the banks' loan portfolios may be particularly hard to verify for market participants.

The rest of the table supports this conjecture. We examine whether the association between environmental reporting and banks' lending activities in brown industries is influenced by 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

headquarters country 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. 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 3). 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 4). Finally, we show that the use of an external auditor does not materially enhance the credibility of the sustainability disclosures (column 5), in line with recent studies suggesting that auditors have limited expertise and experience in evaluating sustainability disclosures (Aobdia and Yoon, 2022). Collectively, these results are consistent with the view that environmental disclosures are inherently hard to compare and standardize and 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.

6. Conclusions

In response to the rising institutional pressures towards the green economy transition, 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.¹⁷

Studying how banks' environmental disclosures reflect their lending policies, we contribute to this ongoing debate. We show that features of banks' business models, such as relationship lending, hinder the effective transition to a green lending strategy and 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 the environmental disclosures reflect banks' underwriting activities in the more transparent bond market but not their lending policies.

Our results support concerns about the lack of transparent and consistent sustainability disclosures (European Central Bank [ECB] 2022) and indicate that efforts to increase the comparability and transparency of sustainable financing products (e.g., Reg. 2020/852; Reg. 2019/2088) should be extended to banks.

¹⁷ 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. 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).

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Figure 1. Environmental disclosures over time.

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

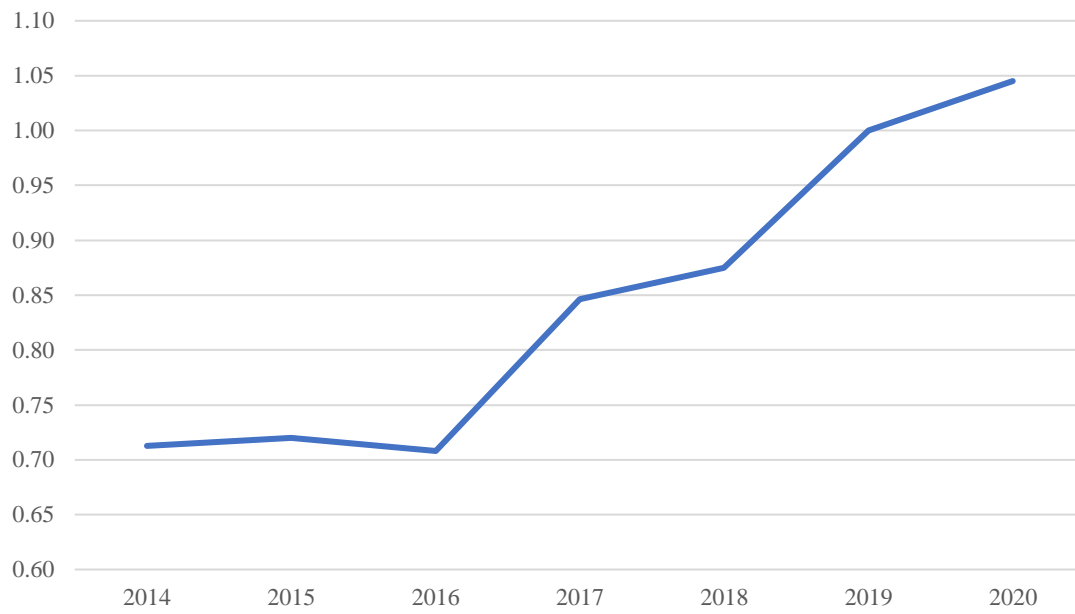


Figure 2. Word Cloud of Environmental Disclosure Content

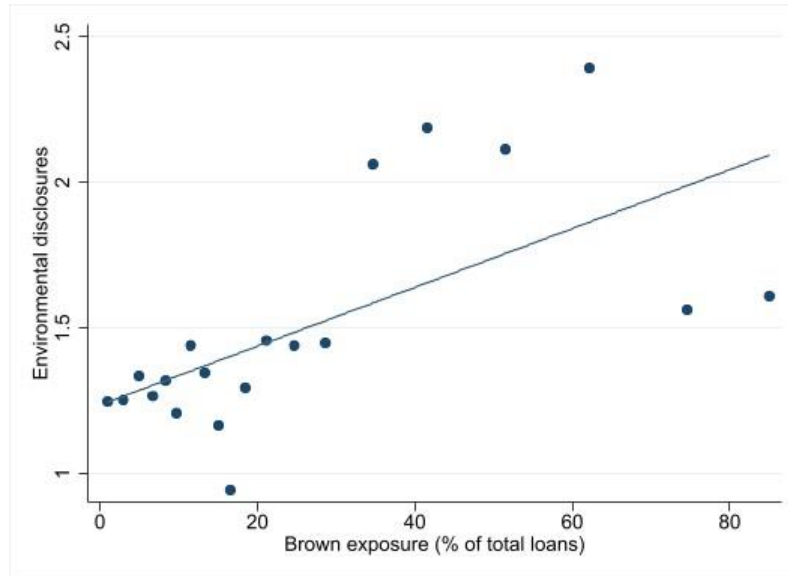
The figure presents the cloud of words identified in sentences with at least one environmental disclosure keyword of our dictionary in banks' reports over the 2014-2020 period. Terms are assigned a font size proportional to their frequency in the corpus of reports.



Figure 3. Environmental Disclosures and Banks' Exposure to Brown Industries

The figure presents the relationship between banks' environmental disclosures and their exposure to brown borrowers. Panel A shows a bin scatter plot for the lagged share of bank's lending to brown borrowers as a share of total credit outstanding (*Brown exposure*) and the continuous variable of bank's environmental exposure. Panel B further controls for country and time fixed effects in lending. The scatter plots report averages for the data sorted in 20 bins based on the bank's exposure to brown firms.

Panel A.



Panel B.

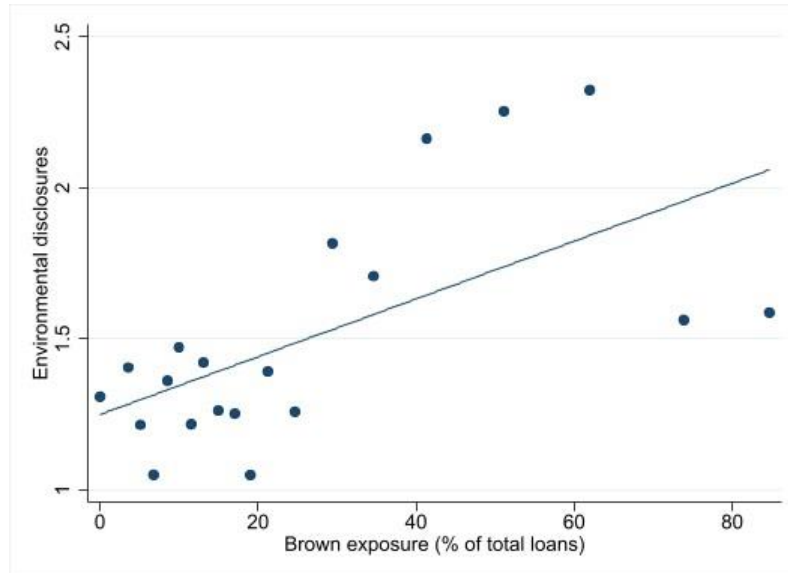


Figure 4. Banks' Environmental Disclosures and New Loans to Brown Industries

The figure presents the coefficients of time-varying estimates of the association between banks' environmental disclosures and the volume of new loans to borrowers in brown industries for each year, as described by Model 1. 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. Vertical lines denote a 95% confidence interval. Standard errors are reported in parentheses, corrected for heteroskedasticity and clustered at the bank level.

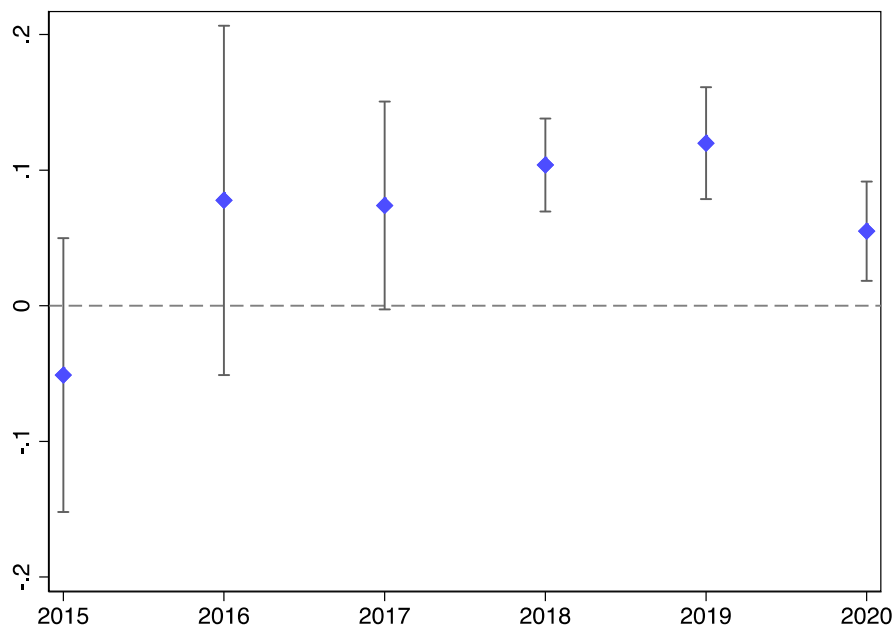


Table 1. Descriptive statistics

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 A. ***,** 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
Total	1,397	42,760	503

Panel B. Summary statistics of banks' characteristics.

	Obs.	Mean	S.D.	Q1	Median	Q3
<i>Environmental disclosures (%)</i>	660	0.846	0.594	0.415	0.698	1.056
<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. Summary statistics of loan-level data.

	Obs.	Mean	S.D.	Q1	Median	Q3
<i>Loan Amount</i>	3,740,323	11.00	1.52	10.13	10.82	11.90
<i>Loan Maturity</i>	3,712,480	1588	1213	574	1642	2100
<i>High env. reporter</i>	3,740,323	0.09	0.29	0	0	0
<i>Brown</i>	3,740,323	0.16	0.87	0	0	0
<i>Leverage</i>	3,740,323	0.91	0.03	0.89	0.91	0.93
<i>ROA</i>	3,740,323	0.03	0.01	0.02	0.03	0.04
<i>Total assets</i>	3,740,323	25.13	1.61	23.88	24.97	26.7
<i>Tier 1 capital</i>	3,740,323	0.18	0.04	0.15	0.17	0.20
<i>GHG emissions (Urgentem)</i>	3,765	109.68	181.83	19.96	32.57	78.9

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 A. 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.

	Environmental disclosures						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Activism	3.680*** (0.498)						
Socioeconomic beliefs	0.016 (0.401)						
High Env risk country	0.353** (0.130)						
GRI standards		0.185*** (0.052)	0.162*** (0.060)	0.114* (0.068)	0.136** (0.062)	0.186*** (0.053)	0.178*** (0.052)
Integrated reporting		0.242* (0.126)	0.048 (0.103)	0.148 (0.124)	0.043 (0.083)	0.261** (0.126)	0.213* (0.128)
Leverage		2.414 (1.532)	4.493*** (1.565)	4.049** (1.982)	3.212** (1.584)	2.477 (1.503)	2.357 (1.472)
ROA		2.101* (1.114)	1.187 (1.649)	1.584 (2.696)	-2.122 (1.448)	2.069* (1.076)	2.160* (1.130)
Total assets		0.051* (0.029)	0.023 (0.031)	0.004 (0.031)	-0.023 (0.030)	0.042 (0.028)	0.060** (0.030)
Tier 1 capital		1.139 (1.031)	2.529*** (0.746)	2.569*** (0.735)	1.081 (1.021)	1.202 (1.029)	1.184 (1.021)
MSCI Env score			0.033* (0.018)				
Sustainalytics Env score				0.004* (0.003)			
Bloomberg Env score					0.012*** (0.003)		
ESG Corporate Knights						0.242*** (0.085)	
Green bond issuance							0.570*** (0.165)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	Yes	Yes	Yes	Yes	Yes
S.E. Cluster	Country	Bank	Bank	Bank	Bank	Bank	Bank
Obs.	471	660	487	452	365	660	660
R ²	0.23	0.44	0.46	0.44	0.43	0.45	0.45

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 a 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 A. 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	-0.112** (0.0488)	-0.0843** (0.0367)		-0.0451 (0.0400)	
Brown	-0.212*** (0.0257)				
High env. reporter x Brown	0.128*** (0.0411)	0.0558 (0.0375)	0.0744*** (0.0223)	0.0388* (0.0220)	0.0363* (0.0217)
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	2,822,338	3,740,323	3,740,250	828,689	828,074
R ²	0.705	0.200	0.207	0.792	0.797

Panel B. Green industries

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.0785* (0.0443)	-0.0647* (0.0331)		-0.0268 (0.0340)	
Green	-0.0614 (0.0459)				
High env. reporter x Green	-0.0697 (0.0571)	-0.0493 (0.0324)	-0.0196 (0.0247)	-0.0463 (0.0484)	-0.0172 (0.0436)
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	2,822,338	3,740,323	3,740,250	828,689	828,074
R ²	0.704	0.200	0.207	0.792	0.797

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 A. 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	-0.0704 (0.0945)	-0.0347 (0.138)		-0.0774 (0.123)	
GHG emissions	-0.195* (0.103)	0.0422 (0.0299)	0.0355 (0.0316)		
High envir. reporter x GHG emissions	-0.217 (0.213)	0.290** (0.135)	0.305** (0.134)	0.0495 (0.128)	0.0393 (0.125)
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	3,765	3,637	3,454	2,989	2,786
R ²	0.652	0.540	0.577	0.790	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 A. 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	0.122 (0.0903)	0.0928 (0.0822)		0.129 (0.0967)	
Brown	-0.000316 (0.0123)				
High env. reporter x Brown	0.00712 (0.0186)	0.00857 (0.0123)	-0.0219** (0.00862)	0.00866 (0.0219)	-0.0337** (0.0151)
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	340,664	344,817	344,669	339,288	339,050
R ²	0.0694	0.0266	0.0652	0.0890	0.142

Panel B. Relationship Termination

	Exit				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.00624 (0.00526)	-0.0273 (0.0230)		-0.0537** (0.0241)	
Brown	0.00124 (0.00217)				
High env. reporter x Brown	-0.00844** (0.00420)	-0.0235** (0.0116)	-0.00743*** (0.00278)	-0.0131* (0.00723)	-0.00747 (0.00942)
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	506,186	913,794	913,766	222,283	222,143
R ²	0.469	0.0700	0.0752	0.504	0.509

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 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 A. 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	-0.0993 (0.0754)	-0.144** (0.0559)		-0.00103 (0.00116)	-0.000372 (0.00131)	
Brown	-0.159*** (0.0291)	-0.104** (0.0432)	-0.109** (0.0439)	-0.00311*** (0.000866)	-0.000704 (0.00138)	-0.00129 (0.00131)
High env. reporter x Brown	0.160** (0.0639)	0.257*** (0.0698)	0.267*** (0.0704)	0.0140*** (0.00341)	0.0114*** (0.00355)	0.00936*** (0.00353)
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	93,963	93,959	93,874	93,963	93,959	93,874
R ²	0.577	0.592	0.614	0.346	0.353	0.349

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 columns (7) and (8), we compare lending to firms with emissions reductions targets or commitments with the SBTi and with firms of the same size and same industry (NACE-2) without SBTi commitments. 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 A. 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		SBTi targets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High env. reporter x Brown	0.0734*** (0.0211)	0.0442* (0.0245)	0.0778*** (0.0218)	0.0508** (0.0228)	0.0533** (0.0219)	0.0354 (0.0310)	-0.0160 (0.0740)	0.126*** (0.0451)
High env. reporter x Proxy	0.167 (0.314)	0.240 (0.162)	0.148*** (0.0486)	0.00129 (0.0241)	0.0487 (0.0484)	0.00494 (0.0152)	0.756** (0.300)	0.165 (0.407)
High env. reporter x Brown x Proxy	-0.480 (0.624)	-0.590*** (0.210)	-0.00472 (0.0367)	-0.0338 (0.0358)	0.0625 (0.0464)	0.0368 (0.0547)	-0.794 (0.796)	0.600 (1.027)
Industry-Country-Time FE	Yes	-	Yes	-	Yes	-	Yes	-
Firm-Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,218,763	683,941	2,200,842	682,215	2,084,272	667,548	453,020	151,116
R ²	0.208	0.792	0.207	0.792	0.210	0.791	0.299	0.801

Table 8. Loan Contractual Features

The table reports the results of the tests on the association between banks' environmental disclosures and loan contractual features. In Panel A, the agreed annualized interest rate offered by a bank to a given borrower during a year (*Interest Rate*). In Panel B, 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, *Interest Rate* and *Loan maturity* are computed as the weighted average of the loan interest rate and maturity, respectively, 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 A. 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. Interest Rate

	Interest rate				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.00149 (0.000924)	-0.000395 (0.000844)		0.000377 (0.000527)	
Brown	0.00176*** (0.000679)				
High env. reporter x Brown	0.000962 (0.000926)	-0.0000283 (0.000404)	-0.000323 (0.000409)	-0.000133 (0.000474)	-0.000206 (0.000524)
Bank controls	Yes	Yes	-	Yes	-
Loan controls	Yes	Yes	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	671,120	1,201,352	1,201,282	359,679	359,427
R ²	0.721	0.378	0.392	0.737	0.741

Panel B. Loan Maturity

	Loan maturity				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.170*	-0.0795**		-0.0422	
	(0.101)	(0.0376)		(0.0444)	
Brown	-0.165***				
	(0.0337)				
High env. reporter x Brown	0.125	0.0388	0.0366*	0.0478	0.0162
	(0.0764)	(0.0384)	(0.0204)	(0.0316)	(0.0217)
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	2,810,878	3,712,480	3,712,407	824,777	824,165
R ²	0.519	0.250	0.268	0.656	0.665

Table 9. The Environmental Impact of Bank Relationships and Zombie Lending

The table examines three proxies for the zombie channel. Columns (1) and (2) present the *Exposure* proxy that denotes the share of credit a firm f receives from bank b as a share of the firm's total bank credit outstanding. Columns (3) and (4) use dummy variable *ROA* that takes the value of 1 if the firm's return on assets ranks in the bottom quartile of firms in the same industry (NACE-2) and the same year, and 0 otherwise. Columns (5) and (6) present the estimates using the dummy variable that takes the value of 1 if the firm's sales to employee ratio in the bottom quartile of firms in the same industry (NACE-2) and the same year, and 0 otherwise. Columns (7) and (8) report the estimates using the dummy variable that takes the value of 1 if interest coverage ratio ranks in the bottom quartile of firms in the same industry (NACE-2) and the same year, and 0 otherwise. 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*). A dummy variable *Brown* 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 top quintile of all industries in a respective reporting country during year t , and 0 otherwise. *High environmental reporter* is a dummy variable that takes value equal to 1 if bank's environmental disclosures rank in the top quintile of the variable's distribution in year t , and 0 otherwise. Fixed effects are included as indicated in the table, 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							
	Exposure		Low ROA		Low Sales to employee		Low Interest Coverage Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High env. reporter x Brown	0.00617 (0.0162)	0.0421* (0.0234)	0.0545*** (0.0146)	0.0394** (0.0178)	0.0321* (0.0166)	0.0298* (0.0181)	0.0666*** (0.0172)	0.0288 (0.0193)
High env. reporter x Proxy	0.0707*** (0.0105)	0.168*** (0.0235)	0.0547*** (0.00949)	0.0276* (0.0156)	0.0342*** (0.0106)	0.0336** (0.0153)	0.00222 (0.0108)	0.00794 (0.0136)
High env. reporter x Brown x Proxy	0.199*** (0.0212)	0.0502 (0.0531)	0.0545** (0.0234)	0.0107 (0.0392)	0.124*** (0.0277)	0.0772* (0.0416)	0.0192 (0.0283)	0.0622* (0.0373)
Industry-Country-Time FE	Yes	-	Yes	-	Yes	-	Yes	-
Firm-Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,626,362	408,934	2,003,216	666,516	1,642,281	635,608	1,039,126	377,787
R ²	0.194	0.797	0.202	0.791	0.218	0.788	0.197	0.773

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), *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 column (2), *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 (3), *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 (4), *Post Paris agreement* is an indicator variable of whether a loan was issued post 2017. In column (5), *Audited sustainability report* is an indicator variable of whether a borrower's sustainability report is audited by an external reviewer or auditor. 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 A. 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				
	Low Tier 1 capital (1)	Large bank (2)	Mandatory sustain. reporting (3)	Post Paris agreement (4)	Audited sustain. report (5)
High env. reporter x Brown	0.0134 (0.0163)	-0.105* (0.0623)	0.0989* (0.0597)	-0.0336 (0.0584)	0.0293 (0.0206)
High env. reporter x Brown x Factor	0.0582** (0.0254)	0.142** (0.0619)	-0.0616 (0.0613)	0.0737 (0.0600)	-0.00619 (0.0280)
Bank-Time FE	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	Yes	Yes	Yes	Yes
N	828,074	828,070	828,074	828,074	828,074
R ²	0.797	0.797	0.797	0.797	0.797

Appendix A. Variable definitions.

Variables	Variable definitions
Bank disclosure characteristics	
<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.
Bank sustainability performance	
<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.
Bank financial performance	
<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.
Country ESG characteristics	
<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 D.

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

Appendix B. Environmental-related keywords.

(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 certifi	(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)	commut	(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		

Appendix C. 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.

Commerzbank (2019)- GRI Report (pg. 53-54):

The integration of non-financial aspects into the Bank's **risk management processes** is hugely important for sustainable finance. These include risks resulting from **climate change**. They form part of the overall risk management and in future will be anchored even more firmly in the risk strategy under "Commerzbank 5.0". Credit risk management already incorporates climate issues in country and sector analyses and in risk assessment. Physical risks include rising sea levels and flooding for the real estate sector, along with crop failures in agriculture or low water levels in rivers, with implications for the transport and chemical industries. Transition risks such as changes in energy policy are also taken into account in the analysis.

Lending decisions for companies and institutional customers are therefore based not only on an individual risk assessment but also – where relevant – on the extent to which they involve climate risks and on the level of resistance to them. If a customer is exposed to a higher probability of physical climate risk, a scenario analysis is carried out and the resilience to climate-related phenomena tested.

In implementing the "Commerzbank 5.0" strategy, we are currently developing a methodology for embedding sustainability considerations in the future management of Commerzbank AG's loan portfolio. **The initial focus is on the CO2 emissions associated with our business activities.** The CO2 intensity of the bank's loan portfolio is to be reduced through individual target values and measures. These include the **promotion of emission-reducing technologies and the active management of financing in CO2-intensive industries.**

By contrast, environmental and social risks arising from our core business are assessed in Commerzbank AG's Reputational Risk Management department. The Bank has adopted a clear position on controversial issues such as weapons, environmentally harmful energy sources and speculative trading in basic foodstuffs. Our process for managing these risks is described in detail in the framework for handling environmental and social risks in the core business, which is published online. The framework also includes all industry-specific requirements, for example relating to mining, energy, oil and gas. Exclusion criteria were defined for particularly critical products, transactions or business relationships. These include projects related to fracking or tar sands, but also the Group-wide decision not to finance new coal (...)

Appendix D. 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 Spearman correlation matrix of the variables in the validation tests.

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***

Table IA.II. 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 a 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 A. 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	-0.139** (0.0628)	-0.136*** (0.0426)		-0.0307 (0.0386)	
Brown	-0.0504*** (0.0179)				
High env. reporter x Brown	0.0151 (0.0329)	0.0756*** (0.0247)	0.0914*** (0.0232)	0.0356* (0.0190)	0.0401* (0.0232)
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	1,614,428	2,483,590	2,483,549	669,713	669,496
R ²	0.761	0.183	0.187	0.781	0.785

Panel B. Green industries

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.129* (0.0672)	-0.126*** (0.0486)		-0.0214 (0.0423)	
Green	-0.0234 (0.0473)				
High env. reporter x Green	-0.0344 (0.0385)	-0.00539 (0.0321)	-0.0194 (0.0328)	-0.0182 (0.0459)	-0.0195 (0.0486)
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	1,614,428	2,483,590	2,483,549	669,713	669,496
R ²	0.761	0.183	0.187	0.781	0.785

Table IA.III. New Loans Analysis. Robustness using pre 2020 period

The table reports the results of a robustness test of the Baseline analyses in Table 3 using a shorter time window (loans originated prior to 2020). 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 a 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 A. 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	-0.0555 (0.0705)	-0.0612 (0.0468)		-0.0421** (0.0197)	
Brown	-0.223*** (0.0274)				
High env. reporter x Brown	0.186*** (0.0548)	0.0904*** (0.0315)	0.0825*** (0.0255)	0.0680** (0.0324)	0.0497 (0.0310)
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	1,952,401	2,701,497	2,701,444	575,227	574,719
R ²	0.716	0.207	0.214	0.798	0.801

Panel B. Green industries

	Loan Amount				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.0159 (0.0737)	-0.0443 (0.0476)		-0.0251 (0.0277)	
Green	-0.100** (0.0456)				
High env. reporter x Green	-0.0691 (0.0602)	-0.0364 (0.0380)	-0.00327 (0.0334)	-0.0365 (0.0737)	-0.0165 (0.0642)
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	1,952,401	2,701,497	2,701,444	575,227	574,719
R ²	0.716	0.207	0.214	0.798	0.801

Table IA.IV Robustness using lagged environmental disclosures

The table reports the results of a robustness test of the Baseline analyses in Panel A of Table 3 defining the *High environmental reporter* dummy using the three-year lag of the environmental disclosures. 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 (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 A. 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 env. reporter (t-3)	-0.146** (0.0687)	-0.165*** (0.0634)		-0.111** (0.0538)	
Brown	-0.0523*** (0.0181)				
High env. reporter (t-3) x Brown	0.0336 (0.0518)	0.0875*** (0.0164)	0.0831*** (0.0167)	0.0761*** (0.0213)	0.0635*** (0.0242)
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	1,552,512	2,386,642	2,386,627	636,756	636,539
R ²	0.761	0.179	0.183	0.780	0.783

Table IA.V Robustness: High Environmental Reporters Defined using Positive Sentiment of the Environmental Disclosures

The table reports the results in which high environmental reporters are defined based on environmental disclosures with more positive sentiment. 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 for their sentiment distribution during a year. Bank controls include *Total assets*, *Leverage*, *ROA*, and *Tier 1 Capital*. All variables are defined in Appendix A. 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 env. reporter	-0.0503 (0.0643)	0.0516 (0.0411)		-0.0138 (0.0498)	
Brown	-0.193*** (0.0310)				
High env. reporter x Brown	0.0806* (0.0450)	0.0431 (0.0304)	0.0426 (0.0324)	0.0802*** (0.0226)	0.0802*** (0.0246)
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	No	Yes	No
Firm FE	Yes	No	No	No	No
Time FE	Yes	No	No	No	No
Industry-Country-Time FE	No	Yes	Yes	No	No
Firm-Time FE	No	No	No	Yes	Yes
Bank-Time FE	No	No	Yes	No	Yes
N	2,262,821	3,065,744	3,065,668	590,776	590,412
R ²	0.704	0.219	0.226	0.800	0.805

Table IA.VI. 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 A. 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	0.116 (0.0856)	0.0893 (0.0779)		0.122 (0.0921)	
Green	-0.0436 (0.0351)				
High env. reporter x Green	0.0249 (0.0279)	0.0151 (0.0250)	0.00433 (0.0119)	0.0253 (0.0291)	0.00485 (0.0138)
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	340,664	344,817	344,669	339,288	339,050
R ²	0.0695	0.0266	0.0652	0.0891	0.142

Panel B. Relationship Termination

	Exit				
	(1)	(2)	(3)	(4)	(5)
High env. reporter	-0.00522 (0.00681)	-0.0284 (0.0236)		-0.0535** (0.0256)	
Green	0.00308 (0.00506)				
High env. reporter x Green	-0.00615 (0.00509)	-0.00630* (0.00372)	-0.00418** (0.00185)	-0.00750 (0.00712)	-0.00250 (0.00397)
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	506,186	913,794	913,766	222,283	222,143
R ²	0.469	0.0700	0.0752	0.504	0.509