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Keywords: Climate change, banks, emerging markets, green management, greenwashing

JEL classification numbers: D22, G21, G32, O12, Q54, Q56, R51

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Abstract

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1 Introduction

The transition to a low-carbon economy will require unprecedented financial mobilization, with estimates suggesting trillions of dollars in annual investment over the coming decades. Recognizing this challenge, Article 2.1 of the Paris Agreement explicitly calls for "*making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development*". Policymakers have emphasized that private capital, particularly bank lending, must complement public funding to achieve global decarbonization (Carney, 2021).

The financial sector has responded with ambitious promises, with more than $130 trillion in assets now aligned with net-zero targets (Glasgow Financial Alliance for Net Zero, 2021). However, it remains unclear whether these voluntary commitments translate into meaningful changes in bank lending and, ultimately, in the real economy's carbon footprint. This potential gap between climate pledges and actual lending behavior is particularly worrying in emerging markets, where the gains from improving energy efficiency are the largest and climate vulnerability the most acute. Understanding whether voluntary climate commitments represent genuine change or merely 'greenwashing' in this context is essential to assess how private finance can help achieve the ambitious goals of the Paris Agreement.

In this short paper, we provide some first evidence on how banks' climate commitments actually relate to their internal practices and lending decisions across 33 low- and middle-income countries in Emerging Europe, Central Asia, and North Africa. To do so, we leverage unique survey data that allow us to lift the hood of banking organizations and observe internal green lending practices that have remained unobserved in previous research. Unlike earlier studies, we directly measure banks' environmental governance, climate risk assessment procedures, and green lending policies through detailed surveys with 644 bank CEOs and heads of credit of 335 banks. To our knowledge, this is the first study to possess systematic data on both lenders' and borrowers' internal environmental management practices, rather than inferring them from external indicators or emissions data.

Our analysis proceeds in three steps. First, we examine whether banks that sign inter-

national climate initiatives operate with greener internal practices. We find that signatory banks score 0.83 standard deviations higher on green management practices and 0.47 standard deviations higher on green lending practices compared to non-signatories. These differences reflect concrete organizational practices. Climate-committed banks are more likely to employ dedicated environmental managers reporting to senior leadership, maintain explicit climate risk frameworks, and conduct environmental screening of loan applications. Importantly, these differences hold even when controlling for bank ownership (foreign or domestic), size, culture, and main lending technology.

Second, we investigate the link between bank characteristics and borrower behavior by merging our bank data with detailed information on 4,719 firms—predominantly small- and medium-sized enterprises (SMEs) that form the backbone of many emerging economies. This firm-bank matching, rare in cross-country studies, reveals that firms borrowing from climate-committed banks are 5.4 percent more likely to undertake green investments over a three-year horizon. Although we cannot definitively establish the causality from bank lending to firms' green investment decisions, our findings still carry important implications. That is, whether our results reflect causal effects of bank lending on firm investments, selection effects whereby greener banks choose greener clients, or a combination of both, they demonstrate that the environmental commitments of banks are not merely greenwashing. Instead, these commitments translate into meaningful differences in client composition and potentially influence the investment choices of borrowing firms.

Third, we exploit a unique feature of our data: geocoded locations of both firms and bank branches across all sample countries. This allows us to examine not only existing lending relationships, but also potential matches between firms and nearby banks. We document significant assortative matching between green banks and green firms within local credit markets. Green-managed firms preferentially borrow from climate-committed banks in their vicinity, with this pattern being stronger for firms that undertake actual green investments. The matching extends to banks' internal environmental capabilities: firms making green

investments are more likely to borrow from banks with strong green management practices.

This paper makes three contributions to the emerging literature on banks and the green transition. First, we address an important geographic gap. Existing research focuses almost exclusively on high-income countries with strong environmental regulation and developed financial sectors. We examine low- and middle-income countries, where different institutional constraints, financing patterns, and climate vulnerabilities may limit the transferability of findings from developed markets (De Haas, 2025).[1]

Second, we overcome some key data limitations. The sustainable banking literature relies heavily on syndicated loan data, limiting analysis to large, publicly-traded firms (Degryse, Goncharenko, Theunisz, and Vadasz, 2023; Martini, Sautner, Steffen, and Theunisz, 2023; Delis, de Greiff, Iosifidi, and Ongena, 2024). These studies find that banks have begun pricing climate risks and reallocating credit away from carbon-intensive industries, especially after the Paris Agreement. In particular, Degryse et al. (2023) document a "green meets green" matching pattern where environmentally conscious banks lend to green firms at preferential rates. However, many developing countries are characterized by small private firms that lack access to international credit markets. Our firm-bank matched data capture lending to these smaller firms, filling a gap left by syndicated loan research. Moreover, while De Haas, Martin, Muûls, and Schweiger (2025) collect survey data on small firms' green management practices across emerging Europe, we are the first to gather comparable information for banks. Using these data, we show that banks with stronger environmental capabilities exhibit distinct lending patterns.

Third, we extend research examining how banks' environmental commitments correlate with lending patterns and borrower characteristics. The existing literature presents largely discouraging evidence on voluntary climate commitments. Giannetti, Jasova, Loumioti, and Mendicino (2023) document that European banks with extensive environmental rhetoric

[1]Fan, Peng, Wang, and Xu (2021) show that China's mandatory green credit policies successfully raised loan costs for non-compliant firms and encouraged pollution abatement. Their focus on mandatory regulation leaves open whether voluntary climate commitments can achieve similar results in emerging markets.

often maintain substantial exposure to carbon-intensive industries. Kacperczyk and Peydró (2022) find that even when climate-committed banks reduce credit to high-carbon companies, borrower environmental performance does not improve. Recent evidence reinforces these concerns: Sastry, Verner, and Marques-Ibanez (2024) find that European banks joining the Net Zero Banking Alliance show no meaningful changes in lending patterns or borrower engagement, while Berg, Döttling, Hut, and Wagner (2025) document that tightening the Equator Principles fails to shift project finance away from brown projects. Only Green and Vallée (2025) find positive effects, demonstrating that banks' voluntary coal exit policies can reduce carbon emissions.

Several factors specific to our low-income context can explain why we observe more encouraging associations between voluntary commitments and lending practices than the null results documented in most (though not all) prior studies. First, developing countries offer greater scope for impact given lower baseline environmental standards. This is particularly true for our sample of SMEs, which typically lack the environmental management systems common among the large, publicly traded firms accessing syndicated loan and project finance markets studied elsewhere. Second, our unique data on the green management practices or both banks and their clients reveal the 'green inside' (the actual organizational practices) of both lenders and borrowers, moving beyond the environmental rhetoric examined by Giannetti et al. (2023) and emissions proxies used elsewhere. We observe how commitments translate into concrete changes—dedicated environmental personnel, explicit climate risk frameworks, and systematic environmental screening of loan applications—not captured by analyses of portfolio composition or borrower emissions.

2 Data

We construct our data set by merging three key data sources. First, we track whether and when banks joined three major climate initiatives: the Principles for Responsible Bank-

ing/Investment (PRB/PRI), the Science Based Targets initiative (SBTi), and the Task Force on Climate-related Financial Disclosures (TCFD). Second, the Banking Environment and Performance Survey (BEPS III) provides unique information on bank management and lending practices. Third, the latest Business Environment and Enterprise Performance Survey (BEEPS VI) captures firm borrowing and green investment characteristics. Appendix Table A1 provides all data sources and definitions.

2.1 Banks' climate commitments

We measure bank climate commitments using a dummy variable that indicates whether a bank signed at least one of the three initiatives mentioned above. We collect this information directly from the official websites maintained by these initiatives. The Principles for Responsible Banking (2019) and Investment (2006) were developed by the United Nations, with PRB targeting banks and PRI covering the broader investment industry. We treat both principles as equivalent given their similar objectives. When committing to PRB, banks agree to conduct impact analysis of their products, set at least two targets aligned with Sustainable Development Goals, and report progress. PRI signatories commit to incorporate ESG issues into investment analysis and report on responsible investment activities.

The Task Force on Climate-related Financial Disclosures was established by the Financial Stability Board in 2015 to promote more informed investments by encouraging disclosure of climate-related risks and opportunities. The initiative provides recommendations for disclosure in four areas: governance, strategy, risk management, and metrics and targets.

The Science Based Targets initiative emerged in 2015 as a collaboration between the Carbon Disclosure Project, UN Global Compact, World Resources Institute, and World Wide Fund for Nature. This initiative sets targets to align signatories' strategies with Paris Agreement guidance to achieve carbon neutrality. Banks joining the SBTi must develop greenhouse gas emission reduction targets within 24 months, with validated targets communicated publicly and emissions disclosed and monitored.

For each of these initiatives, signing up requires banks to complete a form and pledge to follow the initiative's guidance. Enforcement is limited: SBTi and PRI delist non-compliant banks after two years, PRB after two violations, while TCFD sets no time limits. In our sample, 29% of the banks had committed to at least one initiative at the time of our survey: 29% joined PRB/PRI, 16% TCFD, and 10% SBTi. This results in 10% joining one initiative, 13% two initiatives, and 6% three initiatives. Although the first commitment occurred in 2008, systematic adoption began in 2016, peaking in 2019 with PRB's launch (Figure 1).

2.2 Banking Environment and Performance Survey III

2.2.1 BEPS III survey design

We overcome a fundamental limitation of the existing literature by using surveys to directly capture banks' internal environmental practices—information that remains unobservable in studies relying on public disclosures or regulatory filings. The third round of the European Bank for Reconstruction and Development's Banking Environment and Performance Survey (BEPS III) was conducted across 33 economies during 2020-2021, with 335 banks participating. The survey was designed to be nationally representative.[2] To construct the target sample, commercial, cooperative, and savings banks were ranked by total assets and added sequentially until they covered at least 95% of each country's banking assets. Taking into account attrition, the final sample represents 78% of banking assets in the BEPS III economies, ensuring comprehensive coverage of both large and small banks.[3]

The survey was conducted through online interviews with the bank's CEO and head of credit, using separate structured questionnaires tailored to their areas of expertise. BEPS III expanded on previous survey waves by retaining core questions while adding new modules. Most importantly for this study, the third wave included a comprehensive set of questions on climate change and environmental practices. In addition to survey responses, BEPS III

[2]For more details on the BEPS survey, see Beck, Degryse, De Haas, and Van Horen (2018) and De Haas, Lu, and Ongena (2023).

[3]Table A2 in the Appendix provides a list of all countries and the respective bank and firm sample sizes.

incorporated geospatial data on bank branch locations collected by a separate specialized team of consultants. We also merged the survey data with financial metrics from Bureau Van Dijk's ORBIS and S&P's SNL Financial datasets to capture bank size and profitability.

2.2.2 General bank characteristics

We classify banks along several key dimensions using standard measures. Foreign banks are those with 50% or more foreign ownership, identified through Orbis data. Bank size is measured by total assets in millions of euros, with large banks defined as those in the top third of the asset distribution. We categorize banks as relationship banks if they consider relationship lending techniques "very important" for both large enterprises and SMEs, based on CEO responses. Bank culture is captured through a binary variable distinguishing value creation approaches: banks emphasizing commitment, communication, development, innovation, transformation, and agility are coded as '1', while those prioritizing efficiency, timeliness, consistency, market share, and profitability are coded as '0'. Approximately two-thirds of all banks have a culture that focuses relatively more on development and innovation than efficiency and profitability. Our sample comprises 46% foreign-owned banks, one-third large banks, and 72% relationship banks (Table A3, Panel A in the Appendix).

2.2.3 Green banking indices

CEOs and heads of credit were asked a comprehensive set of questions about their bank's green management and lending practices. We use the responses to construct a Green Management Index (GMI) and a Green Lending Index (GLI), analogous to similar indices developed by Martin, Muûls, de Preux, and Wagner (2012) and De Haas et al. (2025) for firms.

Green Management Index. This index captures banks' internal climate management capabilities through three components. First, environmental manager seniority, scored from 0 to 3: no designated manager (0), manager reporting indirectly to CEO (1), manager reporting directly to CEO (2), or CEO personally managing environmental issues (3). Second,

environmental policies and risk management: the average of four binary indicators covering explicit climate policies, risk management integration, stress testing inclusion, and strategic response documentation. Third, quantitative climate risk analysis: the average of three indicators measuring climate-related, transition, and vulnerable asset risks. Each component is standardized and averaged to create a z-score where positive values indicate above-average green management practices. Table A4 and Table A5 in the Appendix contain all survey questions and related descriptive statistics, respectively.

Green Lending Index. This index measures environmental considerations in lending decisions using responses from both CEOs and heads of credit. It captures the bank's years of experience with energy efficiency loans, environmental impact assessments, and frequency of ESG-based loan rejections. All components are standardized and averaged to create a z-score where positive values indicate above-average green lending practices. Table A6 and Table A7 in the Appendix contain all survey questions and descriptive statistics, respectively.

Figure 2 presents kernel density distributions to examine how banks' GMI and GLI vary across five organizational dimensions: climate signatory status, ownership, size, corporate culture, and lending technology. Both indices are normalized to zero, with GMI ranging from -1 to 3 and GLI from -1.7 to 3.3.

We find that climate-committed banks exhibit pronounced rightward shifts in both indices compared to non-signatories, indicating substantially stronger green practices. Moreover, foreign banks outperform domestic institutions on green management, while large banks show superior green management practices compared to smaller ones, though lending practice differences are more modest. Banks emphasizing development and innovation demonstrate significantly greener lending practices than those focused on efficiency and profitability, while relationship-oriented banks exhibit stronger green lending practices than transaction-focused institutions, suggesting that long-term relationships enable better environmental screening. These patterns provide some first evidence that banks' environmental commitments align

with actual green practices, suggesting that climate pledges reflect genuine managerial differences and not just greenwashing.

2.3 Business Environment and Enterprise Performance Survey

For firm-level data, we turn to the sixth round of the Business Environment and Enterprise Performance Survey (BEEPS VI), conducted by the EBRD, World Bank, and European Investment Bank in 2018–2019 through face-to-face interviews with 4,719 firm managers across the same countries as BEPS III.

The survey's Green Economy module helps us to construct several key variables. First, "green investments" indicates whether a firm undertakes any of the following: heating/cooling improvements, renewable energy generation on site, machinery upgrades, energy management, waste management, air pollution control, water management, fleet upgrades, lighting improvements, or other pollution control measures. Second, we create a variable "climate investment" that only includes investments in renewable energy generation on site, machinery upgrades, energy management, heating/cooling improvements, and fleet upgrades. This narrower measure focuses specifically on investments that directly reduce greenhouse gas emissions, distinguishing climate mitigation from broader environmental improvements. Third, we create the variable "green machinery", indicating whether the firm invested to upgrade machinery, equipment, or vehicles. These investments involve purchasing fixed assets with an embedded greener technology. We find that 80% of the companies made at least one green investment over the past three years, with 73% specifically investing in climate investments, and 62% in machinery or fleet upgrades (Table A3, Panel B in the Appendix).

In addition, we classify firms as green-managed using a Green Management Index (GMI) constructed similarly to the bank GMI. The firm GMI also has four components: strategic environmental objectives; environmental manager seniority (CEO/Board/Owners = 3, direct CEO report = 2, indirect report = 1, none = 0); emissions/energy/water monitoring; and environmental targets. Firms with positive scores exhibit above-average green management

practices (questions in Table A8 in the Appendix). Figure A1 in the Appendix shows the left-skewed GMI distribution, with only one-third of all firms being relatively well managed in the green sense.

Our sample is dominated by smaller enterprises, with micro firms (fewer than 10 employees) representing 19%, small firms (10-49 employees) comprising 42%, and medium-sized firms (50-249 employees) accounting for 29%, while large firms constitute only 9%. The sectoral composition is 62% goods-producing, 24% trade, and 13% other services. We define a firm as credit constrained if it was rejected or discouraged from getting a loan in the last fiscal year. It is not credit constrained if its loan was approved or if it did not need a loan in the first place. In our sample, 17% of firms (especially smaller ones) are credit constrained.

3 Empirical analysis and results

We conduct our empirical analysis in three steps. First, we examine whether banks that join international climate initiatives exhibit stronger environmental management and lending practices than non-signatory banks, controlling for other key bank characteristics (Section 3.1). Second, we investigate whether firms borrowing from climate-committed banks display better green management and are more likely to make green investments (Section 3.2). Third, we exploit the spatial distribution of bank branches and firms to examine whether environmentally-oriented firms preferentially match with green banks (Section 3.3).

3.1 Climate commitments and green banking practices

Sample and empirical approach. We first examine whether banks' voluntary participation in international climate initiatives correlates with their environmental management and lending practices. The sample consists of 335 banks in 33 low- and middle-income countries covered by the BEPS III survey. We estimate the following cross-sectional regression:

$$\text{Green Practice}_{ic} = \alpha + \beta \cdot \text{Climate Sign}_i + \gamma' \mathbf{X}_i + \delta_r + \epsilon_{ic} \tag{1}$$

where *Green Practice*$_{ic}$ represents either the Green Management Index (GMI) or the Green Lending Index (GLI) for bank i in country c. Both indices are standardized z-scores with mean zero and standard deviation one. *Climate Sign*$_i$ is an indicator variable equal to one if the bank has signed at least one of the three climate initiatives, and zero otherwise. The vector $\mathbf{X}_i$ includes the following bank-level characteristics: foreign ownership status, bank size (large bank indicator), relationship banking orientation, bank culture (development-focused versus efficiency-focused), and financial performance measures (return on equity and debt-to-assets ratio). We include region fixed effects δ_r to account for systematic differences across five main geographic regions.[4] Standard errors are clustered by country.

Results. Table 1 presents the regression results for both the GMI (Panel A) and GLI (Panel B). The univariate specification in column (1) reveals a strong positive association between climate commitments and green practices. Banks that have signed climate initiatives exhibit green management practices that are 0.847 standard deviations higher than non-signatory banks ($p<0.01$). This effect remains economically large and statistically significant at 0.829 standard deviations when we include the full set of controls in column (6).

Given that the GMI has a standard deviation of 1.0 by construction, climate-committed banks score nearly a full standard deviation above non-committed banks in their green management capabilities. This reflects meaningful internal differences: climate-committed banks are more likely to have dedicated environmental managers reporting directly to senior leadership, maintain climate risk frameworks integrated into their overall risk management systems, and conduct quantitative assessments of climate-related financial risks. These dif-

[4]South-eastern Europe, Central Europe and the Baltic States, Eastern Europe and the Caucasus, Central Asia, and Northern Africa. We use region rather than country fixed effects because many countries contain relatively few banks (limiting within-country variation for identification) and including 33 country dummies would substantially reduce statistical power. Clustering at the country level still accounts for within-country correlation in errors.

ferences are present even when we control for other important bank attributes (and potential drivers of banks' green credentials), such as bank ownership, size, and culture.

For green lending practices (Panel B), we observe a positive but somewhat smaller association. Climate signatory banks score 0.425 standard deviations higher on the GLI in the univariate specification (column 1), increasing slightly to 0.470 standard deviations with full controls in column (6) (both $p<0.01$). This indicates that climate-committed banks not only organize themselves differently internally, but also translate their commitments into different lending decisions. More concretely, they are more likely to offer energy efficiency loans, conduct environmental impact assessments before loan approval, and reject loan applications based on ESG considerations.

Examining the control variables in both panels provides additional insight into the drivers of green banking practices. Foreign banks show significantly stronger green management practices, though this effect disappears when we control for other bank traits, suggesting that foreign ownership correlates with such green-promoting characteristics. Large banks similarly display stronger green management (even with full controls), consistent with scale economies in developing environmental capabilities. Bank culture is also an important correlate of green practices. Banks that emphasize innovation and development over pure efficiency show higher green management and green lending scores. Interestingly, relationship banking orientation correlates positively with green lending but not with green management, suggesting that close client relationships may facilitate the implementation of green lending policies.

In all, the strong and persistent correlations between participation in climate initiatives and both green management and lending practices suggest that these commitments reflect genuine organizational differences rather than mere public relations exercises (greenwashing). The magnitude of the effects (particularly for green management practices) indicates that climate-committed banks differ substantially in terms of investments in their environmental capabilities: they walk the talk.

Several interpretations of these patterns are possible. First, banks may self-select into cli-

mate initiatives based on pre-existing environmental orientation, with commitments serving as credible signals of their green credentials. Second, the act of joining these initiatives may catalyze organizational change, as banks adapt their practices to meet reporting requirements and stakeholder expectations. Third, both mechanisms may operate simultaneously, with environmentally-inclined banks joining initiatives that then reinforce and formalize their green practices. The differential magnitude of effects on management versus lending practices (0.829 vs. 0.470 standard deviations) suggests that internal organizational changes precede and exceed changes in external lending practices.

3.2 Climate commitments and client composition

Sample and empirical approach. Having established that climate-committed banks exhibit stronger internal green practices, we next investigate whether these differences translate into distinct lending relationships and borrower outcomes. We restrict our sample to the 4,719 firms across our 33 sample countries that have a loan with a bank in BEPS III. These borrowing firms identified their primary lender as part of the survey, enabling us to link firm-level outcomes with the environmental characteristics of their bank. We then estimate the following regression to examine the link between banks' climate commitments and their borrowers' environmental behavior:

$$Y_{isc} = \alpha + \beta_1 \cdot \text{Climate Sign}_{j(i)} + \beta_2 \cdot \text{GMI}_{j(i)} + \beta_3 \cdot \text{GLI}_{j(i)} + \beta_4 \cdot \text{EE}_{j(i)} + \gamma' \mathbf{F}_i + \delta_s + \theta_r + \varepsilon_{isc} \quad (2)$$

where Y_{isc} represents the environmental outcome for firm i in sector s and country c. This is either the firm's green management index (GMI), a standardized z-score measuring the firm's environmental management capabilities, or a binary indicator for whether the firm undertook green investments in the past three years. The subscript $j(i)$ denotes the bank from which firm i borrows.

Our main variable of interest is *Climate Sign*$_{j(i)}$, an indicator equal to one if firm i's

lending bank has committed to at least one international climate initiative; zero otherwise. To disentangle the effect of banks' public climate commitments from their actual green practices, we include the bank's Green Management Index—$GMI_{j(i)}$—and/or Green Lending Index—$GLI_{j(i)}$. The vector $\mathbf{F}_i$ includes firm-size controls (for micro, small, medium, and large firms). Lastly, we include sector fixed effects—δ_s—to account for industry-specific environmental requirements and opportunities, and region fixed effects θ_r to control for geographic variation in environmental regulations and climate vulnerability. Standard errors are again clustered by country.

This specification tests whether firms borrowing from climate-committed banks exhibit systematically different environmental practices and investment patterns, even after controlling for the banks' actual green management and lending capabilities. A positive and significant β_1 would suggest that banks' public climate commitments correlate with meaningful differences in their client portfolios or influence their borrowers' environmental behavior, beyond what can be explained by the banks' internal green practices alone.

Results. Table 2 presents our findings on the link between banks' climate commitments and borrower environmental behavior. Panel A examines firms' green management practices, while Panels B to D focus on different types of green investment. In Panel A, the univariate specification (column 1) reveals that firms borrowing from climate signatory banks score 0.108 standard deviations higher on the GMI compared to firms borrowing from non-signatory banks ($p<0.05$). This association strengthens when including all bank controls in column 4, reaching 0.151 standard deviations ($p<0.01$). Given that the firm GMI has a standard deviation of 1.0 by construction, this represents a large economic effect: firms borrowing from climate-committed banks exhibit green management practices that are roughly one-sixth of a standard deviation stronger than those borrowing from non-committed banks.

The results for green investments in Panel B are striking too. Column 1 shows that firms borrowing from climate signatory banks are 4.7 percentage points more likely to make green

investments ($p<0.05$). This effect remains stable at 4.2 percentage points when including the entire set of controls in column 4 ($p<0.05$). Relative to the baseline probability of green investment among borrowers (87.1%), this represents a 5.4% increase in the likelihood of green investment. This substantial effect indicates that climate-committed banks are linked to meaningfully different firm investment behavior. We obtain similar results when focusing on specific types of green investments in Panels C and D. Column 1 shows that firms borrowing from climate signatory banks are 6.9 percentage points more likely to make climate investments and 6.3 percentage points more likely to make green machinery investments ($p<0.01$). These effects remain stable at 6.1 percentage points ($p<0.01$) and 5.0 percentage points ($p<0.05$) when including the full set of controls in column 4. Interestingly, the bank-level green practice indices (GMI and GLI) generally show insignificant coefficients. This suggests that formal climate commitments, which require external verification and reporting, are more predictive of borrower outcomes than internal green practices alone.

Three interpretations are consistent with these results, and each supports the conclusion that banks' climate commitments represent more than mere greenwashing. First, our results may reflect selection effects whereby greener banks systematically choose greener clients. Second, the patterns could indicate causal effects of bank lending practices on firm investments, where climate-committed banks actively encourage green investments among their borrowers. Third, a combination of both selection and treatment effects operates simultaneously. Regardless of the specific mechanism, our findings demonstrate that banks' voluntary climate commitments are associated with systematic differences in client composition and green-investment behavior. This indicates that formal climate initiatives can, in fact, serve as credible signals of banks' genuine environmental orientation.

3.3 Spatial matching between green banks and green firms

Sample and empirical approach. To examine whether environmentally-oriented firms preferentially match with green banks in their vicinity, we exploit the unique geocoded

locations of both firms and bank branches. We construct a firm-bank network by identifying all bank branches within 5 or 10 kilometers of each firm and keeping the closest branch from each BEPS III bank, creating 46,843 potential firm-bank pairs for the 5km radius and 54,383 pairs for the 10km radius. Our sample includes all firms with existing loans, allowing us to observe which nearby banks they actually borrow from versus which banks they could have potentially accessed. We estimate the following linear probability model:

$$\text{Loan}_{ij} = \alpha + \beta_1 \cdot \text{Green Bank}_j + \beta_2 \cdot \text{Green Bank}_j \times \text{Green Firm}_i + \gamma \cdot \text{Distance}_{ij} + \mu_i + \epsilon_{ij} \quad (3)$$

where $Loan_{ij}$ is an indicator variable equal to one if firm i has a loan from bank j within the specified radius (5km or 10km), and zero otherwise. *Green Bank*$_j$ represents one of three measures of bank environmental orientation: whether the bank is a climate signatory, has above-average green management practices (GMI>0), or has above-average green lending practices (GLI>0). *Green Firm*$_i$ captures firm environmental characteristics through either the green management indicator (GMI>0) or whether the firm undertook green investments. $Distance_{ij}$ measures the distance in kilometers between firm i and bank branch j, and μ_i represents firm fixed effects that control for all time-invariant firm characteristics. Standard errors are clustered by country.

The coefficient β_1 captures differential lending propensities of green banks to proximate firms, while the interaction coefficient β_2 identifies differential matching between green banks and green firms—our primary coefficient of interest. A positive β_2 would indicate that environmentally-oriented firms have a higher propensity to borrow from nearby green banks than regular firms, reflecting either demand-side sorting (green firms seeking green banks) or supply-side selection (green banks preferring green firms).

Results. Table 3 presents clear evidence of assortative matching between green banks and green firms within local credit markets. Panel A examines the relationship between climate signatory banks and various measures of firm environmental orientation, showing

consistent patterns of green-on-green matching. We find that green-managed firms are 1.2 percentage points more likely to borrow from climate-committed banks in their vicinity compared to brown-managed firms ($p<0.10$, column 1). This represents an economically meaningful increase given the baseline probability of borrowing from any specific nearby bank (approximately 10% within 5km).[5]

The matching intensifies when examining actual green investment behavior. Firms with green investments are 2.3 percentage points more likely to borrow from climate signatory banks (column 2, $p<0.01$), representing a 23% increase over baseline. The relationship is similarly strong for climate investments specifically (column 3, 2.2 percentage points, $p<0.01$). Green machinery investments show a more moderate but still significant effect of 1.3 percentage points (column 4, $p<0.05$). The effects are again very similar at the 10km radius (Appendix Table A9).

Panel B examines matching based on banks' internal green management capabilities rather than external commitments. Green-managed firms do not show a significant differential tendency to borrow from green-managed banks (column 1). However, firms making actual green investments are 1.7 percentage points more likely to borrow from banks with strong green management practices (column 2, $p<0.05$). The effect is particularly pronounced for climate investments at 2.1 percentage points (column 3, $p<0.01$), while green machinery investments show an 1.8 percentage point increase (column 4, $p<0.01$). These results suggest that green banks prioritize lending to firms that demonstrate real green investments rather than those that simply adopt green management practices.

Interestingly, Panel C shows no significant matching patterns between firms and banks based on green lending practices, with interaction coefficients close to zero and statistically insignificant. This null result may reflect that green lending practices, as measured, capture banks' willingness to provide green finance broadly rather than their selectivity in choosing environmentally-oriented clients. Alternatively, green lending banks may serve both green

[5]Appendix Table A9 shows these results are robust to using a 10km radius around firms.

and non-green firms equally, using their green lending products to help transform brown firms rather than exclusively focusing on already-green clients.

These geographic matching patterns provide further evidence against pure greenwashing: if climate commitments were merely cosmetic, we would not expect systematic differences in the geographic distribution of lending relationships. Furthermore, the stronger matching effect for firms with actual green investments compared to those with just green management structures suggests that banks value demonstrated environmental action over organizational commitments. This revealed preference aligns with concerns about greenwashing at the firm level and indicates that banks may use observable investment behavior as a more reliable signal of environmental commitment than management structures alone.[6]

The negative and highly significant distance coefficients across all specifications (-0.020, $p<0.01$) confirm that geographic proximity remains highly relevant in these markets: each additional kilometer reduces lending probability by 2 percentage points, even when environmental preferences align.[7] The persistence of distance effects alongside environmental matching suggests they operate as complementary screening mechanisms in local credit markets. As such, the spatial distribution of green banking infrastructure may also create disparities in access to green credit. Firms near climate-committed banks can more easily find lenders aligned with their environmental objectives, while environmentally-oriented firms in areas dominated by traditional banks may face barriers to implementing green investments.

4 Conclusions

This paper has analyzed the associations between banks' voluntary climate commitments and both lending practices and borrower characteristics across 33 low- and middle-income

[6]Our local-level findings complement the international evidence on green-meets-green matching. Degryse et al. (2023) document similar assortative matching patterns in global syndicated loan markets, where green banks provide loans to green firms at lower spreads. Although they focus on large, publicly traded firms accessing international credit markets, our results demonstrate that this matching pattern extends to smaller firms in low- and middle-income countries where geographic proximity remains important.

[7]See also De Haas et al. (2023) and the references therein.

countries. By combining unique survey data on banks' internal green management practices with detailed firm-level information and geocoded locations, we document three key findings that collectively suggest climate commitments represent more than mere greenwashing.

First, we show that banks signing international climate initiatives exhibit substantially stronger green management and lending practices—scoring 0.83 and 0.47 standard deviations higher, respectively, than non-signatory banks. This reflects concrete organizational differences: climate-committed banks employ dedicated environmental managers, maintain climate risk frameworks, and conduct environmental screening of loan applications. Second, firms borrowing from climate-committed banks display different environmental behavior, with a 4 percentage point higher likelihood of making green investments. Third, our geographic analysis (which addresses a key limitation in the literature by examining potential rather than just observed lending relationships) reveals that environmentally-oriented firms preferentially match with climate-committed banks in their vicinity. This suggests that the spatial distribution of green banks shapes the credit allocation in emerging markets where physical proximity remains relevant for banking relationships.

These patterns are particularly important given the unique challenges facing low- and middle-income countries. These economies must balance development needs with climate goals, often lacking the regulatory capacity and market infrastructure of developed countries. Our evidence suggests that even in this context, voluntary climate initiatives can reflect meaningful differences in banking practices and capital allocation. Although we do not establish causality with our cross-sectional data, the consistent patterns across multiple levels of analysis—from banks' internal organization to borrower investments to geographic credit access—indicate consistently that climate commitments by emerging market banks represent more than cheap talk.

Our results also highlight important heterogeneity in the adoption of green banking. The significance of bank size points to potential barriers for smaller institutions in developing environmental capabilities, possibly due to fixed costs in establishing climate risk frameworks

or limited technical expertise. The role of bank culture suggests that strategic orientation matters as well: banks already focused on innovation and long-term value creation find it easier to integrate environmental considerations than those primarily emphasizing short-term efficiency and profitability.

Looking ahead, two key questions emerge from our analysis. First, do climate commitments change how banks lend and/or do already-green banks choose to make these commitments? Answering this question more conclusively requires panel data or quasi-experimental methods. Second, the concentration of green banking among certain types of banks raises concerns about whether voluntary initiatives alone can achieve the comprehensive financial sector transformation needed to meet the goals of the Paris Agreement. While our evidence that voluntary commitments correlate with meaningful operational differences suggests these initiatives play a useful role even without formal enforcement, their uneven adoption indicates that complementary policies (such as stricter regulation or support for smaller banks to develop green capabilities) may be called for.

References

Beck, T., H. Degryse, R. De Haas, and N. Van Horen (2018). When Arm's Length is Too Far: Relationship Banking over the Credit Cycle. *Journal of Financial Economics 127*(1), 174–196.

Berg, T., R. Döttling, X. Hut, and W. Wagner (2025). Do Voluntary Initiatives Make Loans Greener? Evidence from Project Finance. Working Paper.

Carney, M. (2021, September). Clean and Green Finance. *Finance & Development 58*(3), 20–22.

De Haas, R. (2025). Sustainable Banking. In A. N. Berger, P. Molyneux, and J. O. Wilson (Eds.), *The Oxford Handbook of Banking* (4th ed.)., Chapter 14. Oxford University Press.

De Haas, R., L. Lu, and S. Ongena (2023). Close Competitors? Bilateral Bank Competition and Spatial Variation in Firms' Access to Credit. *Journal of Economic Geography 23*(6), 1237–1271.

De Haas, R., R. Martin, M. Muûls, and H. Schweiger (2025). Managerial and Financial Barriers to the Green Transition. *Management Science 71*(4), 2890–2921.

Degryse, H., R. Goncharenko, C. Theunisz, and T. Vadasz (2023). When Green Meets Green. *Journal of Corporate Finance 78*, 102355.

Delis, M., K. de Greiff, M. Iosifidi, and S. Ongena (2024). Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans. *Financial Markets, Institutions & Instruments 33*(3), 239–265.

Fan, H., Y. Peng, H. Wang, and Z. Xu (2021). Greening Through Finance? *Journal of Development Economics 152*, 102683.

Giannetti, M., M. Jasova, M. Loumioti, and C. Mendicino (2023). "Glossy Green" Banks: The Disconnect Between Environmental Disclosures and Lending Activities. *Available at SSRN 4473695*.

Glasgow Financial Alliance for Net Zero (2021, November). Amount of Finance Committed to Achieving 1.5°C Now at Scale Needed to Deliver the Transition. Press Release, COP26, Glasgow.

Green, D. and B. Vallée (2025). Measurement and Effects of Bank Exit Policies. *Journal of Financial Economics 172*, 104129.

Kacperczyk, M. T. and J.-L. Peydró (2022). Carbon Emissions and the Bank-Lending Channel. *SSRN Electronic Journal*.

Martin, R., M. Muûls, L. de Preux, and U. J. Wagner (2012). Anatomy of a Paradox: Management Practices, Organizational Structure and Energy Efficiency. *Journal of Environmental Economics and Management 63*(2), 208–223.

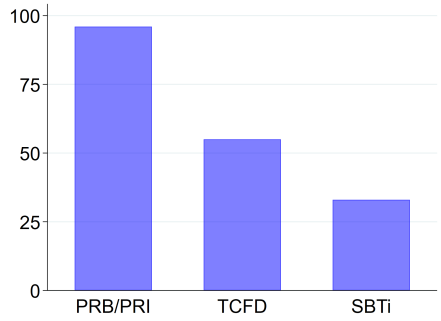
Martini, F., Z. Sautner, S. Steffen, and C. Theunisz (2023). Climate Transition Risks of Banks: Evidence from Syndicated Loan Books. Technical report, Swiss Finance Institute. Research Paper No. 23-66.

Sastry, P., E. Verner, and D. Marques-Ibanez (2024). Business as Usual: Bank Net Zero Commitments, Lending, and Engagement. NBER Working Paper No. 32402.

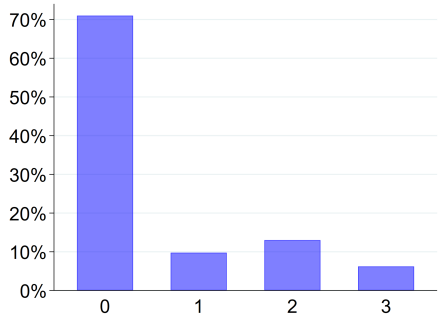
Figures and Tables

Figure 1. Banks' Commitment to Climate Change Initiatives

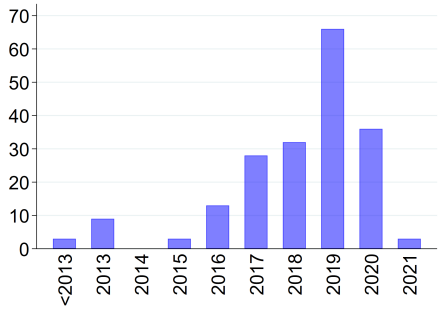
(a) Number of banks committed to each initiative



(b) % of banks committed to N initiatives

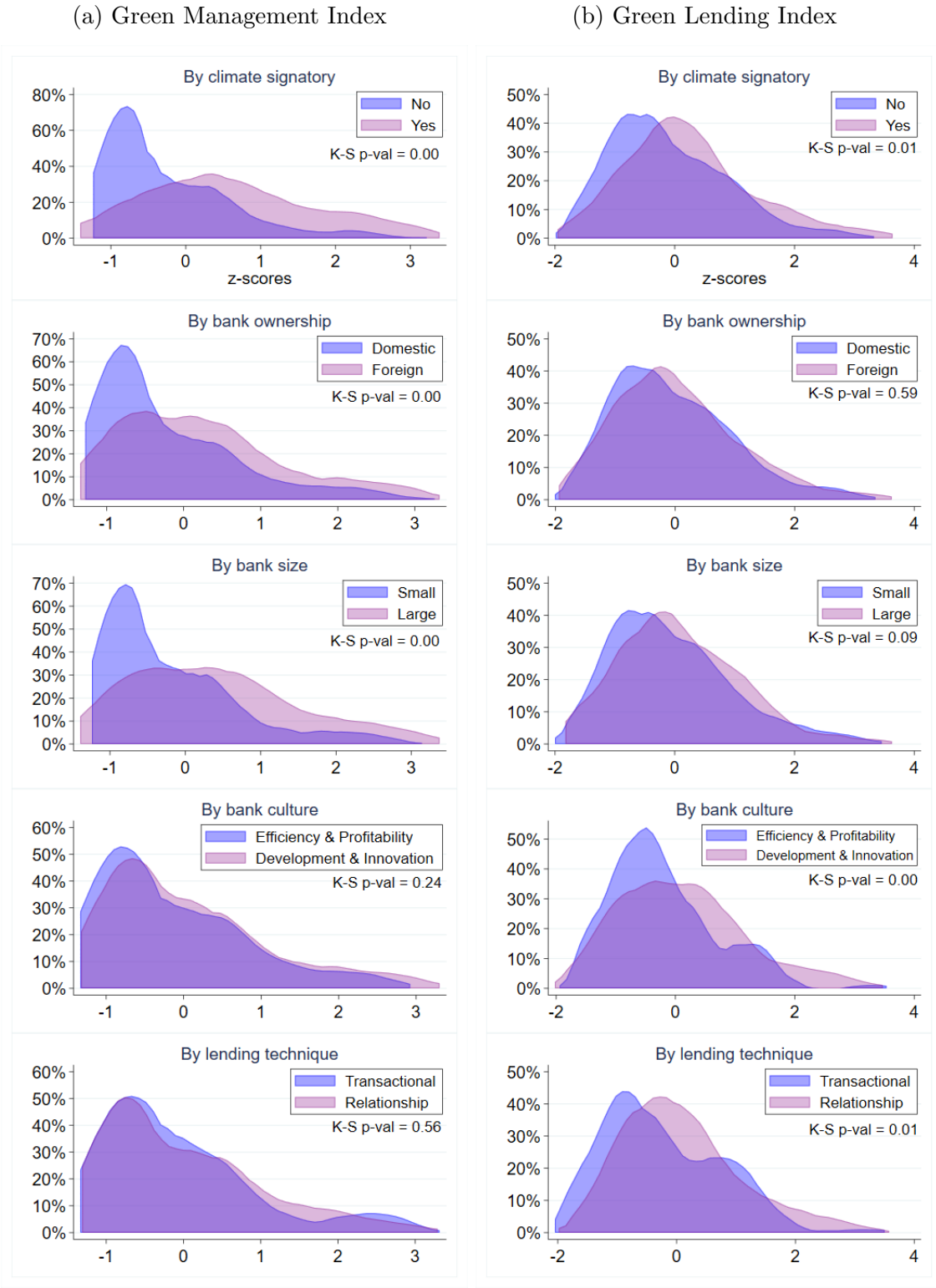


(c) Number of initiatives committed per year



Notes: (a) Number of banks in our sample committed to Principles for Responsible Banking (PRB) or Responsible Investment (PRI), Task Force on Climate-related Financial Disclosures (TCFD), and Science Based Targets initiative (SBTi); (b) Percentage of banks committed to N initiatives at time of survey; (c) Number of initiatives signed each year by all banks in the sample.

Figure 2. Distribution of Green Management Index and Green Lending Index, by Bank Type



Notes: Kernel density estimates of the Green Management Index (left) and Green Lending Index (right) using an Epanechnikov kernel. Kolmogorov-Smirnov (K-S) test p-values indicate statistical significance of distributional differences between groups.

Table 1. Climate Commitments and Green Banking Practices

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dependent variable - Green Management Index						
Climate signatory bank	0.847***					0.829***
	(0.156)					(0.169)
Foreign bank		0.442***				-0.076
		(0.135)				(0.127)
Large bank			0.515***			0.431***
			(0.156)			(0.148)
Bank culture				0.231**		0.147
				(0.105)		(0.097)
Relationship bank					0.118	0.104
					(0.104)	(0.097)
Constant	-2.288***	-2.588***	-1.462**	-1.910***	-1.882***	-2.036***
	(0.487)	(0.587)	(0.575)	(0.640)	(0.648)	(0.491)
Panel B: Dependent variable - Green Lending Index						
Climate signatory bank	0.425***					0.470***
	(0.131)					(0.121)
Foreign bank		0.131				-0.151
		(0.139)				(0.139)
Large bank			0.070			0.055
			(0.140)			(0.128)
Bank culture				0.315***		0.271**
				(0.109)		(0.107)
Relationship bank					0.338***	0.299***
					(0.103)	(0.101)
Constant	-1.632*	-1.616*	-1.335*	-1.550*	-1.658**	-1.746*
	(0.866)	(0.929)	(0.773)	(0.772)	(0.721)	(0.935)
Observations	335	335	335	335	335	335
Region FE	Y	Y	Y	Y	Y	Y
Bank covariates	Y	Y	Y	Y	Y	Y

Notes: This table examines the relationship between banks' climate initiative participation and their environmental practices. The dependent variable in Panel A is the Green Management Index (GMI), and in Panel B is the Green Lending Index (GLI), both standardized z-scores. Climate signatory bank equals 1 if the bank has joined at least one international climate initiative (PRB/PRI, TCFD, or SBTi), 0 otherwise. Bank covariates include debt-to-assets ratio and return on equity. All specifications include region fixed effects. Standard errors clustered by country are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 2. Climate Commitments and Borrower Green Practices

	(1)	(2)	(3)	(4)
Panel A: Dependent variable - Firm's Green Management Index				
Climate signatory bank	0.108**			0.151***
	(0.050)			(0.052)
GMI (z-score)		-0.035		-0.050
		(0.028)		(0.029)
GLI (z-score)			-0.020	-0.014
			(0.029)	(0.029)
Constant	0.987***	1.087***	1.067***	1.002***
	(0.147)	(0.149)	(0.139)	(0.152)
Panel B: Dependent variable - Green Investments				
Climate signatory bank	0.047**			0.042**
	(0.018)			(0.019)
GMI (z-score)		0.012		0.009
		(0.011)		(0.012)
GLI (z-score)			-0.001	-0.006
			(0.011)	(0.013)
Constant	0.871***	0.892***	0.902***	0.869***
	(0.029)	(0.029)	(0.028)	(0.029)
Panel C: Dependent variable - Climate Investments				
Climate signatory bank	0.069***			0.061***
	(0.017)			(0.020)
GMI (z-score)		0.021*		0.018
		(0.011)		(0.012)
GLI (z-score)			-0.007	-0.017
			(0.010)	(0.012)
Constant	0.834***	0.864***	0.883***	0.831***
	(0.036)	(0.034)	(0.036)	(0.033)
Panel D: Dependent variable - Green Machinery Investments				
Climate signatory bank	0.063***			0.050**
	(0.021)			(0.020)
GMI (z-score)		0.025*		0.023
		(0.013)		(0.014)
GLI (z-score)			-0.005	-0.016
			(0.011)	(0.012)
Constant	0.774***	0.796***	0.817***	0.770***
	(0.041)	(0.038)	(0.042)	(0.037)
Observations	4,778	4,778	4,778	4,778
Firm size controls	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y
Region FE	Y	Y	Y	Y

Notes: This table examines lending banks' climate commitments and borrower environmental outcomes for 4,719 firms with loans from BEPS III banks. Panel A uses firms' Green Management Index (GMI, standardized z-score) as dependent variable. Panels B-D use binary indicators for green, climate, and green machinery investments (past three years). Climate signatory bank equals 1 if the lending bank joined international climate initiative(s). Bank GMI and GLI are standardized green management and lending indices. All specifications include firm size, sector FE, and region FE. Standard errors clustered by country. *, **, *** denote 10%, 5%, 1% significance.

Table 3. Spatial Matching Between Green Banks and Green Firms

Dependent variable: Firm i has a loan from bank j in its locality	(1)	(2)	(3)	(4)
Panel A: Climate signatory banks				
Climate signatory bank	0.015*	0.001	0.003	0.011
	(0.008)	(0.009)	(0.009)	(0.009)
Climate signatory bank × Green-managed firm	0.012*			
	(0.007)			
Climate signatory bank × Green investment		0.023***		
		(0.006)		
Climate signatory bank × Climate investment			0.022***	
			(0.005)	
Climate signatory bank × Green machinery investment				0.013**
				(0.006)
Distance	-0.020***	-0.020***	-0.020***	-0.020***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.099***	0.099***	0.099***	0.099***
	(0.004)	(0.004)	(0.004)	(0.004)
Panel B: Green-managed banks				
Green-managed bank	0.039***	0.026*	0.024	0.029*
	(0.013)	(0.014)	(0.014)	(0.014)
Green-managed bank × Green-managed firm	0.001			
	(0.007)			
Green-managed bank × Green investment		0.017**		
		(0.007)		
Green-managed bank × Climate investment			0.021***	
			(0.006)	
Green-managed bank × Green machinery investment				0.018***
				(0.006)
Distance	-0.020***	-0.020***	-0.020***	-0.020***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.086***	0.086***	0.086***	0.086***
	(0.006)	(0.006)	(0.006)	(0.006)
Panel C: Green-lending banks				
Green-lending bank	0.025**	0.024*	0.024**	0.025*
	(0.012)	(0.013)	(0.012)	(0.012)
Green-lending bank × Green-managed firm	-0.001			
	(0.009)			
Green-lending bank × Green investment		0.001		
		(0.008)		
Green-lending bank × Climate investment			-0.000	
			(0.008)	
Green-lending bank × Green machinery investment				-0.000
				(0.007)
Distance	-0.021***	-0.021***	-0.021***	-0.021***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.093***	0.093***	0.093***	0.093***
	(0.006)	(0.006)	(0.006)	(0.006)
Observations	46,843	46,843	46,843	46,843
Firm FE	Y	Y	Y	Y

Notes: This table examines assortative matching between environmentally-oriented banks and firms within local credit markets. The dependent variable equals 1 if firm i has a loan from bank j within a 5km radius. Sample includes all potential firm-bank pairs where the bank has a branch within a 5km radius (46,843 pairs). Panel A: climate signatory banks; Panel B: banks with above-median green management (GMI>0); Panel C: banks with above-median green lending (GLI>0). Green-managed firm equals 1 if the firm's GMI>0. Green, climate, and green machinery investments equal 1 if firm made respective investments in past three years. Distance measures kilometers between firm and bank branch. All specifications include firm FE. Standard errors clustered by country. *, **, *** denote 10%, 5%, 1% significance.

Appendix

Table A1. Variable Definitions and Data Sources

Variable	Description	Data source
Panel A: Bank characteristics		
Climate signatory bank	Dummy=1 if bank signed at least one climate initiative (PRB/PRI, TCFD, or SBTi).	PRB/PRI, TCFD, SBTi websites
Green Management Index (z-score)	Standardized index of green management quality based on three components: environmental policies and targets, management structure for climate issues, and quantitative climate risk analysis. See Table A4.	BEPS III CEO
Green Lending Index (z-score)	Standardized index of green lending practices based on energy efficiency loan offerings, environmental impact assessments, and ESG-based loan rejections. See Table A6.	BEPS III CEO & HOC
Foreign bank	Dummy=1 if bank is $\geq$50% foreign owned.	Orbis
Large bank	Dummy=1 if bank assets are in top tercile of sample distribution.	Orbis; SNL Financial
Relationship bank	Dummy=1 if bank rates relationship lending as "very important" for both SMEs and large enterprises.	BEPS III CEO
Bank culture	Dummy=1 if bank emphasizes development and innovation (commitment, communication, transformation); 0 if emphasizes efficiency and profitability (consistency, market share, goal achievement).	BEPS III CEO
Debt-to-assets ratio	Bank leverage measured as debt-to-assets ratio.	Orbis; SNL Financial
Return on equity	Bank profitability measured as return on equity ratio.	Orbis; SNL Financial
Total assets (EUR mm)	Bank total assets in millions of euros.	Orbis; SNL Financial
Panel B: Firm characteristics		
Green Management Index (z-score)	Standardized index of firm green management quality based on four components: environmental objectives, management structure, monitoring systems, and environmental targets. See Table A8.	BEEPS VI
Green-managed firm	Dummy=1 if firm's green management index > 0.	BEEPS VI
Credit constrained	Dummy=1 if loan application rejected or firm discouraged from applying; 0 if loan approved or no financing needed.	BEEPS VI
Green investment	Dummy=1 if firm invested in energy efficiency, renewable energy, machinery or fleet upgrades, pollution control, or resource management in the past 3 years.	BEEPS VI
Climate investment	Dummy=1 if firm invested in energy efficiency, renewable energy, or machinery or fleet upgrades in the past 3 years.	BEEPS VI
Green machinery investment	Dummy=1 if firm invested in machinery or fleet upgrades in the past 3 years.	BEEPS VI
Firm size	Size category by employees: Micro ($<$10), Small (10–49), Medium (50–249), Large ($\geq$250).	BEEPS VI
Sector	Firm sector: 1 = Goods-producing (manufacturing and construction), 2 = Trade (wholesale and retail), 3 = Other services (hotel or restaurant, other service provision).	BEEPS VI
Panel C: Geographic variables		
Distance	Distance in kilometers between firm i and nearest branch of bank j.	Geocoded data
5km radius	Dummy=1 if bank j has branch within 5km of firm i.	Geocoded data
10km radius	Dummy=1 if bank j has branch within 10km of firm i.	Geocoded data

Notes: This table provides definitions and data sources for all variables used in the analysis. BEPS III refers to the Banking Environment and Performance Survey (third round), conducted with bank CEOs (Chief Executive Officers) and HOCs (Heads of Credit) during 2020–2021. BEEPS VI refers to the Business Environment and Enterprise Performance Survey (sixth round), conducted with firm managers during 2018–2019. Climate initiatives include: PRB/PRI (Principles for Responsible Banking/Investment), TCFD (Task Force on Climate-related Financial Disclosures), and SBTi (Science Based Targets initiative). Orbis and SNL Financial are commercial databases providing bank financial data. All indices are standardized z-scores with mean zero and standard deviation one. Dummy variables equal 1 if the condition is met, 0 otherwise.

Table A2. Sample Distribution by Country

Country	Banks	Firms
Albania	10	129
Armenia	15	234
Azerbaijan	18	27
Belarus	11	167
Bosnia and Herzegovina	14	147
Bulgaria	10	236
Croatia	10	161
Czechia	10	208
Estonia	4	22
Georgia	9	266
Hungary	9	293
Jordan	11	110
Kazakhstan	14	265
Kosovo	6	91
Kyrgyzstan	17	82
Latvia	6	85
Lithuania	3	74
Moldova	9	98
Mongolia	6	156
Montenegro	9	57
Morocco	5	77
North Macedonia	11	154
Poland	13	375
Romania	11	70
Serbia	12	147
Slovakia	5	73
Slovenia	7	136
Tajikistan	7	22
Tunisia	8	115
Turkey	12	131
Ukraine	23	248
Uzbekistan	14	221
West Bank and Gaza	6	42
Total	**335**	**4,719**

Notes: Sample includes 335 banks and 4,719 firms across 33 countries surveyed in BEPS III (2020–2021) and BEEPS VI (2018–2019), respectively.

Table A3. Descriptive Statistics

	N	Mean	SD	Min	Med	Max
Panel A: Banks						
Climate signatory bank	335	0.29	0.46	0	0	1
Green Management Index (z-score)	335	0.00	1.00	-1.01	-0.32	2.99
Green Lending Index (z-score)	335	0.00	1.00	-1.70	-0.12	3.29
Foreign bank	335	0.46	0.50	0	0	1
Large bank	335	0.33	0.47	0	0	1
Relationship bank	335	0.72	0.45	0	1	1
Bank culture	335	0.64	0.48	0	1	1
Debt-to-assets ratio	335	0.86	0.06	0.55	0.88	1.04
Return of equity	335	0.10	0.16	-1.62	0.11	0.70
Total assets EURO (mn)	335	4,443	9,939	23	1,128	82,500
Panel B: Firms						
Green Management Index (z-score)	4,719	0.00	1.00	-0.75	-0.41	5.73
Green-managed firm	4,719	0.33	0.47	0	0	1
Credit constrained	4,327	0.17	0.37	0	0	1
Green investment	4,719	0.80	0.40	0	1	1
Climate investment	4,719	0.73	0.44	0	1	1
Green machinery investment	4,719	0.62	0.48	0	1	1
Size						
Micro (<10 employees)	4,719	0.19	0.39	0	0	1
Small (10-49 employees)	4,719	0.42	0.49	0	0	1
Medium (50-249 employees)	4,719	0.29	0.45	0	0	1
Large (>249 employees)	4,719	0.09	0.29	0	0	1
Sector						
Goods-producing	4,719	0.62	0.48	0	1	1
Trade	4,719	0.24	0.43	0	0	1
Other services	4,719	0.13	0.34	0	0	1

Notes: This table presents descriptive statistics for 335 banks and 4,719 firms across 33 low- and middle-income countries in Emerging Europe, Central Asia, and North Africa. Panel A reports bank-level data from the Banking Environment and Performance Survey (BEPS III) conducted in 2020-2021, supplemented with financial data from Orbis and SNL Financial databases. Panel B reports firm-level data from the Business Environment and Enterprise Performance Survey (BEEPS VI) conducted in 2018-2019. All variable definitions are provided in Appendix Table A1.

Table A4. Components of Bank Green Management Index

Question	Description	Interview
Manager		
C17	Whom does the manager responsible for environmental and climate change issues report to?	CEO
Environmental policies, targets, and risk		
C18	Does your bank have explicit: (a) environmental policies and targets; (b) climate change policies and targets	CEO
C19	Is climate change risk an explicit part of the bank's risk management?	CEO
C20	Is climate change risk an economic risk factor considered in the bank's internal stress testing framework that is used for capital adequacy assessment purposes?	CEO
C21	Does your bank have a specific document outlining your strategic response to climate change?	CEO
Quantitative analysis of climate change-related risks		
C22	Over the last three years, has your bank undertaken any quantitative analysis of the potential impact of climate-related risks on your assets?	CEO
C23	Over the last three years, for assets linked to sectors and projects with high-carbon business models, have your bank undertaken any quantitative analysis to estimate potential losses in the event of a rapid transition to a lower-carbon economy ("transition risk")?	CEO
C24	Over the last three years, has your bank undertaken any quantitative analysis of the potential impact of climate-related risks on assets linked to sectors, regions, and clients that are particularly vulnerable to climate-related events, such as storms, floods, or drought?	CEO

Notes: This table presents the survey questions used to construct the Bank Green Management Index. The index consists of three equally-weighted components: (1) Environmental manager seniority, scored 0-3 based on reporting structure (0 = no designated manager, 1 = manager reporting indirectly to CEO, 2 = manager reporting directly to CEO, 3 = CEO personally managing environmental issues); (2) Environmental policies and risk management, calculated as the average of four binary indicators; and (3) Quantitative climate risk analysis, calculated as the average of three binary indicators. Each component is standardized and averaged to create a z-score where positive values indicate above-average green management practices. Questions were administered to bank CEOs as part of BEPS III conducted in 2020-2021. Missing responses were treated as zeros in index construction. The final sample includes 335 banks across 33 countries.

Table A5. Descriptive Statistics for Bank Green Management Index Components

	N	Mean	SD	Min	Med	Max
Green Management practices Index (z-score)	335	0.00	1.00	-1.01	-0.32	2.99
Manager responsible for environmental issues reporting structure	335	0.73	0.87	0	0	3
Environmental policies, targets, and risk						
Bank has explicit environmental or/and climate change policies and targets	335	1.03	0.82	0	1	2
Climate change risk is an explicit part of the bank's risk management	335	0.39	0.49	0	0	1
Climate change as economic risk factor for bank's internal stress testing	335	0.19	0.39	0	0	1
Bank has a specific document outlining its strategic response to climate change	335	0.26	0.44	0	0	1
Quantitative analysis of potential climate change-related risks on assets						
Climate-related risks	335	0.17	0.38	0	0	1
Transition risk	335	0.09	0.29	0	0	1
Climate-related risks on vulnerable sectors	335	0.10	0.30	0	0	1

Notes: This table presents descriptive statistics for the individual components of the Bank Green Management Index. The environmental manager variable is scored from 0 to 3: 0 = no designated manager; 1 = manager reports indirectly to CEO; 2 = manager reports directly to CEO; 3 = CEO/Board personally manages environmental issues. The environmental policies variable equals 2 when the bank has both environmental and climate change policies and targets, 1 when it has either, and 0 when it has neither. All other variables are binary indicators (0/1). The Green Management Index (z-score) is constructed by standardizing and averaging the three main components shown in Table A4. Sample includes 335 banks from BEPS III (2020-2021).

Table A6. Components of Bank Green Lending Index

Question	Description	Interview
Loans specifically targeted to improve energy efficiency		
C26 / C27	Does your bank provide loans specifically targeted to improve the energy efficiency of SMEs and/or corporate (large enterprise) clients? Since when?	CEO
C30 / C31	Does your bank provide loans specifically for improving the energy efficiency of commercial real estate? Since when?	CEO
Environmental considerations before loan approvals and rejections for SMEs		
H15 / H16	Does your bank undertake an (a) environmental and/or (b) climate change impact assessment of at least some SMEs before loan approval? Since when?	HOC
H17	How often does your bank reject SME loan applications for environmental (including climate), social, or governance reasons?	HOC
Environmental considerations before loan approvals and rejections for large enterprises		
H23 / H24	Does your bank undertake an (a) environmental and/or (b) climate change impact assessment of at least some large enterprises before loan approval? Since when?	HOC
H25	How often does your bank reject loan applications by large enterprises for environmental (including climate), social, or governance reasons?	HOC

Notes: This table presents the survey questions used to construct the Bank Green Lending Index. The index captures environmental considerations in lending decisions through three main components: (1) Energy efficiency loans—whether banks provide loans specifically targeted to improve energy efficiency for SMEs, large enterprises, and commercial real estate, weighted by years of experience; (2) Environmental impact assessments—whether banks conduct environmental and/or climate change assessments before loan approval for SMEs and large enterprises, weighted by years since implementation; and (3) ESG-based loan rejections—frequency of rejecting loan applications for environmental, social, or governance reasons. Questions were administered to both bank CEOs and heads of credit as part of BEPS III conducted in 2020-2021. All components are standardized and averaged to create a z-score where positive values indicate above-average green lending practices. Sample includes 335 banks across 33 countries. See Table A7 for descriptive statistics of individual components.

Table A7. Descriptive Statistics for Bank Green Lending Index Components

	N	Mean	SD	Min	Med	Max
Green Lending Index (z-score)	335	0.00	1.00	-1.66	-0.12	3.29
Loans specifically targeted to improve the energy-efficiency of:						
SMEs and/or corporate (LE) clients	332	0.75	0.43	0	1	1
Since when?	231	2015	4.20	1991	2016	2020
Residential housing	332	0.57	0.50	0	1	1
Since when?	177	2015	4.32	1991	2016	2021
Commercial real estate	326	0.54	0.50	0	1	1
Since when?	162	2015	3.98	2000	2015	2021
Impact assessment of SMEs regarding:						
Environment	317	0.73	0.45	0	1	1
Since when?	206	2014	4.91	1997	2015	2021
Climate change	317	0.36	0.48	0	0	1
Since when?	102	2015	4.78	2000	2017	2021
Rejection of SME loan applications for ESG reasons	288	2.56	0.74	1	3	5
Impact assessment of large enterprises regarding:						
Environment	304	0.78	0.41	0	1	1
Since when?	214	2014	5.17	1997	2015	2021
Climate change	304	0.45	0.50	0	0	1
Since when?	127	2015	5.28	1997	2016	2021
Rejection of LE loan applications for ESG reasons	288	2.60	0.83	1	3	5

Notes: This table presents descriptive statistics for the individual components of the Bank Green Lending Index. The sample includes 335 banks from BEPS III (2020-2021). Energy efficiency loan variables indicate whether banks provide loans specifically targeted to improve energy efficiency for SMEs, large enterprises, and commercial real estate, with "Since when?" showing the year of implementation (mean reported). Environmental and climate change impact assessment variables indicate whether banks conduct these assessments before loan approval for SMEs and large enterprises, with implementation years shown. Rejection of loan applications for ESG reasons is measured on a scale from 1 to 5, where 1 = Never, 2 = Almost never, 3 = Sometimes, 4 = Often, and 5 = Very often. The Green Lending Index (z-score) is constructed by standardizing and averaging all components, where positive values indicate above-average green lending practices. Missing responses for specific questions result in reduced sample sizes for some variables as indicated in the N column.

Table A8. Components of Firm Green Management Index

Question	Description
Environmental strategic objectives	
BMGA.1	In the last fiscal year, did this firm have strategic objectives that mention environmental or climate change issues?
Manager	
BMGA.3	In the last fiscal year, whom did the manager responsible for environmental and climate change issues report to? (i) There was no manager responsible for these issues; (ii) a manager indirectly reporting to the CEO; (iii) a manager directly reporting to the CEO; (iv) the CEO, board, or owners.
Monitoring	
BMGC.2	Over the last three years, how often did this establishment monitor its energy consumption?
BMGC.5	Over the last three years, how often did this establishment monitor its water usage?
BMGC.9	Over the last three years, how often did this establishment monitor its CO2 emissions?
BMGC.11	Over the last three years, did this establishment monitor CO2 emissions along its supply chain?
BMGC.14	Over the last three years, how often did this establishment monitor its emissions of pollutants other than CO2?
Environmental targets	
BMGC.17	Over the last three years, what sort of targets for energy consumption did this establishment have? (i) Quantity or Expenditure; (ii) both
BMGC.19	Over the last three years, what sort of targets for CO2 emissions did this establishment have? (i) Quantity per unit of output or absolute quantity,; (ii) both
BMGC.21	Over the last three years, what sort of targets for pollution emissions other than CO2 did this establishment have? (i) Quantity per unit of output or absolute quantity; (ii) both

Notes: This table presents the survey questions used to construct the Firm Green Management Index. The index consists of four equally-weighted components: (1) Environmental strategic objectives—whether the firm had strategic objectives mentioning environmental or climate change issues; (2) Environmental manager seniority—scored from 0 to 3 based on reporting structure (0 = no designated manager, 1 = manager reporting indirectly to CEO, 2 = manager reporting directly to CEO, 3 = CEO/Board/Owners managing environmental issues); (3) Monitoring systems—frequency of monitoring energy consumption, water usage, CO_2 emissions, supply chain emissions, and other pollutants; and (4) Environmental targets—whether the firm has targets for energy consumption (quantity/expenditure), CO_2 emissions (quantity per unit of output/absolute quantity), and other pollution emissions. Each component is standardized and averaged to create a z-score where positive values indicate above-average green management practices. Questions were administered to firm managers as part of BEEPS VI conducted in 2018–2019. The final sample includes 4,719 firms across 33 countries.

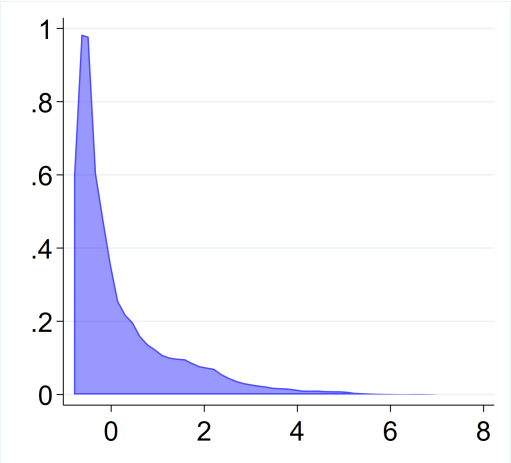
Table A9. Spatial Matching Between Green Banks and Green Firms: 10km radius

Dependent variable: Firm i has a loan from bank j in its locality	(1)	(2)	(3)	(4)
Panel A: Climate signatory banks				
Climate signatory bank	0.014*	0.002	0.004	0.010
	(0.008)	(0.009)	(0.008)	(0.009)
Climate signatory bank × Green-managed firm	0.012*			
	(0.006)			
Climate signatory bank × Green investment		0.021***		
		(0.006)		
Climate signatory bank × Climate investment			0.020***	
			(0.005)	
Climate signatory bank × Green machinery investment				0.014**
				(0.006)
Distance	-0.012***	-0.012***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.092***	0.092***	0.092***	0.092***
	(0.004)	(0.004)	(0.004)	(0.004)
Panel B: Green-managed banks				
Green-managed bank	0.039***	0.025*	0.023	0.028*
	(0.012)	(0.014)	(0.014)	(0.014)
Green-managed bank × Green-managed firm	-0.001			
	(0.007)			
Green-managed bank × Green investment		0.017**		
		(0.007)		
Green-managed bank × Climate investment			0.022***	
			(0.006)	
Green-managed bank × Green machinery investment				0.018***
				(0.006)
Distance	-0.012***	-0.012***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.080***	0.080***	0.080***	0.080***
	(0.006)	(0.006)	(0.006)	(0.006)
Panel C: Green-lending banks				
Green-lending bank	0.026**	0.024*	0.025**	0.025**
	(0.011)	(0.012)	(0.011)	(0.012)
Green-lending bank × Green-managed firm	-0.000			
	(0.009)			
Green-lending bank × Green investment		0.002		
		(0.007)		
Green-lending bank × Climate investment			0.001	
			(0.007)	
Green-lending bank × Green machinery investment				0.001
				(0.007)
Distance	-0.012***	-0.012***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.086***	0.086***	0.086***	0.086***
	(0.006)	(0.006)	(0.006)	(0.006)
Observations	54,383	54,383	54,383	54,383
Firm FE	Y	Y	Y	Y

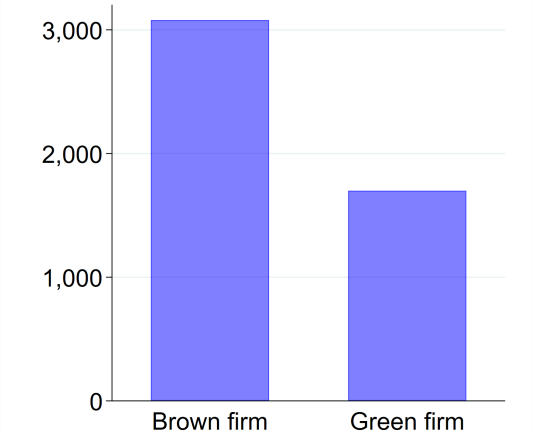
Notes: This table examines assortative matching between environmentally-oriented banks and firms within local credit markets. The dependent variable equals 1 if firm i has a loan from bank j within a 10km radius. Sample includes all potential firm-bank pairs where the bank has a branch within a 10km radius (54,383 pairs). Panel A: climate signatory banks; Panel B: banks with above-median green management (GMI>0); Panel C: banks with above-median green lending (GLI>0). Green-managed firm equals 1 if the firm's GMI>0. Green, climate, and green machinery investments equal 1 if firm made respective investments in past three years. Distance measures kilometers between firm and bank branch. All specifications include firm FE. Standard errors clustered by country. *, **, *** denote 10%, 5%, 1% significance.

Figure A1. Distribution of Firm Green Management Index

(a) Continuous GMI Distribution



(b) Binary GMI Classification



Notes: This figure shows the distribution of the Firm Green Management Index (GMI) for 4,719 firms across 33 low- and middle-income countries surveyed in BEEPS VI (2018–2019). Panel (a) displays the continuous distribution of the GMI z-score, which ranges from -0.75 to 5.73 with a mean of 0 and standard deviation of 1. The distribution is heavily left-skewed, indicating that most firms have below-average environmental management practices. Panel (b) shows the binary classification where firms are categorized as green-managed if their GMI>0 (29% of firms) or brown-managed if their GMI $\leq$ 0 (71% of firms). The GMI is constructed from four equally-weighted components: environmental strategic objectives, environmental manager seniority, monitoring systems (energy, water, CO_2, and other pollutants), and environmental targets.