"There is No Planet B", but for Banks "There are Countries B to Z": Domestic Climate Policy and Cross-Border Lending

Emanuela Benincasa
Swiss Finance Institute
University of Zurich

Gazi Kabaş
Tilburg University

Steven Ongena
Swiss Finance Institute & University of Zurich
KU Leuven & NTNU Business School & CEPR

October 2024

Abstract

We document that banks react to domestic climate policy stringency by increasing cross-border lending. We use loan fixed effects to control for loan demand and an instrumental variable strategy to establish causality. Consistent with a race to the bottom, the positive effect increases as the borrower country becomes less stringent and is absent if the borrower country is more stringent. Furthermore, climate policy stringency decreases loan supply to domestic borrowers with high carbon risk while increasing loan supply to high-risk borrowers abroad. Our results suggest that cross-border lending enables lenders to exploit the lack of global coordination in climate policies.

JEL classification: G21, H73, Q58.

Keywords: Cross-border lending, climate policy, race to the bottom.

1   Introduction

Climate change is a global problem whose solution needs global coordination and cooperation.[1] Despite this need, there exists a significant heterogeneity in climate policy stringency across countries, which may lead to numerous consequences. Cross-border lending, for example, can be affected by this heterogeneity since banks use cross-border lending extensively as a tool to react to the differences across countries, while the effect in this context could be positive or negative. On the one hand, stricter climate policies may increase firms' loan demand as the transition into a low-carbon economy requires investment, and banks may reduce their cross-border lending to satisfy the higher loan demand at home. On the other hand, these policies may make lending to domestic firms less appealing due to the transition risks and affect banks' loan portfolios adversely. Therefore, banks may increase their cross-border lending to reduce their exposure to stringent climate policies. While the former suggests a negative financial spillover, the latter suggests a race to the bottom behavior by banks, which can undermine the efforts to combat climate change.

In this paper, we consider both of these channels and empirically investigate how banks use cross-border lending to react to a change in climate policy stringency in their home country. To investigate cross-border lending, we use a sample of syndicated loans for the years between 2007 and 2017, where banks are located in 39 different countries, and borrowers are located in 40 different countries. We find that banks react to higher climate policy stringency in their home country by increasing their cross-border lending. To put the magnitude of the effect in perspective, we can consider a hypothetical example of a cross-border syndicated loan where one bank is located in the UK, the other bank is in Australia, and the borrower is in a third country, say, Brazil. Our results indicate that the UK's 35 index points more stringent climate policy in 2015 leads the bank in the UK to have a 19.25 percent higher loan share in this loan compared to the bank in Australia. We show that the increase in cross-border lending is not driven by loan demand by using loan fixed effects to control for loan demand. Moreover, we dispel concerns about omitted variables by instrumenting climate policy stringency with the Green Party shares in the domestic parliaments.

Our measure of climate policy stringency is the Climate Change Performance Index (CCPI).[2] As a popular index among academicians and practitioners, CCPI has three main advantages. First, countries use different policies against climate change with different inten-

---

[1]In the January 27th, 2021, "Executive Order on Tackling the Climate Crisis at Home and Abroad" by U.S. President Biden, it is stressed that "domestic action must go hand in hand with United States international leadership, aimed at significantly enhancing global action (link)."

[2]CCPI is developed by Germanwatch with the aim to track efforts to combat climate change (Burck et al., 2016). We provide more details on CCPI in Section 2.

sities, making a cross-country comparison a serious challenge. CCPI overcomes this challenge by utilizing climate policy experts to aggregate all different climate policies into one metric. Second, CCPI has extensive coverage across countries and time, enabling us to study a large portion of the universe of cross-border lending. Third, by consisting of both climate policies and the outcome of these policies, such as emission reduction improvements and efficiency in energy usage, CCPI measures policy stringency more accurately and is less prone to green-washing. We combine CCPI with syndicated loans, which we use to assess cross-border bank lending. Syndicated loans are one of the main tools for cross-border lending (De Haas and Van Horen, 2013). In addition, syndicated loans make cross-border lending easier for smaller banks, as the lead arranger of a syndicated loan can take actions to reduce the information asymmetries (Sufi, 2007). Therefore, a combination of CCPI and syndicated loans provides an ideal setting to investigate whether banks alter their cross-border lending to react to a change in climate policy stringency in their home country.

A naive regression model that estimates a positive coefficient for climate policy stringency on cross-border lending can suffer from two primary sources of endogeneity. The first one is about loan demand. After observing an increase in a country's climate policy stringency, a borrower may increase its loan demand to the banks from that country. One reason can be that the borrower can use the relationship with a bank from a stringent country as a signaling device. Alternatively, the borrower may want to improve its knowledge in efforts against climate change, and a lending relationship with this bank can provide this knowledge. These arguments imply that the borrower's loan demand can be lender-country-specific, which violates the Khwaja-Mian estimator's main assumption that loan demand is constant across the lenders of a borrower over time (Khwaja and Mian, 2008).

We tackle this challenge by using loan fixed effects to control for loan demand. Loan fixed effects provide an exemplary approach to control for loan demand in a syndicated loan sample, thanks to the institutional setting of syndicated loans. Typically, there are multiple banks in a single syndicated loan; one of them is called the lead arranger and performs the main banking tasks, and the others are called participants. The participant banks join the syndicated loan after the loan terms, such as loan amount and interest rate, are determined. Moreover, these participants have limited interactions with the borrower. Thus, their loan supply decisions are made after the loan demand is settled, hence not affected by the loan demand thanks to the lack of interaction with the borrower. Therefore, the within-loan comparison, which is more granular than the standard within-borrower-time comparison, allows us to identify the loan supply effects of climate policy stringency.

The second concern is about the variables that are correlated with both policy stringency

3

and cross-border lending. An improvement in economic conditions, for instance, can lead to an increase in policy stringency and cross-border loan supply. Or, a change in the demographics of the country can affect policy stringency by altering the perception of climate change and cross-border lending by affecting loan demand. We show that controlling for a rich set of factors that are found to be related to cross-border lending in the literature or comparing two banks from two countries that are in the same country group, such as Norway and Sweden, in the same year does not change the positive effect of climate policy stringency on cross-border lending. Despite this robustness, unobservable variables can still induce omitted variable bias, which we tackle with two exercises.

In the first exercise, we exploit the difference in policy stringency between the lender and borrower country. The main idea of this exercise is that the difference between the lender and borrower country gives two specific implications that are not likely to be produced by an omitted variable. Thus, confirming these implications in our setting would suggest that the main driver of the results is climate policy stringency. The first implication is that if banks use cross-border lending to decrease their exposure to climate policies, the banks should not increase their cross-border lending if the borrower country has a higher stringency. Second, banks should increase their cross-border lending more as the borrower country's stringency decreases. We confirm both of these implications in our setting.

In the second exercise, we use the Green Party share in national parliaments as an instrument for climate policy stringency and again find a positive effect on cross-border lending. We argue that the Green Party share is a credible instrument in our setting for two main reasons. First, thanks to the focus of these parties on environmental problems, the Green Party share is correlated with countries' climate policy stringency. Second, the Green Party share changes only after elections, indicating that the exclusion restriction may be satisfied if the predetermined nature of election cycles eliminates the association between the share and omitted variables. The most probable threat to the exclusion restriction would be the economic conditions and relevant economic policies: a change in economic conditions or policies could influence both the Green Party shares and cross-border lending. We provide evidence for the validity of the exclusion restriction by documenting that the Green Party share neither predicts nor is predicted by proxies for economic conditions and policies. Furthermore, we relax the exact exclusion restriction with the method developed by Conley et al. (2012). This method demonstrates that the magnitude of the effect of Green Party share through other channels should be as large as the size of its effect through climate policy stringency to make the latter insignificant. We find this implausible, considering the lack of correlation between the Green Party's share and economic conditions and policies.

We also show that our results are robust to including the Green Party's stances on other political topics, such as the economy and international relations, mitigating the concern that the Green Party share could pick up changes in political tendencies in other areas.

After establishing the positive effect of climate policy stringency on cross-border lending, we investigate the underlying mechanism. Our findings indicate that banks use cross-border lending as a tool for the race to the bottom. Race to the bottom refers to banks' actions to reduce the influence of changes in regulations on their loan portfolios (Acharya et al., 2009; Houston et al., 2012). In our context, a stringent climate policy can induce a reallocation of resources that may deteriorate the business conditions and profitability of some firms. As these firms can be banks' borrowers, the climate policy may adversely affect their loan portfolios and incentivize them to increase their cross-border lending—a race to the bottom behavior. Indeed, we show that as climate policies become more stringent, banks' loan portfolio performance worsens, measured by the non-performing loans (NPL) ratio and net profit ratio. In line with worse performance, banks charge higher spreads in domestic syndicated loans, indicative of a lower domestic loan supply. These results explain why banks perform race to the bottom behavior by increasing their cross-border lending to less stringent countries.

Race to the bottom in the climate policy context has specific predictions for borrower-level carbon risk. Namely, higher climate policy stringency may hinder lending to domestic borrowers with high carbon risk, encouraging banks to increase their cross-border lending to foreign borrowers with high carbon risk. We collect borrower-level carbon risk intensity information and include domestic lending in our data set to test these two hypotheses together. Consistent with the race to the bottom, we find that climate policy stringency reduces domestic lending to borrowers with high carbon risk. At the same time, it increases cross-border lending to borrowers with high carbon risk.

We support our findings for the underlying mechanism with three additional exercises. The first exercise considers bank specialization in domestic markets. Race to the bottom behavior suggests that banks should utilize their sectoral expertise at home to reduce monitoring and screening costs while granting a cross-border loan. We find that the effect is stronger for loans that are banks specialized in their domestic markets. Second, behavior may provoke negative publicity and hurt the bank's reputation, suggesting that banks should increase their cross-border lending where their reputation is less at stake. We find that the effect is larger when the bank's reputation is less likely to be affected. Last, race to the bottom behavior can also attract the attention of the supervisory authority with possible penalties. In line with this intuition, the effect is smaller if the domestic country's bank su-

pervisory authority is more powerful. We also investigate the role of domestic borrowers in the mechanism. By moving their activities to their foreign subsidiaries, domestic borrowers can incentivize banks to pursue a race to the bottom behavior. Even though banks are more likely to extend loans to foreign subsidiaries of their domestic borrowers, the effect is too small and becomes insignificant when controls are added.

Next, we exploit the heterogeneity among the banks and borrowers. Exercises on bank-level heterogeneity show that banks that are more expected to engage with cross-border lending as a reaction to climate policy stringency are indeed the ones who are more likely to do so. For instance, the magnitude of the effect is significantly larger for the banks that have higher cross-border loans in their books and for banks that face a higher nonperforming loans ratio. A higher cross-border loan ratio implies that the banks have more experience with cross-border lending, which means it is easier for this bank to use cross-border lending to react to changes in domestic climate policy stringency. Moreover, a higher NPL ratio creates a stronger incentive for the bank to engage with cross-border lending since a more stringent climate policy can reduce the returns of the loans when the bank needs a higher return rate due to the high NPL ratio. Regarding geographical heterogeneity among borrowers, we focus on European lenders and find that European banks increase their cross-border lending more to borrowers in emerging market countries. At the same time, the effect is insignificant if the borrowers and banks are located in Europe.

Last, we assess the robustness of our results to different measures. First, we tackle the concern that our results might be driven by the CCPI measure itself. Even though CCPI fits our research question very well, the way it is constructed could play a role in our findings, limiting the external validity of our results. Therefore, we use three other commonly used climate policy stringency indices—Climate Change Cooperation Index, OECD's Environmental Policy Stringency Index, and the Environmental Performance Index, and find the same results, alleviating the related concerns. Then, we use loan amounts instead of loan shares as the dependent variable in loan-level regressions. If loan amounts decrease as climate policy becomes stricter, higher lender shares can mask the decline in loan amounts. Yet, we find identical results when the loan amount is the dependent variable. Finally, we aggregate the loan level data up to the borrower country level and use the number and volume of loans between the banks and the borrowing country as dependent variables. Although the loan-level data improves identification, it can mask the aggregate changes, such as the number of cross-border loans from a bank to a country decreasing with policy stringency. The results are confirmed when replicating our main finding with borrower country-level data.

Our paper mainly contributes to the literature on climate change and finance. First,

our paper is related to the discussions about the challenges that the financial markets entail regarding the transition to a green economy. One such challenge is created by the policies implemented to fight against climate change, known as the regulatory risk (Krueger et al., 2020; Seltzer et al., 2020; Ilhan et al., 2021; Stroebel and Wurgler, 2021).[3] Due to this challenge, firms may prefer to reallocate their activities to the areas with less stringent climate policies (Bartram et al., 2021).[4] Close to our work, Ben-David et al. (2021) document that multinational firms that are headquartered in countries with stringent climate policies are more likely to execute their polluting activities in countries with less stringent policies. We add to their work by showing that banks use cross-border lending as a tool to protect their loan portfolio's exposure to climate policies. Specifically, we show that banks increase lending to borrowers in countries with less stringent countries as a reaction to an increase in their home countries' climate policy stringency. This finding indicates that banks exploit the lack of homogeneity in climate policy stringency across countries through a cross-border lending channel, decreasing the effectiveness of such policies.

Second, our paper is also related to literature about the role of banks in the fight against climate change. While banks provide less demanding funding sources to browner firms compared to the bonds and stocks market (De Haas and Popov, 2023; Beyene et al., 2021), they reflect the climate risk on loan terms (Atanasova and Schwartz, 2019; Correa et al., 2020; Bolton and Kacperczyk, 2021; Delis et al., 2021; Mueller and Sfrappini, 2022; Ivanov et al., 2021). In addition, banks lower their loan supply to browner firms after committing themselves to carbon neutrality (Kacperczyk and Peydro, 2021).[5] We complement these findings by studying how banks adjust their domestic and cross-border lending according to their home country's climate policy stringency. After an increase in their home country's policy stringency, we document that banks decrease their domestic loan supply to browner firms while increasing cross-border lending to browner firms abroad.

Finally, we add to the strand of literature that examines cross-border lending incentives. Cross-border lending can be an important tool to transmit shocks among countries (Cetorelli and Goldberg, 2011; Giannetti and Laeven, 2012; Ongena et al., 2015; Claessens, 2017; Hale et al., 2020). So far, the literature has established that geographical and cultural proximity (Mian, 2006; Lin et al., 2012), bank acquisitions and capital requirements (Karolyi and

---

[3]In addition to regulatory risks, climate change creates physical risks through extreme weather events (Kruttli et al., 2021) and sea-level rise (Bernstein et al., 2019; Baldauf et al., 2020; Bakkensen and Barrage, 2017). Investors may demand higher returns considering these risks (Chava, 2014; Painter, 2020; Bolton and Kacperczyk, 2021; Hsu et al., 2022; Nguyen et al., 2022).

[4]Bartram et al. (2021) show that financially constrained firms shift their production to the outside of California after California's cap-and-trade program. See also Li and Zhou (2017); Dai et al. (2021).

[5]Degryse et al. (2021) show that environmentally conscious banks offer cheaper loans to green firms after the Paris Agreement.

Taboada, 2015; Gao and Jang, 2021), and regulatory arbitrage opportunities (Houston et al., 2012; Ongena et al., 2013; Demyanyk and Loutskina, 2016; Beck et al., 2022) are drivers of cross-border lending. Linking to existing work that examines the influence of international differences in corporate taxes on firm behavior (Bartelsman and Beetsma, 2003; Huizinga et al., 2008; Dischinger and Riedel, 2011), Laeven and Popov (2023) show that the incidence of carbon taxes can influence the reallocation of fossil lending across the borders. Our paper complements the existing literature on cross-border lending in three ways. First, we document that heterogeneity in country-level climate policy stringency that accounts for all climate-related policies and their outcomes can also induce cross-border lending by incentivizing banks to engage in a race to the bottom behavior. Second, we introduce loan fixed effects as a tool to control for loan demand, which is particularly important in a cross-border lending setting since borrowers' loan demand can be lender-country-specific—this specificity violates the main Khwaja-Mian estimator assumption of loan demand being constant across lenders. Third, we show that the climate policy-induced increase in cross-border lending decreases as the domestic banking regulator strengthens. This suggests that strong banking regulation may complement climate policies by preventing banks from creating shortcuts for such policies.

The rest of the paper is organized as follows: Section 2 describes the data and variables, Section 3 discusses the empirical strategy, Section 4 reports the results, and Section 5 concludes.

2 Data

Our analysis combines several data sources to assess climate policy stringency and estimate its effects on cross-border lending. This section describes the main variables and how we construct the sample. Appendix A provides additional details on the data and discusses the remaining variables. Table A1 provides the variables' description.

Climate policy stringency Our measure of climate policy stringency is the Climate Change Performance Index (CCPI), whose main aim is to allow countries to compare their climate protection progress (Burck et al., 2016). This annual index is developed by Germanwatch—a non-profit organization, and is published in collaboration with the NewClimate Institute and the Climate Action Network. CCPI consists of four main components: GHG Emissions Improvement (60%), Renewable Energy (10%), Energy Efficiency (10%), and Climate Policy (20%), where its range is between 0 and 100 and higher scores indicating better

performance. CCPI gives weights to both levels and changes in levels of these components to be able to reflect both current conditions and recent developments in the country.[6] By being available for 59 countries, CCPI covers almost 90 percent of global GHG emissions, making it one of the most extensive indices for climate policies. Due to a change in methodology in CCPI and external shocks such as COVID-19, our sample period ends in 2017.[7]

We use CCPI as our climate policy stringency measure thanks to its several advantages. Countries have various policies regarding climate change, reflecting their different approaches. This nature of climate policies makes cross-country comparisons a significant challenge. For instance, focusing only on one policy would mean overlooking other policies, leading to a severe mismeasurement problem. Also, different policies have different implications for the efforts regarding the fight against climate change, meaning that a cross-country comparison would entail a careful aggregation of various climate policies. In addition, even if countries have the same policies, they may implement the same policies with different intensities. CCPI rigorously tackles all of these challenges. Namely, around 450 independent climate experts carefully evaluate all aspects of the countries' climate policies each year. These evaluations consider different intensities of the same policy and incorporate different policies into a single framework. Therefore, CCPI enables us to compare countries with a single variable.

CCPI's next advantage is thanks to how it is constructed. Like other policies, the effectiveness of climate policies depends on whether their intended outcomes align with the realized outcomes. If the policymakers do not implement the policy with the needed intensity, there could be a difference between the intended and realized outcomes, meaning the policy itself may not reflect its stringency correctly. This could be a specifically important problem for climate policies due to the vagueness of their nature and possibilities for greenwashing. Therefore, to measure the policy effectiveness correctly, CCPI considers both the policies and their outcomes by giving weight to policy outcomes, such as GHG emissions. Moreover, CCPI uses only the emissions generated by domestic production (not consumption), making CCPI a particularly good fit for our research question as we are interested in banks' reactions to changes in firms' behavior induced by climate policies. Moreover, being a transparent index, using CCPI limits the researcher's discretionary power and subjective choices. Thanks to these advantages, CCPI is heavily used by researchers (e.g., Atanasova

---

[6]The main reason for giving weights to both levels and changes in levels is to make the countries in different phases of economic development more comparable. For instance, on average, advanced countries emit more GHG per capita and contribute to climate change more, while developing countries emit less. At the same time, the recent developments in advanced countries demonstrate a more positive picture than the developing countries. By considering both levels and changes in levels, CCPI aims to provide a fair and thorough assessment.

[7]Our results do not change when we extend our sample beyond 2017.

and Schwartz (2019); Bolton and Kacperczyk (2023)), the financial industry (e.g., Blackrock, NN Investment), and policy institutions (e.g., World Bank, Financial Stability Board).[8]

Figure A1 plots the average CCPI against its standard deviation for all countries included in our sample. European countries typically have more stringent climate policies than emerging economies, Anglo-Saxon, and Asian countries. As expected, Scandinavian countries stand out in their climate performance.[9] Panel A of Figure A2 depicts the change in the climate policy stringency over time. This figure shows a general improvement in climate policy stringency, which varies, however, across the sample countries. Panel B of Figure A2 plots instead the percentage change in the CCPI over time, showing a clear time-variation among countries' climate policy stringency.

Bank loans and balance sheets We follow the literature and use syndicated loans to measure cross-border lending (e.g., Giannetti and Laeven (2012); Ferreira and Matos (2012); De Haas and Van Horen (2013); Ivashina et al. (2015); Gao and Jang (2021)). Specifically, we use the syndicated loans originated between 2007 and 2017 by commercial, savings, cooperative, and investment banks to non-financial firms (excluding SIC codes between 6000 and 6999). Data comes from the LPC DealScan database and contains information about the loan amount, maturity, origination, borrowers, and lenders. The dependent variable of our analysis is *lender share*, which is the share of a lender in a cross-border syndicated loan. We define a loan as cross-border on a locational basis, thereby the lender and borrower are located in different countries (De Haas and Van Horen, 2013).[10] We use only reported loan shares without imputing for the missing observations.[11] In Table 1, we report the summary statistics. Our final sample comprises 11,671 cross-border loan shares.[12] In our sample, the average value of loan shares is 7.6 percent, with a standard deviation of 7.66. Almost half of the syndicates are collateralized. A syndicated loan has 6 participants on average and an average maturity of 51 months. We collect bank balance sheet data from Bankscope and

---

[8]See Appendix Section A for details on the importance of the CCPI for practitioners and financial actors.

[9]Details about the countries included in our sample and their average CCPI values are reported in Appendix Figure A3, while details about the variation in the CCPI's components are depicted in Appendix Figure A4.

[10]Even though the lenders may sell their shares, the secondary market of the syndicated loans is active mostly for the American market. Thus, lenders are likely to keep the cross-border loan shares in their books. In line with this, Tamura and Tabakis (2013) report that the secondary market in Europe is significantly smaller than the one in the USA.

[11]This is available for 28 percent of the sample in the period 2007-2017. Imputing the missing loan shares does not change our baseline results (see Section 4.4). We also remove observations with incorrect values, such as total loan shares larger than 100 or loan shares equal to 0.

[12]45 percent of the syndicated loan shares are cross-border shares between 2007 and 2017. Approximately 23 percent of these shares have non-missing loan share information, yielding 11,671 cross-border loan shares.

BankFocus. We have 376 banks (of which 294 are parent banks) located in 39 countries in our cross-border sample. We match the bank-level data to climate policy stringency using the country of each bank. We identify firms' locations by using the headquarters country information in Compustat. Our sample includes a total of 1,146 firms located in 40 countries.

Table 1: **Summary statistics**

This table provides the summary statistics of our sample. The sample consists of cross-border loan shares in the syndicated loan market. Balance sheet variables are at an annual frequency. For variable definitions, see Table A1.

	Obs.	Mean	Std. Dev.	Minimum	Maximum
Lender share	11,671	7.595	7.664	0.070	94.210
$CCPI_{lender}$	11,671	56.090	8.057	22.848	76.620
$CCPI_{borrower}$	11,671	50.095	9.070	22.848	76.620
Bank-level controls					
log(Total assets)	11,671	28.055	3.072	11.169	36.838
Tier 1 capital ratio	11,671	12.327	7.723	3.700	182.760
log(Customer deposits)	11,671	27.196	3.338	11.727	36.813
Liquidity ratio	11,671	49.885	36.666	0.720	395.494
ROAE	11,671	5.540	11.583	-223.690	46.090
Net interest margin	11,671	1.473	0.779	-0.130	9.170
Country-level controls					
log(GDP per capita)	11,157	10.481	0.718	6.906	11.685
GDP growth	11,157	1.934	2.653	-8.075	14.526
Domestic credit to GDP	10,944	118.850	36.422	25.456	206.671
Unemployment rate	11,157	7.646	3.535	0.489	27.071
Common Language	10,670	0.240	0.427	0	1
log(Distance)	10,670	7.885	1.038	4.798	9.384
Top 5 bank concentration	11,464	74.543	13.916	35.495	100
Population growth	11,158	0.530	0.529	-1.854	5.322
Young workforce	11,157	26.405	4.4	15.767	55.337
Old workforce	11,157	25.625	6.343	4.192	45.125
Capital regulatory index	8,315	6.782	1.798	3	10
Independence of supervisory authority	9,922	2.012	0.831	0	3
Property rights	11,062	76.786	18.748	20	97.100
log(Contract enforcing days)	6,161	4.607	0.504	3.258	5.720
Climate policy$_{lender}$	11,671	12.223	4.180	0	20
Renewable energy$_{lender}$	11,671	2.636	1.719	0.023	8.094
Energy efficiency$_{lender}$	11,671	5.749	1.439	1.017	9.124
$CO_2{}_{lender}$	11,671	35.481	5.286	9.570	45.564
Loan characteristics					
Number of lenders	11,671	5.587	3.465	2	26
log(Loan amount)	11,671	17.374	1.534	7.427	21.563
Loan spread	8,915	171.998	109.575	2	1150
Others					
Δ Green Party Vote Shr.	7,452	0.288	1.403	-4.5	6.667
High Carbon Intensity Risk	1,385	0.723	0.448	0	1
Bank Supervisory Power	10,482	9.958	1.816	6	16
Ind. of Bank Supervisory Auth.	9,971	2.012	0.832	0	3
C3-I$_{lender}$	2,441	54.672	1.865	48.455	58.345
EPI$_{lender}$	10,790	83.068	7.248	53.580	91.050
EPS$_{lender}$	11,052	3.231	0.692	0.167	4.222

Electoral outcomes   We collect data on national-level election outcomes from countries' National Archives Election results. Specifically, we collect data on the number of seats a political party won during the election year. We use this data to calculate *Green Party share* after each election. Because elections do not take place annually, we used the latest election

results for non-election years. We gather data only on European countries since the Green Party has a sizeable relevance only in European countries.[13] Our instrumental variable Δ *Green Party share* equals the change in the Green Party's share in the national parliaments after an election.

3   Empirical strategy

Our objective is to estimate the causal effect of the home country's climate policy stringency on cross-border lending. To achieve this objective, we need to address two main identification challenges. The first one is about loan demand. A change in a country's climate policy stringency can alter the loan demand to the banks of that country from abroad. The second challenge is that an omitted variable can affect both climate policy stringency and cross-border lending. These two challenges suggest that our empirical strategy needs to control for loan demand properly and have an exogenous variation in climate policy stringency.

We tackle these two challenges in two steps. In the first step, we exploit the granularity of our data to control for loan demand. Controlling for loan demand is essential to estimate the causal relationship in our setting since climate policy could be correlated with the loan demand of foreign borrowers. For instance, firms could consider a lending relationship with a bank in a stringent country as a positive signaling device, suggesting that a stricter climate policy could attract loan demand from abroad. Alternatively, if firms anticipate that banks are willing to increase their cross-border lending as a reaction to a more stringent climate policy, they would increase their loan demand to such banks.

To control for loan demand, we use loan fixed effects. Using granular fixed effects has become the standard way of controlling for loan demand. The main assumption of this practice is that a firm's loan demand is homogeneous across its banks at the granularity of the fixed effects ([Khwaja and Mian](), [2008]). For instance, when *borrower × year* fixed effects is used, the assumption is that the borrower's loan demand is constant across its lenders at the same year. Yet, this assumption is less likely to hold in a cross-border lending setting since the borrower's loan demand could be lender-country-specific, as explained above. At the same time, the loan fixed effects in a syndicated loan setting provide an exemplary implementation as this assumption is likely to be satisfied thanks to the institutional details of the syndicated loans. Typically, in a syndicated loan, the lead arranger is the one who negotiates the loan amount and other terms with the borrower. After the lead arranger and

---

[13]We collect electoral data for the following countries: Austria, Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

the borrower agree on these terms, the lead arranger invites other lenders to participate in the syndicated loan, which means that the participants join the syndicated loan after the effect of loan demand on equilibrium loan outcomes is completed (Dennis and Mullineaux, 2000; Sufi, 2007; Ivashina, 2009). Moreover, the limited interaction between the participants and the borrower indicates that the borrower cannot influence the decisions of the participant banks. For instance, the borrower cannot influence which banks would participate in the loan, effectively preventing any borrower-lender selection effect from influencing the estimations.[14] Thanks to these features, the participants' loan supply decisions, indicated by their loan shares, are not affected by the loan demand. This suggests that comparing these shares in the same loan is possibly the cleanest way to keep the loan demand constant. To make a within-loan comparison, we include loan fixed effects (α_l) in our preferred specification and estimate the following model:

$$\text{Lender Share}_{\text{blft}} = \alpha_{\text{l}} + \beta \text{CCPI}_{\text{ct}} + \gamma \mathbf{X}_{\text{bt-1}} + \varepsilon_{\text{blft}} \tag{1}$$

where Lender Share$_{\text{blft}}$ is the cross-border loan share that bank b finances in loan l to firm f in year t.[15] The variable of interest is CCPI$_{\text{ct}}$, which measures the climate policy stringency of the country where the bank is located (hereafter lender-country) and is indexed by c. As explained in Section 2, CCPI$_{\text{ct}}$ reflects the recent changes in levels in its subcategories directly, meaning that β captures these changes without any need for adjustments.[16] Moreover, thanks to the loan fixed effects, β provides an interpretation in relative terms across the banks holding the borrower and loan factors, such as loan demand and borrower climate policy stringency, constant.[17] $\mathbf{X}_{\text{blt-1}}$ includes lagged bank-level controls such as bank size (log of total assets), bank capital ratio (Tier 1 capital ratio), bank performance and financial health (ROE, Net interest margin, log of customer deposits) and bank's liquid assets position (liquidity ratio). We cluster the standard errors at the lender's country-year level as it is the unit of treatment (Abadie et al., 2022).[18]

In the second step, we address the challenge created by the variables that can be correlated

---

[14]As loan fixed effects require multiple lenders to be in a loan, loans with a single lender are dropped. Yet, such loans are only 15 percent of the sample.

[15]In Section 4.4, we show that our results do not change when we use loan amounts as the dependent variable or aggregate our sample at the bank-borrower country and use the number and volume of loans at the bank-borrower country level as dependent variables.

[16]This feature indicates that the change in CCPI between two time periods would mean taking a double difference. Moreover, we also check whether CCPI exhibits a time trend and fail to find any evidence for such a trend. This is expected since CCPI is bounded by 0 and 100.

[17]For instance, using the difference between CCPI$_{\text{lender}}$ and CCPI$_{\text{borrower}}$ yields exactly same coefficients since loan fixed effects capture all variation at the borrower-year level.

[18]The inference does not change when we cluster the standard errors at the lender's country level.

with both climate policy stringency and cross-border lending. So far, the literature has documented that laws and institutions (Qian and Strahan, 2007; Houston et al., 2012; Ongena et al., 2013), cultural and geographical proximity (Mian, 2006; Giannetti and Yafeh, 2012), economic conditions and demographics (Giannetti and Laeven, 2012; Hale et al., 2020) affect cross-border lending. We start the second step by documenting that including these variables as controls does not change our results. Next, we exploit the difference between climate policy stringency between the lender and borrower country. The difference between the lender and borrower countries provides specific predictions that omitted variables are not likely to generate: the effect should be nonexistent when the borrower country has a higher stringency, and the effect should increase as the borrower country becomes less stringent. We test and confirm these two predictions in our setting.

Lastly, we use an instrumental variable strategy to have an exogenous variation in policy stringency. Namely, we use the change in Green Party share in the national parliaments as an instrument for the climate policy stringency and refer to them as the Green Party share. Political parties that mainly focus on environmental protection, the Green Parties, entered into the political scene around the early 1970s.[19] In tandem with increasing concerns regarding climate change in public, these parties have started to play more prominent roles. As the main agenda of these parties is about the protection of the environment and actions against climate change, a change in their shares in the parliament should reflect the perception of environmental problems in a given country. For instance, an increase in Green Party share should predict stringent climate policies. Note that the relevance of the Green Party share does not require the Green Party to be the ruling party or be a part of the ruling coalition. The reason is that the parties in charge can adjust their actions accordingly after observing the changes in the Green Party's share. Indeed, Meguid (2005) and Spoon et al. (2014) show that other parties highlight environmental problems in their political agendas more as a response to the Green Party's success in the elections. Moreover, to make sure that the relevance condition is satisfied, we let one year pass after the election, and we restrict our sample to European lenders, considering the Green Party's relevance in Europe.

In addition to the relevance condition, the Green Party share should satisfy the exclusion restriction. In our context, exclusion restriction means that the changes in Green Party share should not affect cross-border lending other than its effect through the climate policy stringency. This assumption would be violated if, for instance, the Green Party share affects both the climate policy stringency and economic conditions and economic policies, as changes in these variables are likely to affect cross-border lending. We consider the exclusion restriction

---

[19]There can be several parties that focus on environmental protection. We combine all of such parties and mention them as the Green Party for ease of exposition.

as feasible in this setting thanks to the fact that the Green Party shares change only after elections. Typically, elections are held on a predetermined cycle. The predetermined election cycles could make the Green Party share uncorrelated to economic conditions if the election cycles are not related to economic conditions and policies, effectively mitigating the biggest threat to exclusion restriction. In Section 4, we provide supporting evidence that changes in Green Party share are orthogonal to these variables—Green Party share neither predicts nor is predicted by economic conditions and economic policies that are relevant for cross-border lending.

4   Results

In this section, we use syndicated loans to measure cross-border lending and the CCPI to measure climate policy stringency to study whether banks use cross-border lending to react to changes in climate policy stringency in their home country. In Section 4.1, we give the main results, in which we use granular fixed effects to control for loan demand, a rich set of control variables, the difference in policy stringency between the lender and the borrower country, and an instrumental variable strategy to mitigate concerns related to omitted variable bias. In Section 4.2, we provide our findings regarding the underlying mechanism. In Section 4.3, we describe additional analysis exploiting the lender and regional heterogeneity of our sample. Finally, Section 4.4 concludes with a battery of robustness tests to determine the sensitivity of our results.

Before moving to the regression models, Figure A5 plots a strong and positive correlation between the policy stringency and cross-border loan share on the bank balance sheets. Even though this plot suggests that banks may use cross-border lending to react to higher climate policy stringency, this positive correlation can be driven by other factors, such as loan demand and variables correlated with both policy stringency and loan supply. We use the regression models to document that this positive correlation is indeed driven by banks' reaction to the climate policy stringency in their home countries.

4.1   Main results

We start our regression analysis with the model in Equation 1, in which we regress Lender Share in syndicated loans on the climate policy stringency of the bank's home country. As mentioned in Section 3, one of the concerns with this model is that loan demand can be correlated with policy stringency. For instance, observing an increase in policy stringency of

15

a country, the borrower may decide to increase its demand to the lenders from that country. The reason might be that having a lending relationship with a lender from a stringent country can generate a positive signal for the borrower. Alternatively, the borrower might want to increase its compliance with climate policies, and a lending relationship with a lender from a stringent country can facilitate this process.

To mitigate the concerns related to loan demand, we use granular fixed effects to control for borrower characteristics and report the results in Table 2. Column (1) starts with lender-level control variables, such as log(total assets), capital ratio, and liquidity ratio. We include borrower- and year-fixed effects in columns (2) and (3). In column (4), we saturate the model with borrower×year fixed effects, which means we compare loan shares of different lenders for the same borrower in the same year.

Table 2: **Effect of home country climate policy stringency on cross-border lending**

This table reports estimates from Equation 1. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), return on equity ratio and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Lender Share				
	(1)	(2)	(3)	(4)	(5)
$CCPI_{lender}$	0.036*	0.045***	0.046***	0.046***	0.042***
	(0.019)	(0.008)	(0.009)	(0.008)	(0.008)
Bank Group Controls	✓	✓	✓	✓	✓
Borrower FE		✓	✓		
Year FE			✓		
Borrower × Year FE				✓	
Loan FE					✓
Obs.	11,671	11,671	11,671	11,671	11,671
R^2	0.006	0.740	0.742	0.812	0.844
Mean(Lender Share)	7.595				

As explained in Section 3, using granular fixed effects to control for loan demand requires an assumption that loan demand is constant across the lenders within the fixed effects level (Khwaja and Mian, 2008). This assumption is less likely to hold in a cross-border lending framework since borrowers may have lender-country-specific loan demand. However, since banks, except the lead arranger, participate in a syndicated loan after the loan terms are determined, the decisions of these banks are not affected by the borrower's loan demand, making the assumption valid. Specifically, comparing banks in the same loan would enable us to control the loan demand more precisely and identify the changes in loan supply more

accurately. Therefore, we include loan fixed effects and compare two lenders of the same loan in column (5).[20] The magnitude of the coefficient in this within-loan model indicates that, as depicted in Figure A6, the loan share of the lender increases by 19.25 percent of the sample mean value when its home country's CCPI increases by 35 points—the difference between the UK and Australia in 2015.

After establishing that the positive relation between cross-border lending and policy stringency is not driven by loan demand, we now turn to the concern related to variables that are possibly correlated with both policy stringency and loan supply. This concern could arise, for instance, due to an improvement in the economic conditions. Better economic conditions can enable residents of a country to be more careful about the environment, leading to stringent climate policies while allowing banks to increase their cross-border lending. Moreover, cultural differences among the countries can be a factor in the observed heterogeneity in policy stringency.[21] In addition, demographic differences might explain heterogeneity in climate change awareness—a younger population can be more careful about the environment. Alternatively, the heterogeneity in policy stringency can be partially driven by legal and institutional differences across the countries. These variables can threaten our estimations to the extent that they are correlated with loan supply.

We mitigate the concern about the omitted variables with three exercises. First, we collect variables that are shown to be related to cross-border lending in the literature and include them in our models. More specifically, in column (1) of Table 3, we include log(GDP per capita), domestic credit to GDP ratio, and the unemployment rate to control for economic conditions in the lender's home country. Next, we address lender country-level unobservables by forming country groups and including country-group and country-group×year fixed effects.[22] Thanks to these fixed effects, we compare lenders in the same loan from the same country groups in the same year, such as comparing one bank in Norway to another bank in Sweden in the same loan. To ensure that the results are not driven by the cultural proximity between the lender and the borrower, we include a dummy variable that takes the value of 1 if the lender and borrower country have the same language and log of the distance between

---

[20]Note that loan fixed effects are more granular than borrower×year fixed effects since a borrower may obtain more than one loan in a year.

[21]Results from Round 8 of the European Social Survey show that there are variations in climate preferences and beliefs among the countries. For instance, residents in Israel, Norway, and Eastern European countries are less likely to think that climate change is caused by human activity (Poortinga et al., 2018).

[22]Country group consist of nine different country groups: Southern Europe (Portugal, Spain, Greece, Cyprus, Italy), Eastern Europe (Croatia, Ukraine, Poland), Western Europe (Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland), Northern Europe (Finland, Denmark, Norway, Sweden), Anglo-Saxon countries (USA, Australia, New Zeland, Canada, UK), Emerging Far-East Asia (India, China, Malaysia, Thailand), Emerging Asia (Russia, Kazakhstan, Saudi Arabia, Turkey), Advanced Asia (Japan, South Korea, Taiwan, Singapore), and others (Brazil, Mexico, South Africa, Egypt).

these countries in column (4). We control for bank competition in the country by the market share of the largest five banks in the domestic market in column (5). We use population growth, and the share of old and young workforce in column (6) to capture the differences in demographics. The next column follows the literature and includes the property rights index and the log of contract enforcing days to control for the legal environment of the bank's home country (Qian and Strahan, 2007; Houston et al., 2012). Finally, we use indices of supervisory authority and capital regulation to control for bank regulation. In all of these specifications, the positive coefficient survives, and its magnitude is similar to the baseline results in Table 2.

Table 3: **Mitigating concerns about omitted variables**

This table reports estimates from Equation 1 but adding additional controls. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. Economic controls are log(GDP per capita), domestic credit to GDP, unemployment rate, and GDP growth. Country group fixed effects consist of nine different country groups: Southern Europe (Portugal, Spain, Greece, Cyprus, Italy), Eastern Europe (Croatia, Ukraine, Poland), Western Europe (Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland), Northern Europe (Finland, Denmark, Norway, Sweden), Anglo-Saxon countries (USA, Australia, New Zeland, Canada, UK), Emerging Far-East Asia (India, China, Malaysia, Thailand), Emerging Asia (Russia, Kazakhstan, Saudi Arabia, Turkey), Advanced Asia (Japan, South Korea, Taiwan, Singapore), and others (Brazil, Mexico, South Africa, Egypt). Cultural controls are log(Distance) and common language. Domestic bank competition control is the Top 5 bank concentration. Demographic controls are log(total population), young workforce, old workforce, and population growth. Institution controls are the property rights index and log(Contract enforcing days). Bank regulation controls are independence of supervisory authority and capital regulatory index (Barth et al., 2013). Control variables and fixed effects are indicated at the bottom of each column. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	Lender Share							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$CCPI_{lender}$	0.033***	0.036***	0.044***	0.038***	0.038***	0.043***	0.043***	0.038*
	(0.008)	(0.011)	(0.012)	(0.011)	(0.012)	(0.012)	(0.011)	(0.022)
Loan FE	✓	✓	✓	✓	✓	✓	✓	✓
Bank Group Controls	✓	✓	✓	✓	✓	✓	✓	✓
Country Controls	✓	✓	✓	✓	✓	✓	✓	✓
Country Group FE		✓						
Country Group × Year FE			✓	✓	✓	✓	✓	✓
Culture Controls				✓	✓	✓	✓	✓
Bank Competition Controls					✓	✓	✓	✓
Demography Controls						✓	✓	✓
Institutions Controls							✓	✓
Bank Regulation Controls								✓
Obs.	10,776	10,776	10,772	10,256	10,256	10,256	10,178	7,792
R^2	0.854	0.854	0.857	0.856	0.856	0.856	0.857	0.864
Mean(Lender Share)	7.595							

Despite the rich set of control variables, the error term in Equation 1 can still be correlated with climate policy stringency, biasing our estimates. In the next exercise, we exploit the difference in policy stringency between the borrower and lender country to address this concern. As discussed in Section 4.2 in detail, our findings regarding the underlying mechanism indicate that banks use cross-border lending to decrease their exposure to climate policy stringency at home. These findings yield two predictions that could be useful in assessing

whether the effect is driven by omitted variables. First, the increase in cross-border lending should be decreasing in the borrower's climate policy stringency. As the borrower's climate policy becomes more stringent, cross-border lending provides less evasion for the banks. Second, the increase in cross-border lending should occur only if the lender country's climate policy is more stringent than the borrower country's. Otherwise, increasing cross-border lending would not decrease but increase the lender's exposure to stringent climate policies. Confirming these predictions in our data may allow us to argue that the effect is not driven by an omitted variable since such an omitted variable has to be correlated with the borrower country's policy stringency in a way that generates these two implications, which is highly unlikely.

Table 4: **Cross-border lending and borrower climate policy stringency**

This table reports estimates from Equation 1. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. Columns (1) and (2) include the interaction term $CCPI_{lender} \times CCPI_{borrower}$. Columns (2) to (6) show results when we split the sample in CCPI index of the lender's country higher/lower than the one of the borrower's country. Control variables, fixed effects, and the difference in estimated coefficients between split samples are indicated at the bottom of each column. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

| Lender Share	Interaction		$CCPI_{borrower} < CCPI_{lender}$			
	(1)	(2)	(3) Yes	(4) No	(5) Yes	(6) No
$CCPI_{lender}$	0.048***	0.044***	0.062***	0.018	0.061***	0.016
	(0.008)	(0.008)	(0.015)	(0.016)	(0.016)	(0.017)
$CCPI_{lender} \times CCPI_{borrower}$	-0.002**	-0.002***				
	(0.001)	(0.001)				
Bank Group Controls	✓	✓	✓	✓	✓	✓
Borrower × Year FE	✓		✓	✓		
Loan FE		✓			✓	✓
Obs.	11,671	11,671	7,935	3,230	7,784	2,951
R^2	0.812	0.844	0.811	0.830	0.852	0.843
Mean(Lender Share)	7.595					
Difference			0.044***		0.045***	

We test the first prediction on the first two columns of Table 4, where we interact the policy stringency of the lender country ($CCPI_{lender}$) with the stringency of the borrower country ($CCPI_{borrower}$). In line with the prediction, we estimate a negative coefficient for the interaction term, which suggests that a 10-unit increase in $CCPI_{borrower}$ reduces the increase in cross-border lending by approximately 40 percent. The remaining columns in Table 4 test the second prediction by splitting the sample into two in terms of the difference between $CCPI_{lender}$ and $CCPI_{borrower}$. We find that $CCPI_{lender}$ has a positive and statistically significant coefficient when $CCPI_{lender}$ is larger than $CCPI_{borrower}$. In contrast, it

has an economically and statistically insignificant coefficient when $CCPI_{lender}$ is lower than $CCPI_{borrower}$. We can combine these two findings with Figure 1, where we use $\Delta CCPI$, defined as the difference between $CCPI_{lender}$ and $CCPI_{borrower}$, on the x-axis and lender share on the y-axis. Akin to regression discontinuity design, Figure 1 illustrates that the effect of domestic climate policy stringency on cross-border lending materializes only if the lender's country has a more stringent policy, and this effect increases in magnitude when $\Delta CCPI$ gets larger.

Figure 1: **Difference in CCPI and Lender Share**

This figure shows that the positive effect of climate policy stringency does not exist if the borrower has a stringent climate policy, and the magnitude of the effect on loan supply increases as borrowers' climate policy becomes less stringent. The x-axis shows $\Delta CCPI$, which is defined as $CCPI_{lender}$-$CCPI_{borrower}$. The y-axis shows Lender Share. This figure uses residuals of a regression model, where Lender Share is regressed on loan fixed effects, bank group control variables (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), return on assets, and liquidity ratio). For variable definitions, see Table A1.
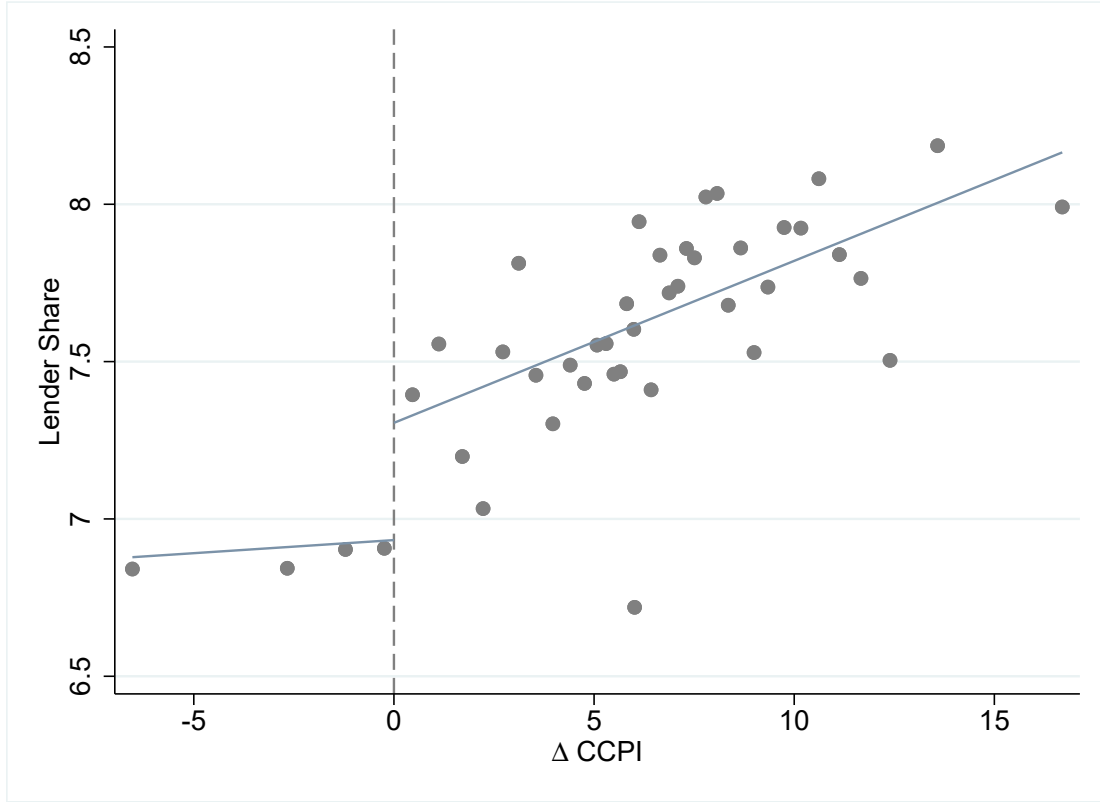
In the last exercise, we use the changes in the Green Party share in the parliament as an instrument for policy stringency. As discussed in Section 3, this instrument is likely to be relevant for policy stringency owing to the main agenda of the Green Party. For instance, Table A2 documents that the Green Party devotes a significantly larger part of their election manifestos to climate- and environment-related topics compared to other political parties. In line with this evidence, column (1) of Table 5 shows that, indeed, policy stringency increases

when there is an increase in the Green Party share.[23] After establishing that the first stage works as expected and is strong enough, we use the instrumented policy stringency as the main independent variable in column (2). In line with our previous results, the instrumented stringency has a positive and significant coefficient.[24]

Table 5: **Green Party share as an instrument for climate policy stringency**

This table reports estimates from Equation 1 in which CCPI is instrumented by ΔGreen Party Share. The dependent variable is Lender Share. The sample covers the period 2007-2017 and includes only European lenders. Column (1) reports the first stage. Column (2) includes loan fixed effects. Column (3) includes the Green Party's other policies, measured by the Manifesto Project (Lehmann et al., 2023). Column (4) includes country controls. 1st Stage Efficient F-statistics are calculated by the method developed by Olea and Pflueger (2013). The Green Party's other policies are about the economy, international relations, social policies, and welfare policies. Country control variables are GDP per capita, GDP growth, domestic credit to GDP ratio, unemployment rate, change in government expense to GDP ratio, and change in trade openness ((imports+exports)/GDP). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	$CCPI_{lender}$	Lender Share		
	(1)	(2)	(3)	(4)
ΔGreen Party Share	1.600***			
	(0.342)			
$\widehat{CCPI}_{lender}$		0.122***	0.122*	0.135**
		(0.040)	(0.067)	(0.063)
GP's other policies			✓	✓
Country Controls				✓
Loan FE	✓	✓	✓	✓
Obs.	3,572	3,572	3,572	3,557
R^2	0.695	0.020	0.026	0.033
1st Stage Eff. F-stat		17.578	19.817	19.695
Mean(Lender Share)	7.942			

In addition to climate-related issues, the Green Party share could reflect changes in the other aspects of politics. For instance, the Green Party could favor additional welfare policies

---

[23]We use the efficient F-statistics developed by Olea and Pflueger (2013) to statistically assess the weak instrument problem. They propose a test for weak instruments robust to heteroscedasticity, serial correlation, and clustering. The first stage efficient F-statistics is 19.817 in our preferred specification, which is slightly larger than the threshold level of 19.748 for a 10 percent worst-case benchmark derived by Olea and Pflueger (2013), alleviating the concerns about the weak instrument.

[24]The increase in coefficient magnitude is due to using only European lenders: replicating our main model without instrumenting policy stringency yields a coefficient of 0.103. Note that removing Germany from the lender country sample does not change the results. In addition, the direction of the omitted variable bias (OVB) in our setting is unclear. Even though the main concern is that OVB could lead to overestimation, it can also lead to underestimation, if the omitted variable increases policy stringency and decreases cross-border lending. Therefore, a slight increase in the magnitude of the coefficient in the IV estimation is not unexpected in our setting. Regarding the inference of instrumented variables, Lee et al. (2021) report that the adjustment factor for instrumental variables is 1.376 when the 1st-Stage F-statistics is 17.810. This adjustment factor indicates that the t-statistics of $\widehat{CCPI}_{lender}$'s coefficient should be larger than 2.696 to be significant at 5 percent level. In column (2), the t-statistics of $\widehat{CCPI}_{lender}$ is 3.04, which means that the coefficient is significant at 5 percent.

or more market regulation, making the Green Party share to be correlated to such policies. Such correlations could be a problem for causal interpretation. To assess the importance of the Green Party's stance on other political topics, we use the Manifesto Project data and include the Green Party's stance on economic policies, international relations, and social and welfare policies as control variables in column (3) of Table 5. Reassuringly, explicitly controlling for other policies does not change the positive and significant coefficient of the instrumented policy stringency.

Next, we consider the validity of exclusion restriction in this setting. As argued in Section 3, the most likely way the exclusion restriction is to be violated is that the Green Party share is correlated with economic conditions or with economic policies that are relevant to cross-border lending. If this is the case, then policy stringency instrumented by the Green Party share could still pick up the effect of these variables. On the other hand, the Green Party share may be uncorrelated to these variables due to election cycles being predetermined and unrelated to economic conditions. To evaluate the exclusion restriction, we use $\log(\text{GDP})_{pc}$, $\Delta log(GDP)$, credit to GDP ratio, and unemployment rate as economic controls and Δ government expense to GDP ratio and Δ trade openness as proxies for economic policies and include these variables as controls in column (4) of Table 5.[25] Supporting the exclusion restriction assumption, adding these control variables does not alter the positive effect on cross-border lending. Second, we explicitly investigate the correlation between the economic conditions and the Green Party share in Table 6, in which we again use the same six variables. We start by regressing these variables on the change in Green Party share one by one in Panel A, considering the possibility that the Green Party share can influence these proxy variables.[26] Supporting the exclusion restriction, the estimated coefficient is insignificant in all these models. In Panel B, we consider another possibility in which economic conditions and policy proxies influence the Green Party's share. To assess this possibility, we regress the change in Green Party share on the lagged values of these variables. In line with the exclusion restriction, these economic condition and policy variables have insignificant coefficients in these models. These results in Table 6 provide consistent evidence that economic conditions and policies do not pose a threat to the identification.

Despite the lack of correlation between economic conditions and the Green Party share, it is still possible that the exclusion restriction does not hold exactly. Due to this possibility, we

---

[25]Trade openness is defined as the ratio of (imports+exports)/GDP.

[26]We do not use the whole election cycle in this panel as we do in Table 5. Instead, we use the observations one year after the election. Note that this is a conservative sample decision since using the whole election cycle reduces the statistical power of the change in Green Party share. The reason is that the instrumental variable does not change within the election cycle. When we use the whole election cycle, the explanatory power of the change in Green Party share is even smaller, in line with this argument.

Table 6: **Green Party share and economic conditions**

This table shows the correlation between the Green Party shares and macroeconomic variables. Panel A reports the results of regression models in which GDP per capita, Log change in GDP, domestic credit to GDP ratio, unemployment rate, change in government spending (% of GDP), and change in trade openness (% of GDP) are regressed on Δ Green Party Share$_{t-1}$. Panel B reports the results of regression models in which Δ Green Party Share is regressed on GDP per capita, log change in GDP, domestic credit to GDP ratio, unemployment rate, change in government spending (% of GDP), and change in trade openness (% of GDP). The sample covers the period 2007-2017. Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	log(GDP)$_{pc}$	Δ log(GDP)	Credit to GDP	Unemp. Rate	Δ Gov. Spen.	Δ Trade Open.
Panel A						
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Green Party Share	0.015	0.165	-1.427	0.099	-0.118	0.209
	(0.024)	(0.292)	(2.908)	(0.380)	(0.303)	(0.593)
Obs.	1,583	1,583	1,581	1,583	1,582	1,583
R^2	0.022	0.018	0.007	0.005	0.013	0.007

	(1)	(2)	(3)	(4)	(5)	(6)
Panel B						
			Δ Green Party Voting Share			
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP)$_{pc, t-1}$	0.704					
	(1.024)					
Δ log(GDP)$_{t-1}$		-0.225				
		(0.145)				
Credit to GDP$_{t-1}$			0.002			
			(0.005)			
Unemp. Rate$_{t-1}$				-0.031		
				(0.174)		
Δ Gov. Spending$_{t-1}$					-0.023	
					(0.178)	
Δ Trade Openness$_{t-1}$						-0.089
						(0.087)
Obs.	1,599	1,599	1,599	1,599	1,603	1,603
R^2	0.009	0.093	0.002	0.002	0.001	0.055

relax the exclusion restriction assumption with the method developed by Conley et al. (2012). The exclusion restriction in our setting means that the effect of the Green Party share on cross-border lending is assumed to be zero after controlling for its effect through the climate policy stringency. Formally, the exclusion restriction corresponds to assuming that $\gamma = 0$ in the following regression model: *Lender share* $= \beta\,CCPI + \gamma\,\Delta Green\ Party\ share + \epsilon$. The plausibly exogenous instrumental variable method by Conley et al. (2012) provides interval estimates for β when γ deviates from being exactly zero. Intuitively, these interval estimates show how large the direct effect of $\Delta Green\ Party\ share$ (γ) should be to make the effect of $CCPI$ (β) insignificant. We report the results of this method in Figure A7 at 10 percent significance level for β, in which the x-axis shows different values of γ and the y-axis depicts the corresponding intervals for β. Figure A7 illustrates that the direct effect of the Green Party should be as large as its effect through climate policy stringency to make β insignificant at 10 percent. Considering the lack of correlation between economic conditions and the Green

Party share, we deem this implausible. Overall, our findings provide consistent evidence that indicates a positive and causal effect of climate policy stringency on banks' cross-border loan supply.[27]

4.2 Mechanism

So far, our results show that a more stringent climate policy leads to an increase in cross-border lending. This section investigates the underlying mechanism and provides evidence that banks use cross-border lending to facilitate race to the bottom behavior. The race to the bottom in the international banking context means that after facing stricter regulation in their home country, banks shift their activities from their home country to countries with looser regulation, which enables them to evade the more stringent regulation at home (Acharya, 2003; Houston et al., 2012; Karolyi and Taboada, 2015). In our context, this mechanism occurs since climate policies prompt a reallocation of resources that may hurt some firms, which has two main implications. First, stricter climate policies may make domestic lending less appealing due to the possible adverse effects of stricter policies on banks' loan portfolios. Second, banks engage with cross-border lending if doing so enables banks to circumvent these adverse effects.

We start our analysis by investigating the first implication: do stricter climate policies make domestic lending less appealing? Stricter climate policies aim to reduce the carbon print of the economy, which entails a reduction in carbon emissions. A reduction in emissions may require a reallocation of resources that influences the relative prices of the factors. In addition, it may entail a change in the business model or the production process within a firm. Also, existing inventories and machinery may lose value due to the needed changes (Litterman, 2021). These suggest that a stringent climate policy may worsen some of the domestic firms' economic prospects, making domestic lending less appealing. One direct way to assess this channel is by looking at the relationship between climate policy stringency and the performance of banks' loan portfolios. To this end, we regress banks' nonperforming loans and net profit ratios on policy stringency in Table 7. In this table, we use all banks in each country, both the ones that engage and do not engage with cross-border lending. We

---

[27]In an additional test, we deploy deindustrialization as another instrumental variable with the idea that countries experience deindustrialization may have stringent climate policies. In Table A3, we use the log of the time in years since a country's GDP per capita crosses USD 5,000 as an instrument for climate policy stringency. The idea behind this measure is that the time since crossing this threshold is positively correlated with the time since deindustrialization, as higher GDP per capita implies an increase in the importance of services. Similar to our other findings, we estimate a positive and significant effect of policy stringency on cross-border lending.

find that policy stringency is positively associated with the nonperforming loans ratio and negatively associated with banks' profits, which creates motives for banks to perform a race to the bottom.[28] As explained before, the race to the bottom behavior suggests that banks engage with cross-border lending to mitigate these adverse effects. Therefore, the effect of climate policy stringency on loan portfolios can be different for cross-border lenders. To test this, we create a dummy variable that takes the value of one if a bank extends a cross-border loan in a year in our sample and interact this dummy with policy stringency. Indeed, we find that the interaction term has the opposite sign of the direct effect—it is negative for nonperforming loans and positive for bank profits. These results indicate that climate policies hurt banks' loan portfolios, and cross-border lending enables banks to circumvent the adverse effects of climate policies.

Table 7: **Climate policy stringency and banks' loan portfolios**

This table documents that domestic climate policy stringency is positively correlated with lenders' nonperforming loans ratio, and negatively correlated with lenders' profit ratio. *Cross-Border Lender* is a dummy variable that takes the value of 1 if the lender engages in cross-border lending in our sample. Data used in this table covers all banks that operate domestically and/or internationally. Columns (1)-(3) use the nonperforming loans ratio as the dependent variable. Columns (4)-(6) use banks' net profit ratio as the dependent variable. Control variables and fixed effects are indicated at the bottom of each column. Control variables are GDP growth, unemployment rate, GDP per capita, exchange rate, and domestic credit to GDP ratio. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Nonperforming Loans Ratio				Net Profit Ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$CCPI_{lender,\ t-1}$	0.032**	0.031*	0.037**	0.013	-4.628***	-1.533***	-1.411***	-1.057**
	(0.014)	(0.017)	(0.016)	(0.022)	(0.762)	(0.515)	(0.479)	(0.461)
$CCPI_{lender,\ t-1} \times$ Cross-Border Lender				-0.060**				2.907*
				(0.024)				(1.546)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓				✓			
Bank FE		✓	✓	✓		✓	✓	✓
Controls			✓	✓			✓	✓
Obs.	24,297	23,434	23,216	23,076	179,856	178,323	177,236	176,286
R^2	0.318	0.943	0.943	0.943	0.156	0.527	0.529	0.529
Mean(Dep. Var.)	4.893				24.786			

The negative association between policy stringency and banks' loan portfolios raises a related question of how policy stringency influences domestic loan demand. A lower loan demand at home could explain the increase in cross-border loan supply and worsening banks' loan portfolio performances. Even though the needed changes induced by stricter policies suggest higher loan demand by domestic firms, policy stringency could also lower the loan

---

[28]To explain these adverse effects, we relate firm profitability to climate policy stringency in the Appendix (Table A4). Confirming the negative impact on banks' loan portfolios, we again find that climate policy stringency is negatively correlated with firms' profits. Specifically, we use Return on Equity, Return on Capital, Net Profit Margin, and Operating Margin as firm profit indicators at the country level. We use the aggregate values obtained from Aswath Damodaran's website. The profit variables are calculated at the firm level for only public firms and then aggregated up to the country-year level. These aggregate values are, therefore less susceptible to outliers.

demand, for instance, if it affects economic activity negatively. We regress domestic loan spread on policy stringency at home in Table 8 to assess whether the demand or the supply plays a role in our results. A decline in loan demand suggests a decline in the spread, whereas a decline in supply suggests an increase in the spread. Our findings in Table 8 are in line with a decrease in loan supply and thus with the race to the bottom mechanism: the loan spread at home country increases as the climate policy becomes more stringent.

Table 8: **Climate policy stringency and domestic loan spread**

This table reports estimates, in which the dependent variable is loan spread and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017 and consists of banks that operate in the domestic syndicated loans market. Loan spread is obtained from syndicated loans. Bank group controls are net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Country controls are GDP per capita), domestic credit to GDP, unemployment rate, and GDP growth. Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	Loan Spread			
	(1)	(2)	(3)	(4)
$CCPI_{lender}$	3.146**	3.804***	1.273	2.429**
	(1.240)	(1.145)	(0.996)	(1.167)
Bank Group Controls		✓	✓	✓
Country Controls			✓	✓
Country FE				✓
Obs.	11,819	11,819	8,626	8,625
R^2	0.032	0.115	0.171	0.225
Mean(Dep. Var.)	171.206			

So far, we have separately shown that stringent climate policies at home increase banks' cross-border lending to borrowers located in countries with less strict policies while worsening banks' domestic loan portfolios and thereby reducing their domestic loan supply. In what follows, we combine these two findings and simultaneously test the two implications of the race to the bottom mechanism. The race to the bottom mechanism suggests that a more stringent climate policy can make lending to borrowers with high carbon risks less appealing. Therefore, this mechanism predicts a decline in lending to domestic borrowers with high carbon risk. At the same time, this mechanism predicts that banks may increase their cross-border lending to borrowers with high carbon risk since banks may prefer replacing their high-risk domestic borrowers with comparable borrowers abroad. We combine cross-border lending with domestic lending to assess these two predictions together. In addition, we collect information about firm-level carbon intensity risk. The carbon intensity risk shows

how much a firm is exposed to unmanaged carbon risk based on emissions level.[29] These additional data allow us to create two dummy variables. The first dummy variable, *same country*, takes the value of 1 if the loan is domestic. The second dummy variable, *high carbon intensity risk*, equals one if the borrower is defined as a high, severe, or medium carbon risk firm. We interact these two dummy variables with $CCPI_{lender}$ and report the results in Table 9. In line with the mechanism, high carbon intensity risk×$CCPI_{lender}$ has a positive coefficient, which means that climate policy stringency increases cross-border lending more if the borrower has a high carbon risk. In addition, we estimate a negative coefficient for the same country×high carbon intensity risk×$CCPI_{lender}$. This negative coefficient shows that credit supply to domestic firms decreases when $CCPI_{lender}$ increases if the domestic firm has a high carbon risk.

Table 9: Does a stricter climate policy change the supply of credit domestically?

This table reports estimates from Equation 1. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. All columns include the triple interaction term, $CCPI_{lender}$×Same Country×High Carbon Intensity Risk, where High Carbon Intensity Risk is a dummy variable equal to 1 if the firm is assigned to a High, Severe, or Medium Carbon Risk category according to the final carbon risk score (high-level polluting firms) and 0 otherwise (Negligible or Low Carbon Risk Category); Same Country is a dummy variable equal to 1 if the lender and the borrower are located in the same country (domestic loan) and 0 otherwise. Control variables and fixed effects are indicated at the bottom of each column. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Lender Share	Carbon-intensive firms				
	(1)	(2)	(3)	(4)	(5)
Same Country × High Carbon Intensity Risk × $CCPI_{lender}$	-0.317**	-0.353***	-0.344***	-0.234**	-0.234**
	(0.125)	(0.110)	(0.111)	(0.097)	(0.096)
Same Country × High Carbon Intensity Risk	19.355***	19.198***	18.794***	11.999**	11.733**
	(7.041)	(6.585)	(6.619)	(5.664)	(5.672)
High Carbon Intensity Risk × $CCPI_{lender}$	0.085	0.070	0.077	0.104**	0.083*
	(0.085)	(0.068)	(0.065)	(0.044)	(0.043)
Same Country × $CCPI_{lender}$	0.066	0.086	0.079	0.011	0.023
	(0.101)	(0.125)	(0.126)	(0.099)	(0.107)
Same Country	-1.752	-2.171	-1.784	2.550	1.799
	(5.998)	(7.491)	(7.539)	(5.939)	(6.354)
High Carbon Intensity Risk	-4.178	-0.698	-1.201		
	(5.066)	(4.887)	(4.680)		
$CCPI_{lender}$	-0.022	0.012	0.002	-0.023	-0.021
	(0.067)	(0.069)	(0.067)	(0.045)	(0.044)
Bank Group Controls	✓	✓	✓	✓	✓
Borrower FE		✓	✓		
Year FE			✓		
Borrower × Year FE				✓	
Loan FE					✓
Obs.	2,540	2,540	2,540	2,540	2,540
R^2	0.073	0.540	0.543	0.612	0.701
Mean(Lender Share)	9.008				

A corollary of the race to the bottom mechanism in our context is that banks should extend cross-border loans to borrowers who are similar to their domestic borrowers. The

---

[29]Due to data availability of firm-level carbon risk, the number of observations declines in this sample.

reason is that lending to similar borrowers reduces both screening and monitoring costs, making cross-border lending easier for banks. To test this, we turn to banks' domestic syndicated loans and use these loans to calculate bank specialization. Namely, we calculate each industry's share in banks' domestic lending. Then, we assume that a bank is specialized in an industry if this industry has the largest share in its domestic loans. We use this specialization variable to create a dummy variable, *specialized loan*, that takes the value of 1 if the cross-border loan is in the banks' specialized industry. In the first three columns of Table 10, we regress the *specialized loan* dummy on policy stringency with different control variables. We find that banks lend more specialized cross-border loans as policy stringency increases, suggesting that banks aim to conserve the industrial composition of their loan portfolios. Moreover, banks may increase their supply more when they lend specialized loans. Indeed, interacting *specialized loan* dummy with policy stringency in the last three columns of Table 10 reveals that banks almost double their loan shares if the loan is specialized.

Table 10: **Climate policy stringency and specialized loans**

This table documents that lenders extend more specialized cross-border loans as the climate policy stringency in their home countries becomes more stringent, and the positive effect of climate policy stringency on cross-border lending is stronger for specialized loans. *Specialized Loan* is a dummy variable that takes the value of 1 if a borrower is in the banks' specialized industry. Lenders' specialized industry is the industry that received the highest loan amount from the lender last year in the domestic syndicated loan market. Columns (4)-(6) of Table 10 use *Specialized Loan* as the dependent variable. Columns (1)-(3) of Table 10 interact $CCPI_{lender}$ with *Specialized Loan*. Control variables and fixed effects are indicated at the bottom of each column. Bank Group controls are log(total assets), net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio and their interaction with *Specialized Loan*. Country Controls are GDP growth, unemployment rate, GDP per capita, and domestic credit to GDP ratio. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Specialized Loan			Lender Share		
	(1)	(2)	(3)	(4)	(5)	(6)
$CCPI_{lender}$	0.007***	0.005***	0.005**	0.043***	0.030***	0.022**
	(0.002)	(0.002)	(0.002)	(0.007)	(0.008)	(0.009)
$CCPI_{lender} \times$ Specialized Loan				0.034**	0.041**	0.031*
				(0.014)	(0.017)	(0.018)
Bank Group Controls		✓	✓		✓	✓
Country Controls			✓			✓
Loan FE	✓	✓	✓	✓	✓	✓
Obs.	11,671	11,671	10,776	11,671	11,671	10,776
R^2	0.476	0.480	0.479	0.842	0.844	0.855
Mean(Dep. Var.)	0.300			7.595		

One prediction related to the race to the bottom mechanism is that climate policy-induced cross-border lending should not be affiliated with lower emissions by cross-border borrowers since this mechanism does not suggest that banks should impose a restriction on their borrowers' emissions. To test this, we regress cross-border borrowers' emissions on exposure to climate policy from cross-border lending, which is the weighted average of policy stringency where the weights are cross-border loan amounts. Even though the number of

observations is low due to data availability, we do not find any effect on borrower emissions, in line with the race to the bottom mechanism (Table A5).

Next, we consider two indirect implications of the race to the bottom mechanism in the context of climate policy. The first indirect implication is about the bank's reputation. Due to the public pressure for climate policies, the race to the bottom may be perceived negatively and hurt banks' publicity. Therefore, banks may prefer increasing their cross-border lending to countries where the flow of information is less likely to reach their home country. In Panel A of Table 11, we use the distance between the lender and borrower countries and whether the lender and borrower countries share a border or have the same language as a proxy for information flow possibilities. In line with the possible adverse effects of race to the bottom on banks' publicity, banks increase their cross-border lending more if the borrower country does not have the same language or share a border with the lender country. In addition, the increase in cross-border lending is driven by lender-borrower pairs that have larger distances above the sample's median value. The second indirect implication is about the bank supervision environment of lender countries. Due to political pressure, a race to the bottom behavior may attract the attention of the bank supervisory authorities with a possible penalty on banks. Therefore, banks may be more likely to pursue such behavior in a weaker supervision environment. We test this hypothesis in Panel B of Table 11, using two different bank supervision environment variables. Namely, we use *independence of the bank supervisory authority*. This variable shows the degree to which the supervisory authority is independent of the government and legally protected from the banking industry. In the last three columns, we use *bank supervisory power*, which measures whether the supervisory authorities have the authority to take specific actions to prevent and correct problems (Barth et al., 2013). Higher values indicate higher power/authority for both of these variables. By splitting our sample into three, we see that the increase in cross-border lending is stronger if the lender country's bank supervision has low independence or low power. These two heterogeneity tests suggest that strong bank regulation may complement climate policies and also support the race to the bottom mechanism as the main driver of our results.

We conclude this section by exploring the role of banks' domestic borrowers in the underlying mechanism. Suppose firms react to a stringent climate policy at home by moving their activities abroad via their subsidiaries. In that case, banks may follow these domestic borrowers by lending to their foreign subsidiaries, effectively increasing cross-border lending. To test the role of domestic borrowers, we first obtain parent-subsidiary information from the Orbis database and match this information to syndicated loan data. Then, we create a dummy variable, *subsidiary lending*, that is equal to one if the bank has a lending relation-

Table 11: **The role of bank reputation and bank regulation**

This table documents that the increase in cross-border lending is larger when the bank reputation is less likely to be affected and when the bank regulatory authority has less power. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. In Panel A, Columns (1) and (2) split the sample into two with respect to the languages of the lender and borrower countries. Columns (3) and (4) split the sample into two with respect to the distance between the lender and borrower countries. Columns (5) and (6) split the sample into two, considering whether the lender and borrower countries share borders. In Panel B, the first three columns split the sample in terms of the *Independence of the Bank Supervisory Authority*. The last three columns split the sample in terms of *Bank Supervisory Power*. Control variables and fixed effects are indicated at the bottom of each column. Bank group control variables are net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Bank Reputation

Lender Share	Language		Distance		Border	
	(1) Diff.	(2) Same	(3) High	(4) Low	(5) No	(6) Yes
$CCPI_{lender}$	0.043***	0.035**	0.072***	0.007	0.051***	0.008
	(0.010)	(0.013)	(0.012)	(0.012)	(0.009)	(0.043)
Bank Group Controls	✓	✓	✓	✓	✓	✓
Loan FE	✓	✓	✓	✓	✓	✓
Obs.	8,601	1,723	5,766	4,587	10,072	1,030
R^2	0.856	0.827	0.822	0.885	0.838	0.939
Mean(Lender Share)	7.595					
Difference	-0.025		0.037*		-0.056	

Panel B: Bank Regulation

Lender Share	Bank Supervisory Power			Bank Supervisory Auth.		
	(1) Low	(2) Medium	(3) High	(4) Low	(5) Medium	(6) High
$CCPI_{lender}$	0.066***	0.035*	0.008	0.072***	0.047	0.027**
	(0.025)	(0.020)	(0.021)	(0.021)	(0.065)	(0.011)
Bank Group Controls	✓	✓	✓	✓	✓	✓
Loan FE	✓	✓	✓	✓	✓	✓
Obs.	2,347	2,326	2,741	2,948	2,184	2,910
R^2	0.828	0.868	0.870	0.873	0.852	0.861
Mean(Lender Share)	7.595			7.595		

ship with the parent company of the cross-border borrower in the bank's domestic market. We regress *subsidiary lending* on policy stringency in Table A6. We find that stricter climate policy increases the probability of lending to a subsidiary of a domestic borrower in the cross-border loan market, yet the effect becomes insignificant when we add control variables and is small in magnitude—a six-point increase in policy stringency increases subsidiary lending by only 18 basis points. Considering that the mean of subsidiary lending in our sample is 11 percent, we deem this effect too small to play a major role in the underlying mechanism. To sum up, our results illustrate a clear picture, in which banks use cross-border loans for race to the bottom behavior, possibly reducing the effectiveness of climate policies of their home countries.

4.3 Additional analysis

This section continues our analysis by providing additional findings. First, we investigate which component of the CCPI is more important for the increase in cross-border lending. As explained in Section 2, CCPI consists of four main categories: GHG emissions improvement, renewable energy, energy efficiency, and climate policy. Climate policy captures governments' policy actions against climate change, and it is the initial point of the fight against climate change. The climate policies are expected to affect energy use and renewable energy categories, which, in turn, are expected to lower GHG emissions. Investigating which of these categories is the main driver of our results is informative about banks' cross-border lending behavior. For instance, if banks anticipate the consequences of policies, the policy component could be the main driver. On the other hand, if banks wait to react until they observe changes in firm performances, such as lower profitability due to climate policies, the other components could be the main factors. We regress lender share on each of these components one by one in columns (1) to (4) in Table 12 and find that all categories have positive and significant coefficients separately. In the last two columns, we run horse race models with all four categories included as explanatory variables. In these models, only the climate policy has a statistically significant coefficient, suggesting that banks anticipate the consequences of climate policies and adjust their lending accordingly.[30]

Second, we explore the heterogeneity in lender characteristics in Table 13. In columns (1) and (2) of Table 13, we split our sample in terms of bank size. For larger banks, increasing cross-border lending as a reaction to more stringent climate policy is easier since the fixed costs attached to cross-border lending can be less important for such banks. In line with this intuition, we find that the increase in cross-border lending is stronger for larger banks. Similarly, for banks with more experience in cross-border lending, exploiting cross-border lending as a reaction to climate policy should be easier. This is indeed what our results show in columns (3) and (4). The increase in cross-border lending is almost five times larger for the banks whose cross-border loan ratios are above our sample's median. The next two columns split the sample into two with respect to bank capital. Even though the effect is larger for less capitalized banks, the difference is not statistically significant. Columns (5) and (6) divide our sample with respect to capital. Banks with lower capital may suffer from agency problems, leading to a higher incentive for race to the bottom behavior. Indeed, the effect is larger for low-capitalized banks. Next, we investigate the influence of banks' NPL ratio on the effect of climate policy stringency. The race to the bottom mechanism

---

[30]We replicate our main table by using the climate policy component in Table A7 and find slightly larger effects. Moreover, we replicate all of our tables by using the climate policy component and find similar results.

Table 12: **Which component of the CCPI matters most?**

This table reports estimates from Equation 1 in which parts of CCPI are used as explanatory variables. The dependent variable is Lender Share. The sample covers the period 2007-2017. Control variables and fixed effects are indicated at the bottom of each column. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	Lender Share				
	(1)	(2)	(3)	(4)	(5)
Climate policy$_{lender}$	0.057***				0.057***
	(0.012)				(0.012)
Renewable energy$_{lender}$		0.111**			0.055
		(0.048)			(0.052)
Energy efficiency$_{lender}$			0.124***		0.061
			(0.038)		(0.077)
$CO_{2 lender}$				0.039***	0.028
				(0.013)	(0.022)
Bank Group Controls	✓	✓	✓	✓	✓
Loan FE	✓	✓	✓	✓	✓
Obs.	11,671	11,671	11,671	11,671	11,671
R^2	0.843	0.843	0.843	0.843	0.844
Mean(Lender Share)	7.595				

has a special prediction for the NPL ratio, which is that the effect can be stronger for banks with a high NPL ratio. The reason is that these banks are more in need of profits. Thus, the incentive for them to increase cross-border lending must be stronger. In line with this argument, we find that the effect is significantly larger for banks with a high NPL ratio. Last, we investigate whether the effect depends on the role of the lender in the syndicated loan. Columns (9) and (10) of Table 13 show that the effect is similar for lead arrangers and participants.

Next, we study the regional patterns in the effect of climate policy stringency. Studying the regional patterns can be particularly interesting as it would show the direction of climate policy-induced cross-border lending. Given the distribution of CCPI across the world, we focus on Europe and report the results in which we use only European lenders in Table 14. This table categorizes borrowers into five locations: the U.S., emerging markets, Europe, Asia, and Anglo-Saxon countries. Among these five groups, the positive effect of climate policy stringency on cross-border lending is strongest for emerging markets. At the same time, the estimated effect is insignificant and small in size when the borrowers are located in the USA and Europe. This suggests that European lenders channel their credit supply towards emerging markets due to a more stringent climate policy at home.

We also study the influence of loan terms on the effect on cross-border lending. To this end, we interact policy stringency with maturity, spread, and covenant in Table A8.

Table 13: **How does the effect differentiate with respect to lenders' characteristics?**

This table reports estimates from Equation 1. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. Columns (1) and (2) split the sample into two with respect to bank size (above/below total assets sample median). Columns (3) and (4) split the sample into two with respect to the ratio of cross-border lending to total lending (above/below the sample median). Columns (5) and (6) split the sample into two with respect to the Tier 1 capital ratio (above/below sample median). Columns (7) and (8) split the sample into two with respect to the non-performing loans ratio (NPL) (above/below sample median). Columns (9) and (10) split the sample into two with respect to the lead bank and participant banks following the definition by Ivashina (2009). Split points are the sample's median values. Control variables, fixed effects, and the difference in estimated coefficients between split samples are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

Lender Share	Size		Cross-Border		Capital		NPL		Lead bank	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Low	High	Low	High	Low	High	Low	High	Yes	No
$CCPI_{lender}$	0.024***	0.054***	0.023***	0.108***	0.066***	0.039***	0.020	0.051*	0.046***	0.045***
	(0.009)	(0.010)	(0.009)	(0.016)	(0.012)	(0.008)	(0.014)	(0.027)	(0.013)	(0.007)
Loan FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Obs.	4,941	5,046	5,039	5,043	5,106	5,183	779	776	1,722	9,382
R^2	0.840	0.858	0.839	0.842	0.844	0.866	0.854	0.731	0.846	0.869
Mean(Lender Share)	7.595									
Difference	0.031***		0.086***		-0.027***		0.031		0.001***	

None of these interaction terms is significant, suggesting that banks use the loan amounts as their main tool to react to stricter climate policies at home. Last, we assess if time effects influence the positive effect on cross-border lending. To see this, we run six-year rolling window regressions and plot the coefficients in Figure A8. The coefficients indicate that coefficients are not statistically different from each other, suggesting that time effects, such as different macroeconomic conditions, do not matter for our results.

4.4 Robustness

The last section examines the sensitivity of our results to alternative measures and starts with considering different climate policy indices. While CCPI is suitable for our research question as explained in Section 2, our results could partially depend on how CCPI is constructed and, therefore, have limited external validity. To assess whether our results extend to other climate policy measures, we estimate our main model with three other policy indices in Table 15. The first index is the Climate Change Cooperation Index (C3-I) by Bernauer and Böhmelt (2013). The main difference between C3-I and CCPI is that C3-I uses countries' ratification for standard climate policies, such as UNFCCC, and Kyoto Protocol, to measure climate policy strictness. The second index is the OECD's Environmental Policy Stringency Index (EPS). Similar to C3-I, and unlike CCPI, EPS also focuses only on a set of climate policies, such as CO_2 trading schemes, and aggregates these policies up to a single index (Kruse et al., 2022). The last index is the Environmental Performance Index (EPI), developed jointly by the World Economic Forum, European Commission, Yale, and Columbia Universities (Hsu

Table 14: **The effect of home country climate policy on cross-border lending: Are there regional patterns?**

This table reports estimates from Equation 1 in which we cluster countries in the same geographical area. The dependent variable is Lender Share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. European countries are Austria, Belgium, Denmark, France, Germany, Greece, Netherlands, Ireland, Italy, Norway, Spain, Portugal, and the United Kingdom. Emerging market countries are Saudi Arabia, China, Chinese Taipei, India, Brazil, the Russian Federation, Indonesia, South Africa, Malaysia, and Turkey. Asian countries are Japan, Singapore, Korea, Chinese Taipei, and China. Anglo-Saxon countries are the United States, Canada, Australia, and New Zealand. All lenders in this table are located in Europe. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables, fixed effects, and the difference in estimated coefficients between split samples are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

Lender Share	Europe vs USA	Europe vs Emer. mark.	Europe vs Europe	Europe vs Asia	Europe vs Anglo-Saxon
	(1)	(2)	(3)	(4)	(5)
$CCPI_{lender}$	0.029	0.131***	0.016	0.111	0.040*
	(0.026)	(0.032)	(0.017)	(0.070)	(0.023)
Bank Group Controls	✓	✓	✓	✓	✓
Loan FE	✓	✓	✓	✓	✓
Obs.	3,751	885	3,057	373	4,091
R²	0.820	0.894	0.903	0.864	0.833
Mean(Lender Share)	7.595				

et al., 2016). While covering a longer time period, EPI is a biennial index and consists of policies regarding climate change, energy consumption, and biodiversity. These three indices focus on different aspects of climate policies and have correlations with CCPI lower than 50 percent. Despite these differences, all three indices confirm our main finding: banks increase their cross-border lending as their home countries implement stricter climate policies (Table 15).

In the next robustness check, we use loan amounts as the dependent variable instead of lender shares. The concern about using the lender share is that if the loan size gets smaller as climate policy becomes more stringent, the amount of lending of a bank to a borrower can be smaller, even though the loan share is higher. To alleviate this concern, we use log(loan amount) as the dependent variable in our main model in Table A9. Similar to our main table, we saturate the model with the loan fixed effects and estimate a positive and significant coefficient, confirming the positive impact of climate policy stringency on cross-border lending.

Next, we aggregate our loan level data up to the bank-borrower country level, following De Haas and Van Horen (2013). Even though the granularity of the loan level data is valuable for identification, it can mask some patterns at the aggregate level. For instance, an increase in policy stringency may decrease the number of cross-border loans, and this decrease can offset the increase in loan shares caused by policy stringency. To see whether such a pattern emerges in our sample, we use two aggregated lending variables at the bank-borrower country level: the number of syndicated loans a bank extends to a country, and the total amount of loans a bank extends to a country. We use log(number of loans) as

Table 15: **Alternative indices for home country climate policy stringency**

This table investigates the relationship between cross-border lending and home country climate policy stringency using alternative country-level indices. The dependent variable is Lender Share. In columns (1)-(2), the index is the Climate Change Cooperation Index (C3-I) by Bernauer and Böhmelt (2013). In columns (3)-(4), the index is the OECD Environmental Policy Stringency Index (EPS). In columns (5)-(6), the index the Environmental Policy Index developed by YCELP, CIESIN, and the World Economic Forum (Hsu et al., 2016). The sample covers the period 2007-2014 in columns (1) and (2), 2007-2017 in columns (3) and (4), and 2007-2016 in columns (5) and (6). Bank controls are Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio. Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Lender Share				
	(1)	(2)	(3)	(4)	(5)	(6)
C3-I$_{\text{lender}}$	0.149**	0.157*				
	(0.071)	(0.094)				
EPS$_{\text{lender}}$			0.465***	0.176*		
			(0.079)	(0.105)		
EPI$_{\text{lender}}$					0.077***	0.066***
					(0.011)	(0.011)
Bank Group Controls		✓		✓		✓
Loan FE	✓	✓	✓	✓	✓	✓
Obs.	1,697	1,697	10,949	10,949	10,790	10,790
R^2	0.818	0.828	0.854	0.855	0.843	0.845
Mean(Index)	54.561		3.234		83.068	
Mean(Lender Share)	6.574		7.640		7.723	

the dependent variable in the first four columns of Table A10 and log(loan amount) in the remaining four columns. Importantly, in addition to CCPI$_{\text{lender}}$, we use ΔCCPI as the main independent variable, which is the difference between CCPI$_{\text{lender}}$ and CCPI$_{\text{borrower}}$ in Panel B of Table A10. We follow Khwaja and Mian (2008) and De Haas and Van Horen (2013) and control for loan demand with borrower country×year fixed effects and include bank-level characteristics as control variables. Intuitively, we compare the lending of two banks with different CCPI$_{\text{lender}}$ or ΔCCPI to the same borrower country. Note that when we include borrower country×year fixed effects, CCPI$_{\text{lender}}$ and ΔCCPI have exactly the same coefficients since borrower country×year fixed effects absorb all variation at the borrower country level, including CCPI$_{\text{borrower}}$. In these alternative specifications, we estimate positive and significant coefficients for the number of loans and loan amount, confirming our main result. Last, we follow the literature and populate the missing loan shares by allocating the total amount of unreported loan shares equally to the lenders whose shares are not reported (Doerr and Schaz, 2021; De Haas and Van Horen, 2013; Giannetti and Laeven, 2012).[31] We again estimate a positive and significant effect for climate policy (Table A11).

---

[31]Approximately, we can observe the loan shares for 28 percent of the loans.

5 Conclusion

Due to disagreements about how and when to implement policies about climate change, there is a large heterogeneity in these policies across the countries. This lack of coordination can create escape rooms for the ones who may be adversely affected by these policies. In this paper, we focus on banks and try to understand whether they exploit the heterogeneity in climate policies with their loan supply decisions. In particular, we use the syndicated loan market as a laboratory to study the link between the cross-border loan supply and the climate policy stringency of the banks' home countries.

We find that banks react to a more stringent climate policy at home by increasing their cross-border lending. Specifically, banks increase their shares in cross-border syndicated loans by 19.25 percent when the climate policy stringency of their home country increases by 35 stringency index points. To establish that the effect is not driven by loan demand, we use the granularity of syndicated loans and compare the banks within the same loan by employing loan fixed effects. To mitigate concerns about omitted variables, we instrument climate policy stringency with Green Party shares in the parliament. Thanks to the predetermined election cycles, we show that these shares are not correlated with economic conditions and policies, which suggests that these shares provide us arguably exogenous variation in climate policies.

Why do we observe the increase in cross-border lending? Our findings are in line with a race to the bottom behavior, in which the increase in cross-border lending reduces banks' exposure to climate policies. For instance, the positive effect on cross-border lending decreases in the borrower country's policy stringency and is non-existent if the stringency is higher in the borrower country. In addition, domestic lending to brown borrowers decreases, but cross-border lending increases to such borrowers as climate policy becomes more stringent. We demonstrate a negative correlation between climate policy stringency and banks' loan portfolio performance as a possible explanation for why banks have incentives to increase their cross-border lending.

Our paper documents one adverse effect of the lack of coordination in climate policies. Considering the nature of climate change, an action that reduces the pace of transition into a green economy can have far-reaching negative externality. By studying the previously overlooked use of cross-border lending, we aim to provide a broader picture of how international banking interacts with climate policies, which can help policymakers improve international coordination and develop more effective policies.

References

Abadie, Alberto, Susan Athey, Guido W Imbens, and Jeffrey M Wooldridge (2022) "When Should You Adjust Standard Errors for Clustering?", *The Quarterly Journal of Economics*, 138 (1), pp. 1–35.

Acharya, Viral V (2003) "Is the International Convergence of Capital Adequacy Regulation Desirable?", *The Journal of Finance*, 58 (6), pp. 2745–2782.

Acharya, Viral, Paul Wachtel, and Ingo Walter (2009) "International alignment of financial sector regulation", *Restoring Financial Stability: How to Repair a Failed System*, 18, pp. 365–376.

Atanasova, Christina and Eduardo S. Schwartz (2019) "Stranded Fossil Fuel Reserves and Firm Value", *National Bureau of Economic Research Working Paper Series* (26497).

Bakkensen, Laura A and Lint Barrage (2017) "Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics: Going Under Water?", *National Bureau of Economic Research*.

Baldauf, Markus, Lorenzo Garlappi, and Constantine Yannelis (2020) "Does Climate Change Affect Real Estate Prices? Only if You Believe in It", *The Review of Financial Studies*, 33 (3), pp. 1256–1295.

Bartelsman, Eric J and Roel MWJ Beetsma (2003) "Why Pay More? Corporate Tax Avoidance through Transfer Pricing in OECD Countries", *Journal of Public Economics*, 87 (9-10), pp. 2225–2252.

Barth, James R, Gerard Caprio, and Ross Levine (2013) "Bank Regulation and Supervision in 180 Countries from 1999 to 2011", *Journal of Financial Economic Policy*.

Bartram, Söhnke M, Kewei Hou, and Sehoon Kim (2021) "Real Effects of Climate Policy: Financial Constraints and Spillovers", *Journal of Financial Economics*.

Beck, Thorsten, Consuelo Silva Buston, and Wolf Wagner (2022) "Supranational Cooperation and Regulatory Arbitrage".

Ben-David, Itzhak, Yeejin Jang, Stefanie Kleimeier, and Michael Viehs (2021) "Exporting Pollution: Where Do Multinational Firms Emit CO2?", *Economic Policy*.

Bernauer, Thomas and Tobias Böhmelt (2013) "National Climate Policies in International Comparison: The Climate Change Cooperation Index", *Environmental Science & Policy*, 25, pp. 196–206.

Bernstein, Asaf, Matthew T Gustafson, and Ryan Lewis (2019) "Disaster on the Horizon: The Price Effect of Sea Level Rise", *Journal of Financial Economics*, 134 (2), pp. 253–272.

Beyene, Winta, Kathrin De Greiff, Manthos D Delis, and Steven Ongena (2021) "Too-Big-to-Strand? Bond versus Bank Financing in the Transition to a Low-Carbon Economy".

Bolton, Patrick and Marcin Kacperczyk (2021) "Do Investors Care about Carbon Risk?", *Journal of Financial Economics*.

Bolton, Patrick and Marcin Kacperczyk (2023) "Global Pricing of Carbon-Transition Risk", *The Journal of Finance*.

Burck, Jan, Franziska Marten, Christoph Bals, and Niklas Höhne (2016) "Climate Change Performance Index: Background and Methodology", *Germanwatch and Climate Action Network Europe*.

Cetorelli, Nicola and Linda S Goldberg (2011) "Global Banks and International Shock Transmission: Evidence from the Crisis", *IMF Economic review*, 59 (1), pp. 41–76.

Chava, Sudheer (2014) "Environmental Externalities and Cost of Capital", *Management Science*, 60 (9), pp. 2223–2247.

Claessens, Stijn (2017) "Global Banking: Recent Developments and Insights from Research",

Review of Finance, 21 (4), pp. 1513–1555.

Conley, Timothy G, Christian B Hansen, and Peter E Rossi (2012) "Plausibly Exogenous", *Review of Economics and Statistics*, 94 (1), pp. 260–272.

Correa, Ricardo, Ai He, Christoph Herpfer, and Ugur Lel (2020) "The Rising Tide Lifts Some Interest Rates: Climate Change, Natural Disasters and Loan Pricing", *European Corporate Governance Institute – Finance Working Paper No. 889/2023*.

Dai, Rui, Rui Duan, Hao Liang, and Lilian Ng (2021) "Outsourcing Climate Change", *European Corporate Governance Institute–Finance Working Paper* (723).

De Haas, Ralph and Alexander Popov (2023) "Finance and Green Growth", *The Economic Journal*, 133 (650), pp. 637–668.

De Haas, Ralph and Neeltje Van Horen (2013) "Running for the Exit? International Bank Lending during a Financial Crisis", *The Review of Financial Studies*, 26 (1), pp. 244–285.

Degryse, Hans, Roman Goncharenko, Carola Theunisz, and Tamas Vadasz (2021) "When Green Meets Green", *Available at SSRN 3724237*.

Delis, Manthos, Kathrin De Greiff, and Steven Ongena (2021) "The Carbon Bubble and the Pricing of Bank Loans", *Combatting Climate Change: a CEPR Collection*.

Demyanyk, Yuliya and Elena Loutskina (2016) "Mortgage Companies and Regulatory Arbitrage", *Journal of Financial Economics*, 122 (2), pp. 328–351.

Dennis, Steven A and Donald J Mullineaux (2000) "Syndicated Loans", *Journal of Financial Intermediation*, 9 (4), pp. 404–426.

Dischinger, Matthias and Nadine Riedel (2011) "Corporate Taxes and the Location of Intangible Assets within Multinational Firms", *Journal of Public Economics*, 95 (7-8), pp. 691–707.

Doerr, Sebastian and Philipp Schaz (2021) "Geographic Diversification and Bank Lending during Crises", *Journal of Financial Economics*.

Ferreira, Miguel A and Pedro Matos (2012) "Universal Banks and Corporate Control: Evidence from the Global Syndicated Loan Market", *The Review of Financial Studies*, 25 (9), pp. 2703–2744.

Gao, Janet and Yeejin Jang (2021) "What drives global lending syndication? effects of cross-country capital regulation gaps", *Review of Finance*, 25 (2), pp. 519–559.

Giannetti, Mariassunta and Luc Laeven (2012) "The Flight Home Effect: Evidence from the Syndicated Loan Market during Financial Crises", *Journal of Financial Economics*, 104 (1), pp. 23–43.

Giannetti, Mariassunta and Yishay Yafeh (2012) "Do Cultural Differences between Contracting Parties Matter? Evidence from Syndicated Bank Loans", *Management Science*, 58 (2), pp. 365–383.

Hale, Galina, Tümer Kapan, and Camelia Minoiu (2020) "Shock Transmission Through Cross-Border Bank Lending: Credit and Real Effects", *The Review of Financial Studies*, 33 (10), pp. 4839–4882.

Houston, Joel F., Chen Lin, and Yue Ma (2012) "Regulatory Arbitrage and International Bank Flows", *The Journal of Finance*, 67 (5), pp. 1845–1895.

Hsu, Angel, D Esty, M Levy, and Alex de Sherbinin (2016) "2016 Environmental Performance Index (EPI)", *Yale Center for Environmental Law and Policy (YCELP) and Center for International Earth Science Information Network (CIESIN), Columbia University*.

Hsu, Po-Hsuan, Kai Li, and Chi-Yang Tsou (2022) "The Pollution Premium", *Journal of Finance, Forthcoming*.

Huizinga, Harry, Luc Laeven, and Gaetan Nicodeme (2008) "Capital Structure and International Debt Shifting", *Journal of Financial Economics*, 88 (1), pp. 80–118.

Ilhan, Emirhan, Zacharias Sautner, and Grigory Vilkov (2021) "Carbon Tail Risk", *The Review of Financial Studies*, 34 (3), pp. 1540–1571.

Ivanov, Ivan, Mathias S Kruttli, and Sumudu W Watugala (2021) "Banking on Carbon: Corporate Lending and Cap-and-Trade Policy", *Available at SSRN 3650447*.

Ivashina, Victoria (2009) "Asymmetric Information Effects on Loan Spreads", *Journal of Financial Economics*, 92 (2), pp. 300–319.

Ivashina, Victoria, David S Scharfstein, and Jeremy C Stein (2015) "Dollar funding and the lending behavior of global banks", *The Quarterly Journal of Economics*, 130 (3), pp. 1241–1281.

Kacperczyk, Marcin T. and Jose-Luis Peydro (2021) "Carbon Emissions and the Bank-Lending Channel".

Karolyi, Andrew G. and Alvaro G. Taboada (2015) "Regulatory Arbitrage and Cross-Border Bank Acquisitions", *The Journal of Finance*, 70 (6), pp. 2395–2450.

Khwaja, Asim Ijaz and Atif Mian (2008) "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market", *American Economic Review*, 98 (4), pp. 1413–42.

Krueger, Philipp, Zacharias Sautner, and Laura T. Starks (2020) "The Importance of Climate Risks for Institutional Investors", *The Review of Financial Studies*, 33 (3), pp. 1067–1111.

Kruse, Tobias, Antoine Dechezleprêtre, Rudy Saffar, and Leo Robert (2022) "Measuring Environmental Policy Stringency in OECD Countries: An Update of the OECD Composite EPS Indicator".

Kruttli, Mathias S, Brigitte Roth Tran, and Sumudu W Watugala (2021) "Pricing Poseidon: Extreme Weather Uncertainty and Firm Return Dynamics".

Laeven, Luc and Alexander Popov (2023) "Carbon Taxes and the Geography of Fossil Lending", *Journal of International Economics*, 144, p. 103797.

Lee, David S, Justin McCrary, Marcelo J Moreira, and Jack R Porter (2021) "Valid T-ratio Inference for IV",Technical report, National Bureau of Economic Research.

Lehmann, Pola, Simon Franzmann, Tobias Burst, Sven Regel, Felicia Riethmüller, Andrea Volkens, Bernhard Weßels, and Lisa Zehnter (2023) "The Manifesto Data Collection. Manifesto Project (MRG/CMP/MARPOR). Version 2023a".

Li, Xiaoyang and Yue M Zhou (2017) "Offshoring Pollution while Offshoring Production?", *Strategic Management Journal*, 38 (11), pp. 2310–2329.

Lin, Chen, Yue Ma, Paul Malatesta, and Yuhai Xuan (2012) "Corporate Ownership Structure and Bank Loan Syndicate Structure", *Journal of Financial Economics*, 104 (1), pp. 1–22.

Litterman, Bob (2021) *Climate Risk: Tail Risk and the Price of Carbon Emissions-Answers to the Risk Management Puzzle*, John Wiley & Sons.

Meguid, Bonnie M (2005) "Competition between Unequals: The Role of Mainstream Party Strategy in Niche Party Success", *American Political Science Review*, 99 (3), pp. 347–359.

Mian, Atif (2006) "Distance Constraints: The Limits of Foreign Lending in Poor Economies", *The Journal of Finance*, 61 (3), pp. 1465–1505.

Mueller, Isabella and Eleonora Sfrappini (2022) "Climate Change-Related Regulatory Risks and Bank Lending", *ECB Working Paper*.

Nguyen, Duc Duy, Steven Ongena, Shusen Qi, and Vathunyoo Sila (2022) "Climate Change Risk and the Cost of Mortgage Credit", *Review of Finance*.

OECD (2016) "Environmental Policy: Environmental Policy Stringency Index".

Olea, José Luis Montiel and Carolin Pflueger (2013) "A Robust Test for Weak Instruments", *Journal of Business & Economic Statistics*, 31 (3), pp. 358–369.

Ongena, Steven, José-Luis Peydró, and Neeltje Van Horen (2015) "Shocks Abroad, Pain at Home? Bank-Firm-Level Evidence on the International Transmission of Financial Shocks", *IMF Economic Review*, 63 (4), pp. 698–750.

Ongena, Steven, Alexander A. Popov, and Gregory F. Udell (2013) ""When the Cat's Away the Mice will Play": Does Regulation at Home Affect Bank Risk-Taking Abroad?", *Journal of Financial Economics*, 108 (3), pp. 727–750.

Painter, Marcus (2020) "An Inconvenient Cost: The Effects of Climate Change on Municipal Bonds", *Journal of Financial Economics*, 135 (2), pp. 468–482.

Poortinga, Wouter, Stephen Fisher, Gisela Bohm, Linda Steg, Lorraine Whitmarsh, and Charles Ogunbode (2018) "European Attitudes to Climate Change and Energy. Topline Results from Round 8 of the European Social Survey".

Qian, Jun and Philip E Strahan (2007) "How Laws and Institutions Shape Financial Contracts: The Case of Bank Loans", *The Journal of Finance*, 62 (6), pp. 2803–2834.

Rose, Andrew K (2004) "Do We Really Know that the WTO Increases Trade?", *American Economic Review*, 94 (1), pp. 98–114.

Seltzer, Lee, Laura T Starks, and Qifei Zhu (2020) "Climate Regulatory Risks and Corporate Bonds", *Nanyang Business School Research Paper* (20-05).

Spoon, Jae-Jae, Sara B Hobolt, and Catherine E De Vries (2014) "Going Green: Explaining Issue Competition on the Environment", *European Journal of Political Research*, 53 (2), pp. 363–380.

Stroebel, Johannes and Jeffrey Wurgler (2021) "What Do you Think about Climate Finance?", *Journal of Financial Economics*, 142 (2), pp. 487–498.

Sufi, Amir (2007) "Information Asymmetry and Financing Arrangements: Evidence from Syndicated Loans", *The Journal of Finance*, 62 (2), pp. 629–668.

Tamura, Kentaro and Evangelos Tabakis (2013) "The Use of Credit Claims as Collateral for Eurosystem Credit Operations", *ECB Occasional Paper* (148).

Internet appendix

A   Data description

A.1   Climate policy stringency and the CCPI

The Climate Change Performance Index (CCPI) has been internationally recognized for assessing a country's climate change performance index. Here are a few examples showing the index's impact:

- The Institutional Investor Group on Climate Change (IIGCC) has named the CCPI "recommended methodology" for climate-proofing sovereign bonds (link), and the CCPI presents countries' rankings at the COP to the UNFCCC (link);

- The European Parliament has ranked the CCPI "first" within their ten composite indices for policy-making (link);

- The G20's Financial Stability Board (FSB) has named the CCPI a proxy for transition risks as part of their research on the availability of data to assess climate-related risks to financial stability (link);

- The World Bank has referenced the CCPI as one of the three most robust key performance indicators for sovereign sustainability globally (link);

- BlackRock has undertaken major research of CCPI-adjusted smart-beta strategies making extensive use of the Germanwatch data, as part of their systemic research approach (link);

- NN Investment Partners, a subsidiary of Goldman Sachs, has published a statement on creating net-zero investment portfolios within sovereign bonds, referencing their use of the CCPI database (link).

A.2 Country characteristics

Due to the possible effect of country-level characteristics on cross-border lending and climate policy stringency, we collect information about countries' economic conditions, culture, demography, law, and quality of institutions from several sources (Worldwide Governance Indicator, The Heritage Foundation, Fraser Institute among others). The common language and distance dummy variables come from Rose (2004). We also measure countries' competition in the domestic banking sector as the share of the five largest banks in total bank deposits. Finally, to examine whether the quality of banking system regulation affects cross-border lending activity, we rely on Barth et al. (2013) data set and their measures of countries' stringency of bank regulation -capital regulation, independence of supervisory authority and power of supervisory authority indices.[i]

A.3 Carbon intensity measure

We gather borrower-level data on carbon intensity from Sustainalytics. Sustainalytics rates the sustainability of publicly-listed companies based on their social, environmental, and corporate performance. It offers a time-varying carbon risk rating based on carbon emissions for 4,000 companies from 2013 to 2017. The rating is an effort to assess the degree to which a company is exposed to unmanaged carbon risk, or the risks arising in the transition process to a low-carbon economy. We create the variable *high carbon intensity risk* as a dummy variable equal to 1 if the firm is assigned to a Severe, High, or Medium Carbon Risk Category according to the final overall firm's carbon risk rating score.[ii] We compile data for 1,419 firms, of which 72.5 percent are defined as at high carbon intensity risk.

---

[i]The data set provides information on bank regulation, supervision, and monitoring in more than 100 countries. As the indices are not available annually, we follow the literature and use the value of the variables from the third survey (data as of 2005) for 2005 to 2010, and the value of the variables from the last survey for the period 2011 ongoing.

[ii]The Carbon Risk Rating score ranges in the interval [0;100]. The score band and assigned categories are organized as follows: 0.00 - Negligible Risk; 0.01-9.99 - Low Risk; 10-29.99 - Medium Risk; 30-49.99 - High Risk; ≥50 - Severe Risk.

Figure A1: **Variation in the climate policy stringency**

This figure reports the average value against the Climate Change Performance Index (CCPI) standard deviation for each country included in our sample. The CCPI score takes values in the interval [0;100], where higher values proxy a country with a more stringent climate policy. The panel consists of 39 countries over the period 2007-2017. Dots are colored according to the regional area where countries are located (Europe, Anglo-Saxon, Asia, and Emerging markets). The y-axis shows the standard deviation, while the x-axis shows the average value of the CCPI. For the list of the countries included in our sample, see Figure A3. For the variation in each CCPI component, see Figure A4.
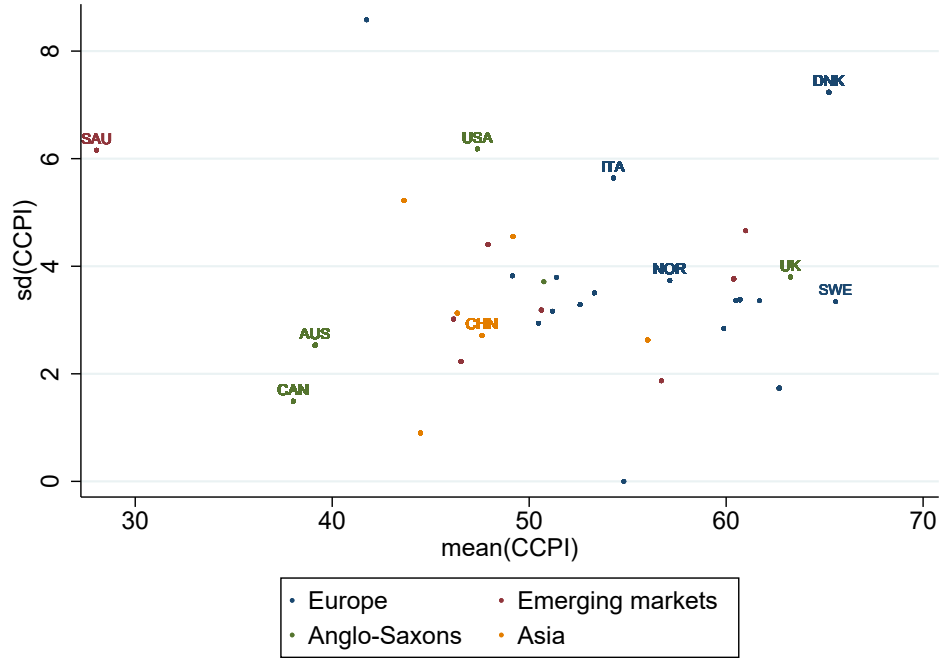
Figure A2: **Evolution over time and changes in climate policy stringency**

This figure shows the evolution and percentage change in the CCPI index over the period 2007-2017 for a sample of representative countries. The x-axis shows the sample period. In Panel A, the y-axis shows the CCPI values; in Panel B, the y-axis shows the change in the CCPI. For the list of the countries included in our sample, see Figure A3.
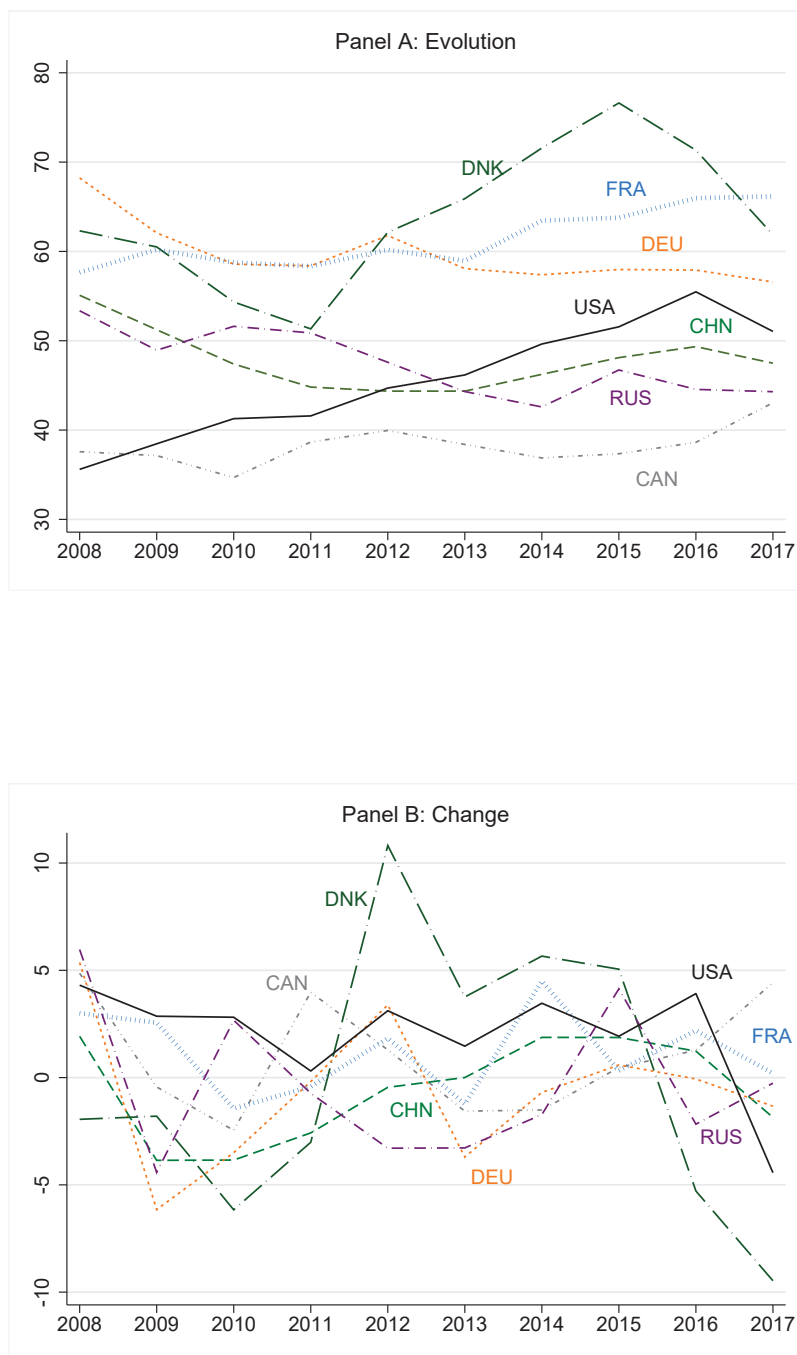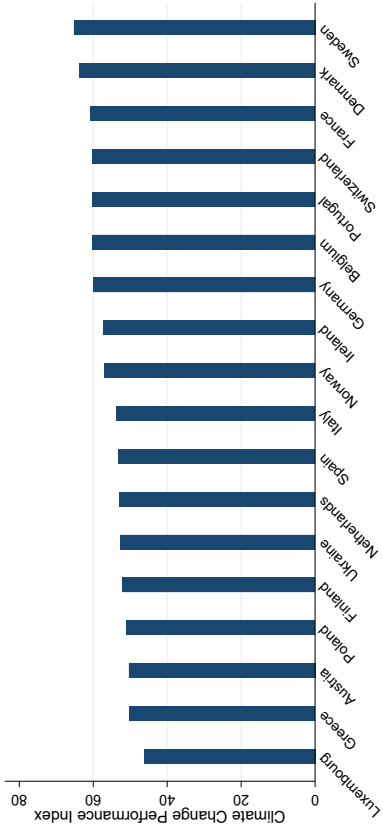
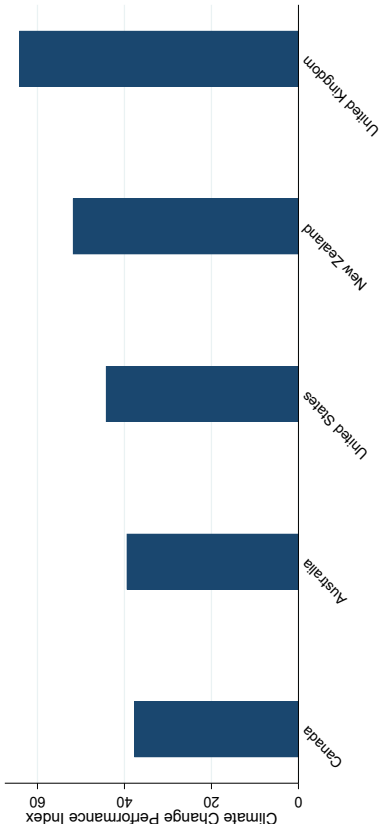Figure A3: **Average home country climate policy**

This graph reports the average Climate Change Performance Index (CCPI) for each country included in our sample over the period 2007-2017.
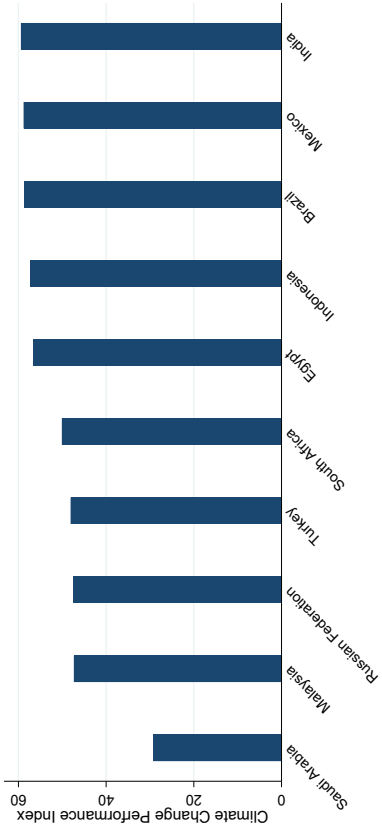

(a) Europe

(b) Anglo-Saxons

(c) Emerging markets

(d) Asia
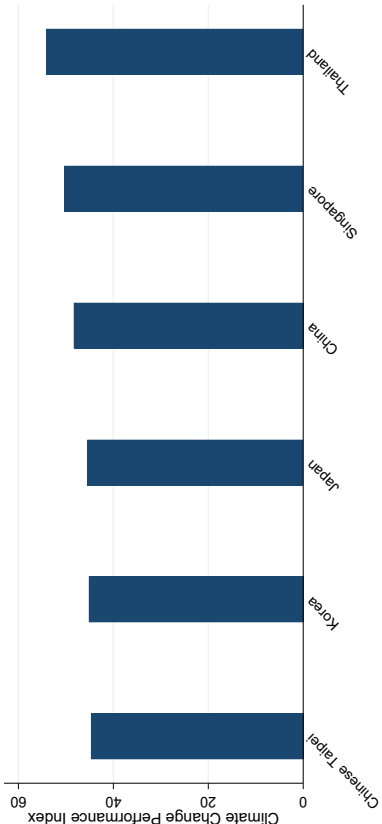
Figure A4: **Variation in CCPI components**

This figure reports the average value against the standard deviation of each component of the CCPI index and for each country included in our sample. The *GHG emissions* component's value range in the interval [0;60]. The *Climate policy* component's value range in the interval [0;20]. The *Renewable energy* component's value range in the interval [0;10]. The *Energy efficiency* component's value range in the interval [0;10]. The panel consists of 39 countries over the period 2007-2017
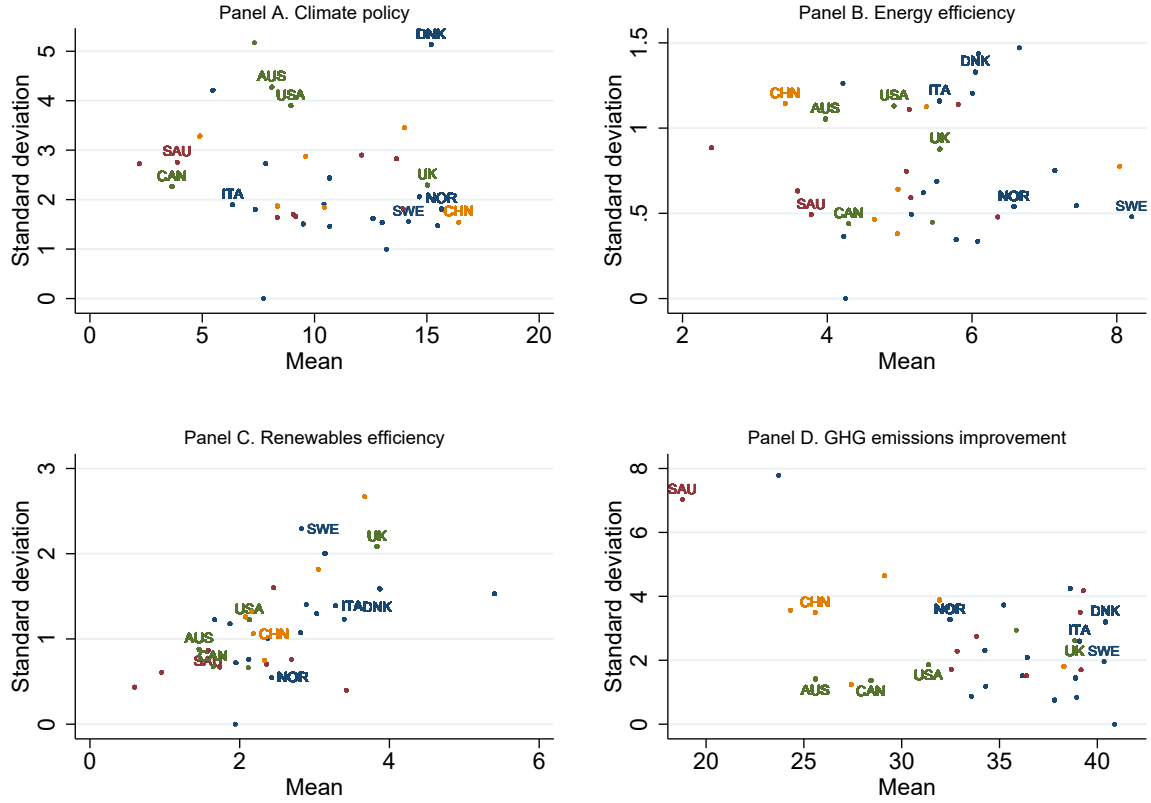
Figure A5: **Correlation between home country climate policy and cross-border bank lending**

This figure reports the correlation between the climate policy stringency measured by the Climate Change Performance Index (CCPI) and the share of cross-border lending in total lending on bank balance sheets. Share of cross-border lending is calculated as the ratio between the total cross-border loan volume that each parent bank in the sample has financed in the syndicated loan market over the period 2007-2017 and total net loans. For variable definitions, see Table A1.
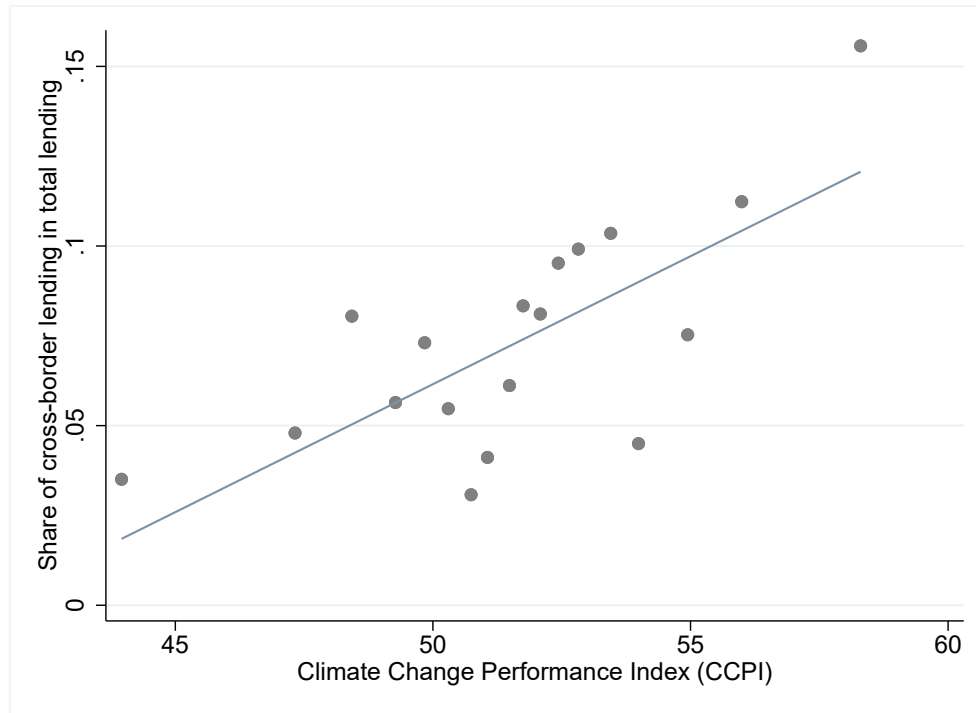
Figure A6: **The effects of climate policy stringency on cross-border lending: Main results**

These maps visually depict the main results of our analysis. Specifically, it shows three sample countries (United Kingdom, Brazil, and Australia) to represent the intuition and results from our study: Banks located in countries with stricter climate policy (e.g., UK) increase their cross-border lending to high carbon intensity risk firms (i.e., polluting firms) located abroad (e.g., in Brazil) compared to a similar bank that is located in a lax climate policy country (e.g., Australia) and that joins the syndicated loan granted to the same foreign firm.

Australia

United Kingdom

Brazil

2

1

3

Bank

Firm

High carbon intensity firm

Low carbon intensity firm

Differential CCPI UK-AUS =
35 index points in 2015

1. Increase in cross-border loan share by 19.25 percent

2. Increase in cross-border loan share by **32 percent**

3. Decrease in domestic loan share by **9 percent**
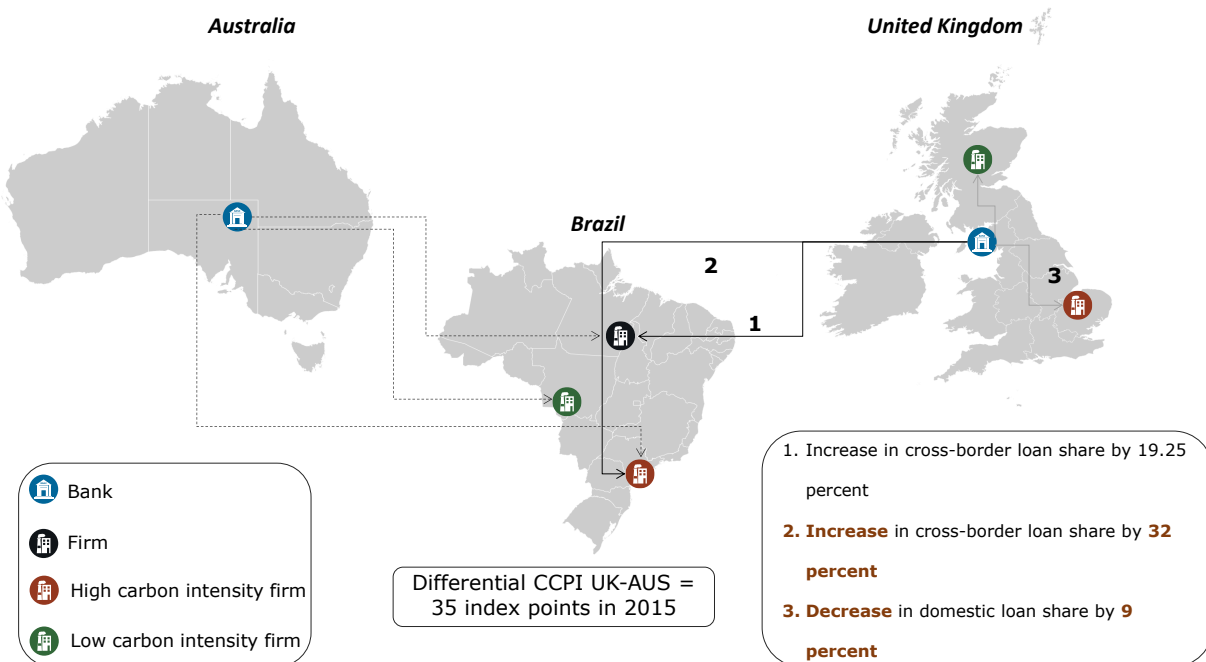
Figure A7: **Green Party share and the exclusion restriction**

This figure shows the estimated coefficient of $CCPI_{lender}$ when the exclusion restriction assumption is relaxed. The dashed lines on the y-axis are 90 percent upper and lower bounds for the estimated coefficient of $CCPI_{lender}$ with the method developed by Conley et al. (2012). The x-axis shows the direct effect of Green Party vote shares on cross-border lending after controlling for its effect through $CCPI_{lender}$ and country-level variables. For variable definitions, see Table A1.
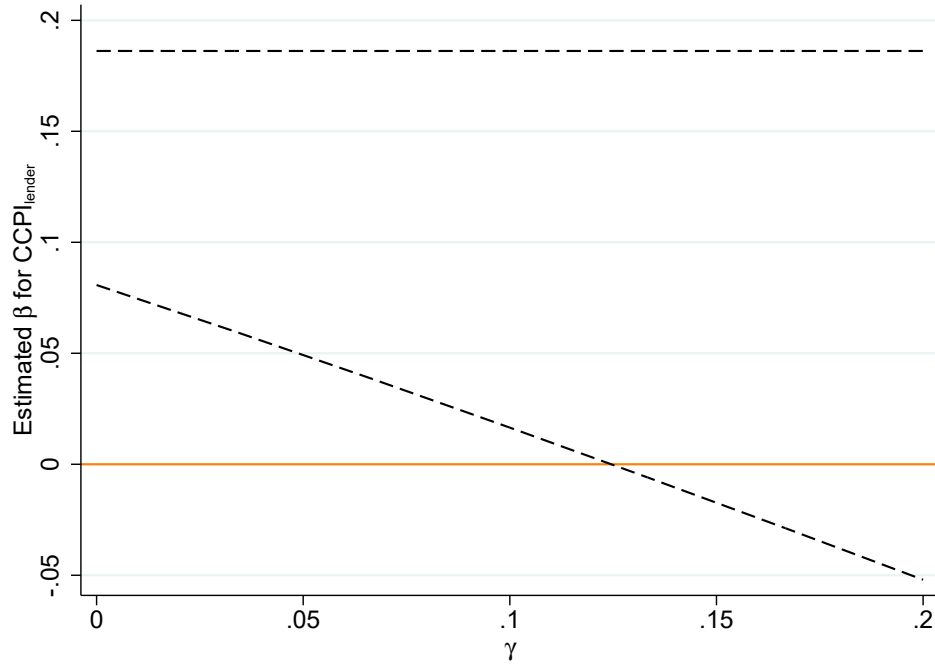
Figure A8: **Different time periods and the effect on cross-border lending**

This figure plots the coefficients of CCPI$_{lender}$, obtained from different time periods. The dependent variable is Lender Share. The models include loan fixed effects. The time periods are indicated on the x-axis. Bars indicate 90 percent confidence intervals. Standard errors are clustered at the lender's country-year level. For variable definitions, see Table A1.

Table A1: **Variables description**

Variable name	Variable definition	Source
Lender share (%)	Cross-border loan share in % values financed by syndicated loan participants.	LPC's DealScan
CCPI	Country-level climate policy stringency proxied by the Climate Change Performance (CCPI). The score ranges from [0;100]	Germanwatch e.V.
Climate Policy	Country-level climate policy measuring government efforts in national and international climate policy. 20 percent of overall CCPI score. It ranges from [0;100].	Germanwatch e.V.
GHG Emissions	Country-level measure of GHG emissions. 60 percent of overall CCPI score. It ranges from [0;100].	Germanwatch e.V.
Renewable Energy	Country-level measure of usage of renewable energies. 10 percent of CCPI overall score. It ranges from [0;100]	Germanwatch e.V.
Energy Efficiency	Country-level measure of efficiency in energy usage. 10 percent of overall CCPI score. It ranges from [0;100].	Germanwatch e.V.
Total assets (log)	The natural logarithm of the value of total assets in USD millions.	Bankscope
Net Interest Margin (%)	Percentage of earnings in interest as compared to the outgoing expenditures payed to customers.	Bankscope
Customer deposits (log)	Total customer deposits in USD millions.	Bankscope
Nonperforming loans (NPL) (%)	Ratio of loans defined to be nonperforming over gross loans in USD millions.	Bankscope
Liquidity ratio (%)	Ratio of liquid assets over deposits and short-term funding.	Bankscope
GDP per capita (log)	Logarithm of gross domestic product divided by midyear population at the country-year level.	World Bank
GDP growth (%)	Annual GDP growth rate.	World Bank
Domestic credit to GDP (%)	Domestic credit to private sector as % of GDP at the country-year level.	World Bank
Unemployment rate (%)	Number people unemployed as a percentage of the labour force at the country-year level.	World Bank
Population growth rate (%)	Annual population growth rate calculated as the exponential rate of growth of midyear population from year t-1 to t. Population counts all residents regardless of legal status or citizenship.	World Bank
Old workforce (%)	Ratio of older dependents–people older than 64–to the working-age population–those ages 15-64.	World Bank
Young workforce (%)	Ratio of young dependents–people younger than 15–to the working-age population–those ages 15-64.	World Bank
Common Language	Dummy variable that is equal to one if the two countries share the same language or have a former colonial relation.	Rose (2004)

Table A1 (cont.): **Variables description**

Variable name	Variable definition	Source
Distance (log)	Log of geographic distance borrower-lender's country.	Rose (2004)
High Carbon Intensity Risk	Dummy variable equals to 1 if the company (borrower) is assigned to a High, Severe, or Medium Carbon Risk Category; 0 otherwise (Negligible or Low Carbon Risk Category). Specifically, based on the distribution of the carbon risk scores, each company is assigned to one of the five Carbon Risk Categories.	Sustainalytics
Property rights	Score that ranges from 0 to 100. Countries with more secure property rights and legal institutions that are more supportive of the rule of law receive higher ratings.	Fraser Institute Website (2008)
Number of days to enforce contracts (log)	The enforcing contracts indicator measures the time and cost for resolving a commercial dispute through a local first-instance court and the quality of judicial processes index. It counts the number of days the lawsuit filing in court until payment.	World Bank Doing Business Database
Strength of legal rights index	Strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders, facilitating lending. The index ranges from 0 to 12, with higher scores indicating that these laws are better designed to expand access to credit.	World Bank Doing Business Database
Top five bank concentration (all banks)	The fraction of total assets held by the five largest banks in the country.	World Bank Global Financial Development Database
Capital regulatory index	The sum of overall capital regulatory stringency and initial capital stringency, which measures whether certain funds may be used to initially capitalize a bank and whether they are officially verified. A higher value indicates greater stringency. We use the latest available observation of the same country if the data is missing.	Barth et al. (2013)
Independence of supervisory authority	The degree to which the supervisory authority is independent of the government and legally protected from the banking industry. The indicator is constructed based on the following three questions. (1) Are the supervisory bodies responsible to (a) the Prime Minister, (b) the Finance Minister or other senior government officials, or (c) a legislative body (yes = 1)? (2) Whether the supervisors can be sued if they take of the supervisory agency have a fixed term actions against a bank (No = 1)? (3) Does the chair value means a more independent supervisory contract and how long? (=1 if term ≥ 4). Higher values mean more independent supervisory authority. We use the latest available observation of the same country if the data is missing.	Barth et al. (2013)
Official supervisory power	An index aggregating supervisory power. Specifically, it indicates whether the supervisory agency has the legal right to meet directly with external auditors to discuss their report without getting approval from the bank; intervene the ownership rights; suspend the board decision to distribute dividends, among others.	Barth et al. (2013)
Green Party share (%)	Share of seats that the Green Party obtained during a given election at the country-level. The variable is calculated as the number of party seats won over total seats.	National Archives Election Results

Table A1 (cont.): **Variables description**

Variable name	Variable definition	Source
Same country	Dummy variable equal to 1 if the lender and the borrower are located in the same country; 0 otherwise This variable indicates a loan granted domestically.	LPC's DealScan
Loan amount	Log change in the amount of cross-border lending by bank i to destination country j. The variable is constructed as $\log(1+$ the amount of cross-border lending).	LPC's DealScan
Number of loans	Log change in the number of cross-border loans by bank i to destination country j. The variable is constructed as $\log(1+$ the number of cross-border lending).	LPC's DealScan
EPI	The EPI (The Environmental Policy Index) is a composite indicator that measures how countries address national environmental challenges. The EPI categories track performance and progress on two broad policy objectives: Environmental Health and Ecosystem vitality.	Hsu et al. (2016)
C3-I	The C3-I (The Climate Change Cooperation Index) measures countries' climate policy performance, both in terms of political behavior (output) and emissions (outcome).	Bernauer and Böhmelt (2013)
EPS	The OECD EPS (Environmental Policy Stringency) index is a country-specific and internationally comparable indicator of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting.	OECD (2016)

Table A2: **Emphasis on climate environmental protection across different political party groups**

This table provides summary statistics of the emphasis on environmental protection across different political party groups. The information is obtained from The Manifesto Project (Lehmann et al., 2023). The emphasis on the environment is the share of quasi-sentences in the environmental protection category, defined as general policies in favor of protecting the environment, fighting climate change, and other "green" policies. The last column reports the difference in the emphasis on environmental protection between the green parties and respective political parties. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| | Emphasis on environment | | | | | |
	Mean	25th perc.	Median	75th perc.	Max.	Diff.
Green	16.88	10.52	14.43	21.13	47.57	
Socialist	5.24	2.36	5.13	7.00	14.97	11.64***
Soc. Dem.	4.30	2.95	4.22	5.12	13.47	12.58***
Liberal	4.99	2.35	4.33	7.22	16.87	11.89***
Chr. Dem.	6.86	3.29	4.86	8.00	31.46	10.02***
Conser.	5.14	3.17	4.45	6.67	14.29	11.73***
National.	2.93	1.01	2.09	4.33	12.50	13.95***

Table A3: **Time of industrial development as an instrument for climate policy stringency**

This table reports estimates from Equation 1 in which CCPI is instrumented by the time of industrial development. The dependent variable is Lender share. The instrumental variable, ln(Years since GDP_{pc}>5k), is log of the years since GDP per capita of the country crosses five thousand dollars. The sample covers the period 2007-2017. Column (1) reports the first stage. Column (2) includes loan fixed effects. Column (3) includes country controls. Column (4) includes bank controls. 1st Stage Efficient F-statistics are calculated by the method developed by Olea and Pflueger (2013). Country control variables are GDP per capita, GDP growth, domestic credit to GDP ratio, and unemployment rate. Bank controls are Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio. Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	$\text{CCPI}_{\text{lender}}$	Lender Share		
	(1)	(2)	(3)	(4)
ln(Years since GDP_{pc}>5k)	0.430***			
	(0.063)			
$\widehat{CCPI}_{\text{lender}}$		0.128***	0.083**	0.095*
		(0.025)	(0.034)	(0.056)
Country Controls			✓	✓
Bank Controls				✓
Loan FE	✓	✓	✓	✓
Obs.	10,993	10,993	10,667	10,667
R^2	0.857	-0.025	0.008	0.012
1st Stage Eff. F-stat		34.182	10.995	5.306
Mean(Lender Share)	7.750			

Table A4: **Climate policy stringency and firm profits**

This table documents the negative correlation between climate policy stringency and firm profits. The sample covers the period 2013-2017. Column (1) uses Return on Equity as the dependent variable. Column (2) uses Return on Capital as the dependent variable. Column (3) uses the Net Profit Margin as the dependent variable. Column (4) uses the Operating margin as the dependent variable. Control variables and fixed effects are indicated at the bottom of each column. Control variables are country-level population growth, ratio of the young workforce, GDP growth, unemployment rate, monetary policy rate, GDP per capita, and domestic credit to GDP ratio. Robust standard errors are shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	ROE	ROC	Net Margin	Opr. Margin
	(1)	(2)	(3)	(4)
CCPI	-0.007**	-0.004*	-0.007**	-0.004*
	(0.003)	(0.002)	(0.003)	(0.002)
Controls	✓	✓	✓	✓
Country FE	✓	✓	✓	✓
Obs.	214	213	216	216
R^2	0.302	0.291	0.337	0.395
Mean(Dep. var.)	0.096	0.079	0.076	0.097

Table A5: **Climate policy stringency exposure from lenders and carbon emissions**

This table investigates the relationship between exposure to climate policy stringency via the lenders and the borrowers' carbon emissions. The dependent variable is the log of carbon emissions divided by total revenue. The main independent variable is CCPI exposure, which is a weighted average of lenders' CCPI where the weights are loan amounts. Column (1) uses the contemporaneous $ln(Carbon\ em./Tot.\ revenue)$. Column (2) uses $ln(Carbon\ em./Tot.\ revenue)$ one year later. Column (3) uses $ln(Carbon\ em./Tot.\ revenue)$ two years later. Fixed effects are indicated at the bottom of each column. Standard errors are robust and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	ln(Carbon em./Tot. revenue)		
	(1)	(2)	(3)
	t=0	t=1	t=2
CCPI exposure	0.008	0.022	-0.024
	(0.016)	(0.015)	(0.044)
Borrower FE	✓	✓	✓
Obs.	253	201	153
R^2	0.980	0.992	0.991
Mean(Dep. Var.)	4.738		

Table A6: **The role of domestic borrowers in race to the bottom mechanism**

This table reports estimates from Equation 1. The dependent variable is subsidiary lending, and the main independent variable is $CCPI_{lender}$. Subsidiary lending is a dummy variable that takes the value of one when the bank has a lending relationship with the parent company of the cross-border borrower in the bank's home country. The sample covers the period 2007-2017. Control variables and fixed effects are indicated at the bottom of each column. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	Subsidiary Lending		
	(1)	(2)	(3)
$CCPI_{lender}$	0.0003*	0.0004**	0.0003
	(0.0002)	(0.0002)	(0.0002)
Bank Group Controls		✓	✓
Country Controls			✓
Loan FE	✓	✓	✓
Obs.	11,671	11,671	10,776
R^2	0.925	0.925	0.934
Mean(Dep. Var.)	0.113		

Table A7: **Climate policy component and cross-border lending**

This table reports estimates from Equation 1. The dependent variable is Lender share and the main independent variable is CCPI's Climate policy$_{\text{lender}}$. The sample covers the period 2007-2017. All regressions include lagged bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1, + p<0.101.

	Lender Share				
	(1)	(2)	(3)	(4)	(5)
Climate policy$_{lender}$	0.060*	0.059***	0.059***	0.062***	0.057***
	(0.033)	(0.013)	(0.012)	(0.012)	(0.012)
Bank Group Controls	✓	✓	✓	✓	✓
Borrower FE		✓	✓		
Year FE			✓		
Borrower × Year FE				✓	
Loan FE					✓
Obs.	11,671	11,671	11,671	11,671	11,671
R^2	0.005	0.739	0.741	0.811	0.843
Mean(Lender Share)	7.595				

Table A8: **Climate policy stringency and loan terms**

This table reports estimates from Equation 1 and interacts $CCPI_{lender}$ with loan terms. Maturity is measured in months. Spread is in basis points. Covenant is a dummy variable that takes the value of one if there is a financial covenant. The sample covers the period 2007-2017. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	Lender Share		
	(1)	(2)	(3)
$CCPI_{lender} \times$ spread	0.000		
	(0.000)		
$CCPI_{lender} \times$ log(Maturity)		-0.006	
		(0.008)	
$CCPI_{lender} \times$ covenants			0.004
			(0.011)
$CCPI_{lender}$	0.048***	0.042***	0.041***
	(0.010)	(0.008)	(0.009)
Bank Group Controls	✓	✓	✓
Loan FE	✓	✓	✓
Obs.	8,915	11,601	11,671
R^2	0.807	0.843	0.844
Mean(Lender Share)	7.595		

Table A9: **Home country climate policy and cross-border loan amounts**

This table reports estimates from Equation 1. The dependent variable is log(loan amount) and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** p<0.01, ** p<0.05, * p<0.1.

	log(Loan amount)				
	(1)	(2)	(3)	(4)	(5)
$CCPI_{lender}$	0.030***	0.012***	0.012***	0.013***	0.012***
	(0.007)	(0.002)	(0.002)	(0.002)	(0.002)
Bank Group Controls	✓	✓	✓	✓	✓
Borrower FE		✓	✓		
Year FE			✓		
Borrower × Year FE				✓	
Loan FE					✓
Obs.	11,671	11,671	11,671	11,671	11,671
R^2	0.070	0.738	0.741	0.808	0.903
Mean(log(Loan amount))	17.374				

Table A10: **Climate policy stringency differentials and cross-border credit flows**

This table shows estimation results from the bank-country pair's analysis –bank-country level regressions– and effects on cross-border credit flows. We study the number (first four columns) and the volume (last four columns) of cross-border lending from bank i to country j –the country where borrower companies are located. The dependent variables are log(1+loan amount) (Volume) or log(1+number of loans) (Number) and the main independent variables $CCPI_{lender}$ and $\Delta CCPI$, which is equal to the difference between $CCPI_{lender}$ and $CCPI_{borrower}$. The sample covers the period 2007-2017. Columns (4) and (8) include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the country-pair level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Panel A

	Number				Volume			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$CCPI_{lender}$	0.029***	0.034***	0.036***	0.028***	0.074***	0.070***	0.073***	0.057***
	(0.008)	(0.005)	(0.005)	(0.005)	(0.013)	(0.010)	(0.010)	(0.011)
Bank Group Controls				✓				✓
Borrower country FE		✓				✓		
Borrower country × Year FE			✓	✓			✓	✓
Obs.	4,211	4,208	4,185	4,185	4,211	4,208	4,185	4,185
R²	0.042	0.275	0.318	0.354	0.081	0.237	0.309	0.372
Mean(dep. var.)	2.198				19.495			

Panel B

	Number				Volume			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta CCPI$	0.025***	0.028***	0.036***	0.028***	0.029***	0.055***	0.073***	0.057***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.008)	(0.009)	(0.010)	(0.011)
Bank Group Controls				✓				✓
Borrower country FE		✓				✓		
Borrower country × Year FE			✓	✓			✓	✓
Obs.	4,211	4,208	4,185	4,185	4,211	4,208	4,185	4,185
R²	0.058	0.265	0.318	0.354	0.024	0.222	0.309	0.372
Mean(dep. var.)	2.198				19.495			

Table A11: **Imputing the missing loan share**

This table reports estimates from Equation 1 when we impute the missing loan shares. The dependent variable is Lender share and the main independent variable is $CCPI_{lender}$. The sample covers the period 2007-2017. All regressions include bank group level controls (net interest margin, Tier 1 capital ratio, log(total assets), log(customer deposits), and liquidity ratio). Control variables and fixed effects are indicated at the bottom of each column. Standard errors are clustered at the lender's country-year level and shown in parentheses. For variable definitions, see Table A1. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Lender Share			
	(1)	(2)	(3)	(4)
$CCPI_{lender}$	0.038***	0.040***	0.030***	0.020***
	(0.014)	(0.011)	(0.006)	(0.006)
Bank Group Controls	✓	✓	✓	✓
Borrower FE	✓	✓		
Year FE		✓		
Borrower × Year FE			✓	
Loan FE				✓
Obs.	38,634	38,634	38,634	38,634
R^2	0.585	0.588	0.847	0.916
Mean(Lender Share)	16.734			