# Climate Transition Risk and Bank Lending

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**Abstract**

We collect data from multiple sources to investigate bank lending practices in response to increased climate transition risk (CTR). We exploit the 2015 Paris Agreement on climate change in an event-like framework to investigate how banks in the global syndicated loan market changed the pricing and supply of credit to larger emitters in the years following the agreement. We measure CTR by considering both the bank borrowers' level of pollution and the attention to climate issues of the government where borrowers are located. Our evidence indicates that after the Paris Agreement banks applied higher loan price to borrowers with higher carbon emissions in countries where climate policy is more stringent. At the same time, banks granted larger amount but progressively lower share of loans to those borrowers. Overall, the evidence on banks' reaction to increasing CTR is mixed and influenced by the level of borrowers' exposure to climate risk as well as by the environmental agenda within governements were borrowers are located.

*Keywords*: Climate change risk; Loan pricing; Loan supply; Syndicated Loans; Carbon emissions; Paris Agreement

*JEL classification*: G2; Q3; Q5.

# 1 Introduction

Climate change has been at the core of policy makers' agenda for some time now because it constitutes a threat to the future of the world under a wide spectrum of perspectives. In the banking industry, for example, both physical impacts of changing climate and transition risk due to climate change mitigation policies entail emerging risks for bank balance sheets, with consequences in terms of financial stability (Brunetti et al., 2021).

A mechanism by which climate change may affect bank balance sheet is through the lending channel. To explain the mechanism, increased climate change risk may directly impact businesses and households, by determining asset stranding, property deterioration, and higher capital expenditure due to transition. It follows that banks more exposed to those households and businesses can suffer from increased default rates and collateral deterioration. As far as transition risk is concerned, the adoption of mitigation policies and changes in sentiment toward climate change may impact polluting companies' business and, through them, their banks and the financial system in general.

In this paper we investigate how banks react to climate transition risks (from now on, CTR), namely, those risks associated with the transition to a lower-carbon economy. We address the following questions: Do banks charge higher loan spread to more polluting (i.e., riskier), firms? Do they cut back lending to those firms as a consequence of increasing CTR?

Addressing these questions has relevant policy implications, as banks are important actors in the low-carbon transition. If banks have climate sentiments, i.e. they form expectations about the impacts of climate change on their exposures, they could adjust their investment decisions, thereby influencing the outcome of the transition. However, while in principle higher risks would be associated with higher cost of funding for riskier firms, whether banks would adjust their risk assessment to increased CTR and how this would affect bank credit allocation strategies is not obvious. This is because measuring CTR is difficult, depending on firm and industry specific characteristics. Moreover, perception of CTR is strongly associated with the credibility of climate policy implementation. Delays in climate policy enforcement, and policy incoherence, for example, may contribute to weaken market signalling to investors and increase uncertainty about the realisation of climate-related financial risks. This can affect banks' risk assessment and, hence, their propensity to invest into high-carbon firms.

Against this background, in this work we rely on the 21st Conference of the Parties (COP21, also known as Paris Agreement) as an event that raised CTR concerns.[1] Specifically, we exploit COP21 in an event-like framework and investigate whether banks in the global syndicated loan market changed their lending practices to larger emitters in the years following the agreement, i.e., since 2016 onward. We collect data from various sources to control for a large set of fixed and time

[1] The 2015 Paris Agreement represented a pivotal moment in the fight against climate change, as for the first time ever, countries agreed to work together to limit global warming

variant characteristics at the firm, industry, loan facility, and bank level. We also gather country-specific information on public awareness about climate change.

The comprehensiveness of our dataset enables us to construct a measure of exposures to CTR that takes into account three dimensions: the amount of carbon emission at the borrower level, a policy shock rising awareness about climate change, and climate policy stringency at the country level. We find a positive association between loan price and borrowers' carbon emissions in countries where climate policy stringency is higher, after COP21. Larger emitters in more climate-sensitive countries get on average higher loan volumes. Yet, an analysis of lenders' portfolio mix shows that banks reduced the loan share to more polluting borrowers since 2016.

The richness of our data allows us to address other relevant questions. We exploit heterogeneity in our dataset to explore non-linearities and investigate bank behavior with respect to highly vulnerable borrowers, as for the level of both (idiosyncratic) CO2 emissions and (country-specific) climate policy stringency. Our evidence points to a non-linear relationships between loan variables and CTR. We also test for whether EU banks react differently to increased CTR than banks located in jurisdictions less ambitious in copying with climate change. Results do not show striking differences between EU and non-EU banks. Furthermore, we test for whether banks identified as "green" display stronger effects in incorporating CTR in their lending decisions. We find only limited evidence supporting the hypothesis that banks labeled as "green" react to CTR differently than non-green banks.

In additional checks, we group borrowers according to the industry level of carbon emissions. We find strong evidence of a pricing effect (where borrowers from more polluting industries are charged higher prices) but, at the same time, of increased credit exposure to more polluting industries.

Overall, we find that following the Paris agreement, banks have charged higher spread to larger emitters from countries with more stringent climate policy as well as to borrowers from more polluting industries. Evidence on loan supply is mixed. Considering bank exposure at the borrower-level, banks increased the amount of resources allocated to more polluting firms, while progressively reducing the share allocated to those borrowers. Considering bank exposure at the industry level, interestingly, banks increased both the amount and the share of resources allocated to more polluting industries.

This paper contributes to the literature on climate risk in bankng in several manners. First, unlike most of previous works that focus on the loan pricing effects of climate risk, we investigate bank lending behaviour more comprehensively by studying the implication of climate transition risk on both loan price and credit supply. Second, while previous studies employ either supervisory data (e.g. Degryse et al., 2020; Ivanov et al., 2021) or syndicated loans market data (e.g. Ehlers et al., 2021, Benincasa et al., 2021), our work relies on a rich dataset that combines information from multiple sources to gauge the triple dimension of exposure to climate change risk at bank, borrower and country levels.

Relying on a comprehensive dataset in studies on CTR is relevant for several reasons. Using

country-level measures only would be misleading since country-level variation could be driven by sources other than carbon transition (Bolton et al., 2021). Going beyond industry-level analysis is also important as each bank faces "idiosyncratic climate-related financial risks within its portfolio, according to the geographies, markets, sectors, political environment and tecnological frontiers to which its clients and counterparties are exposed" (BIS, 2021b).[2] In addition, employing firm-level data for carbon emission measurement is consistent with CTR definitions adopted by financial authorities in their climate stress test exercises (Baudino and Svornos, 2021).

Moreover, using bank-borrower data from syndicated loan market is important to address the identification challenge of disentangling credit demand from supply, as lending to particular borrower categories may vary not only as a result of changes in supply but also as an effect of changes in demand of credit. In fact, we are able to control not only for bank-specific factors, but also for firm-specific characteristics that can affect bank loan price and amount. Finally, the syndicated loan market constitutes an ideal setting to investigate banking behavior in a context of CTR because of the peculiarities of syndicated deals, which include the lead arrangers' incentives and responsabilities towards other members of the syndicate (Ivashina, 2009).

The rest of the paper is organized as follows: Section 2 illustrates the institutional framework by focusing on definition of climate change-related risks and their impact on financial insitutions. Section 3 reviews the existing literature and sets out the testable predictions. Section 4 illustrates data and methodology. Sections 5 comments on the results. Section 6 concludes.

# 2 Institutional framework

## 2.1 Climate change-related risk and implications for financial systems

Climate change generates a multifaceted set of risks whose consequences could go far beyond the well known threats to ecosystems. Societies and economies may be seriously affected by extreme or rising temperatures, resulting in relevant geopolitical risks. At the same time, climate change could be a source of monetary and financial instability (e.g. Dafermosa et al., 2018; Bolton et al., 2020; Lamperti et al., 2019; Alogoskoufis, et al., 2021).

As for the implications of climate change for financial stability, there are two channels at work: the physical impacts of climate-related shocks and risk of transition towards a "greener" economy. More precisely, physical risks represent *"the economic costs and financial losses due to increasing frequency and severity of climate-related weather events (e.g. storms, floods or heat waves) and the effects of long-term changes in climate patterns (e.g. ocean acidification, rising sea levels or changes in precipitation)"* (Bolton et al., 2020).[3] Transition risks, instead, are

[2] Even if companies tend to exhibit risk exposure commonalities along sectoral classification for climate transition risk, sectoral classification can mask heterogeneity within a given sector: individual firm may demonstrate differing carbon intensities, energy mixes, or adaptive capabilities (e.g. Ehlers et al., 2021; ESRB, 2020).

[3] Physical risk is categorised as *acute* when it arises from extreme events (storms, floods, heat waves), while it is

associated "*with the uncertain financial impacts that could result from a rapid low-carbon transition, including policy changes, reputational impacts, technological breakthroughs or limitations, and shifts in market preferences and social norms*" (Bolton et al., 2020).

The determinants of physical and transition risks may impact economic activities, which in turn may affect the health of financial system, either directly, for example, by inducing macro-financial changes, or indirectly in the form of lower profitability or devaluation of assets of companies financed through banks and financial markets. It follows that both risk categories can manifest themselves in terms of financial risks, i.e., credit risk, market risk, liquidity risk, operational risk, insurance risk, and reputational risk. For instance, natural disasters, when happening to severely affect economic activity, can quickly destabilise financial markets (Bolton et al., 2020). They can trigger a sharp stock market correction, resulting in a major loss of financial wealth, and determine a spike in demand for liquidity. Likewise, transition risks may threaten financial stability by sparking runs on brown assets, if actions directed at greening the economy may generate the expectation that other investors are willing to exclude high-carbon companies from their portfolios (Jondeau et al., 2021).

Although intertwined, climate-related risks differ from conventional financial risks in many peculiar aspects (Carney, 2021).[4] First, they tend to be unexpected, therefore past data provide little help when forecasting future evolution. Then, they are likely to impact entities in each sector and country, in a correlated, non-linear and irreversible manner. Also, while we can predict that they will manifest themselves at some point, the exact time and magnitude of such manifestation are uncertain. In addition, while physical risks are long-term, action to cope with them has to be taken "now" in order to have an impact (Carney, 2015). For all these reasons, climate change represents a systemic risk affecting the whole real economy and the financial system alike.

As far as the banking sector is concerned, physical risks and transition risks may impact bank balance sheet through the traditional categories of credit, liquidity, and market risks (BIS, 2021a). For example (see Reghezza et al., 2021, among others), extreme weather events may have negative effects on properties, agricultural productivity, human labor and physical assets, thus impairing firm profitability and balance sheets. This "physical" channel is likely to translate into higher credit risk for banks as damages to borrowers'activity may entail lower creditworthiness and higher default probability. Transition risks can also impair bank balance sheets due to *unanticipated* changes in climate policies, regulations, and even technologies and market sentiment. A possible repercussion of CTR could be a repricing of bank asset values. This may result into fire sales of carbon-intensive assets, which could determine liquidity problems in

defined as *chronic* when it arises from progressive shifts, such as increasing temperatures, sea-level rises, water stress, biodiversity loss, land use change, habitat destruction and resource scarcity (ECB, 2020).

[4] Mark Carney, a former Governor of the Bank of England, has played a prominent role in building awareness on the repercussions of climate change on financial markets, making insurance companies and banks more sensitive towards this emerging source of risk.

banks more exposed to climate-sensitive sectors. A second consequence relates to higher market risk due to increased uncertainty and procyclicality. In addition, unanticipated changes may also spur technological developments and/or changes in consumers' behavior, which may lower the profitability of carbon-intensive firms. In turn, this could result into higher credit risk for banks.[5]

Climate-related risks have become material to the banking system to the extent that banking authorities have launched specific stress tests aimed at evaluating banks' exposure to climate risks (Baudino and Svornos, 2021). According to the European Banking Authority, making the financial system sound and resilient to climate-related risks is a necessary step to facilitate a smooth transition to a low-carbon economy and mitigate the potentially disruptive impact of envirnmental risks (EBA, 2021). The ECB, for instance, identifies climate-related risks as a key risk in the SSM Risk Map for the Euro Area banking system (ECB, 2020; ECB, 2022) and promotes the adoption of a strategic, forward-looking and comprehensive approach to climate-related risks among institutions. Still, the role played by the banking sector in this process is unclear. In principle, as important providers of credit to the real economy, banks should be positioned to play a pivotal role in influencing the meeting of climate change-related goals. However, evidence points to the fact that financial markets are more effective than banks in performing such a stimulus: De Haas and Popov, 2019, for instance, show that stock-market based financial systems are tightly associated with better environmental quality. Hence, they suggest that countries whose financial system is bank-based and which aim to green their economy could consider giving impulse to the development of conventional equity markets, on top of the promotion of green bonds or other financial initiatives. On an even more extreme view, other works underlined that the banking system may also act as a barrier to a low-carbon economy. For instance, Degryse et al., 2020 show that, by preventing the financing of entry and innovation in industries most exposed to green technology externalities, banks can indeed slow the "green transition".

### 2.2. Measures of exposure to climate transition risks and the Paris Agreement

A relevant topic in the discussion on the impact of climate change in banking deals with the issue of how to measure bank and borrower exposure to climate-related risks. Relatedly, developing proper climate-specific risk management tools for banks is difficult and cumbersome (BIS 2021b; NGFS, 2019; FSB, 2020).

As far as transition risk is concerned, academics, supervisors and banks commonly base their measures on the amount of CO2 emissions (ECB, 2021a; ECB, 2021b). The underlying idea is that more polluting firms are more likely to be targeted by climate regulation, which may entail costs and losses for banks triggered by the mechanisms described in the previous section. Another

[5] According to Carney (2021), three lines of business are especially vulnerable to CTR: lending to high-carbon intensity sectors (where many assets are likely to become stranded), auto loans and consumer credit (e.g., if new emission standards will determine a loss in the residual values of vehicles), and mortgages (e.g., if properties used as collateral depreciate due to lack of compliance to new energetic parameters) (Carney, 2021).

common proxy for CTR is the stringency of climate policies in a given country (e.g. Benincasa et al., 2021; Delis et al., 2021). In this view, if climate change mitigation is a priority in the national political agenda, it is more likely that companies will have to face rules and fines, or to sustain unplanned investments in greener technology in order to adapt to the new framework.

Another way to measure CTR is also by looking at significant events that have introduced limits to activities of companies, countries and investors (such as the introduction of the European Trading Scheme in 2005, see Fard et al., 2020) or that have changed people's, policy makers' and institutions' perception of environmental matters. In this last respect, an event commonly regarded as a major spark of climate transition risk is the document ratified at the closing of the 21st Conference of the Parties (COP21) on December 12th, 2015, also known as Paris Agreement (e.g. Reghezza et al., 2021; Delis et al., 2021). The Agreement, which brought together 194 Parties, set out a global framework to avoid dangerous climate change, in the ambitious attempt to reach climate-neutrality before the end of the century. The best-known resolution of the Agreement is the one related to mitigation policies, meaning actions concerning the reduction of greenhouse gas (GHG) emissions to limit global warning.[6] To achieve this ambituous goal, countries have agreed to review their own commitments every five years, as well as to provide financing to developing countries to mitigate climate change and strengthen resilience to adapt to climate impact. With its entry into force on November 4th, 2016, the Paris Agreement became a legally binding international treaty[7]. As such, COP21 constitutes the first-ever universal and legally binding global climate change agreement.[8] By stating the need to "make finance flows compatible with a pathway toward a low greenhouse gas emissions and climate-resilient development", it also represents the first climate deal that explicitly recognizes the role of the financial system on environmental actions (Reghezza et al., 2021).

# 3 Literature review and testable predictions

## 3.1 Related literature

Research on finance and environmental issues is recent but growing fast in volume and scope. Within the studies on green finance, our work is closely related to those on the impact of climate change risks on financial instruments. The range of financial products potentially affected by climate change-related issues is vast (Giglio et al., 2021). For instance, Alessi et al., 2021 look at stocks and carbon emissions, Garbarino and Guin, 2021 consider mortgage and property

[6] In particular, governments agreed to limit global warming with a view to holding the increase in the global average temperature well below 2°C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5°C. Along with that, the final document also aims to strengthen countries' ability to deal with the impacts of climate change and support them in their efforts, tackling issues such as transparency and accountability, adaptation, addressing loss and damage, the role of local governing bodies, and support to developing countries.

[7] Source: https://www.un.org/en/climatechange/paris-agreement

[8] Source: https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_it.

transactions in relation to extreme weather events, Bolton and Kacperczyk, 2021 deal with stock prices and market-based premium associated with transition risks, and Agliardi and Agliardi, 2021 analyse how bond pricing is affected by CTR.

Within this strand of literature, research on the effects of physical and transition climate-related risks in the banking industry is relatively limited. Rehbein and Ongena, 2020, by exploiting a natural disaster (the Elbe flood of 2013), find that climate change effects are transmissible to firms in non-affected areas via their banks, the more so the less capitalised those banks are. As such, capital shortage amplifies local shock spillovers. On the contrary, adequate capital buffers are important to prevent the propagation of real economic shocks through the financial system and shield lending to firms.

Most studies on CTR and the banking sector exploit either data on syndicated loans or supervisory data (e.g. Reghezza et al., 2021; Delis et al., 2021). Syndicated loan market data are commonly used to investigate bank lending behaviour toward more or less polluting firms. In those studies, transition risk is often measured in terms of pollutants' emissions. Kleimeier and Viehs, 2018 show that firms which choose to voluntarily disclose their carbon emissions enjoy more favorable lending conditions than their non-disclosing counterparts. Moreover, higher carbon emissions are found to be positively related to loan spreads. Degryse et al., 2020, focusing on loan pricing patterns according to the "greenness" of both borrowers and lenders, find a green-meets-green configuration: firms showing environmental consciousness (i.e., green firms) enjoy more favorable terms. This effect is pronounced when green firms meet banks that also show environmental consciousness (i.e., green banks), especially since the Paris Agreement. By exploiting industry-country level data, Fatica et al., 2021 find that banks shift loans towards less polluting firms after the issuance of a green bond.

Studies using supervisory data exploit heterogeneity of patterns in climate policy stringency across countries to quantify their exposure to CTR (e.g. Atanasova and Schwartz, 2019; Lin et al., 2019). Within these studies, Delis et al., 2021 focus on the fossil fuel sector and adopt a peculiar measure obtained by combining country-level climate policy indexes with firm-level information on fossil fuel reserves retrieved from firms' annual reports. Benincasa et al., 2021 look at the syndicated loan market and find that banks increase cross-border lending in response to higher climate policy stringency in their home countries. An explanation for this result is that funding is more expensive for firms more exposed to climate risks as both investors (Atanasova and Schwartz, 2019; Bolton and Kacperczyk, 2021; Huynh and Xia, 2021) and banks (Delis et al., 2021) may require higher return rates to compensate for the higher risk. This, in turn, can lead to regulatory arbitrage by firms, which may decide to reallocate their facilities to areas where climate policies are less stringent (Bartram et al., 2021).

Literature on transition risks has often identified the months around the Paris Agreement (COP21) as a period of rising CTR. Delis et al., 2021 look at the relation between climate policy exposure (quantified by a proxy for the amount of stranded assets of a fossil fuel firm in a given year) and syndicated loan spreads for fossil fuel firms, finding higher loan spreads to fossil fuel firms after 2015. Ehlers et al., 2021 look at the relation between firm-level GHG emissions in the

oil and gas sectors and syndicated loan margins and find evidence of a statistically significant carbon premium, which increased after the Paris Agreement. The effect is driven by the so called Scope 1 carbon emissions rather than the broader carbon footprint of a firm. Reghezza et al, 2021 investigate whether euro area banks changed their bank lending behavior following the COP21. They find that EA banks reallocated credit away from polluting companies, by reducing the loan share for polluting firms compared with that for less polluting firms.

As for the relevant events in the debate on climate change (over and beyond COP21), Ivanov et al., 2021 consider the periods between the announcement and the approval (or rejection) of the California Cap-and-Trade Bill and the federal Waxman-Markey Cap-and-Trade Bill, as times in which uncertainty related to CTR was particularly pronounced. They uncover that corporate lending adjusts quickly when transition risks are high. Finally, Antoniou et al., 2020 exploit the implementation of phase III of the EU Emission Trading System and find that, despite the program was designed to pass the cost of CO2 emissions to the polluters since 2013, loan spreads charged to those borrowers fell by almost 25%.[9]

## 3.2 Testable predictions

This work investigates banks' reaction to climate-related transition risks by looking at two dimensions of bank lending behaviour: loan pricing and credit supply. First, we aim to investigate whether and how banks incorporate CTR into loan pricing, and whether any changes occurred since the 2015 Paris Agreement (**RQ1**). Second, we aim to explore bank lending behaviour toward more exposed borrowers as a result of increased CTR concerns, i.e., in the years following the Paris Agreement (**RQ2**).

Previous findings show that banks tend to price risks related to regulatory changes induced by climate issues. Bolton and Kacperczyk, 2021 find that financial markets price CTR, although the impact of the Paris Agreement is not homogeneous across countries. Degryse et al., 2020 find that borrowers that are more transparent in disclosing their carbon emissions and that emit less pollutants receive more favorable lending terms. Ehlers et al., 2021 uncover that after the signing of the Paris Agreement, banks charged higher loan rates to companies with higher carbon emissions as a share of their revenues. In light of previous evidence, overall, we expect that larger carbon emitters face higher loan spreads. We also expect this effect to be more pronounced after the signining of the Paris agreement and in countries that are more sensitive to climate change issues.

The existing evidence on how banks adjust credit supply as a consequence of increased climate risk is, instead, more mixed. The literature on risks of assets becoming stranded (such as fossil fuel reserves, should environmental regulation substantially limit access to them) warns

[9] According to the authors, the decrease was almost entirely driven by the low permits price in that period and the firms' proactiveness to store permits, originating a dynamic that partly undermined the envisioned reductions in CO2 emissions.

about the possibility that firms that are highly exposed to climate policy and transition risks may need to find alternative sources of financing. Empirical findings from the tobacco industry (Hong and Kacperczyk, 2009) hint at the fact that higher perceived risk may lead to higher risk premia required by equity investors, which may induce vulnerable firms to switch to other funding sources. Likewise, Delis et al., 2021 find that fossil fuel companies would need to increase their credit volume in order to make up for the “lost access to equity finance". On the contrary, other works show a bank credit reallocation effect from brown to green firms following banks’ specific commitments (Kacperczyk and Peydrò, 2021) or policy shocks as the signing of the Paris Agreement (Reghezza et al., 2021) or the introduction of the California Cap-and-Trade Regulation (Ivanov et al., 2021). Other studies, such as Mueller and Sfrappini, 2022, hint at different banks’ behavior towards European versus US firms. In light of the above, two opposite reactions to increased CTR are plausible. On the one hand, suasion effects of the Paris Agreement could incentivize lenders to cut lending to more polluting firms, due to concerns about possible (direct or indirect) consequences of transition risks. On the other hand, banks may be encouraged to lend even more to more polluting firms after the COP21. The rationale would be that, in absence of binding constraints, banks may find it advantegoues to lend to more polluting (and potentially more profitable) firms, even more than in the past, while they are still allowed to do so.

As such, whether banks will grant more or less credit to more polluting borrowers is an empirical question. Moreover, one may expect suasion effects to be more intense after the Paris Agreement in countries that are more aware of climate change issues, but whether these forces will prevail over bank-specific moral hazard considerations remains, *a priori*, unclear and needs to be tested empirically.

# 4 Data and methodology

## 4.1 Data and summary statistics

This study relies on multiple sources of data. We retrieve data on syndicated loans from Thomson Reuters DealScan, which provides the most comprehensive loan-deal information on a global level. As argued (see Delis et al., 2021, among others, and our discussion in the introductory section), the peculiarities of syndicated lending make the syndicated loan market an ideal setting to investigate banking behavior in relation to climate change transition risks. In a loan syndication, a lead bank originates a loan whose shares are sold to other financial institutions. Before and after the syndication, the lead bank collects and process information about the borrower, thus acting as an information provider agent. Precisely, prior to the syndication, the lead bank carries out due diligence on the borrower and presents to potential investors a creditworthiness assessment of the borrower; after syndication, the lead bank monitors the borrower. In light of this, lead banks have sufficient information and incentives to assess their borrowers’ risk profile and price in the potential losses that firms could suffer because of the implementation of strict climate policies. In fact, given the large size of syndicated loans, mispricing would imply substantial potential losses for the involved lenders, especially for lead arrangers that commonly hold the largest shares and are responsible for pricing decisions.

Furthermore, the role of lead banks implies strong reputational incentives: even in case of moral hazard issues during the syndication formation (Ivashina, 2009), the existance of reputational costs would reduce the probability of poor screening and inaccurate pricing. The (typically) medium-term maturity of syndicated loans is another feature making syndicated lending appropriate for studying the implication of climate change on banks. While CTR and the risk of stranded assets have been considered for long an "unlikely and very long-term" events, the Paris Agreement shifted the perspective towards the medium term.

In our study, the unit of observation is the loan (or facility), which is usually grouped into deals or packages (Benincasa et al., 2021). We collect data on bank loans including details on the lender (name and loan share), the loan (maturity, amount, origination date, presence of collateral and covenants), and the borrower (name and location).

We also employ several direct and indirect proxies of CTR. We measure firm-level pollution in terms of carbon emissions. Unlike studies that employ ESG ratings, we use an absolute measure of pollution, i.e., the total CO2 emissions (in thousands of tonnes), retrieved from Thomson Reuters Eikon that provides data on total CO2 emissions (in tonnes), Scope1, Scope2 and Scope3 CO2 emissions. There are a few reasons suggesting that CO2 are preferable measures of a firm's exposure to climate change risk. First, ESG ratings are questionable indicators of exposure to climate risk due to discrepancies across different providers, frequent updates, and systematic measurement errors (see, for instance, Berg et al., 2022; Chatterji et al., 2016).[10] Second, the usage of total emissions (over the different Scope measures) mitigates the concern of greenwashing and pollution outsourcing by companies (Ehlers et al., 2021). This is because relying mainly on Scope-1 carbon emissions (i.e., those deriving from owned or controlled sources) may disregard the fact that firms can maintain their (presumably high) carbon footprint while, at the same time, outsourcing carbon intensive activities in order to reduce their Scope-1 emissions by (Ben-David et al., 2021).

We also collect information on country climate policy stringency from Germanwatch's Climate Change Performance Index (CCPI), which tracks the countries' efforts to combat climate change (see Delis et al., 2021). This indicator is considered a long-standing and reliable tool for identifying leaders and laggards in climate protection. In some specifications, we interact climate risk measures at the firm-level with the borrower country's CCPI, so as to capture firms' exposure to CTR deriving from both each firm's specific CO2 emissions and the relevance climate change has in the policy agenda of the country where the borrower is located.

The CCPI is published annually and gathers several dimensions that are relevant for a country's climate policy sensitivity.[11] It is constructed as a 0-100 indicator, where the country's

[10] Examples of works that have documented an association between ESG ratings and loan pricing (e.g. Sharfman and Fernando, 2008; Goss and Roberts, 2011; Hauptmann, 2017; Erragragui, 2018; Houston and Shan, 2021). However, these works deal with on corporate social responsibility in general, and not with climate transition risk which is better captured by more specific indicators.

[11] CCPI uses 14 indicators that are grouped into four categories: GHG Emissions; Renewable Energy; Energy Use; Climate Policy, the former category accounting for 40% and the latter for 20% each of the overall score.

behavior in pursuing environmental goals is increasing in the score. The overall indicator is calculated from the weighted sum of four components (GHG emissions – 40% weighting, Renewable Energy – 20% weighting, Energy Use – 20% weighting, Climate Policy – 20% weighting), totalling 14 indicators. Bottom positions are occupied by countries with a passive approach to climate change issues and, in particular, relatively lax environmental policy. [12]

In the Appendix, we report details on the measure, which is computed for the EU and a basket of non-EU countries (57 in 2020, 60 in 2022). The worldwide average is close to 50, a score remained relatively stable across the years (Figure A1). Figure A2 shows CCPI across countries at the beginning and at the end of the sample period considered in this work (i.e., 2011 and 2018, respectively), providing a rather similar snapshot for the two years. Figure A1 also shows a declining trend and increased volatility over the last five years. Finally, discrepancies in index trends in individual countries (Figure A3) reflect the different reactions to the climate change debate. The case of the United States is emblematic in that the recent drop of CCPI is consistent with former President Trump's withdrawal from the Paris Agreement in 2017 and his major U-turn in all climate policy matters.

As for the sample selection, the original DealScan sample consists of a cross-section of syndicated loan tranches originated in 2010-2021 to borrowers located worldwide, resulting in 510,682 observations. All amounts are converted in USD. Consistently with previous studies, we refine the sample by considering only entries for which information on loan rates (as defined by either margin or all-in-spread drawn) is present. [13] We consider as "lenders" institutions classified as Commercial Banks, Finance Companies, Investment banks, Mortgage Banks, Thrift/S&L, and Trust Companies in DealScan. We only include lenders that are lead banks in each syndicate, as they are informed agents with strong monitoring incentives. [14] As far as borrowers are concerned we only include non-financial firms (i.e. with SIC code between 6000 and 6999).

We then match the refined sample extracted from DealScan with data coming from different sources, so as to obtain a rich and comprehensive dataset gathering information on financial, economic and environmental characteristics at loan, borrower, lender and country levels.

Specifically, by using the borrower ISIN numbers we match DealScan entries with Eikon climate risk measures (firm-level carbon emissions and ESG scores). In order to control for firm-

[12] In fact, Sweden, Norway, Luxembourg and Denmark are among the countries which constantly score above average in the overall CCPI indicator. Among them, however, Norway and Luxembourg occupy top positions in the overall ranking even if their Climate Policy indicator score is lower than that of Sweden or Denmark (the CCPI forerunner in Climate Policy in 2022). Notably, Germanwatch attributes the top three overall positions to countries that are "doing enough to prevent climate change". If no country performs well enough in all index categories to achieve an overall very high rating in the CCPI, as it has always been the case so far, the top three places in the overall ranking remain empty. Source: https://ccpi.org/methodology/

[13] In cleaning the syndicated loan data set we follow, in particular, Benincasa et al., 2021; Doerr and Schaz, 2021; Ehlers et al., 2021; Ivashina, 2009; Ivashina, 2005.

[14] As in Ivashina, 2009 the lead bank is first identified with the administrative agent, i.e., the bank that conducts due diligence, handles all the payments, and monitors the loan. If not available, the lender acting as agent, arranger, bookrunner, lead arranger, lead bank, or lead manager is defined to be the lead bank.

specific and bank-specific time-varying characteristics, borrower data from DealScan's loan-level dataset are then matched with BvD Orbis' corporate database, while lender data are matched with items from BvD Bank Focus. We also collect bank level data on the signing of the green principles of the United Nations Environment Programme Finance Initiative (UNEP-FI) used in robustness checks[15]. Finally, we retrieve country-level data on annual GDP and annual GDP growth from World Bank's WDI database.

After the data cleaning and matching with Orbis (corporate-level information), Eikon (climate risk measures) and Bank Focus (bank-level information), the sample includes 48,825 records. The final sample, obtained by considering only lead banks (as defined above) and deals issued up to 2018 comprises 8,488 observations uniquely identified by facility and lender.[16] These observations correspond to 1,951 unique deals granted by 185 unique lenders to 556 unique borrowers.

Data are aggregated at two dimensions. The Facility-Lead arranger sample is obtained by considering the association between each lead bank and the corresponding facility, identifying the couple facility-leader as the unit of observation.[17] By this means, we can control for more granular individual bank tyme-variant characteristics as well as bank fixed effects (Degryse et al., 2020). This allows for unobserved cross-sectional differences among lenders, as we examine the loan spreads across firms with different pollution levels within the same bank.

A second level of aggregation refers to the Lender-Borrower dimension that enables us to construct $LoanShare$, a measure of the weight of total credit granted through loan syndication by a given bank to a specific borrower in a fiscal year over the total loans granted by the bank for that same year.[18]

Table 1 and Table 2 provide details on our final sample. The geographical scope and industry coverage of the sample is remarkable. Firms are headquartered in 33 countries (Table 1); as expected, most syndicated loans are granted to firms in the US market. Moreover, firms operate in a wide range of industries: they span 56 2-digit SIC codes, corresponding to 11 industrial sectors (Table 2).

Changes in the proportions represented by each countries and industries across datasets

[15] Information on signatories of the UNEP-FI as well as on the date of their joining can be retrieved at https://www.unepfi.org/banking/bankingprinciples/prbsignatories/ or at https://www.unepfi.org/members/.

[16] This sample maximizes data availability for company- and bank-level information.

[17] If $facility_l$ were granted to borrowing $firm_f$ by a pool of two lead banks ($bank_i$ and $bank_j$, the dataset would record two entries: one for the couple $facility_l$ to $borrower_f$ – $bank_i$, and one for the $facility_l$ to $borrower_f$ – lead $bank_j$.

[18] Precisely, the LoanShare measure is the total amount of (syndicated) lending granted by bank i to firm f in year t divided by the bank i's gross loans in year t. While the denominator is retrieved directly from BankFocus information, the numerator is based on information available on DealScan. In particular, DealScan provides, for each facility l granted to firm f, the total amount of syndicated loans granted to borrower f as well as the share of each participating banks in the syndicate. Hence, the numerator of LoanShare is obtained by multiplying the total amount obtained by borrower f through loan l by the share of bank j. If, during the same fiscal year t, firm f obtained credit from bank j also through another loan, the result of the corresponding amount*share multiplication is added to the previous one.

arise for the different weight attributed to borrowers in the two samples. As far as the Facility-Lead arranger sample is concerned, borrowing firms receiving syndicated loans characterized by a larger pool of lead banks are included in more records as opposed to companies borrowing from syndicates with a smaller number of leaders.[19] Likewise, in the Lender-Borrower configuration, borrowing firms which engaged in deals with different lead banks in the same fiscal year are implicitely given more weight compared to borrowers that were granted loans by the same lender. Moreover, in the Lender-Borrower dataset, discrepancies may arise due to data availability problems, related to the fact that the construction of the dependent variable $LoanShare$ requires information on both the lender's share within the syndicate (source: DealScan) and that lender's total loans (source: Bank Focus).

Table 3 reports the definition of all the variables used in our analysis. Table 4 and Table 5 report summary statistics for the Facility-lead and the Lender-Borrower samples, respectively.

On a Facility-level aggregation (i.e., treating each deal as an observation) in Table 4, the average number of lead banks per loan is 7.89. The average loan facility has a cost (margin) of nearly 144 basis points,[20] a maturity of slightly more than 4 years (51.84 months), and an amount of 2.03 million dollars. Table A 1 and Table A 2 in Appendix break down the basic summary statistics reported in Table 4 and show the t-test for differences in means between firms grouped by their vulnerability to CTR (Table A 1) and the stringency of climate policy in their own country (Table A 2). In Table A 1, we label as vulnerable those firms whose CO2 emissions in a given year exceed the 50-th percentile level of carbon for that year. Likewise, in Table A 2 we identify as highly climate policy stringent countries those whose CCPI score in a given year exceeds the 50-th percentile for that year. Considering vulnerable vis-à-vis non-vulnerable firms at the facility-level data, Table A 1 underscores several differences between vulnerability groups in terms of loan characteristics. For example, borrowers that are classified as Vulnerable display, on average, a lower loan margin and maturity, a higher loan amount, and, hence, are engaged in deals characterised by a higher number of lead banks.[21]

Lenders' characteristics between the two groups are overall comparable. Although banks to non-vulnerable borrowers appear to be better capitalised and smaller than lenders to vulnerable borrowers, the economic relevance of this difference is negligible. Similarly, differences between borrower country-level variables (i.e. CCPI and GDP growth) are small if not nihil.

Differences exist as for borrower characteristics: companies included in the Vulnerable

[19] Facilities with high syndicate concentration get, by construction, more weight compared to those with smaller pools of lead banks since loan facilities with x amount of lead arrangers are duplicated x number of times in the data.

[20] To account for the presence of spurious outliers, loan margin is right-winsorized by year at the 1% level, as suggested by Degryse et al., 2020. This leaves, as reported, margins falling within the range of 1 to 600 bps.

[21] In unreported results, available upon request, we considered facility-level data, aggregating lead banks' information at the level of the syndicate pool. When employing facility as the unit of observation, differences between the two vulnerability groups are less pronounced, with the two subsamples displaying very similar average values for loan margin (150.65 bp for the vulnerable group, 152.99 for the non-vulnerable), loan amount (6.74 vs 6.27 in logs, which correspond to average values of 1.8 and 1.2 million USD, respectively) and number of lead arrangers (2.94 vs 2.49).

group are, on average, larger, more leveraged and less profitable compared to those in the Non-Vulnerable group. This may be driven by industry sector specificities. Figure 1, Panel A shows the distribution of firms across SIC sectors for the two subsamples. Vulnerable borrowers are concentrated in a smaller spectrum of industries, with a prevalence in the mining, transportation, communication and utilities sectors. Fossil fuel firms, in particular, are typically large and highly leveraged companies which make them more likely to search funds in the syndicated loan market (Delis et al., 2021), in line with our summary statistics.

Summary statistics for the Lender-Borrower data set are reported in Table 5. With the aim of detecting discrepancies among different levels of the two main variables relevant for measuring CTR (i.e., company's CO2 emissions and borrower's country CCPI), Table A 3 and A 4 shows the t-test for differences in means according to the vulnerability and climate stringency groups, respectively. The sectoral distribution of borrowing firms in the vulnerable and non vulnerable subsamples is in Figure 1, Panel B. Although the different level of aggregation, results are overall comparable to those reported in previous tables.

Overall, the descriptive statistics show there is great heterogeneity in our sample. This calls for a multivariate analysis to investigate the role of CTR on loan pricing and supply, conditional on the characteristics of loan facility, lenders, and borrowers.

## 4.2 Methodology

In this section, first, we present the baseline specifications, second, we investigate the problem of endogeneity and discuss the strategy to tackle this issue.

### 4.2.1 Baseline specifications

To investigate the impact of exposure to climate-related transition risks on loan pricing (**RQ1**), we refer to the Facility-Lead data set. In line with Ehlers et al., 2021; Delis et al., 2021; Fatica et al., 2021, among others, we adopt the following the specification.

$$CL_{t,l,i,f,c} = \beta_0 + \beta_1 C02Emissions_{t,f} + \beta_2 CO2Emissions_{t,f} * CCPI_{t,c} + \beta_3 L_{t,l} + \beta_4 F_{t-1,f} + \beta_5 B_{t,i} + \epsilon_{t,l,i,f,c}$$

*Equation 1*

where the dependent variable $CL$ is the cost (in basis points) at time $t$ of the loan $l$ granted by bank $i$ to the borrower $f$ located in country $c$. $CO2Emissions$ quantifies the total carbon emissions in thousands of tonnes for borrowing firm $f$ in year $t$, while $CCPI$ is the Germanwatch's Climate Change Performance Index of the borrower's home country $c$ in year $t$. The index measures the climate protection performance in a given country by tracking the country efforts to combat climate change. It ranges from 1 (low attention to climate issues)

to 100 (high sensitivity to climate issues).[22] As such, the interaction $CO2Emissions * CCPI$ captures the annual overall exposure of a firm to climate change transition due to both its own environmental performance and the sensitivity of climate change issues at the country level. The intuition is that for each level of pollution, firms located in countries that are more environmentally conscious are more likely to incur in measures (e.g., sanctions and limitations on certain activities) designed to mitigate their carbon impact. This could affect firms financially and require expensive investments to adjust practices and business models. As such, lenders should charge more exposed firms higher interest rates.[23]

$L$, $F$, $B$ are vectors of, respectively, loan-year, firm-year, and bank-year characteristics that according to previous studies can influence loan pricing. In particular, loan-level controls include the loan amount (in logarithms) and maturity (in months), the number of lead arrangers participating in the syndicate, as well as dummies for loan purpose and type, and the presence of covenants, performance pricing grid and collateralization. Time-varying firm characteristics refer to borrowers' size, leverage and profitability, all lagged by one year. Bank-level variables control for size, capitalization and profitability of individual banks (the lead arrangers). A complete list of the variables considered across estimations is provided in Table 3, together with their definitions.

In order to better control for peculiar characteristics on the demand side, we employ fixed effects for borrower industry as well as time-varying controls for borrower country. We also control for supply-side factors that may affect price by including bank fixed effects, so as to saturate the model for time-invariant characteristics of lenders. Moreover, we include year fixed effects, to capture year-specific movements that may affect the corporate loan market. In the main specifications, we cluster standard errors at the lender level, in accordance with the literature.[24]

To investigate bank behaviour in periods of increasing CTR, we add a dummy $Post$ taking value one after the signing of the Paris Agreement: since the Paris Agreement was ratified in December 2015, $Post$ takes value 1 for the years 2016, 2017, 2018, and is zero otherwise. The equation becomes:

$$CL_{t,l,i,f,c} = \beta_0 + \beta_1 C02_{t,j} + \beta_2 CO2Emissions_{t,f} * CCPI_{t,c} + \beta_3 CO2Emissions_{t,f} * CCPI_{t,c} * Post_t + \beta_4 L_{t,l} + \beta_5 F_{t-1,f} + \beta_6 B_{t,i} + \epsilon_{t,l,i,f,c}$$

*Equation 2*

where the coefficient of interest for the triple interaction is $\beta_3$ that identifies a firm's overall

[22] Germanwatch provides measures for 57 countries and the EU. Data are accessible at https://www.germanwatch.org/en/CCPI.

[23] The main empirical challenge of identifying carbon transition risk drivers is that proxies for CTR are available at the country level only (Bolton and Kacperczyk, 2021). Adding firm-level variation in carbon emissions, then, allows to mitigate bias concerns which may be related to potentially omitted country-level variables.

[24] We will discuss results obtained from estimation with standard errors clustered at the level of the borrowers' country in Section 5.2.2.

exposure to climate change risk in the aftermath of Paris Agreement, when transition risk is assumed to be higher.

To explore non-linear relations between our dependent variables and the level of CTR exposure, we replace the continuous measures of CO2 emissions and CCPI score used in Equation 2 with the dummy variables Vulnerable and HighCCPI. The Equation becomes:

$$CL_{t,l,i,f,c} = \beta_0 + \beta_1 Vulnerable_{t,f} + \beta_2 Vulnerable_{t,f} * High\ \ CCPI_{t,c} + \beta_3 Vulnerable_{t,f} * High\ \ CCPI_{t,c} * Post_t + \beta_4 L_{t,l} + \beta_5 F_{t-1,f} + \beta_6 B_{t,i} + \epsilon_{t,l,i,f,c}$$

*Equation 3*

where, we define as vulnerable to transition risks all the firms whose CO2 emissions are above a given percentile in a specific year. Consistent with the recently-introduced climate stress tests[25], we consider as relevant thresholds the 50$^{th}$ and the 75$^{th}$ percentiles of the distribution. Likewise, we include in the High CCPI group all the borrowers located in countries with a CCPI score above a given percentile in the CCPI distribution in a given year. Again, the relevant thresholds considered are the 50$^{th}$ and the 75$^{th}$ percentiles.[26]

To investigate whether CTRaffects credit allocation policies (**RQ2**), we follow a two-pronged approach. First, we use the Facility-lead arranger dataset and estimate the above specifications employing the LoanAmount as dependent variable.[27] This is the logarithm of total syndicated loan amount granted to a given borrower in a given fiscal year. Second, to examine whether and how banks modify their loan portfolio mix after the Paris Agreement (i.e., in the post-Paris Agreement), we exploit the Lender-Borrower dataset and employ *LoanShare* as dependent variable.[28] This is a measure of the weight of total syndicated loans to a specific borrower (defined as total loan amount in thousands dollars multiplied by the bank's share in the syndicated loan) in a given fiscal year over the total amount of loans recorded by the bank for that same year[29]. Considering the share of loan to polluting firms is in line with the proposal to use the loan book exposures to carbon-intensive sectors or firms as a proxy of transition risk faced by banks (ESRB, 2020).

[25] E.g., the ECB's 2021 economy-wide climate stress test (see Alogoskoufis, et al., 2021).

[26] From the definitions of the Vulnerable and High CCPI dummies, it follows that they are both time-varying, since the threshold is computed over the sample for each year.

[27] When the dependent variable is LoanAmount, we employ loan margin as a control variable. However, in unreported results, we find baseline findings for loan amount to be robust to the inclusion/exclusion of loan margin among the control variables.

[28] As said, we employ the same specifications described for the estimation of Equation 1 and Equation 2. Due to the nature of the data set, at the loan level we control for the average maturity and the average loan margin of syndicated transactions in which each lender participates in a given year. As for the analysis on loan amount, in unreported results, we find baseline findings to be robust to the inclusion/exclusion of average loan margin among the control variables.

[29] The measure is computed dividing the total amount of (syndicated) lending granted by bank i to firm j in year t (obtained by multiplying lender share by loan facility amount, as derived from DealScan) by bank i's gross loans in year t, as retrieved from Bank Focus. Both loan amount and gross loans measures are in thousand dollars.

Finally, due to the nature of the data and the characteristics of the syndicated loan market, a certain data asymmetry is expected. For example, sample composition (see Table 1) reflects the fact that syndicated loans are particularly developed among US companies (e.g. Delis et al., 2017). To allow for this feature of the loan syndication market, depending on the specification, standard errors are clustered at the bank and country level.[30]

### 4.2.2 Estimation and endogeneity issues

In this section we investigate potential endogeneity issues that are common in OLS estimation. In principle, reverse causality (or simultaneity) could occur if loan contract terms would determine the level of pollution of a borrower and its vulnerability to CTR. However, both the nature of the data (loan-level data) and the proxies used for CTR mitigate these concerns. In this last respect, by construction, our most comprehesive measure of CTR vulnerability depends on both country and firm caracteristics (i.e., the borrower country's CCPI and borrower's level of carbon emissions). In addition, as suggested by Delis et al., 2017, the employment of a cross section of loans for multiple years, in itself, limits the possibility of simultaneity since it reduces the odds of observing a change in vulnerability to CTR because of a change in either loan margins or loan amount.

The inclusion of a large set of fixed effects and control variables contribute to mitigate reverse causality concerns. For instance, there might be unobservable characteristics of the borrower's country that are correlated with both transition risk vulnerability and the cost of loan. In particular, the inclusion of country fixed effects, which control for time-invariant characteristics of a borrower's country, implies that the effect of vulnerability to CTR is identified only from country-year observations where vulnerability (the interaction between country's CCPI and firm's performance in terms of CO2 emissions) changes value from one year to the next. Moreover, including bank fixed effects controls for time-invariant bank-specific characteristics that affect spreads, while adding year fixed effects allows to control for annual shocks common to all banks and firms in the sample. Although this comes at the cost of oversaturating the model, using fixed effects at different level along with time-varying loan-level controls would help capture the effect of several observable and unobserved variables affecting loan pricing.

It remains, however, that omitted-variable bias may arise from time-variant macro-economic characteristics (such as change in aggregate credit demand and economic growth) that correlate with a change in both borrowers' vulnerability to CTR and loan pricing. To deal with this concern, as in Benincasa et al., 2021 and Delis et al., 2021, we include country-level controls for GDP per capita and GDP growth. Because other time-varying omitted variables may affect both the supply-side and the demand-side of the syndicated loans market, we also include time-varying firm-specific control variables. These are time-varying measures of risk and performance

[30] Clustering at country level seems preferable when country-specific CCPI is considered, since the treatment variable of interest will be observed precisely at national level (Delis et al., 2021).

that should mitigate concerns related to demand-side potential omitted variables. Similarly, adding lender-specific time-varying variables should mitigate the fear that results are driven by time-varying supply-side policies of banks.[31]

# 5 Results

## 5.1 Main results

**Loan pricing (RQ1)** We first investigate whether the cost of syndicated loans is affected by exposure to CTR, particularly so during periods in which climate transition risk is increasing, as after the signing of the Paris Agreement on December 15th 2015.

Table 6 reports results of the analysis on loan margin as dependent variable by using the facility-lead arranger dataset. Findings in Column 1 show that higher CO2 emission are strongly positively associated with the cost of loans (the estimated coefficient for CO2 is positive and statistically significant at 1% level). We then investigate whether loan pricing is influenced by the climate policy stringency in the bank borrower's country (Column 2). We uncover that when firm-level carbon emissions are interacted with the country-specific CCPI, the sign of the coefficient is still positive but statistically insignificant.

In fact, the interpretation of interaction between two continuuos variables is not easy. As noted by Brambor et al., 2006, in applications with interacted variables, it is possible to obtain statistical significance for a range of values of the interacted variable despite the lack of significance of the reported coefficient. Similarly, the lack of statistical significance for a range of values of the interacted variable is also possible despite the significance of the reported coefficient. Setting the derivative of the specification reported in Column (2) of Table 6 with respect to CO2 equal to zero, we find that for values of the CCPI higher than 35.93 (=0.000442/0.0000123), the effect of total carbon emissions on loan margin turns positive. Given that the mean value of CCPI in the Facility-Lead arranger sample is 54.17 (see Table 4), the positive effect of CCPI on loan margins emerges even at relatively small values of that index.. [32]Also, for a firm with average carbon emissions (9731.11 thousand tonnes in the Facility-Lead dataset), a minimum to maximum change in the CCPI (49.29 in the Facility-Lead dataset) contributes to loan margin with an implied premium of almost 6 bps (= 9731.11 * 49.29 * 0.0000123). All in all, this analysis provides preliminary evidence for the incorporation of CTR in banks' loan pricing behavior in countries with relatively more stringent climate policy

To shed light on the relations among firm-level carbon emissions, climate policy stringency

[31] We do not employ bank-year fixed effects given that it is not the case that every lead bank gives multiple loans within a year.

[32] This consistent with the findings reported by Delis et al., 2021 when investigating the impact of borrowers' fossil fuel reserves on loan rates: they find that the positive effect of fossil fuel reserves on loan margins emerges for CCPI levels higher than 32.60, when the sample mean CCPI is 42.68

of borrowers' countries and loan margins, we graphically assess the marginal effect of CO2 Emissions on the cost of loan over different values of the interacted variable CCPI. The solid line in Figure 3 depicts how the marginal effect of carbon emissions on loan margin changes with CCPI, together with the relevant 95% confidence interval[33]. The upward slope suggests that the detrimental effect of CO2 emissions on loan pricing increases as climate policy stringency in the country in which the borrower operates increases. Hence, this implies that a higher awareness of environmental issues in the country in which borrowers are headquartered may increase banks' perception and reactions to CTR: high-polluters are "punished" more, in terms of loan price, the more severe the climate policy.

In Columns 3 and 4 of Table 6, we then investigate whether any change in loan prices can be detected after the signing of the Paris Agreement in December 2015. We find that larger CO2 emissions are positively associated with loan margin. Interestingly, however, the estimated coefficients for the CO2*Post interaction reported in Columns (3) and (4) are negative, suggesting that more polluting firms were charged relatively lower loan prices from 2016 onwards. This effect is mitigated when the stringency of climate policy (CCPI) is taken into account, as suggested by the positive coefficient (significant at the 10% level) of the triple interaction CO2*CCPI*Post (Column 4).

We then graphically assess the marginal effect of CO2 Emissions on the cost of loan over different values of the interacted variable CCPI, both before and after the Paris Agreement. The solid line in Figure 4 depicts how the marginal effect of carbon emissions on loan margin changes with CCPI, together with the relevant 95% confidence interval, in the two subsamples[34]. For the Pre-COP21 period, the negative slope hints at the fact that, as climate policy stringency increases, the impact of CO2 emissions on loan margin decreases. As far as the Post-Paris period is concerned, the upward slope suggests instead that the impact of CO2 emissions on loan pricing increases as climate policy in the borrower's country becomes more stringent. Overall, this analysis confirms that more stringent climate policies in the country in which borrowers are headquartered may steer banks' perception (and reactions) to CTR.

**Credit volume (RQ2)** Table 7 reports the results of our analysis on CTR and credit supply. We find a positive relation between loan amount and borrowers' vulnerability to climate transition risk (Columns (1) and (3)), which, however, weakens once country climate policy stringency (as measured by Germanwatch's CCPI) is considered, and independently on the inclusion of the Post Paris Agreement dummy.

Similarly to the loan pricing results, in Column (2), the addition of CCPI in the regression

[33] Such marginal effect is the partial derivative $\frac{\partial Loan\ \ margin}{\partial CO2\ \ Emissions}$, which, with reference to Equation 1, is given by $\beta_1 + \beta_2 * CCPI$.

[34] The relevant partial derivative $\frac{\partial Loan\ \ margin}{\partial CO2\ \ Emissions}$ for the Pre-Paris subsample is given by $\beta_1 + \ \ \beta_2 * CCPI$, while for the Post-Paris subsample it is given by $\beta_1 + \beta_2 * CCPI + \beta_3 * CCPI$ (the beta coefficients refer to Equation 2).

makes the estimated coefficient for the measure of carbon emissions become negative. By setting the derivative of the specification with respect to CO2 equal to zero, we find that the effect of total carbon emissions on loan amount turns positive for values of the CCPI higher than 48.61 (=0.0000192/0.000000395). This value of the CCPI score is relatively small, considering that the mean value of CCPI in the Facility-Lead arranger sample is 54.17 (see Table 4). The graphical analysis of marginal effects of CO2, in Figure 5 confirms this interpretation. Moreover, for a firm with average carbon emissions (9731.11 thousand tonnes in the Facility-Lead dataset), a minimum to maximum change in the Climate Change Performance Index (49.29 in the Facility-Lead dataset) is associated to loan amount being on average higher by 19%.[35]

Column (4) shows that, when COP21 enters the picture, the estimated coefficient for the triple interaction is indeed positive. Therefore, taking country-specific climate policy stringency into account attenuates the negative pressure on loan amounts for increasingly higher levels of CO2 emissions after the introduction of the Paris Agreement (CO2 * Post interaction). The finding of a positive estimated coefficient for the triple interaction is consistent with previous works ( which found that loan amount increases with vulnerability to CTR and the more so, the more stringent is the climate policy.

We then graphically assess the marginal effect of CO2 Emissions on the cost of loan over different values of the interacted variable CCPI, both before and after the Paris Agreement. The solid line in Figure 6 depicts how the marginal effect of carbon emissions on loan amount changes with CCPI, together with the relevant 95% confidence interval, in the two subsamples. We find that marginal effects of CO2 emissions on loan amount are positively related to CCPI score in both the Pre- and Post-COP21 periods. This means that the impact of CO2 on credit volume increases as climate policy is more stringent in the country in which the borrower operates.

Finally, in Table 8 we investigate how banks adjust their portfolio mix to higher CTR by using the Lender-Borrower level data set and employing $LoanShare$ as dependent variable.[36] We find the relation between CO2 emissions and loan share to be positive (Columns (1) and (2)), with statistical significance fading once CCPI is included in the specification (Column (2)). Furthermore, the graphical inspection of marginal effects of CO2 for the specification relevant for Column (2) shows a rather flat but still upward sloping line as a function of CCPI score (Figure 7). This indicates that the positive effect of CO2 emissions on loan share slightly increases with the degree of climate policy stringency.

We then focus on the analysis employing the post-COP21 dummy, and we estimate Equation 2. Evidence from Ivanov et al., 2021 and Reghezza et al., 2021 points in the direction of a credit reallocation away from more polluting borrowers as concerns over CTR increase. However,we find no evidence of any such effect (the estimated coefficient for the triple interaction of interest

[35] The relevant calculation is 9731.11 * 49.29 * 0.000000395, which is multiplied by 100 to get the percent change in loan amount, given that we are employing a log-linear model.

[36] Since the variable $LoanShare$ is constructed on the basis of each lender's share in the loan granted by the syndicate, the number of loans considered in the Lender-Borrower data set is lower compared to the other two data sets. This is expected, as DealScan does not provide information on lender share for all its entries.

in Column 4 is negative, although not statistically significant).

Consistent with previous analyses, we graphically assess the marginal effect of CO2 Emissions on the cost of loan over different values of the interacted variable CCPI, both before and after the Paris Agreement (Figure 8). For the Pre-COP21 period, the positive slope hints at the fact that the detrimental effect of CO2 emissions (the sum of the estimated coefficients for CO2 and CO2*Post is negative) on loan shares increases as climate policy stringency in the country of the borrower increases. For the Post-COP21 years, however,the downward slope shows that the impact of higher CO2 Emissions on banks' loan shares decreases with increasing CCPI score.

To wrap up, our main findings on loan pricing, amount and portfolio composition point to the following considerations. First, results change depending on whether or not the Paris Agreement and the climate policy stringency are taken into account. Second, when all the dimensions of CTR (firm-level pollution, the signining of the Paris Agreement, and the climate policy stringency of the countries where polluters are located) are considered, the results suggest that banks tend to charge polluting firms higher interest rates and to issue loans whose amount is larger, ceteris paribus. In terms of portfolio mix decisions, however, our findings hint at a reduction in the share of newly originated loans granted to larger emitters since the Paris Agreement and the more so, the stricter the climate policy in the country where polluting firms are located.

## 5.2 Investigating non-linear relations between bank behaviour and climate change risk

In this section, we exploit the heterogentiy in our dataset by looking at lending practices in banks exposed to highly vulnerable borrowers (Table 9, Table 10, and Table 11). To this end, we focus on the right-most part of both the carbon emissions and CCPI distributions.

The results of the estimation on loan margin in Table 9 show that vulnerable firms borrow in the syndicated loans market at prices that are on average lower than for non-vulnerable borrowers. This is true independently of the vulnerability threshold employed.

The interaction between the Vulnerability dummy and the Post-COP21 indicator uniformly shows that, even after the Paris Agreement, vulnerable borrowers have not been charged higher rates. Estimated coefficients are indeed negative and highly significant even if located countires adopting very stringent climate policies (i.e., those with a CCPI index above the median and in the top 25 percent of the distribution).

As for the role played by the Paris Agreement, interestingly, the Table shows a reverting trend since 2016. Estimates for the triple interaction term are consistently positive across all specifications, and highly significant in countries with a CCPI index in the top 25 percent of the distribution. Hence, in the post-Paris years, vulnerable borrowers were charged on average

higher loan prices in countries with particularly strict climate policies compared to countries with a laxer approach. In particular, if we consider Column (2), which yields a 1%-statistically significant estimated coefficient for the triple interaction, it appears that, from 2016 onwards, vulnerable borrowers in top-25 CCPI countries were charged on average 44 basis points more[37] than equally vulnerable borrowers located in bottom 75-CCPI countries. Moreover, in the post-COP21 period, in top25-CCPI countries, vulnerable borrowers paid prices 13 basis points higher[38], on average, than those applied to non-vulnerable borrowers.

Table 10 and Table 11 report the results for the loan amount and loan share analyses, respectively. In Table 10, the estimation the triple interaction, yields positive and statistically significant values across different thresholds of firm vulnerability and country climate policy stringency. In particular, Column (1), which refers to the top-50 vulnerable borrowers and the top-50 countries by CCPI, shows that, from 2016 onwards, the volume of new loans granted to vulnerable borrowers was, on average, 142% higher than the amount offered to non-vulnerable borrowers located in low-CCPI countries before 2016.[39]

In Table 11, the estimated coefficients for the triple interaction are negative across all specifications considered, and statistically significant in all cases but oneThe climate policy stringency of the borrower's country plays a role in that the magnitude of the triple interaction coefficients is higher when the top25 definition for High CCPI is considered – independently of the definition of borrower's vulnerability. In particular, if we consider Column (2); which yields a 1%-statistically significant estimated coefficient for the triple interaction, it appears that, in the post-COP21 period, in high-CCPI countries, vulnerable borrowers accounted for a share of newly-issued syndicated lending to gross loans lower by 9.23 percentage points[40], on average, compared to non-vulnerable borrowers. Holding vulnerability fixed and considering the period from 2016 onwards, it emerges an effect smaller in magnitude: vulnerable borrowers located in countries particularly sensitive to climate issues accounted, on average, for a syndicated to total lending share lower by 0.24 percent[41] compared to equally vulnerable borrowers located in low-CCPI countries.

## 5.3 Extensions and robustness checks

[37] The result is obtained by combining the estimated coefficients reported in Column (2) as follows: (-7.815+8.163+1.31+4.478-19.14-4.844+38.96)-(-7,815+4.478-19.14)=43.59.

[38] The result is obtained by combining the estimated coefficients reported in Column (2) as follows: (-7.815+8.163+1.31+4.478-19.14-4.844+38.96)-(8.163+4.478-4.84)=13.32.

[39] The measure is obtained by applying the Halvorsen-Palmquist correction to the estimated coefficient of the triple interaction. This is necessary to interpret the effect as percentage changes in log-linear models where the explanatory variables are binary.

[40] The result is obtained by combining the estimated coefficients reported in Column (2) as follows: (1.788+0.993+6.867+1.189+0.254+4.465-12.56)-(0.993+1.189+4.465)=-9.23.

[41] The result is obtained by combining the estimated coefficients reported in Column (2) as follows: (1.788+0.993+6.867+1.189+0.254+4.465-12.56)-(1.788+1.189+0.254)=-0.235.

This section serves a twofold purpose. First, it goes deeper into the investigation of potential additional drivers of CTR. Second, it provides checks ensuring the robustness of the baseline results.

### 5.2.1 Extensions

**Geographic patterns** With the aim of looking further into possible drivers of CTR, we examine whether banks adapt their behavior according to whether or not they are based in the EU.

European banks deal with counterparts (customers, investors) who are well aware of the debate on climate change: in Europe, climate policy gained a prominent position in the political agenda even before the climate summit in Kyoto in December 1997, spurred by the annexion to the EU of countries with high environmental standards environmental standards (Austria, Finland and Sweden) in 1995. The first strutctured policy program targeting environmental issues (the European Climate Change Program) dates back to 1998 and was followed by the Climate Change and Energy Package in 2007 and by the European Green Deal in 2019 (Selin and VanDeveer, 2015; European Climate Policy Hub[42]) . As a result, EU environmental standards are among the highest in the world (Cifuentes-Faura, 2022). However, during the time span relevant for our sample, the political discourse and actions were only starting to recognize the role of the financial sector in the green transition. For instance, in 2018, the European Commission Action Plan on financing sustainable growth (COM/2018/097) outlined the role the financial sector should play in promoting and accelerating the green transition in Europe. It was only in 2020 that the ECB published its Guide on climate-related and environmental risks, sharing its supervisory expectations regarding banks' risk management and disclosure in this area (ECB, 2020).

We employ the models with binary explanatory variables for borrower's vulnerability and climate policy stringency of the borrower's country, and look for differential behavioral patterns of banks by resorting to a sample split on the basis of the dummy variable EU bank, which indicates whether the lender is located in a EU country.[43]

Results concerning loan margin (reported in Table 12) are similar to those of the main analyses for both subsamples: when statistically significant, the estimated coefficients for the triple interaction are positive. As far as LoanAmount is concerned (Table 13), results for the EU bank subsample have a stronger statistical significance and are greater in magnitude compared to their non-EU counterparts. This is true for the triple interaction but also for the Vulnerable-Post Paris and High CCPI-Post Paris interactions. Finally, replicating this sample split with LoanShare as dependent variable (Table 14), we find that highly vulnerable borrowers (those in the top 25 percent of the CO2 distribution) located in top-25% CCPI countries are indeed associated to a lower loan share after the Paris Agreement. Yet, the pattern of results is similar

[42] A detailed timetable of EU climate policy can be found at http://climatepolicyinfohub.eu/european-climate-policy-history-and-state-play

[43] The sample split results in a EU lender group of 2027 observations (45% of the sample) for the facility-lead arranger data set, and of 1088 observations (23% of the sample) for the lender-borrower data set.

for both subsamples.

Overall, our findings suggest that banks incorporate CTR in their lending decisions on the basis of borrowers' carbon emissions and on the stringency of the legal framework in place in the country of the borrowers. In contrast, the location of the lenders does not seem to be a relevant driver for banks' response to climate change risk, at least during the considered time frame.

**Lenders' green attitude** Literature shows that the lenders' ethical attitudes are also a relevant determinant for loan pricing decisions in relation to risks derived from sources that are not merely financial, such as CTR (e.g. Degryse et al., 2020; Delis et al., 2017). Specifically, we investigate whether the banks' green attitudes influence their lending behaviour, in particular in the direction of reacting more strongly when higher CTR manifest themselves. Literature on this topic is not unanimous. On the one hand, there is evidence that green lenders tend to penalize highly-polluting or vulnerable borrowers (Degryse et al., 2020; Delis et al., 2021) Others, (see Ehlers et al., 2021) find that the pricing of CTR does not exhibit significant differences when the loans are arranged by lead banks with "greener" attitudes, consistently with a competitive loan market in which climate change transition risks are priced by all banks.

We contribute to the debate and split the sample by the level of "greenness" of the bank. In line with previous studies (e.g., Delis et al., 2021; Degryse et al., 2020), we label as "Green" the banks that, in each year t, are already members of the United Nations Environment Programme Finance Initiative (UNEP FI).[44] Therefore, the dummy GreenBank is attributed value 1 for each year that follows the lenders' joining of the Initiative.[45]

In terms of loan pricing (Table 15), both subsamples display patterns of coefficients that are similar to our main analyses. We notice that the Green bank subgroups display statistically significant coefficients for the triple interaction of interest only when the Vulnerable-top50 definition is employed and the relevant interaction concerns highly climate policy stringent countries. In contrast, no coefficient is significant for the non-Green bank group. This may hint at a lower sensitivity of non-greenbanks in reacting to CTR. Similar considerations can be made for the LoanAmount case (Table 16): again, both subsamples reflect the overall tendencies highlighted for the main analyses, but the Green bank group shows stronger statistical significance in the estimated coefficients. The analysis concerning LoanShare (Table 17) shows that, while the triple interaction is negative across all specifications in both subgroups (as in the main analyses), statistical significance and magnitude of estimated coefficients are greater for non-Green banks. In contrast, the estimated coefficient for the Vulnerable*Post Paris interaction shows that Green banks have on average reduced the weight of vulnerable borrowers in their share of newly-issued loans, independently of the CCPI of the latters' country, while non-Green banks shows positive and statistically significant coefficients for that interaction for top-25 percent vulnerable borrowers.

[44] The list of signatories as well as the date of their joining can be accessed at https://www.unepfi.org/members/.

[45] The employed "GreenBank" definition returns 2172 observations in the Green group for the Facility-Lead Arranger data set (which corresponds to 43% of the sample), and 1726 observations in the Green group for the Lender-Borrower data set (37% of the sample).

All in all, we find only limited evidence of a different response to increasing CRT in green as opposed to non-green banks. We obtain analogous results event resorting to an alternative definition of "greenness": in unreported results, we replicate the analyses identifying as "Green" banks that at t-1 were among the signatories of another set of relevant standards, the Equator Principles[46].

### 5.2.2 Robustness and other checks

In order to evaluate the robustness of results, we perform the estimation of the main specifications clustering standard errors by country of the borrower. This may be relevant since, as Delis et al, 2021 stress, the latter is the level at which the interacted variable CCPI varies. Furthermore, we replicate the main analysis by considering additional control variables at bank level, among which we also include a measure of banks' CTR exposure. A third robustness check that we perform is specifically related to the analysis on loan share. We replicate the estimation by employing a different measure of loan share, which expresses the total amount of syndicated lending a bank provides to a specific borrower as a share of total syndicated lending in which the bank engages during the year. Difference in the estimation results between the two analysis would indicate that banks may show lower loan share for more polluting firms not because they are actually reducing credit towards them but because they are resorting to instruments other than syndicated loans. The outcome of these checks are reported in the Appendix (Tables A 5 – A 11) and, overall, they appear to be reassuring of the robustness of the baseline results.

Moreover, in unreported results, we exclude loan margin from the pool of loan-level control variables from the analysis on loan amount and loan share. We do not find significant variations either in the magnitude or in the statistical significance of results. Furthermore, we check robustness of ourfindings (Table 6 – Table 11) to the employment of an alternative measure for climate policy stringency. Recognizing that the CCPI gathers several dimensions together, we resort to OECD's Environmental Policy Stringency indicator, which allows to focus specifically on climate policy. We do not find results to be significantly different from those reported in the main tables. Lastly, we consider an alternative definition of the time dummy Post indentifying as cutoff date January 1st, 2017 (instead of 2016). We find that the baseline results are confirmed (Table A 12 – Table A 14), suggesting that the Paris Agreement, which was ratified on December 12th, 2015 and entered into force on November 4th, 2016, has had a persistent effect on banks' behaviour.

The remaining part of this section considers proxies for the Vulnerability and High CCPI binary variables.

**Highly polluting industries** An intuitive approximation for borrowers' vulnerability is the industry they operate in: when facing increasing transition risks, lenders might reduce their exposure to industries that are deemed to be more likely to be affected by climate change

[46] Information on signatories of the UNEP-FI as well as on the date of their joining can be retrieved at https://equator-principles.com/

mitigation regulation. Moreover, it is possible that mitigation policies, in order to achieve substantial reductions more quickly, are mainly targeted at particularly carbon-intensive industries and sectors (Ehlers et al., 2021).

We thus analyse banks' behaviour towards highly polluting industries. We resort to the classification of high-carbon industry sectors suggested by Ehlers et al., 2021. Specifically, we first consider a dummy for borrowers in oil, gas and coal-related sectors, then we add other CO2-intensive sectors (namely, utilities, materials, and transport).[47] Each dummy is included in the loan pricing regression so as to replace the Vulnerability dummy.

Our findings are coherent with the baseline results concerning loan margin and the logarithm of loan amount (Table A 15 and Table A 16). Therefore, it is not only firm-level carbon emission performance that is associated to banks' incorporation of CTR (as suggested by the previous analyses): this investigation underscores that lenders attribute relatively higher premia and higher loan amounts to certain industries. However, in constrast with the main results, the estimation employing LoanShare as dependent variable yields positive and statistically significant coefficients for the triple interaction (Table A 17). Hence, syndicated loans are issued to carbon-intensive industries at higher prices and in higher amounts compared to less polluting industries, and they account for a larger share of banks' gross loans in the post-COP21 period, ceteris paribus. This points to the importance of properly measuring bank exposure by looking not only at polluting borrowers but also at polluting industries.

**Borrowers based in the EU** Since the Paris Agreement, the European Union (EU) has adopted ambitious legislation across multiple policy areas to implement its international commitments on climate change. EU countries have set binding emission targets for key sectors of the economy to substantially reduce greenhouse gas emissions. As already outlined, all these efforts, complemented by actions already taken in the previous decade, have placed the EU at the forefront in terms of climate change mitigation efforts compared to other jurisdictions.

Building on this fact, we proxy climate policy stringency by a dummy variable indicating whether a borrowing firm is located in a EU country. We check whether banks are incorporating the more binding legal constraints that EU borrowers have to be compliant with, in relation to firms' CTR vulnerability as well as to the international climate legal framework.

We find results that are coherent with our analysis employing the Vulnerable and High CCPI dummy variables (Table A 18). The loan pricing analysis does not yield statistically signficant coefficients for the triple interaction of interest. As for LoanAmount, only the Vulnerability definition employing the median as threshold for the CO2 distribution is relevant for the triple interaction of interest. In the case of LoanShare, it is instead the highly vulnerable borrowers that seems to really induce banks to react in the Post Paris period.

[47] This classification excludes SIC sub-industries which are not typically associated with high carbon emissions: Utilities exclude water utilities, and Transport excludes railroad transportation.

# 6 Conclusions

This work studies the bank lending behaviour in a context of increasing climate transition risks. By employing a granular sample obtained by merging corporate, lender, and country information to syndicated loans data, we investigate two relevant dimensions for bank lending, namely loan pricing and supply, to understand, first, whether banks incorporate CTR into loan pricing and, second, whether they reduce credit to borrowers more exposed to climate transition risk.

Specifically, we analyze the relationships between two of the main determinants of CTR, that is borrowers' carbon emissions and climate policy stringency of the country in which they are located, and three of the main characteristics of corporate lending, i.e., price (margin), amount and share of syndicated loans to a given borrower over total loans. Given that both the price and supply of credit can be influenced by multiple factors, we collect data from various sources to control for a large set of fixed and time variant characteristics at the firm, industry, loan facility, and bank level.

Once we have controlled for all these factors, we find some evidence of a pricing effect in that banks have charged polluting borrowers higher margins after the Paris Agreement, and especially so, the more aware of climate change issues is the country where borrowers are headquartered.

Evidence on loan amount and loan share is stronger and more consistent across specifications. In particular, we uncover that banks tend to provide more credit to more polluting borrowers after the Paris Agreement and when climate policy stringency increases. In terms of loan portfolio mix, however, the allocation to more exposed borrowers in the post Paris Agreement decreases as the climate policy stringency of the borrowers' countries increases. We then explore non-linearities by resorting to dummy variables for high CO2 emissions and high CCPI score. Our findings point to non-linearities in the relationships between loan variables and CTR measures at the firm level (carbon emissions) and at the country level (climate policy stringency).

The richness of our data allows us to extend our main analysis and address other relevant questions. We test for whether EU banks react differently to increased CTR than banks located in other jurisdictions. Results do not show striking differences between EU and non-EU banks. Furthermore, we test for whether banks identified as "green" display stronger effects in incorporating CTR in their lending decisions. We find only limited evidence supporting the hypothesis that banks labeled as "green" react to CTR differently than non-green banks

In further checks, we also find that whether a borrower is located in an EU country is a good proxy for high climate policy stringency. Finally, by grouping borrowers according to industry-level carbon emissions, we find strong evidence of a pricing effect (where borrowers from more polluting industries are charged higher prices) as well as, overall, of increased exposure to more polluting industries in terms of both loan amount and loan share.

Overall, we find evidence in support of an incorporation of climate transition risks by banks, especially in countries whose policy agenda is more sensitive to climate change, since the Paris Agreement. However, banks' behaviour to increased CTR is not homogenous and the relation among relevant variables is not linear. In terms of policy implications, our findings support the need to measure firms' exposure to CTR comprehensively, by taking into both idiosyncratic and country-specific factors. Likewise, the banks' exposure to climate-related risk needs to be measured at both firm and industry level, as evidence on banks' reaction to CTR may change according to the proxy used.

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# 8 Tables and Figures

*Table 1: Borrowers by country.*

| | Facility-Lead arranger | | Lender-Borrower | |
|---|---|---|---|---|
| **Country** | **Frequency** | **Percent** | **Frequency** | **Percent** |
| Australia | 197 | 3.88 | 309 | 6.63 |
| Austria | 40 | 0.79 | 23 | 0.49 |
| Belgium | 105 | 2.07 | 12 | 0.26 |
| Brazil | 25 | 0.49 | 49 | 1.05 |
| Canada | 133 | 2.62 | 24 | 0.51 |
| China | 25 | 0.49 | 30 | 0.64 |
| Finland | 2 | 0.04 | 0 | 0 |
| France | 286 | 5.63 | 88 | 1.89 |
| Germany | 465 | 9.15 | 42 | 0.9 |
| Greece | 3 | 0.06 | 5 | 0.11 |
| Hong Kong | 52 | 1.02 | 59 | 1.27 |
| India | 44 | 0.87 | 53 | 1.14 |
| Indonesia | 4 | 0.08 | 0 | 0 |
| Ireland | 76 | 1.5 | 0 | 0 |
| Italy | 184 | 3.62 | 36 | 0.77 |
| Japan | 56 | 1.1 | 20 | 0.43 |
| Luxembourg | 59 | 1.16 | 7 | 0.15 |
| Mexico | 2 | 0.04 | 0 | 0 |
| Netherlands | 19 | 0.37 | 9 | 0.19 |
| Norway | 11 | 0.22 | 0 | 0 |
| Poland | 12 | 0.24 | 0 | 0 |
| Russian Federation | 52 | 1.02 | 3 | 0.06 |
| Singapore | 15 | 0.3 | 8 | 0.17 |
| South Africa | 105 | 2.07 | 11 | 0.24 |
| South Korea | 24 | 0.47 | 21 | 0.45 |
| Spain | 418 | 8.23 | 242 | 5.19 |
| Sweden | 38 | 0.75 | 41 | 0.88 |
| Switzerland | 33 | 0.65 | 4 | 0.09 |
| Taiwan | 447 | 8.8 | 416 | 8.92 |
| Thailand | 6 | 0.12 | 1 | 0.02 |
| Turkey | 24 | 0.47 | 0 | 0 |
| United Kingdom | 842 | 16.57 | 165 | 3.54 |
| United States | 1,278 | 25.15 | 2,984 | 64.01 |
| **Total** | **5,082** | **100** | **4662** | **100** |

*Table 2: Borrowers by industry.*

| | Facility-Lead arranger | | Lender-Borrower | |
|---|---|---|---|---|
| **SIC Code** | Frequency | Percent | Frequency | Percent |
| **Agriculture, Forestry and Fishing** | **8** | **0.16** | **10** | **0.21** |
| 01: Crops | 6 | 0.12 | 10 | 0.21 |
| 02: Livestock | 2 | 0.04 | 0 | 0 |
| **Mining** | **735** | **14.46** | **543** | **11.65** |
| 10: Metal, Mining | 353 | 6.95 | 130 | 2.79 |
| 12: Coal Mining | 9 | 0.18 | 0 | 0 |
| 13: Oil and Gas Extraction | 367 | 7.22 | 413 | 8.86 |
| 14 : Nonmetallic Minerals | 6 | 0.12 | 0 | 0 |
| **Construction** | **246** | **4.84** | **82** | **1.76** |
| 15: General Building Contractors | 171 | 3.36 | 56 | 1.2 |
| 16: Heavy Construction | 75 | 1.48 | 26 | 0.56 |
| **Manufacturing** | **2167** | **42.64** | **2296** | **49.25** |
| 20: Food and Kindred Products | 256 | 5.04 | 175 | 3.75 |
| 21: Tobacco Products | 33 | 0.65 | 55 | 1.18 |
| 23: Apparel and Other Textile Products | 13 | 0.26 | 0 | 0 |
| 24: Lumber and Wood Products | 1 | 0.02 | 0 | 0 |
| 25: Furniture and Fixture | 1 | 0.02 | 13 | 0.28 |
| 26: Paper and Allied products | 106 | 2.09 | 53 | 1.14 |
| **27: Printing and Publishing** | **52** | **1.02** | **4** | **0.09** |
| 28: Chemical and Allied Products | 473 | 9.31 | 375 | 8.04 |
| 29: Petroleum and Coal Products | 31 | 0.61 | 140 | 3 |
| 30: Rubber and Misc. Plastics Products | 13 | 0.26 | 19 | 0.41 |
| 32: Stone, Clay, Glass Products | 130 | 2.56 | 31 | 0.66 |
| 33: Primary Metal Industries | 108 | 2.13 | 39 | 0.84 |
| 34: Fabricated Metal Products | 22 | 0.43 | 42 | 0.9 |
| 35: Industrial Machinery and Equipments | 332 | 6.53 | 385 | 8.26 |
| 36: Electronic and Other Electric Equipment | 301 | 5.92 | 341 | 7.31 |
| 37: Transportation Equipment | 171 | 3.36 | 435 | 9.33 |
| 38: Instruments and Related Products | 124 | 2.44 | 189 | 4.05 |
| **Transportation, Communications, Electric, Gas and Sanitary service** | **928** | **18.26** | **1001** | **21.47** |
| 40: Railroad Transportation | 21 | 0.41 | 30 | 0.64 |
| 41: Local and Interurban Passenger Transit | 5 | 0.1 | 14 | 0.3 |
| 42: Trucking and Warehousing | 94 | 1.85 | 44 | 0.94 |
| 44: Water Transportation | 15 | 0.3 | 10 | 0.21 |
| 45: Transportation by Air | 114 | 2.24 | 177 | 3.8 |
| 47: Transportation Services | 14 | 0.28 | 7 | 0.15 |
| 48: Communications | 228 | 4.49 | 247 | 5.3 |
| 49: Electric, Gas, Sanitary Services | 437 | 8.6 | 472 | 10.12 |
| **Wholesale Trade** | **151** | **2.97** | **95** | **2.04** |
| 50: Durable Goods | 76 | 1.5 | 3 | 0.06 |
| 51: Nondurable Goods | 75 | 1.48 | 92 | 1.97 |
| **Retail Trade** | **263** | **5.18** | **232** | **4.98** |
| 52: Building Materials and Gardening Supplies | 21 | 0.41 | 37 | 0.79 |
| 53: General Merchandise Stores | 6 | 0.12 | 0 | 0 |
| 54: Food Stores | 92 | 1.81 | 77 | 1.65 |
| 55: Automatice Dealers and Service Stations | 1 | 0.02 | 0 | 0 |
| 56: Apparel and Accessory Stores | 13 | 0.26 | 7 | 0.15 |
| 57: Furniture and Homefurnishing Stores | 7 | 0.14 | 34 | 0.73 |
| 58: Eating and Drinking Places | 44 | 0.87 | 34 | 0.73 |
| 59: Misc. Retail | 79 | 1.55 | 43 | 0.92 |
| **Finance, Insurance and Real Estate** | **48** | **0.94** | **25** | **0.54** |
| 63: Insurance Carriers | 1 | 0.02 | 0 | 0 |
| 65: Real Estate | 42 | 0.83 | 25 | 0.54 |
| 67: Holding and Other Investment Offices | 5 | 0.1 | 0 | 0 |
| **Services** | **534** | **10.51** | **378** | **8.11** |
| 70: Hotels and Other Lodging Places | 41 | 0.81 | 47 | 1.01 |
| 72: Personal Services | 7 | 0.14 | 8 | 0.17 |
| 73: Business Services | 206 | 4.05 | 191 | 4.1 |
| 78: Motion Pictures | 10 | 0.2 | 0 | 0 |
| 79: Amusement and Recreation Services | 19 | 0.37 | 23 | 0.49 |
| 80: Health Services | 144 | 2.83 | 52 | 1.12 |
| 83: Social Services | 15 | 0.3 | 0 | 0 |
| 87: Engineering and Management Services | 85 | 1.67 | 48 | 1.03 |
| 89: Services, not elsewhere class. | 7 | 0.14 | 9 | 0.19 |
| **Public Administration** | **2** | **0.04** | **0** | **0** |
| 92: Justice, Public Order, Safety | 2 | 0.04 | 0 | 0 |
| **Total** | **5082** | **100** | **4662** | **100** |

*Table 3: Definitions of the variables considered.*

| Variable | Description | Source |
|---|---|---|
| ***Dependent variables*** | | |
| Margin | Loan margin in bps | *DealScan* |
| LoanAmount | Logarithm of the amount of issued loan (converted in thousands USD) | *DealScan* |
| LoanShare | Amount granted through syndicated lending by a given bank to a specific borrower in a year as a share of the bank's gross loans in the year | *DealScan, Bank Focus, own calculations* |
| ***Independent variables*** | | |
| CO2Emissions | Total CO2 and CO2 equivalents emissions in thousand tonnes | *Eikon* |
| CCPI | Climate Change Policy Index of country $c$ in year $t$ | *Germanwatch* |
| ***Loan-level controls*** | | |
| Maturity | Maturity of the facility, in months | *DealScan* |
| nLeaders | Number of leaders in the facility | *DealScan, own calculations* [48] |
| Secured | Dummy equal to 1 if the loan is collateralized | *DealScan* |
| covenants | Dummy equal to 1 if the loan has covenants | *DealScan* |
| PerfPricing | Dummy equal to 1 if the loan has performance pricing | *DealScan* |
| ***Borrower-level controls*** | | |
| FirmSize | Logarithm of total assets the borrowing firm (in million USD) | *Orbis* |
| FirmLeverage | Leverage of the borrowing firm | *Orbis* |
| FirmProfitability | ROA of the borrowing firm | *Orbis* |
| Industry | Industrial sector of the borrowing firm, SIC 2-digits classification | *DealScan* |
| ***Lender-level controls*** | | |
| BankSize | Logarithm of total assets of the bank (in thousands USD) | *Bank Focus* |
| BankE/TA | Equity to total assets of the bank | *Bank Focus* |
| BankProfitability | ROA of the bank | *Bank Focus* |
| ***Country-level controls*** | | |
| GDP growth | GDP growth of country c in year t, in % | *World Bank* |

[48] Facility leaders are defined according to Ivashina, Asymmetric information effects on loan spreads., 2009.

*Table 4: Facility-Lead: Summary statistics.*

| Variables | N | Mean | SD | Min | p25 | p50 | p75 | Max |
|---|---|---|---|---|---|---|---|---|
| Loan margin (bps) | 5082 | 143.59 | 96.98 | 1.00 | 75.00 | 120.00 | 190.00 | 600.00 |
| Loan amount (log) | 5082 | 6.71 | 1.40 | -0.45 | 5.89 | 6.82 | 7.60 | 10.59 |
| Loan amount (M USD) | 5082 | 2028.93 | 3993.81 | 0.64 | 360.00 | 914.94 | 2000.00 | 39900.00 |
| nLenders | 5082 | 7.89 | 7.22 | 1.00 | 1.00 | 6.00 | 12.00 | 31.00 |
| Secured | 5082 | 0.15 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| Maturity (months) | 5082 | 51.84 | 23.67 | 1.00 | 37.00 | 60.00 | 60.00 | 725.00 |
| Performance Pricing | 5082 | 0.21 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| Covenants | 5082 | 0.25 | 0.43 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Bank's ROA | 3538 | 0.53 | 0.61 | -15.80 | 0.23 | 0.45 | 0.88 | 4.91 |
| Bank's E/TA | 3694 | 6.94 | 3.63 | 1.08 | 4.75 | 6.00 | 9.04 | 67.39 |
| Bank's total assets (log) | 3689 | 13.24 | 1.61 | 5.47 | 12.64 | 13.83 | 14.37 | 15.21 |
| Bank's total assets | 3689 | 1087553.00 | 821351.10 | 236.28 | 309999.70 | 1015625.00 | 1747354.00 | 4041959.00 |
| Bank's Tier1 ratio | 3234 | 13.06 | 3.09 | 0.00 | 11.50 | 12.80 | 14.17 | 64.63 |
| Bank's Cost-to-Income Ratio | 3536 | 62.44 | 16.03 | 5.38 | 52.56 | 60.59 | 71.16 | 315.96 |
| Bank's NLP to Total Loans | 3346 | 2.72 | 2.69 | 0.00 | 1.00 | 1.83 | 3.40 | 42.87 |
| GreenBank (UNEPFI) | 5082 | 0.43 | 0.49 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Firm's total assets (log) | 4313 | 9.64 | 1.41 | 5.57 | 8.69 | 9.63 | 10.62 | 13.00 |
| Firm's total assets | 4331 | 37773.86 | 56442.92 | 0.00 | 5819.00 | 15228.41 | 40878.89 | 444097.00 |
| Firm's leverage | 4448 | 0.42 | 0.17 | 0.00 | 0.31 | 0.41 | 0.53 | 1.11 |
| Firm's ROA | 4456 | 4.32 | 8.47 | -82.62 | 1.80 | 3.49 | 6.65 | 59.70 |
| Firm's sales (log) | 4284 | 9.14 | 1.41 | 4.83 | 8.28 | 9.12 | 10.33 | 13.09 |
| Firm's sales | 4284 | 22469.22 | 36263.84 | 124.73 | 3926.89 | 9093.09 | 30561.85 | 485873.00 |
| Firm's CO2 Emissions (thousand tonnes) | 5082 | 9731.11 | 27053.94 | 0.15 | 175.76 | 1004.55 | 5180.00 | 232011.70 |
| Firm's CO2/Revenue | 5082 | 548.38 | 1657.89 | 0.32 | 24.11 | 94.92 | 515.04 | 24748.65 |
| Firm's country CCPI | 5082 | 54.17 | 11.89 | 25.03 | 48.50 | 54.91 | 64.60 | 74.32 |
| Firm's country GDP growth | 5082 | 2.29 | 2.42 | -7.09 | 1.55 | 2.26 | 2.87 | 25.18 |
| Vulnerable (top25) | 5082 | 0.28 | 0.45 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Vulnerable (top50) | 5082 | 0.54 | 0.50 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| High CCPI (top50) | 5082 | 0.47 | 0.50 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| High CCPI (top25) | 5082 | 0.32 | 0.47 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |

*Table 5: Lender-Borrower: Summary statistics*

| Variables | N | Mean | SD | Min | p25 | p50 | p75 | Max |
|---|---|---|---|---|---|---|---|---|
| Loan Share (% Gross Loans) | 4662 | 7.91 | 11.90 | 0.16 | 1.45 | 3.27 | 8.52 | 66.84 |
| Loan Share (% Syndicated Loans) | 4662 | 0.11 | 0.20 | 0.00 | 0.02 | 0.04 | 0.11 | 1.00 |
| (Avg.) Maturity | 4662 | 51.02 | 12.43 | 12.00 | 45.63 | 54.26 | 60.00 | 124.62 |
| (Avg.) Margin | 4662 | 130.15 | 53.76 | 17.50 | 96.76 | 126.22 | 155.17 | 451.25 |
| Bank's ROA | 4436 | 0.67 | 0.86 | -15.80 | 0.33 | 0.67 | 1.00 | 33.63 |
| Bank's E/TA | 4528 | 7.98 | 3.56 | -2.11 | 5.36 | 7.24 | 10.42 | 96.39 |
| Bank's total assets (log) | 4662 | 13.05 | 1.40 | 7.99 | 11.82 | 13.41 | 14.29 | 15.21 |
| Bank's total assets | 4662 | 919983.10 | 842336.80 | 2954.18 | 135758.40 | 668174.40 | 1601782.00 | 4041958.00 |
| Bank's Tier1 ratio | 4360 | 12.65 | 2.36 | 0.00 | 11.27 | 12.48 | 13.57 | 42.47 |
| Bank's Cost-to-Income Ratio | 4611 | 60.47 | 14.72 | 12.54 | 52.21 | 58.99 | 69.06 | 277.76 |
| GreenBank (UNEPFI) | 4662 | 0.37 | 0.48 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Firm's country GDP growth | 4662 | 2.32 | 1.16 | -7.09 | 1.84 | 2.33 | 2.99 | 8.26 |
| Firm's leverage | 4662 | 0.44 | 0.18 | 0.05 | 0.32 | 0.44 | 0.57 | 1.80 |
| Firm's ROA | 4662 | 4.10 | 7.71 | -57.66 | 2.02 | 3.85 | 7.31 | 32.59 |
| Firm's total assets (log) | 4662 | 9.98 | 1.26 | 6.24 | 9.16 | 9.85 | 10.85 | 12.91 |
| Firm's total assets | 4662 | 47005.52 | 67827.19 | 514.75 | 9526.20 | 19010.00 | 51653.00 | 403821.00 |
| CO2 Emissions (thousand tonnes) | 4662 | 8947.63 | 22470.26 | 0.15 | 362.97 | 1658.92 | 6272.00 | 232011.70 |
| CO2/Revenue | 4662 | 610.66 | 1603.91 | 0.46 | 29.22 | 80.06 | 472.50 | 17148.46 |
| Firm's country CCPI | 4662 | 50.41 | 9.53 | 25.03 | 48.50 | 52.33 | 54.91 | 74.32 |
| Vulnerable (top25) | 4662 | 0.32 | 0.47 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| Vulnerable (top50) | 4662 | 0.59 | 0.49 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| High CCPI (top50) | 4603 | 0.13 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| High CCPI (top25) | 4603 | 0.07 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |

*Table 6: Facility-Lead Arranger: Loan pricing and carbon emissions*

| | Time FE | | Post dummy: 2016, 2017, 2018 | |
|---|---|---|---|---|
| **Loan margin (bps)** | CO2 Emissions | CO2 Emissions * CCPI | CO2 Emissions | CO2 Emissions * CCPI |
| | (1) | (2) | (3) | (4) |
| CO2 | 0.000286*** | -0.000442 | 0.000430*** | 0.00191* |
| | (7.71e-05) | (0.000691) | (8.40e-05) | (0.00107) |
| CCPI | | 0.389* | | 0.339 |
| | | (0.227) | | (0.298) |
| CO2 * CCPI | | 1.23e-05 | | -2.55e-05 |
| | | (1.17e-05) | | (1.81e-05) |
| Post | | | 1.828 | 18.40 |
| | | | (3.276) | (16.02) |
| CO2 * Post | | | -0.000500*** | -0.00447* |
| | | | (0.000149) | (0.00231) |
| CCPI * Post | | | | -0.257 |
| | | | | (0.264) |
| CO2 * CCPI * Post | | | | 6.77e-05* |
| | | | | (3.86e-05) |
| Observations | 3,085 | 3,085 | 3,085 | 3,024 |
| R-squared | 0.589 | 0.671 | 0.577 | 0.581 |
| Adjusted R-Squared | 0.492 | 0.596 | 0.541 | 0.554 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is Loan Margin (in bps). The main regressor is CO2, which refers to total carbon emissions of firm i in year t, measured in thousands of tonnes; it is interacted with firm's country CCPI. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 7: Facility-Lead: Loan amount, carbon emissions, and the Paris Agreement.*

| | Time FE | | Post dummy: 2016, 2017, 2018 | |
|---|---|---|---|---|
| **Loan amount (logs)** | CO2 Emissions (1) | CO2 Emissions * CCPI (2) | CO2 Emissions (3) | CO2 Emissions * CCPI (4) |
| CO2 | 4.35e-06*** | -1.92e-05 | 4.69e-06*** | -7.60e-06 |
| | (1.49e-06) | (1.43e-05) | (1.56e-06) | (1.31e-05) |
| CCPI | | 0.00907*** | | 0.0215*** |
| | | (0.00328) | | (0.00353) |
| CO2 * CPPI | | 3.95e-07 | | 2.06e-07 |
| | | (2.49e-07) | | (2.19e-07) |
| Post | | | 0.154*** | 1.219*** |
| | | | (0.0303) | (0.201) |
| CO2 * Post | | | -2.94e-06** | -1.57E-05 |
| | | | (1.41e-06) | (2.58e-05) |
| CCPI * Post | | | | -0.0180*** |
| | | | | (0.00324) |
| CO2 * CCPI * Post | | | | 2.15E-07 |
| | | | | (4.28e-07) |
| Observations | 3,024 | 3,024 | 3,085 | 3,024 |
| R-squared | 0.679 | 0.683 | 0.673 | 0.683 |
| Adjusted R-Squared | 0.651 | 0.655 | 0.645 | 0.655 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is the logarithm of loan amount (converted in thousands USD). The main regressor is CO2, which refers to total carbon emissions of firm i in year t, measured in thousands of tonnes; it is interacted with firm's country CCPI and a time indicator for the Post-COP21 period. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 8: Loan Share, carbon emissions, and the Paris Agreement*

| | Time FE | | Post dummy: 2016, 2017, 2018 | |
|---|---|---|---|---|
| **Loan share** | CO2 Emissions (1) | CO2 Emissions * CCPI (2) | CO2 Emissions (3) | CO2 Emissions * CCPI (4) |
| CO2 | 3.79e-05*** | 2.84e-05 | 5.36e-05*** | -1.53e-05 |
| | (1.13e-05) | (0.000119) | (1.17e-05) | (0.000135) |
| CCPI | | 0.0368 | | 0.0232 |
| | | (0.0310) | | (0.0406) |
| CO2 * CCPI | | 1.50e-07 | | 1.29e-06 |
| | | (2.04e-06) | | (2.38e-06) |
| Post | | | 1.669*** | -0.126 |
| | | | (0.365) | (2.477) |
| CO2 * Post | | | -4.53e-05*** | 0.000111 |
| | | | (1.11e-05) | (0.000174) |
| CCPI * Post | | | | 0.0393 |
| | | | | (0.0466) |
| CO2 * CCPI * Post | | | | -2.93e-06 |
| | | | | (3.26e-06) |
| Observations | 4,436 | 4,436 | 4,436 | 4,436 |
| R-squared | 0.526 | 0.526 | 0.523 | 0.524 |
| Adjusted R-Squared | 0.496 | 0.496 | 0.493 | 0.494 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is the loan share. The main regressor is carbon emissions in thousand tonnes, interacted with firm's country CCPI and a time indicator for the Post-COP21 period. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 9: Facility-Lead arranger: Loan pricing. Vulnerable borrowers, high climate policy sensitivity, and the Paris Agreement.*

| | Post dummy: 2016, 2017, 2018 | | | |
|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan margin (bps)** | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 |
| | (1) | (2) | (3) | (4) |
| Vulnerable | -20.42** | -7.815 | -14.76 | -15.99** |
| | (8.007) | (7.213) | (10.10) | (8.087) |
| High CCPI | -11.98* | 8.163 | 10.41** | 27.90*** |
| | (6.192) | (7.365) | (5.095) | (9.087) |
| Vulnerable * High CCPI | 23.67* | 1.310 | -23.78* | -46.08*** |
| | (13.47) | (11.90) | (14.30) | (16.73) |
| Post Paris | -0.368 | 4.478 | 4.757 | 1.802 |
| | (5.497) | (5.877) | (5.012) | (4.952) |
| Vulnerable * Post Paris | -5.408 | -19.14** | -28.00*** | -25.92*** |
| | (8.394) | (8.116) | (10.67) | (9.509) |
| High CCPI * Post Paris | 4.699 | -4.844 | -10.62 | -4.667 |
| | (8.436) | (9.641) | (8.249) | (8.804) |
| Vulnerable * High CCPI * Post Paris | -6.727 | 38.96*** | 23.99 | 45.40 |
| | (14.07) | (14.61) | (25.11) | (28.95) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.577 | 0.579 | 0.584 | 0.588 |
| Adjusted R-Squared | 0.563 | 0.566 | 0.573 | 0.577 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO |
| Bank FE | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is loan margin (in basis points). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 10: Facility-Lead arranger: Loan amount. Vulnerable borrowers, high climate policy sensitivity, and the Paris Agreement.*

| | Post dummy: 2016, 2017, 2018 | | | |
|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan amount (log)** | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 |
| | (1) | (2) | (3) | (4) |
| Vulnerable | 0.301*** | 0.241*** | 0.0243 | -0.0224 |
| | (0.0804) | (0.0762) | (0.0866) | (0.0628) |
| High CCPI | 0.894*** | 0.705*** | 0.671*** | 0.415*** |
| | (0.106) | (0.106) | (0.0969) | (0.0908) |
| Vulnerable * High CCPI | -0.550*** | -0.490*** | -0.170 | 0.0456 |
| | (0.165) | (0.115) | (0.138) | (0.129) |
| Post Paris | 0.666*** | 0.480*** | 0.432*** | 0.306*** |
| | (0.0991) | (0.0759) | (0.0923) | (0.0666) |
| Vulnerable * Post Paris | -0.648*** | -0.467*** | -0.377** | -0.339* |
| | (0.119) | (0.106) | (0.174) | (0.178) |
| High CCPI * Post Paris | -0.758*** | -0.543*** | -0.471*** | -0.383*** |
| | (0.114) | (0.110) | (0.1000) | (0.0913) |
| Vulnerable * High CCPI * Post Paris | 0.885*** | 0.385*** | 0.745*** | 0.663* |
| | (0.161) | (0.138) | (0.248) | (0.374) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.691 | 0.684 | 0.688 | 0.682 |
| Adjusted R-Squared | 0.601 | 0.589 | 0.597 | 0.586 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO |
| Bank FE | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is the logarithm of loan amount (converted in thousands USD). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 11: Lender-Borrower: Loan share. Vulnerable borrowers, high climate policy sensitivity, and the Paris Agreement.*

| | Post dummy: 2016, 2017, 2018 | | | |
|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan share (%)** | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI |
| | (1) | (2) | (3) | (4) |
| Vulnerable | 1.704*** | 1.788*** | 2.418*** | 2.539*** |
| | (0.551) | (0.564) | (0.477) | (0.481) |
| High CCPI | 0.509 | 0.993 | 0.244 | 1.066 |
| | (1.100) | (1.112) | (0.842) | (0.766) |
| Vulnerable * High CCPI | 2.647*** | 6.867*** | 7.207*** | 19.80*** |
| | (0.987) | (1.705) | (1.308) | (3.248) |
| Post Paris | 1.214*** | 1.189*** | 0.437 | 0.785* |
| | (0.415) | (0.388) | (0.477) | (0.449) |
| Vulnerable * Post Paris | -0.361 | 0.254 | 1.269** | 1.328** |
| | (0.565) | (0.577) | (0.641) | (0.663) |
| High CCPI * Post Paris | 5.039*** | 4.465*** | 5.699*** | 2.156* |
| | (1.725) | (1.631) | (1.245) | (1.304) |
| Vulnerable * High CCPI * Post Paris | -2.310 | -12.56*** | -8.830*** | -24.26*** |
| | (2.072) | (2.127) | (2.361) | (3.420) |
| Observations | 4,378 | 4,378 | 4,378 | 4,378 |
| R-squared | 0.529 | 0.530 | 0.538 | 0.545 |
| Adjusted R-Squared | 0.513 | 0.521 | 0.524 | 0.530 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO |
| Bank FE | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is Loan Share (total syndicated lending from bank j to borrower i in a given year as a share of bank j's total gross loans in that year). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 12: Facility-Lead Arranger: Loan margin. Vulnerability, High CCPI, and the Paris Agreement: sample split for EU and non-EU banks.*

| | EU banks | | | | Non-EU banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan margin (bps)** | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Vulnerable | -42.16*** | -3.586 | -68.72*** | -33.37*** | -16.52* | -16.10* | 3.415 | -6.672 |
| | (14.06) | (14.64) | (14.28) | (10.11) | (8.913) | (9.642) | (9.256) | (9.733) |
| High CCPI | -16.50 | 22.08** | -7.099 | 36.86*** | -0.418 | -4.906 | 17.97 | 8.544 |
| | (11.16) | (8.448) | (9.606) | (8.575) | (11.00) | (10.18) | (11.17) | (11.66) |
| Vulnerable * High CCPI | 45.88*** | 11.24 | 35.36** | -23.35 | -5.884 | -29.02 | -60.04*** | -64.81** |
| | (13.77) | (15.17) | (13.98) | (16.10) | (18.36) | (19.48) | (19.39) | (27.04) |
| Post Paris | -11.21 | 6.795 | -14.50 | -7.672 | -2.403 | -2.931 | 4.862 | 1.740 |
| | (15.29) | (10.83) | (10.61) | (8.078) | (4.328) | (4.588) | (4.745) | (5.130) |
| Vulnerable * Post Paris | 1.685 | -36.78** | -11.63 | -35.67** | -4.277 | -6.656 | -35.23*** | -26.21*** |
| | (18.48) | (15.56) | (18.45) | (15.32) | (7.460) | (7.272) | (10.69) | (9.434) |
| High CCPI * Post Paris | 8.408 | -16.85 | 3.570 | -6.919 | -8.375 | -7.292 | -15.04 | 0.859 |
| | (17.86) | (13.22) | (13.69) | (12.24) | (11.51) | (11.19) | (11.99) | (11.50) |
| Vulnerable * High CCPI * Post Paris | -21.42 | 40.02** | -4.054 | 32.26 | 20.71 | 54.53*** | 27.26 | 30.32 |
| | (22.57) | (19.95) | (28.22) | (33.05) | (17.24) | (17.98) | (27.27) | (32.01) |
| Observations | 1,281 | 1,281 | 1,281 | 1,281 | 1,743 | 1,743 | 1,743 | 1,743 |
| R-squared | 0.668 | 0.674 | 0.681 | 0.685 | 0.525 | 0.530 | 0.539 | 0.539 |
| Adjusted R-Squared | 0.645 | 0.652 | 0.659 | 0.663 | 0.498 | 0.503 | 0.512 | 0.513 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is loan margin (in basis points). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). We split the sample according to whether the lender is a bank located within the European Union. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table 13: Facility-Lead Arranger: Loan amount. Vulnerability, High CCPI, and the Paris Agreement: sample split for EU and non-EU banks.*

| | EU banks | | | | Non-EU banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan amount (log)** | CCPI: top50 (1) | CCPI: top25 (2) | CCPI: top50 (3) | CCPI: top25 (4) | CCPI: top50 (5) | CCPI: top25 (6) | CCPI: top50 (7) | CCPI: top25 (8) |
| Vulnerable | 0.408** | 0.102 | 0.105 | -0.00619 | 0.405*** | 0.433*** | 0.135 | 0.0869 |
| | (0.184) | (0.130) | (0.185) | (0.131) | (0.0880) | (0.0895) | (0.108) | (0.104) |
| High CCPI | 1.069*** | 0.827*** | 0.805*** | 0.671*** | 0.721*** | 0.564*** | 0.574*** | 0.173 |
| | (0.164) | (0.120) | (0.159) | (0.103) | (0.148) | (0.153) | (0.127) | (0.138) |
| Vulnerable * High CCPI | -0.717*** | -0.364** | -0.256 | -0.122 | -0.339 | -0.377* | -0.0982 | 0.399** |
| | (0.166) | (0.138) | (0.183) | (0.177) | (0.276) | (0.194) | (0.158) | (0.167) |
| Post Paris | 1.240*** | 0.518*** | 0.661*** | 0.328*** | 0.551*** | 0.496*** | 0.385*** | 0.271*** |
| | (0.249) | (0.179) | (0.213) | (0.0848) | (0.0834) | (0.0755) | (0.0997) | (0.0812) |
| Vulnerable * Post Paris | -1.389*** | -0.572** | -0.785*** | -0.593*** | -0.523*** | -0.545*** | -0.344 | -0.281 |
| | (0.230) | (0.217) | (0.229) | (0.129) | (0.130) | (0.126) | (0.213) | (0.234) |
| High CCPI * Post Paris | -1.275*** | -0.572*** | -0.597*** | -0.389*** | -0.424** | -0.341* | -0.522*** | -0.193 |
| | (0.238) | (0.192) | (0.209) | (0.0962) | (0.199) | (0.202) | (0.179) | (0.201) |
| Vulnerable * High CCPI * Post Paris | 1.697*** | 0.515* | 0.968*** | 0.711 | 0.182 | 0.209 | 0.959** | 0.405 |
| | (0.249) | (0.267) | (0.318) | (0.427) | (0.269) | (0.247) | (0.438) | (0.491) |
| Observations | 1,281 | 1,281 | 1,281 | 1,281 | 1,743 | 1,743 | 1,743 | 1,743 |
| R-squared | 0.791 | 0.781 | 0.782 | 0.781 | 0.611 | 0.607 | 0.608 | 0.603 |
| Adjusted R-Squared | 0.777 | 0.767 | 0.767 | 0.766 | 0.588 | 0.584 | 0.585 | 0.580 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is the logarithm of loan amount (converted in thousands USD). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). We split the sample according to whether the lender is a bank located within the European Union. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table 14: Lender-Borrower: Loan share. Vulnerability, High CCPI, and the Paris Agreement: sample split for EU and non-EU banks.*

| | EU banks | | | | Non-EU banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan share (%)** | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Vulnerable | 3.271*** | 3.698*** | 2.462** | 3.569*** | 0.381 | 0.411 | 0.876 | 0.987 |
| | (0.887) | (0.943) | (1.097) | (0.989) | (0.716) | (0.690) | (0.703) | (0.687) |
| High CCPI | 2.116 | 5.443*** | 1.343 | 4.832*** | -0.984 | -0.919 | -1.788** | -1.372 |
| | (1.747) | (1.484) | (1.338) | (1.020) | (1.148) | (0.888) | (0.877) | (0.862) |
| Vulnerable * High CCPI | 1.125 | 6.116** | 5.814* | 16.94*** | 2.829** | 6.437** | 9.262*** | 23.23*** |
| | (1.829) | (2.603) | (2.913) | (4.710) | (1.193) | (2.662) | (1.524) | (4.837) |
| Post Paris | 2.541*** | 2.393** | 0.912 | 2.206** | 0.391 | 0.442 | -0.308 | -0.0567 |
| | (0.930) | (1.003) | (0.927) | (1.015) | (0.433) | (0.422) | (0.490) | (0.484) |
| Vulnerable * Post Paris | -1.683 | 0.670 | 0.737 | 1.298 | -0.176 | 0.0234 | 1.557* | 1.341 |
| | (1.267) | (1.213) | (1.119) | (1.145) | (0.797) | (0.755) | (0.851) | (0.852) |
| High CCPI * Post Paris | 5.562*** | 2.863 | 6.757*** | 0.352 | 5.485** | 5.335** | 6.174*** | 2.928 |
| | (2.002) | (1.980) | (1.556) | (1.783) | (2.624) | (2.461) | (1.983) | (2.041) |
| Vulnerable * High CCPI * Post Paris | 1.935 | -11.49*** | -2.208 | -22.36*** | -5.015* | -12.11*** | -13.71*** | -26.07*** |
| | (2.654) | (3.512) | (4.085) | (5.961) | (3.004) | (3.551) | (2.975) | (5.396) |
| Observations | 1,003 | 1,003 | 1,003 | 1,003 | 3,375 | 3,375 | 3,375 | 3,375 |
| R-squared | 0.459 | 0.468 | 0.467 | 0.488 | 0.330 | 0.331 | 0.337 | 0.342 |
| Adjusted R-Squared | 0.447 | 0.455 | 0.452 | 0.473 | 0.319 | 0.321 | 0.325 | 0.329 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is Loan Share (total syndicated lending from bank j to borrower i in a given year as a share of bank j's total gross loans in that year). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). We split the sample according to whether the lender is a bank located within the European Union. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table 15: Facility-Lead Arranger: Loan margin. Vulnerability, High CCPI, and the Paris Agreement: sample split according to banks' "greenness".*

| | Green banks | | | | Non-Green banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan margin (bps)** | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Vulnerable | -42.99*** | -20.53* | -50.61*** | -46.06*** | -17.30* | -10.69 | -17.65* | -12.17 |
| | (12.28) | (10.95) | (11.68) | (12.45) | (9.605) | (8.573) | (9.545) | (7.441) |
| High CCPI | -21.44** | 2.603 | 2.071 | 26.97** | -1.660 | 3.313 | 7.728 | 11.61 |
| | (9.489) | (10.66) | (7.051) | (11.92) | (9.556) | (10.66) | (9.367) | (11.70) |
| Vulnerable * High CCPI | 41.58** | 14.98 | -12.77 | -43.03* | 11.84 | -7.697 | -0.913 | -24.96 |
| | (17.08) | (16.77) | (18.84) | (22.13) | (11.49) | (12.94) | (11.95) | (17.31) |
| Post Paris | -13.38 | -5.691 | -8.583 | -12.81* | -2.398 | -1.310 | 0.288 | -3.509 |
| | (8.645) | (10.57) | (7.249) | (6.873) | (6.236) | (6.418) | (5.545) | (5.539) |
| Vulnerable * Post Paris | 7.606 | -14.54 | -22.30 | -20.49 | -6.539 | -16.18* | -17.21* | -20.40** |
| | (13.70) | (13.83) | (16.75) | (15.08) | (9.102) | (9.689) | (8.735) | (9.606) |
| High CCPI * Post Paris | 15.78 | 4.407 | -2.182 | 6.976 | 0.376 | -1.896 | -9.932 | 2.641 |
| | (11.51) | (15.02) | (8.115) | (12.07) | (11.72) | (12.46) | (14.13) | (10.76) |
| Vulnerable * High CCPI * Post Paris | -15.66 | 44.07* | 22.98 | 37.36 | -12.40 | 26.83 | 0.435 | 16.75 |
| | (26.21) | (21.74) | (39.11) | (39.32) | (10.91) | (16.57) | (21.24) | (24.01) |
| Observations | 1,346 | 1,346 | 1,346 | 1,346 | 1,678 | 1,678 | 1,678 | 1,678 |
| R-squared | 0.551 | 0.555 | 0.571 | 0.577 | 0.586 | 0.587 | 0.589 | 0.591 |
| Adjusted R-Squared | 0.520 | 0.525 | 0.541 | 0.548 | 0.562 | 0.562 | 0.565 | 0.566 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is loan margin (in basis points). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table 16: Facility-Lead Arranger: Loan Amount. Vulnerability, High CCPI, and the Paris Agreement: sample split according to banks' "greenness".*

| | Green banks | | | | Non-Green banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan amount (log)** | CCPI: top50 (1) | CCPI: top25 (2) | CCPI: top50 (3) | CCPI: top25 (4) | CCPI: top50 (5) | CCPI: top25 (6) | CCPI: top50 (7) | CCPI: top25 (8) |
| Vulnerable | 0.368*** | 0.219** | -0.0116 | -0.142 | 0.291*** | 0.292*** | 0.118 | 0.187* |
| | (0.120) | (0.0823) | (0.200) | (0.0879) | (0.0904) | (0.0989) | (0.106) | (0.0957) |
| High CCPI | 0.884*** | 0.778*** | 0.624*** | 0.449*** | 0.832*** | 0.571*** | 0.605*** | 0.324*** |
| | (0.148) | (0.0641) | (0.181) | (0.109) | (0.121) | (0.126) | (0.105) | (0.111) |
| Vulnerable * High CCPI | -0.722*** | -0.606*** | -0.260 | 0.0296 | -0.304 | -0.174 | 0.154 | 0.342* |
| | (0.123) | (0.0895) | (0.230) | (0.170) | (0.213) | (0.175) | (0.145) | (0.175) |
| Post Paris | 0.987*** | 0.752*** | 0.619*** | 0.500*** | 0.483*** | 0.293*** | 0.334*** | 0.154 |
| | (0.264) | (0.132) | (0.204) | (0.118) | (0.0850) | (0.0752) | (0.124) | (0.113) |
| Vulnerable * Post Paris | -1.060*** | -0.708*** | -0.676* | -0.622** | -0.384*** | -0.310*** | -0.193 | -0.188 |
| | (0.284) | (0.179) | (0.366) | (0.292) | (0.133) | (0.115) | (0.225) | (0.250) |
| High CCPI * Post Paris | -1.057*** | -0.825*** | -0.621*** | -0.610*** | -0.521*** | -0.159 | -0.375** | -0.0226 |
| | (0.261) | (0.167) | (0.159) | (0.112) | (0.116) | (0.120) | (0.161) | (0.142) |
| Vulnerable * High CCPI * Post Paris | 1.291*** | 0.471 | 0.809* | 0.703 | 0.383* | 0.112 | 0.472 | 0.00442 |
| | (0.390) | (0.299) | (0.447) | (0.620) | (0.205) | (0.184) | (0.315) | (0.442) |
| Observations | 1,346 | 1,346 | 1,346 | 1,346 | 1,678 | 1,678 | 1,678 | 1,678 |
| R-squared | 0.726 | 0.720 | 0.719 | 0.717 | 0.643 | 0.637 | 0.643 | 0.637 |
| Adjusted R-Squared | 0.707 | 0.701 | 0.699 | 0.698 | 0.621 | 0.615 | 0.622 | 0.616 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is the logarithm of loan amount (converted in thousands USD). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table 17: Lender-Borrower: Loan share. Vulnerability, High CCPI, and the Paris Agreement: sample split according to banks' "greenness".*

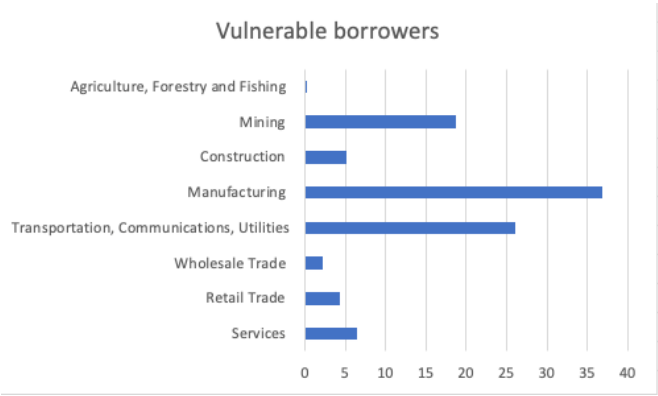
| | Green banks | | | | Non-Green banks | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan share (%)** | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Vulnerable | 0.730 | 0.783 | 2.130** | 2.213** | 1.246 | 1.375* | 1.151 | 1.435** |
| | (0.808) | (0.849) | (0.889) | (0.961) | (0.809) | (0.786) | (0.752) | (0.708) |
| High CCPI | 1.628 | 2.148 | 1.181 | 1.928 | -0.855 | 0.556 | -1.402 | 0.620 |
| | (1.356) | (1.710) | (0.810) | (1.153) | (1.287) | (1.100) | (1.116) | (1.294) |
| Vulnerable * High CCPI | 2.411 | 6.342** | 7.439*** | 17.96*** | 3.318** | 8.123*** | 9.019*** | 22.73*** |
| | (1.610) | (2.672) | (2.479) | (5.104) | (1.458) | (2.973) | (2.012) | (4.577) |
| Post Paris | 2.214*** | 1.954** | 1.607** | 2.011** | -0.00166 | 0.0914 | -0.972* | -0.615 |
| | (0.792) | (0.809) | (0.753) | (0.774) | (0.488) | (0.489) | (0.525) | (0.518) |
| Vulnerable * Post Paris | -0.976 | 0.0865 | -0.142 | -0.187 | -0.301 | 0.209 | 2.062** | 2.205** |
| | (1.184) | (1.142) | (0.961) | (1.071) | (0.899) | (0.897) | (0.930) | (0.968) |
| High CCPI * Post Paris | 2.537 | 2.085 | 3.646*** | 0.177 | 10.31*** | 8.941*** | 10.33*** | 6.340** |
| | (1.533) | (1.739) | (1.248) | (1.346) | (2.974) | (3.244) | (2.141) | (2.657) |
| Vulnerable * High CCPI * Post Paris | -0.0335 | -8.928*** | -6.210* | -17.70*** | -5.461 | -17.57*** | -12.45*** | -31.35*** |
| | (2.478) | (2.962) | (3.297) | (5.021) | (3.840) | (4.568) | (4.178) | (5.986) |
| Observations | 1,598 | 1,598 | 1,598 | 1,598 | 2,780 | 2,780 | 2,780 | 2,780 |
| R-squared | 0.435 | 0.437 | 0.446 | 0.457 | 0.311 | 0.312 | 0.319 | 0.325 |
| Adjusted R-Squared | 0.421 | 0.424 | 0.432 | 0.441 | 0.302 | 0.304 | 0.307 | 0.312 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

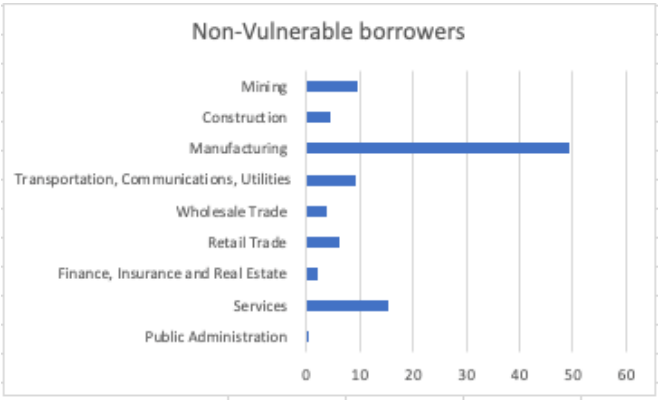
The dependent variable is Loan Share (total syndicated lending from bank j to borrower i in a given year as a share of bank j's total gross loans in that year). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

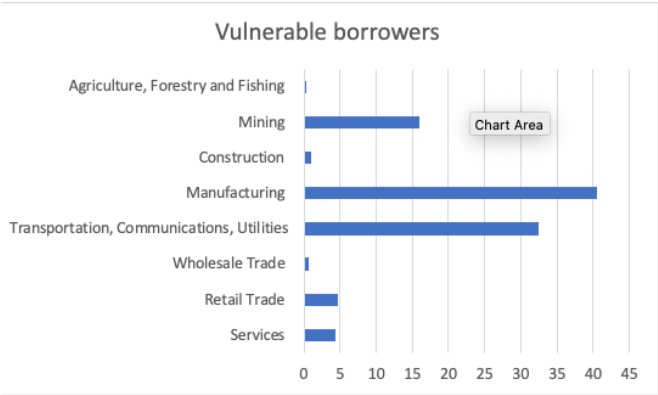
*Figure 1: Borrowers by industry according to CTR vulnerability subgroups*

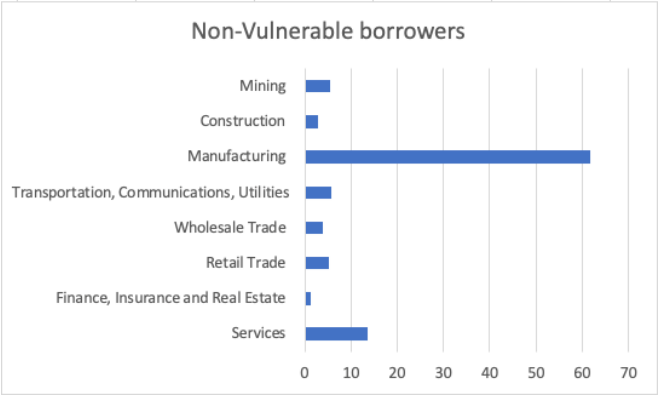
**Panel A: Facility-Lead Arranger**




**Panel B: Lender-Borrower**

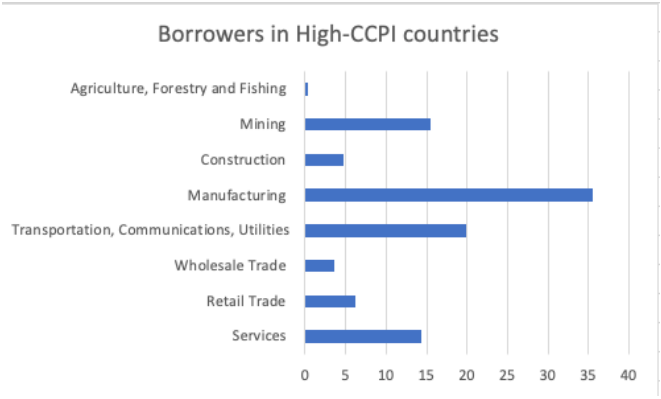


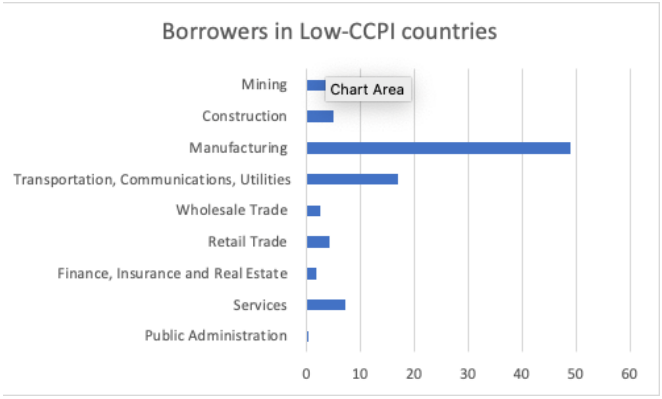




The above graphs illustrate the percentage distribution of borrowing firms by SIC industry sector in each subsample (according to CTR Vulnerability), for the Lead-Arranger and Lender-Borrower data sets.

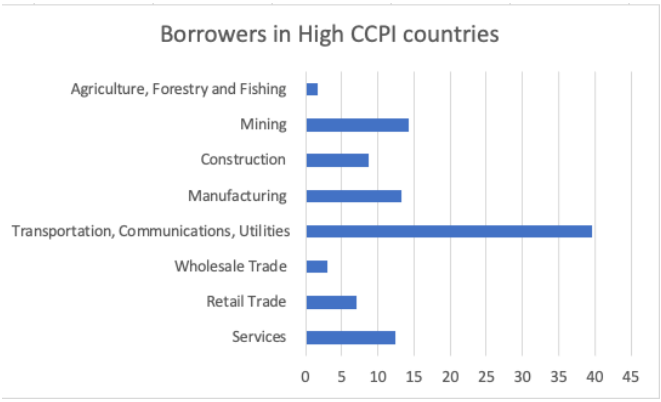
*Figure 2: Borrowers by industry according to CCPI subgroups*

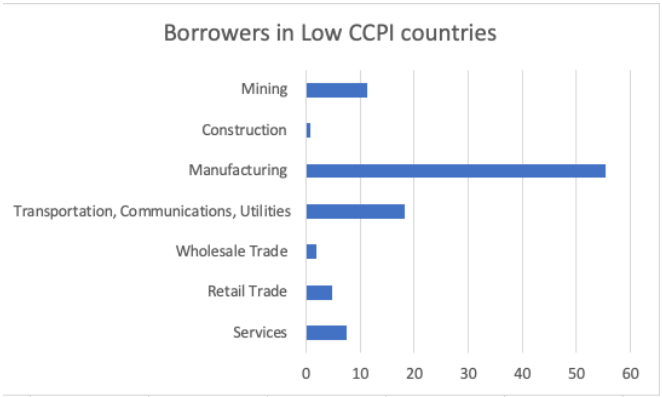
**Panel A: Facility-Lead Arranger**



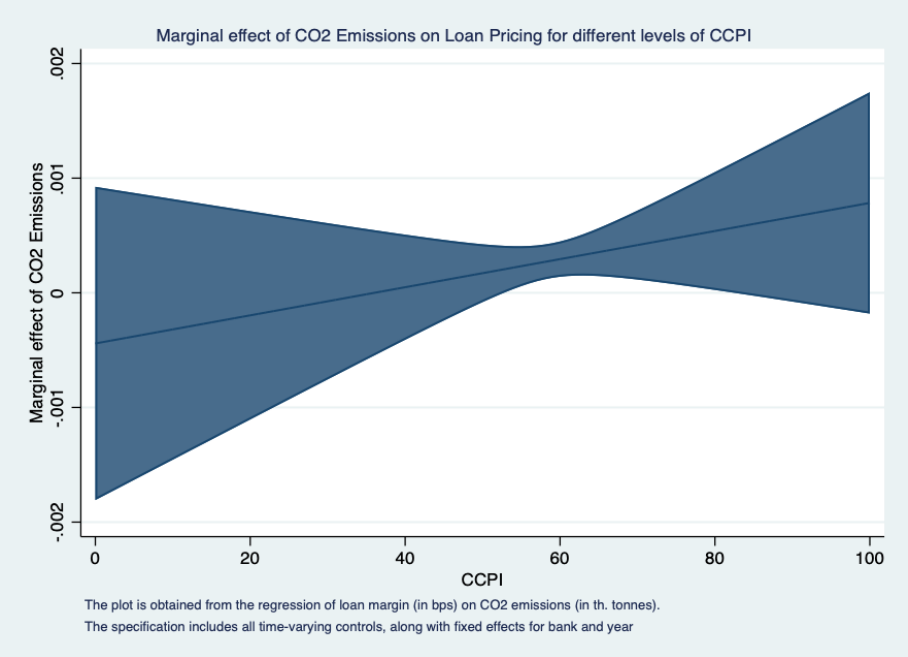

**Panel B: Lender-Borrower**



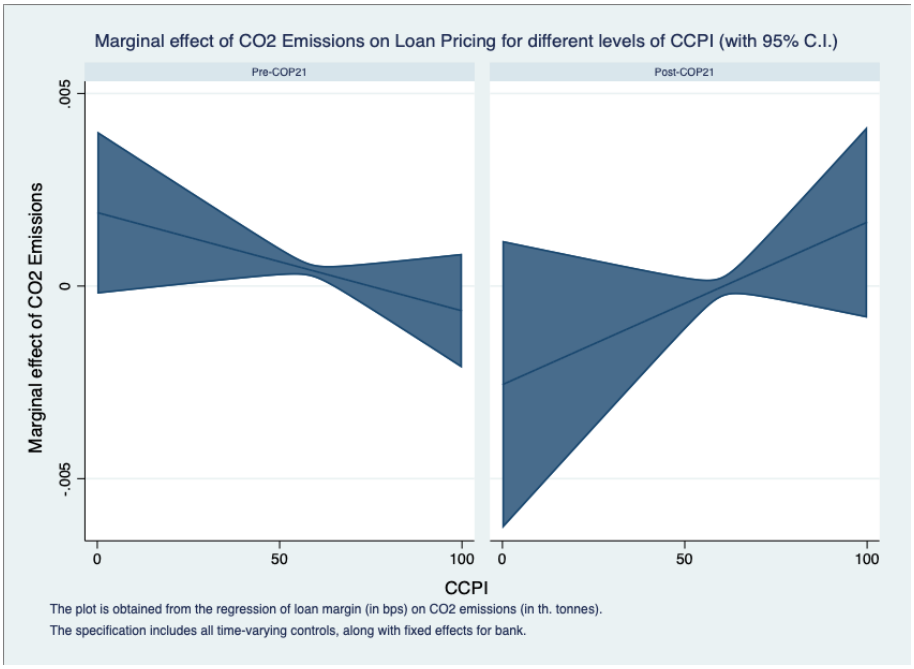

The above graphs illustrate the percentage distribution of borrowing firms by SIC industry sector in each subsample (according to the dummy High CCPI), for the Lead-Arranger and Lender-Borrower data sets.

*Figure 3: Average marginal effect of CO2 Emissions on Loan Pricing for different levels of the Climate Policy Performance Index*



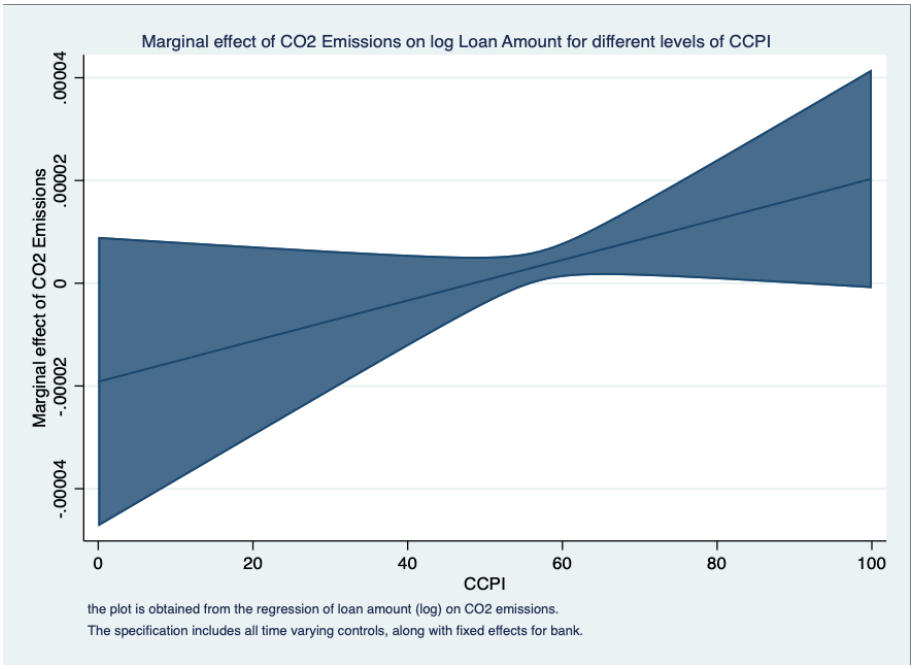

Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 1.

*Figure 4: Average marginal effect of CO2 Emissions on Loan Pricing for different levels of the Climate Policy Performance Index, before and after COP21*



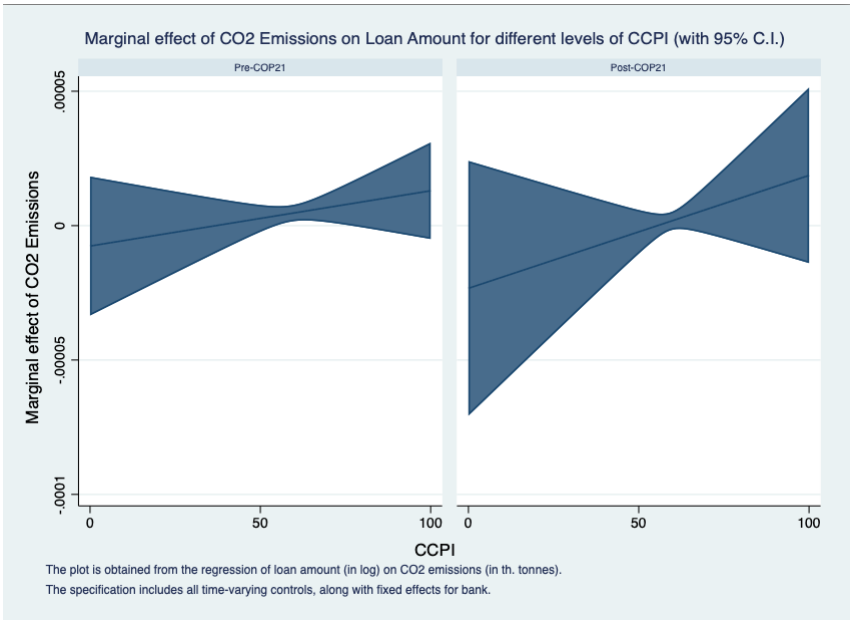

Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 2.

*Figure 5: Average marginal effect of CO2 Emissions on Loan Amount (in logs) for different levels of the Climate Policy Performance Index*



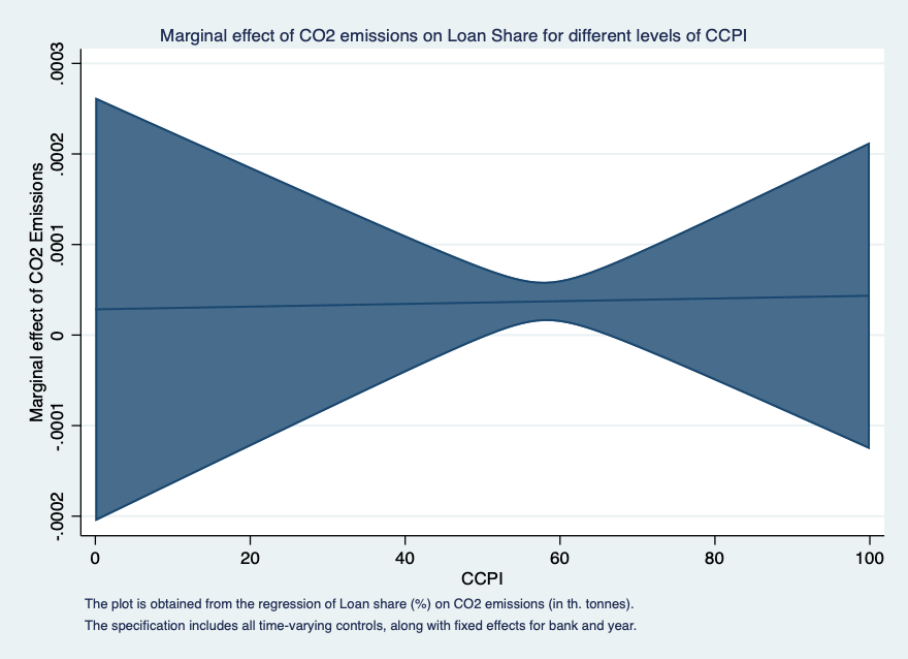

Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 1.

*Figure 6: Average marginal effect of CO2 Emissions on Loan Amount (in logs) for different levels of the Climate Policy Performance Index, before and after COP21*



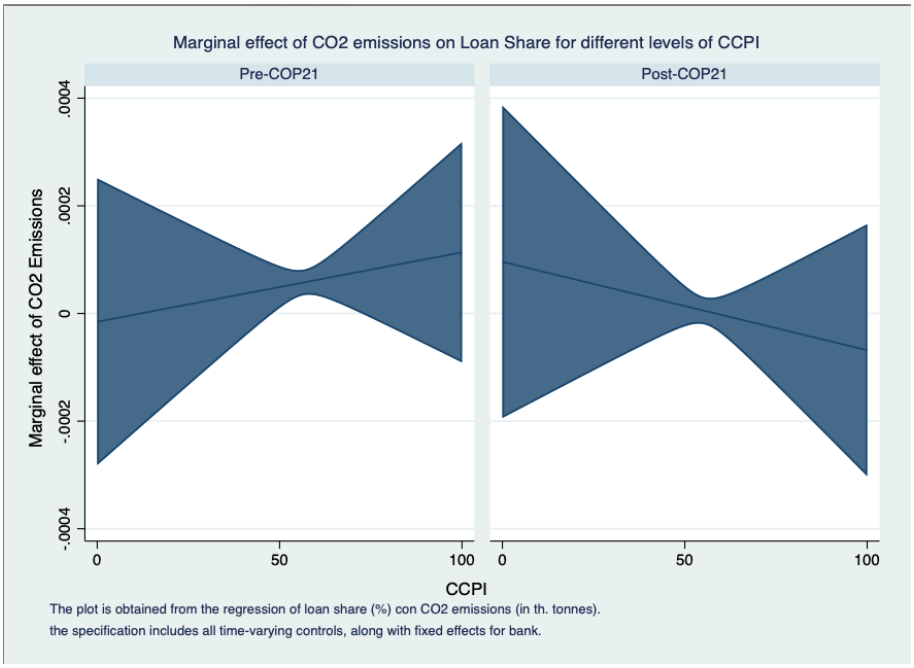

Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 2.

*Figure 7: Average marginal effect of CO2 Emissions on Loan Share for different levels of the Climate Policy Performance Index*




Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 1.

*Figure 8: Average marginal effect of CO2 Emissions on Loan Share for different levels of the Climate Policy Performance Index, before and after COP21*




Note: the banded region represents the 95% confidence interval. Average marginal effects are computed based on Equation 2.

# Appendix

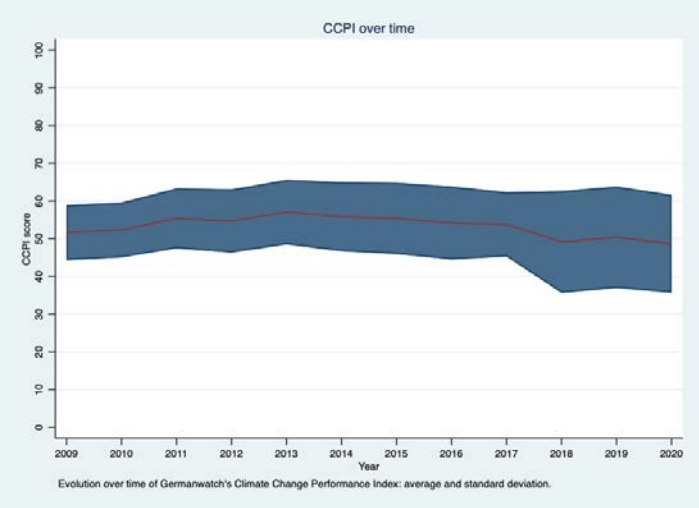



*Figure A1: Annual average and SD of CCPI for the countries for which it is available, 2009-2020. On elaborations based on data from Germanwatch.*

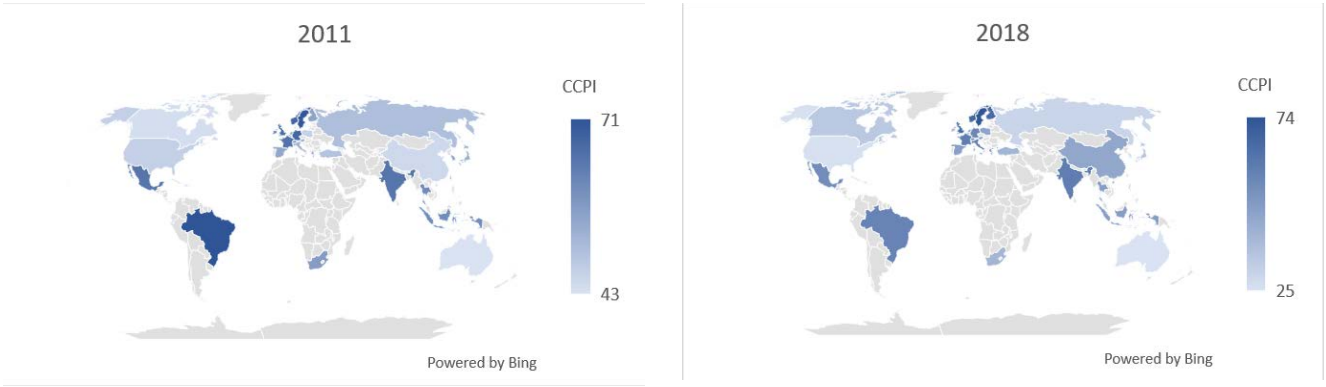



*Figure A7: Value of CCPI in the countries for which it is available, 2011 and 2018 (beginning and end of the considered sample period). Own elaborations based on data from Germanwatch.*

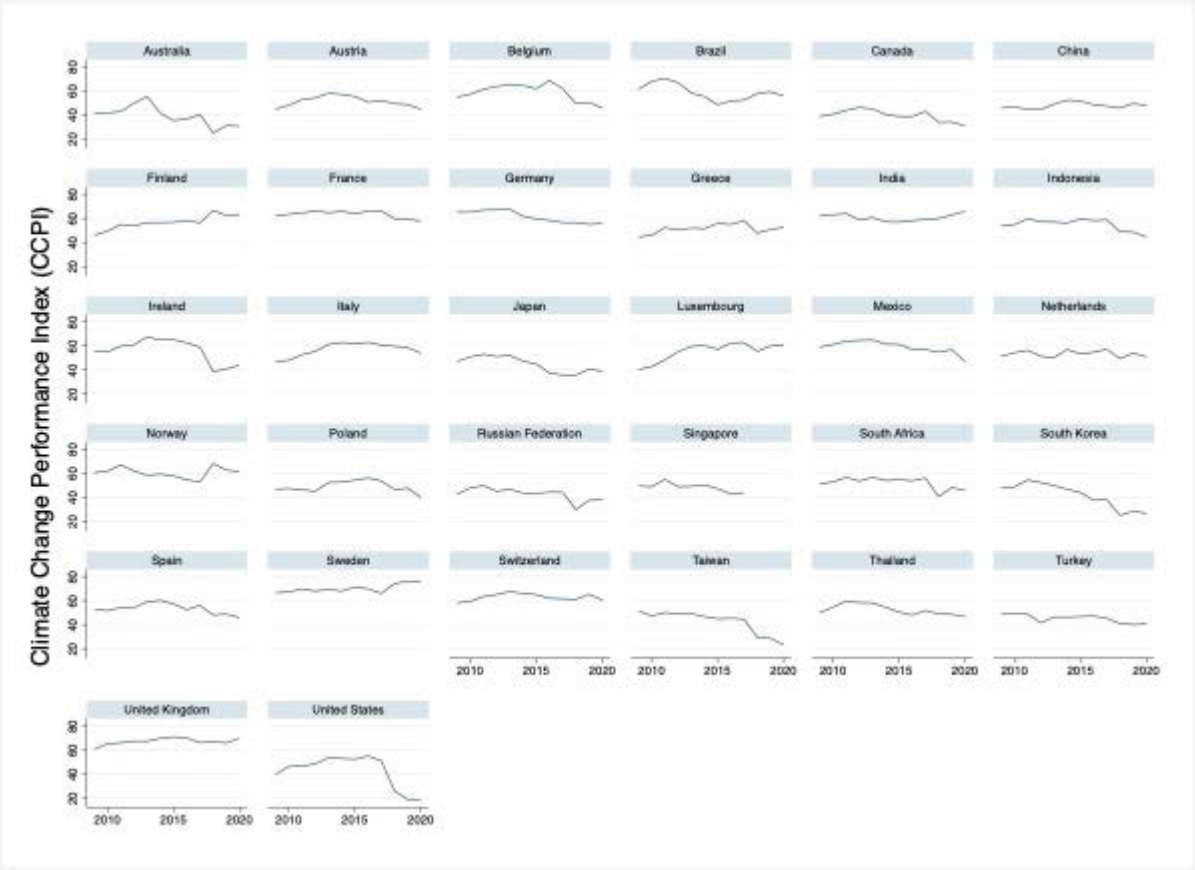



*Figure A3: Evolution of the CCPI score by country[49], 2009-2020. Own elaborations based on data from Germanwatch.*

[49] Figure 4 reports CCPI trends for all the countries included as borrowing firms' countries in our sample, for which the CCPI is available. The only country which is left unmatched is Hong Kong, which is considered as part of China in Germanwatch's computations.

*Table A 1: Facility-Lead arranger. Test for differences in means by vulnerability group*

| | Vulnerable | | Non-Vulnerable | | t-Test | |
|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **SD** | **Mean** | **SD** | **Difference** | **S.E.** |
| Loan margin (bps) | 130.842 | 93.697 | 158.361 | 98.637 | 27.519*** | (10.150) |
| Loan amount (log) | 7.069 | 1.21 | 6.298 | 1.495 | -0.771*** | (-20.012) |
| Loan amount (M USD) | 2450.033 | 4344.443 | 1541.318 | 3482.574 | -908.715*** | (-8.271) |
| nLenders | 9.695 | 8.14 | 5.792 | 5.249 | -3.902*** | (-20.568) |
| Secured | 0.135 | 0.342 | 0.176 | 0.381 | 0.041*** | (4.038) |
| Maturity (months) | 50.909 | 22.991 | 52.915 | 24.393 | 2.006** | (3.002) |
| Performance Pricing | 0.229 | 0.42 | 0.191 | 0.393 | -0.039*** | (-3.375) |
| Covenants | 0.174 | 0.379 | 0.339 | 0.473 | 0.165*** | (13.573) |
| Bank's ROA | 0.513 | 0.595 | 0.54 | 0.637 | 0.028 | (1.322) |
| Bank's E/TA | 6.76 | 3.653 | 7.16 | 3.586 | 0.400*** | (3.346) |
| Bank's total assets (log) | 13.289 | 1.573 | 13.182 | 1.657 | -0.106* | (-1.985) |
| Bank's total assets | 1100950 | 821663.5 | 1071566 | 820936.4 | -29384.197 | (-1.082) |
| Bank's Tier1 ratio | 13.019 | 2.93 | 13.111 | 3.276 | 0.092 | (0.833) |
| Bank's Cost-to-Income Ratio | 61.893 | 16.134 | 63.097 | 15.873 | 1.204* | (2.229) |
| Bank's NLP to Total Loans | 2.717 | 2.763 | 2.714 | 2.604 | -0.003 | (-0.035) |
| GreenBank (UNEPFI) | 0.444 | 0.497 | 0.408 | 0.492 | -0.035* | (-2.534) |
| Firm's total assets (log) | 10.369 | 1.153 | 8.771 | 1.19 | -1.598*** | (-44.519) |
| Firm's total assets | 58431.3 | 68050.38 | 12714.7 | 16973.65 | -45716.606*** | (-31.563) |
| Firm's leverage | 0.451 | 0.137 | 0.387 | 0.195 | -0.064*** | (-12.429) |
| Firm's ROA | 3.734 | 6.809 | 5.009 | 10.018 | 1.275*** | (4.889) |
| Firm's country GDP growth | 2.304 | 2.927 | 2.281 | 1.634 | -0.023 | (-0.351) |
| Firm's sales (log) | 9.801 | 1.187 | 8.31 | 1.228 | -1.491*** | (-40.101) |
| Firm's sales | 33683.13 | 43905.99 | 8531.099 | 14262.31 | -25152.034*** | (-26.244) |
| CO2 Emissions (thousand tonnes) | 17918.79 | 34920.38 | 250.092 | 282.028 | -17668.696*** | (-26.421) |
| CO2/Revenue | 953.632 | 2177.343 | 79.11 | 179.388 | -874.522*** | (-20.892) |
| Firm's country CCPI | 54.131 | 11.182 | 54.214 | 12.655 | 0.083 | (0.245) |
| Vulnerable (top25) | 0.528 | 0.499 | 0 | 0 | -0.528*** | (-55.227) |
| Vulnerable (top50) | 1 | 0 | 0 | 0 | -1.000 | (.) |
| High CCPI (top50) | 0.496 | 0.5 | 0.434 | 0.496 | -0.062*** | (-4.445) |
| High CCPI (top25) | 0.267 | 0.442 | 0.377 | 0.485 | 0.110*** | (8.405) |

Note: Vulnerable borrowers are defined according to the 50$^{th}$ percentile threshold.

*Table A 2: Facility-Lead arranger. Test for differences in means by climate policy stringency group*

| | High CCPI | | Low CCPI | | t-Test | |
|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **SD** | **Mean** | **SD** | **Difference** | **S.E.** |
| Loan margin (bps) | 142.398 | 108.896 | 144.642 | 85.198 | 2.244 | (0.810) |
| Loan amount (log) | 7.02 | 1.346 | 6.442 | 1.397 | -0.578*** | (-15.009) |
| Loan amount (M USD) | 2566.653 | 4602.298 | 1557.91 | 3301.434 | -1008.743*** | (-8.865) |
| nLenders | 11.594 | 7.931 | 4.638 | 4.477 | -6.956*** | (-37.775) |
| Secured | 0.12 | 0.325 | 0.184 | 0.388 | 0.065*** | (6.455) |
| Maturity (months) | 51.871 | 18.636 | 51.811 | 27.332 | -0.060 | (-0.092) |
| Performance Pricing | 0.2 | 0.4 | 0.221 | 0.415 | 0.022 | (1.899) |
| Covenants | 0.09 | 0.287 | 0.391 | 0.488 | 0.300*** | (27.140) |
| Bank's ROA | 0.393 | 0.584 | 0.649 | 0.617 | 0.256*** | (12.695) |
| Bank's E/TA | 5.969 | 3.157 | 7.868 | 3.801 | 1.899*** | (16.553) |
| Bank's total assets (log) | 13.3 | 1.672 | 13.184 | 1.551 | -0.116* | (-2.183) |
| Bank's total assets | 1111579 | 787757 | 1064658 | 851709.3 | -46920.165 | (-1.738) |
| Bank's Tier1 ratio | 13.419 | 2.757 | 12.748 | 3.328 | -0.672*** | (-6.276) |
| Bank's Cost-to-Income Ratio | 64.663 | 17.485 | 60.363 | 14.226 | -4.300*** | (-7.988) |
| Bank's NLP to Total Loans | 3.464 | 3.071 | 1.977 | 1.997 | -1.487*** | (-16.580) |
| GreenBank (UNEPFI) | 0.545 | 0.498 | 0.324 | 0.468 | -0.221*** | (-16.244) |
| Firm's total assets (log) | 9.798 | 1.543 | 9.507 | 1.275 | -0.291*** | (-6.712) |
| Firm's total assets | 45431.37 | 57981.08 | 31030.73 | 54176.22 | -14400.634*** | (-8.410) |
| Firm's leverage | 0.425 | 0.161 | 0.418 | 0.177 | -0.007 | (-1.304) |
| Firm's ROA | 4.239 | 9.355 | 4.398 | 7.626 | 0.159 | (0.616) |
| Firm's country GDP growth | 2.191 | 3.112 | 2.383 | 1.565 | 0.192** | (2.717) |
| Firm's sales (log) | 9.201 | 1.507 | 9.077 | 1.325 | -0.124** | (-2.851) |
| Firm's sales | 24344.53 | 35148.29 | 20786.6 | 37163.61 | -3557.934** | (-3.219) |
| CO2 Emissions (thousand tonnes) | 13928.03 | 34928.3 | 6054.743 | 16604.77 | -7873.283*** | (-10.032) |
| CO2/Revenue | 482.212 | 1157.292 | 606.339 | 1994.205 | 124.127** | (2.753) |
| Firm's country CCPI | 63.817 | 4.736 | 45.718 | 9.613 | -18.099*** | (-86.711) |
| Vulnerable (top25) | 0.315 | 0.465 | 0.256 | 0.436 | -0.059*** | (-4.645) |
| Vulnerable (top50) | 0.57 | 0.495 | 0.508 | 0.5 | -0.062*** | (-4.445) |
| High CCPI (top50) | 1 | 0 | 0 | 0 | -1.000 | (.) |
| High CCPI (top25) | 0.68 | 0.467 | 0 | 0 | -0.680*** | (-71.021) |

Note: high CCPI countries are defined according to the 50$^{th}$ percentile threshold.

*Table A 3: Lender-Borrower: Test for differences in means by vulnerability group*

| | Vulnerable | | Non-Vulnerable | | t-Test | |
|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **SD** | **Mean** | **SD** | **Difference** | **S.E.** |
| Loan Share (% Gross Loans) | 8.694 | 12.744 | 6.782 | 10.468 | -1.912*** | (-5.605) |
| Loan Share (% Syndicated Loans) | 0.128 | 0.213 | 0.094 | 0.183 | -0.034*** | (-5.813) |
| (Avg.) Maturity | 50.277 | 12.762 | 52.09 | 11.858 | 1.812*** | (4.973) |
| (Avg.) Margin | 126.271 | 52.194 | 135.752 | 55.489 | 9.481*** | (5.877) |
| Bank's ROA | 0.645 | 0.75 | 0.714 | 0.988 | 0.069* | (2.511) |
| Bank's E/TA | 7.799 | 3.359 | 8.24 | 3.82 | 0.441*** | (4.014) |
| Bank's total assets (log) | 13.099 | 1.377 | 12.972 | 1.44 | -0.126** | (-2.991) |
| Bank's total assets | 942348.08 | 851103.51 | 887701.51 | 828677.47 | -54646.564* | (-2.189) |
| Bank's Tier1 ratio | 12.689 | 2.262 | 12.588 | 2.485 | -0.100 | (-1.361) |
| Bank's Cost-to-Income Ratio | 60.43 | 14.562 | 60.538 | 14.959 | 0.108 | (0.243) |
| GreenBank (UNEPFI) | 0.376 | 0.484 | 0.362 | 0.481 | -0.014 | (-0.951) |
| Firm's leverage | 0.471 | 0.171 | 0.408 | 0.187 | -0.063*** | (-11.661) |
| Firm's ROA | 3.191 | 8.128 | 5.408 | 6.865 | 2.217*** | (10.045) |
| Firm's total assets (log) | 10.517 | 1.128 | 9.201 | 1.015 | -1.316*** | (-41.561) |
| Firm's total assets | 68102.909 | 80109.327 | 16553.634 | 20231.274 | -51549.275*** | (-32.315) |
| Firm's CO2 Emissions (thousand tonnes) | 14889.3 | 27721.439 | 371.453 | 337.591 | -14517.846*** | (-27.480) |
| Firm's CO2/Revenue | 986.556 | 2000.214 | 68.096 | 115.376 | -918.460*** | (-24.040) |
| Firm's country GDP growth | 2.294 | 1.242 | 2.357 | 1.023 | 0.064 | (1.915) |
| Firm's country CCPI | 49.972 | 9.455 | 51.041 | 9.599 | 1.069*** | (3.762) |
| Vulnerable (top25) | 0.548 | 0.498 | 0 | 0 | -0.548*** | (-57.722) |
| Vulnerable (top50) | 1 | 0 | 0 | 0 | -1.000 | (.) |
| High CCPI (top50) | 14889.3 | 27721.439 | 371.453 | 337.591 | -14517.846*** | (-27.480) |
| High CCPI (top25) | 986.556 | 2000.214 | 68.096 | 115.376 | -918.460*** | (-24.040) |

Note: Vulnerable borrowers are defined according to the 50$^{th}$ percentile threshold.

*Table A 4: Lender-Borrower: Test for differences in means by climate policy stringency group*

| | Vulnerable | | Non-Vulnerable | | t-Test | |
|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **SD** | **Mean** | **SD** | **Difference** | **S.E.** |
| Loan Share (% Gross Loans) | 9.651 | 14.619 | 7.595 | 11.349 | -2.056*** | (-3.320) |
| Loan Share (% Syndicated Loans) | 0.18 | 0.272 | 0.103 | 0.186 | -0.077*** | (-6.745) |
| (Avg.) Maturity | 55.011 | 17.918 | 50.377 | 11.32 | -4.635*** | (-6.193) |
| (Avg.) Margin | 138.74 | 96.464 | 129.209 | 43.764 | -9.531* | (-2.399) |
| Bank's ROA | 0.41 | 0.465 | 0.713 | 0.899 | 0.302*** | (12.509) |
| Bank's E/TA | 6.124 | 2.848 | 8.269 | 3.582 | 2.145*** | (16.562) |
| Bank's total assets (log) | 13.454 | 1.219 | 12.995 | 1.416 | -0.460*** | (-8.468) |
| Bank's total assets | 1093206.1 | 774787.91 | 896838.94 | 846962.22 | -196367.200*** | (-5.748) |
| Bank's Tier1 ratio | 12.992 | 2.574 | 12.581 | 2.293 | -0.412*** | (-3.491) |
| Bank's Cost-to-Income Ratio | 63.045 | 17.234 | 60.277 | 14.232 | -2.768*** | (-3.700) |
| GreenBank (UNEPFI) | 0.574 | 0.495 | 0.34 | 0.474 | -0.234*** | (-10.902) |
| Firm's leverage | 0.47 | 0.173 | 0.443 | 0.181 | -0.027*** | (-3.574) |
| Firm's ROA | 10.21 | 1.533 | 9.933 | 1.216 | -0.277*** | (-4.250) |
| Firm's total assets (log) | 65006.601 | 70466.99 | 44219.053 | 67420.273 | -20787.548*** | (-6.815) |
| Firm's total assets | 1093206.1 | 774787.91 | 896838.94 | 846962.22 | -196367.200*** | (-5.748) |
| Firm's CO2 Emissions (thousand tonnes) | 16301.84 | 42765.958 | 7866.755 | 17346.265 | -8435.085*** | (-4.804) |
| Firm's CO2/Revenue | 7.03E+02 | 2.47E+03 | 5.97E+02 | 1.44E+03 | -105.968 | (-1.033) |
| Firm's country GDP growth | 2.035 | 2.089 | 2.352 | 0.931 | 0.318*** | (3.696) |
| Firm's country CCPI | 63.282 | 5.191 | 48.496 | 8.531 | -14.786*** | (-59.126) |
| Vulnerable (top25) | 0.582 | 0.494 | 0.592 | 0.491 | 0.010 | (0.466) |
| Vulnerable (top50) | 0.582 | 0.494 | 0.592 | 0.491 | 0.010 | (0.466) |
| High CCPI (top50) | 1 | 0 | 0 | 0 | -1.000 | (.) |
| High CCPI (top25) | 0.562 | 0.496 | 0 | 0 | -0.562*** | (-27.936) |

Note: high CCPI countries are defined according to the 50$^{th}$ percentile threshold.

*Table A 5: Facility-Lead Arranger. Loan margin and carbon emissions. Clusterization of Standard Errors by borrower's country*

| | Time FE | | Paris Agreement dummy | |
|---|---|---|---|---|
| **Loan margin (bps)** | CO2 Emissions | CO2 Emissions * CCPI | CO2 Emissions | CO2 Emissions * CCPI |
| | (1) | (2) | (3) | (4) |
| CO2 | 0.000290** | -0.000442 | 0.000436*** | 0.00191 |
| | (0.000106) | (0.00143) | (0.000153) | (0.00226) |
| CCPI | | 0.389 | | 0.339 |
| | | (0.386) | | (0.565) |
| CO2 * CCPI | | 1.23e-05 | | -2.55e-05 |
| | | (2.46e-05) | | (3.92e-05) |
| Post | | | 0.969 | 18.40 |
| | | | (7.688) | (29.28) |
| CO2 * Post | | | -0.000494 | -0.00447 |
| | | | (0.000335) | (0.00314) |
| CCPI * Post | | | | -0.257 |
| | | | | (0.413) |
| CO2 * CCPI * Post | | | | 6.77e-05 |
| | | | | (5.24e-05) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.591 | 0.592 | 0.578 | 0.581 |
| Adjusted R-Squared | 0.555 | 0.556 | 0.542 | 0.544 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is Loan Margin (in bps). The main regressor is CO2, which refers to total carbon emissions of firm i in year t, measured in thousands of tonnes; it is interacted with firm's country CCPI. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. ColumnColumns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 6: Facility-Lead Arranger. Loan amount and carbon emissions. Clusterization of Standard Errors by borrower's country*

| | Time FE | | Paris Agreement dummy | |
|---|---|---|---|---|
| **Loan amount (logs)** | CO2 Emissions | CO2 Emissions * CCPI | CO2 Emissions | CO2 Emissions * CCPI |
| CO2 | 4.35e-06* | -1.92e-05 | 4.84e-06* | -7.60e-06 |
| | (2.26e-06) | (1.47e-05) | (2.50e-06) | (2.63e-05) |
| CCPI | | 0.00907 | | 0.0215*** |
| | | (0.00629) | | (0.00487) |
| CO2 * CPPI | | 3.95e-07 | | 2.06e-07 |
| | | (2.62e-07) | | (4.54e-07) |
| Post | | | 0.151 | 1.219*** |
| | | | (0.0909) | (0.220) |
| CO2 * Post | | | -3.00e-06 | -1.57e-05 |
| | | | (2.38e-06) | (2.43e-05) |
| CCPI * Post | | | | -0.0180*** |
| | | | | (0.00407) |
| CO2 * CCPI * Post | | | | 2.15e-07 |
| | | | | (4.02e-07) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.679 | 0.683 | 0.677 | 0.683 |
| Adjusted R-Squared | 0.651 | 0.655 | 0.649 | 0.655 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Borrower's country | Borrower's country | Borrower's country | Borrower's country |

The dependent variable is the logarithm of loan amount (converted in thousands USD). The main regressor is CO2, which refers to total carbon emissions of firm i in year t, measured in thousands of tonnes; it is interacted with firm's country CCPI and a time indicator for the Post-COP21 period. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 7: Lender-Borrower. Loan share and carbon emissions. Clusterization of Standard Errors by borrower's country*

| | Time FE | | Paris Agreement dummy | |
|---|---|---|---|---|
| **Loan share** | CO2 Emissions | CO2 Emissions * CCPI | CO2 Emissions | CO2 Emissions * CCPI |
| CO2 | 3.79e-05** | 2.84e-05 | 5.36e-05*** | -1.53e-05 |
| | (1.60e-05) | (0.000209) | (1.87e-05) | (0.000162) |
| CCPI | | 0.0368 | | 0.0232 |
| | | (0.0710) | | (0.0867) |
| CO2 * CPPI | | 1.50e-07 | | 1.29e-06 |
| | | (3.54e-06) | | (2.65e-06) |
| Post | | | 1.669** | -0.126 |
| | | | (0.622) | (4.584) |
| CO2 * Post | | | -4.53e-05** | 0.000111 |
| | | | (1.85e-05) | (0.000220) |
| CCPI * Post | | | | 0.0393 |
| | | | | (0.0894) |
| CO2 * CCPI * Post | | | | -2.93e-06 |
| | | | | (3.91e-06) |
| Observations | 4,436 | 4,436 | 4,436 | 4,436 |
| R-squared | 0.526 | 0.526 | 0.523 | 0.524 |
| Adjusted R-Squared | 0.496 | 0.496 | 0.493 | 0.494 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Borrower's country | Borrower's country | Borrower's country | Borrower's country |

The dependent variable is the loan share. The main regressor is carbon emissions in thousand tonnes, interacted with firm's country CCPI and a time indicator for the Post-COP21 period. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 8: Extra controls and banks' CTR exposure: Loan margin.*

| | Time FE | | | | Paris Agreement dummy | | | |
|---|---|---|---|---|---|---|---|---|
| **Loan margin (bps)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| CO2 | 0.000329*** | 0.000325*** | -0.000474 | -0.000483 | 0.000460*** | 0.000458*** | 0.00200* | 0.00197* |
| | (7.72e-05) | (7.70e-05) | (0.000718) | (0.000722) | (8.90e-05) | (8.91e-05) | (0.00112) | (0.00111) |
| CCPI | | | 0.426* | 0.414* | | | 0.348 | 0.348 |
| | | | (0.238) | (0.239) | | | (0.303) | (0.302) |
| CO2 * CPPI | | | 1.35e-05 | 1.35e-05 | | | -2.68e-05 | -2.61e-05 |
| | | | (1.21e-05) | (1.22e-05) | | | (1.89e-05) | (1.88e-05) |
| Post | | | | | 2.597 | 3.424 | 23.18 | 24.03 |
| | | | | | (4.018) | (4.124) | (17.13) | (17.09) |
| CO2 * Post | | | | | -0.000442*** | -0.000447*** | -0.00460** | -0.00456* |
| | | | | | (0.000150) | (0.000151) | (0.00231) | (0.00231) |
| CCPI * Post | | | | | | | -0.319 | -0.321 |
| | | | | | | | (0.277) | (0.277) |
| CO2 * CCPI * Post | | | | | | | 7.10e-05* | 7.03e-05* |
| | | | | | | | (3.86e-05) | (3.86e-05) |
| CTR exposure to total assets | | 0.606*** | | 0.582*** | | 0.402 | | 0.369 |
| | | (0.192) | | (0.196) | | (0.261) | | (0.252) |
| Observations | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 |
| R-squared | 0.584 | 0.584 | 0.585 | 0.586 | 0.572 | 0.572 | 0.575 | 0.575 |
| Adj. R-Squared | 0.546 | 0.547 | 0.548 | 0.548 | 0.534 | 0.534 | 0.537 | 0.537 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank's CTR exposure control | YES | NO | YES | NO | YES | NO | YES | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

*Table A 9: Extra controls and banks' CTR exposure: Loan amount.*

| | Time FE | | | | Paris Agreement dummy | | | |
|---|---|---|---|---|---|---|---|---|
| **Loan amount (log)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| CO2 | 4.31e-06** | 4.20e-06** | -1.97e-05 | -1.99e-05 | 4.85e-06*** | 4.78e-06*** | -1.01e-05 | -1.17e-05 |
| | (1.65e-06) | (1.65e-06) | (1.52e-05) | (1.52e-05) | (1.75e-06) | (1.75e-06) | (1.34e-05) | (1.32e-05) |
| CCPI | | | 0.00948*** | 0.00918*** | | | 0.0221*** | 0.0220*** |
| | | | (0.00345) | (0.00345) | | | (0.00380) | (0.00379) |
| CO2 * CPPI | | | 4.03e-07 | 4.04e-07 | | | 2.49e-07 | 2.74e-07 |
| | | | (2.64e-07) | (2.65e-07) | | | (2.24e-07) | (2.20e-07) |
| Post | | | | | 0.165*** | 0.197*** | 1.241*** | 1.271*** |
| | | | | | (0.0315) | (0.0325) | (0.220) | (0.220) |
| CO2 * Post | | | | | -3.28e-06** | -3.48e-06** | -1.01e-05 | -8.52e-06 |
| | | | | | (1.51e-06) | (1.50e-06) | (2.52e-05) | (2.49e-05) |
| CCPI * Post | | | | | | | -0.0185*** | -0.0185*** |
| | | | | | | | (0.00368) | (0.00369) |
| CO2 * CCPI * Post | | | | | | | 1.16e-07 | 8.57e-08 |
| | | | | | | | (4.19e-07) | (4.13e-07) |
| CTR exposure to total assets | | 0.0143** | | 0.0136** | | 0.0158** | | 0.0161*** |
| | | (0.00653) | | (0.00636) | | (0.00619) | | (0.00609) |
| Observations | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 | 2,773 |
| R-squared | 0.679 | 0.681 | 0.683 | 0.684 | 0.677 | 0.679 | 0.683 | 0.685 |
| Adj. R-Squared | 0.650 | 0.652 | 0.654 | 0.655 | 0.649 | 0.650 | 0.655 | 0.656 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank's CTR exposure control | YES | NO | YES | NO | YES | NO | YES | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

*Table A 10: Extra controls and banks' CTR exposure: Loan share.*

| | Time FE | | | | Paris Agreement dummy | | | |
|---|---|---|---|---|---|---|---|---|
| **Loan share (%)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| CO2 | 4.18e-05*** | 4.15e-05*** | 1.29e-05 | 1.35e-05 | 5.50e-05*** | 5.45e-05*** | 9.98e-06 | 1.09e-05 |
| | (1.02e-05) | (1.02e-05) | (0.000123) | (0.000123) | (1.11e-05) | (1.11e-05) | (0.000145) | (0.000144) |
| CCPI | | | 0.0385 | 0.0380 | | | 0.0443 | 0.0419 |
| | | | (0.0316) | (0.0316) | | | (0.0420) | (0.0427) |
| CO2 * CPPI | | | 4.98e-07 | 4.83e-07 | | | 8.42e-07 | 8.18e-07 |
| | | | (2.10e-06) | (2.10e-06) | | | (2.57e-06) | (2.56e-06) |
| Post | | | | | 1.248*** | 1.287*** | 0.865 | 0.757 |
| | | | | | (0.312) | (0.300) | (2.517) | (2.555) |
| CO2 * Post | | | | | -3.94e-05*** | -3.91e-05*** | 1.98e-05 | 1.88e-05 |
| | | | | | (8.98e-06) | (8.92e-06) | (0.000166) | (0.000165) |
| CCPI * Post | | | | | | | 0.0125 | 0.0154 |
| | | | | | | | (0.0471) | (0.0481) |
| CO2 * CCPI * Post | | | | | | | -1.18e-06 | -1.16e-06 |
| | | | | | | | (3.07e-06) | (3.06e-06) |
| CTR exposure to total assets | | 0.478 | | 0.446 | | 0.543 | | 0.525 |
| | | (0.956) | | (0.961) | | (0.905) | | (0.907) |
| Observations | 4,193 | 4,193 | 4,193 | 4,193 | 4,193 | 4,193 | 4,193 | 4,193 |
| R-squared | 0.526 | 0.526 | 0.526 | 0.526 | 0.522 | 0.522 | 0.524 | 0.524 |
| Adj. R-Squared | 0.497 | 0.497 | 0.497 | 0.497 | 0.494 | 0.494 | 0.495 | 0.495 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Extra bank's CTR exposure control | YES | NO | YES | NO | YES | NO | YES | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

*Table A 11: Lender Borrower. Loan share computed over syndicated lending.*

| | Time FE | | Paris Agreement dummy | |
|---|---|---|---|---|
| **Loan share Syndicated** | CO2 Emissions | CO2 Emissions * CCPI | CO2 Emissions | CO2 Emissions * CCPI |
| CO2 | 2.54e-07** | -2.15e-06* | 4.30e-07*** | -2.33e-06** |
| | (1.24e-07) | (1.09e-06) | (1.27e-07) | (1.05e-06) |
| CCPI | | 0.000480 | | -0.000898* |
| | | (0.000443) | | (0.000537) |
| CO2 * CPPI | | 4.24e-08** | | 4.97e-08** |
| | | (1.97e-08) | | (1.93e-08) |
| Post | | | 0.0318*** | -0.0316 |
| | | | (0.00660) | (0.0346) |
| CO2 * Post | | | -4.38e-07** | 2.64e-07 |
| | | | (2.00e-07) | (2.44e-06) |
| CCPI * Post | | | | 0.00126* |
| | | | | (0.000708) |
| CO2 * CCPI * Post | | | | -1.48e-08 |
| | | | | (4.48e-08) |
| Observations | 4,436 | 4,436 | 4,436 | 4,436 |
| R-squared | 0.740 | 0.740 | 0.733 | 0.734 |
| Adjusted R-Squared | 0.723 | 0.724 | 0.716 | 0.717 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES |
| Time FE | YES | YES | NO | NO |
| Firm's country FE | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is the loan share. The main regressor is carbon emissions in thousand tonnes, interacted with firm's country CCPI and a time indicator for the Post-COP21 period. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects. Columns (1) and (2) also include year fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 12: Continuous analysis, alternative definition of the Post dummy variable*

| | Dep. Var.: Loan margin (bps) | | Dep. Var.: Loan amount (log) | | Dep. Var.: Loan share (%) | |
|---|---|---|---|---|---|---|
| | CO2 Emissions (1) | CO2 Emissions * CCPI (2) | CO2 Emissions (5) | CO2 Emissions * CCPI (6) | CO2 Emissions (5) | CO2 Emissions * CCPI (6) |
| CO2 | 0.000405*** | 0.00158 | 9.71e-07 | -8.13e-06 | 4.41e-05*** | 5.47e-05 |
| | (8.66e-05) | (0.00103) | (2.24e-06) | (1.19e-05) | (1.12e-05) | (0.000140) |
| CCPI | | 0.762** | | 0.0229*** | | 0.108*** |
| | | (0.332) | | (0.00470) | | (0.0355) |
| CO2 * CCPI | | -2.03e-05 | | 1.58e-07 | | -1.82e-07 |
| | | (1.74e-05) | | (1.82e-07) | | (2.46e-06) |
| Post | -3.072 | 49.62** | 0.0613 | 1.319*** | 1.715*** | 4.811** |
| | (4.254) | (19.45) | (0.0571) | (0.223) | (0.507) | (2.428) |
| CO2 * Post | -0.000391** | -0.00372* | 1.11e-06 | -4.05e-06 | -2.96e-05* | -1.91e-05 |
| | (0.000166) | (0.00207) | (1.97e-06) | (2.31e-05) | (1.63e-05) | (0.000187) |
| CCPI * Post | | -0.924*** | | -0.0219*** | | -0.0460 |
| | | (0.344) | | (0.00389) | | (0.0448) |
| CO2 * CCPI * Post | | 5.68e-05 | | 8.44e-08 | | -3.05e-07 |
| | | (3.49e-05) | | (3.70e-07) | | (3.44e-06) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 | 4,436 | 4,436 |
| R-squared | 0.577 | 0.580 | 0.712 | 0.716 | 0.522 | 0.524 |
| Adjusted R-Squared | 0.541 | 0.543 | 0.684 | 0.688 | 0.492 | 0.494 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES |
| Time FE | NO | NO | NO | NO | NO | NO |
| Firm's country FE | NO | NO | NO | NO | NO | NO |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank |

All the three dependent variables are considered in this table: Loan Margin (in bps), Loan Amount (in logs), Loan Share (in % of total loans). The main regressor is CO2, which refers to total carbon emissions of firm i in year t, measured in thousands of tonnes; it is interacted with firm's country CCPI. The dummy Post identifies as "post-period" the years 2017 and 2018. All specifications include loan, bank, firm and firm's country time-varying controls, along with loan purpose and loan type fixed effects, firms' industry fixed effects, and bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 13: Binary analysis, alternative definition of the Post dummy variable (loan margin and loan amount)*

| | Dep. Var.: Loan margin (bps) | | | | Dep. Var.: Loan amount (log) | | | |
|---|---|---|---|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top50 | | Vulnerable: top50 | | Vulnerable: top25 | |
| | CCPI: top50 | CCPI: top50 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 | CCPI: top50 | CCPI: top25 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Vulnerable | -24.17*** | -24.17*** | 0.146* | 0.148* | 0.146* | 0.148* | -29.85*** | -24.55*** |
| | (7.833) | (7.833) | (0.0753) | (0.0775) | (0.0753) | (0.0775) | (10.24) | (8.237) |
| High CCPI | -4.467 | -4.467 | 0.753*** | 0.625*** | 0.753*** | 0.625*** | 11.47** | 30.54*** |
| | (6.485) | (6.485) | (0.0881) | (0.0867) | (0.0881) | (0.0867) | (5.266) | (9.174) |
| Vulnerable * High CCPI | 21.43* | 21.43* | -0.365*** | -0.418*** | -0.365*** | -0.418*** | -9.891 | -42.89*** |
| | (12.41) | (12.41) | (0.126) | (0.0973) | (0.126) | (0.0973) | (12.75) | (16.24) |
| Post | 2.418 | 2.418 | 0.594*** | 0.436*** | 0.594*** | 0.436*** | 2.052 | -2.136 |
| | (7.687) | (7.687) | (0.121) | (0.0919) | (0.121) | (0.0919) | (5.341) | (5.458) |
| Vulnerable * Post | -19.28 | -19.28 | -0.732*** | -0.516*** | -0.732*** | -0.516*** | -2.449 | -7.483 |
| | (11.85) | (11.85) | (0.130) | (0.123) | (0.130) | (0.123) | (9.482) | (9.677) |
| High CCPI * Post | 0.902 | 0.902 | -0.529*** | -0.413*** | -0.529*** | -0.413*** | -21.21** | -15.66 |
| | (8.376) | (8.376) | (0.122) | (0.125) | (0.122) | (0.125) | (8.437) | (9.547) |
| Vulnerable * High CCPI * Post | 4.767 | 4.767 | 0.635*** | 0.376** | 0.635*** | 0.376** | 3.780 | 40.11 |
| | (17.18) | (17.18) | (0.155) | (0.179) | (0.155) | (0.179) | (23.34) | (29.61) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.578 | 0.578 | 0.688 | 0.682 | 0.688 | 0.682 | 0.584 | 0.587 |
| Adjusted R-Squared | 0.541 | 0.541 | 0.661 | 0.655 | 0.661 | 0.655 | 0.547 | 0.551 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variables considered in this table are Loan Margin (in bps) and Loan Amount (in logs). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). The dummy Post identifies as "post-period" the years 2017 and 2018. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 14: Binary analysis, alternative definition of the Post dummy variable (loan share)*

| | Post dummy: 2017, 2018 | | | |
|---|---|---|---|---|
| | Vulnerable: top50 | | Vulnerable: top25 | |
| **Loan share (%)** | Top50 CCPI | Top25 CCPI | Top50 CCPI | Top25 CCPI |
| | (5) | (6) | (7) | (8) |
| Vulnerable | 0.756* | 0.996** | 2.396*** | 2.267*** |
| | (0.429) | (0.477) | (0.460) | (0.465) |
| High CCPI | 0.710 | 1.811* | 1.795** | 1.469** |
| | (0.959) | (0.956) | (0.844) | (0.706) |
| Vulnerable * High CCPI | 3.371*** | 4.739*** | 4.152*** | 12.46*** |
| | (0.845) | (1.555) | (1.348) | (2.737) |
| Post | 0.226 | 0.203 | 0.668 | 0.527 |
| | (0.525) | (0.514) | (0.581) | (0.552) |
| Vulnerable * Post | 5.438** | 4.551** | 1.462** | 2.229*** |
| | (2.321) | (2.202) | (0.673) | (0.689) |
| High CCPI * Post | 1.693** | 1.881** | 0.996 | 1.451 |
| | (0.802) | (0.784) | (1.311) | (1.483) |
| Vulnerable * High CCPI * Post | -5.705* | -11.13*** | 1.193 | -14.58*** |
| | (3.021) | (2.822) | (2.761) | (3.689) |
| Observations | 4,378 | 4,378 | 4,378 | 4,378 |
| R-squared | 0.527 | 0.528 | 0.534 | 0.538 |
| Adjusted R-Squared | 0.497 | 0.498 | 0.504 | 0.508 |
| Loan Purpose FE | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES |
| Firm's industry FE | YES | YES | YES | YES |
| Firm's country GDP controls | YES | YES | YES | YES |
| Firm's Country FE | NO | NO | NO | NO |
| Bank FE | YES | YES | YES | YES |
| Clustered SE | Bank | Bank | Bank | Bank |

The dependent variable is Loan Share (total syndicated lending from bank j to borrower i in a given year as a share of bank j's total gross loans in that year). Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. Similarly, borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided). The dummy Post identifies as "post-period" the years 2017 and 2018. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table A 15: Checks on the dummy variable analysis: Highly polluting industries. Loan margin.*

| | Highly polluting 1 | | Highly polluting 2 | | Highly polluting 3 | | Highly polluting 4 | |
|---|---|---|---|---|---|---|---|---|
| **Loan margin (bps)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| Highly polluting | 97.38** | 114.8*** | 57.54* | 105.2*** | 65.30** | 91.81*** | 74.06** | 98.92*** |
| | (37.31) | (39.13) | (34.30) | (36.53) | (32.59) | (33.87) | (33.98) | (35.24) |
| High CCPI | -10.78** | -4.502 | -22.88*** | -2.412 | -11.84* | 3.332 | -8.143 | 6.602 |
| | (5.306) | (7.589) | (6.551) | (8.239) | (7.075) | (10.43) | (7.025) | (10.56) |
| Highly polluting * High CCPI | 52.49*** | 59.37*** | 57.28*** | 40.20*** | 23.11** | 13.20 | 15.32 | 8.015 |
| | (14.21) | (15.81) | (11.50) | (13.88) | (10.22) | (13.31) | (9.583) | (13.08) |
| Post | -6.636* | -8.164** | -2.792 | 0.0295 | -3.961 | -5.083 | 2.371 | -0.610 |
| | (3.867) | (3.842) | (4.314) | (4.592) | (3.703) | (3.532) | (3.790) | (3.559) |
| Highly Polluting * Post | -18.60 | -16.77 | -23.99** | -41.36*** | -8.345 | -10.30 | -23.69** | -20.43** |
| | (16.27) | (15.93) | (11.09) | (11.29) | (11.60) | (9.987) | (9.617) | (8.403) |
| High CCPI * Post | -5.271 | 6.997 | -0.292 | 2.912 | -8.378 | 0.741 | -16.71** | -3.725 |
| | (6.671) | (6.077) | (6.658) | (5.720) | (7.211) | (7.934) | (8.045) | (8.785) |
| Highly polluting * High CCPI * Post | 52.88** | 36.78* | 40.88** | 49.27*** | 43.85*** | 36.42** | 61.92*** | 44.88** |
| | (21.81) | (20.82) | (19.21) | (15.25) | (15.75) | (17.27) | (16.08) | (18.87) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.586 | 0.587 | 0.592 | 0.588 | 0.580 | 0.578 | 0.582 | 0.579 |
| Adj. R-Squared | 0.550 | 0.551 | 0.557 | 0.552 | 0.544 | 0.542 | 0.546 | 0.542 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Borrower's country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is loan margin (in basis points). We follow Ehelers et al., 2021 for the definition of carbon-intensive industries which is progressively expanded to include more industries. In particular, Highly polluting 1 includes Oil, Coal, Gas SIC subindustries; Highly polluting 2 also includes Utilities; Highly polluting 3 also includes Materials; Highly polluting 4 comprises Transport-related subindustries as well all the previous ones. Borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the $75^{th}$ percentile value of CCPI computed among all countries for which the measure is provided).

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

*Table A 16: Checks on the dummy variable analysis: Highly polluting industries. Loan amount.*

| | Highly polluting 1 | | Highly polluting 2 | | Highly polluting 3 | | Highly polluting 4 | |
|---|---|---|---|---|---|---|---|---|
| **Loan amount (log)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| Highly polluting | 0.257 | -0.0308 | -0.214 | -0.0891 | -0.295 | -0.252 | -0.241 | -0.230 |
| | (0.483) | (0.484) | (0.390) | (0.379) | (0.387) | (0.405) | (0.396) | (0.411) |
| High CCPI | 0.678*** | 0.488*** | 0.460*** | 0.441*** | 0.616*** | 0.541*** | 0.654*** | 0.567*** |
| | (0.0869) | (0.0750) | (0.0941) | (0.0702) | (0.0916) | (0.0802) | (0.0961) | (0.0843) |
| Highly polluting * High CCPI | -0.335** | -0.284** | 0.323** | -0.0811 | -0.0700 | -0.273*** | -0.126 | -0.310*** |
| | (0.137) | (0.122) | (0.140) | (0.109) | (0.134) | (0.102) | (0.136) | (0.102) |
| Post | 0.329*** | 0.189*** | 0.365*** | 0.339*** | 0.367*** | 0.283*** | 0.403*** | 0.305*** |
| | (0.0638) | (0.0467) | (0.0693) | (0.0630) | (0.0579) | (0.0504) | (0.0618) | (0.0501) |
| Highly Polluting * Post | -0.0140 | 0.121 | -0.360 | -0.668*** | -0.227 | -0.242 | -0.282** | -0.271** |
| | (0.123) | (0.109) | (0.220) | (0.256) | (0.149) | (0.156) | (0.118) | (0.133) |
| High CCPI * Post | -0.319*** | -0.300*** | -0.294*** | -0.426*** | -0.524*** | -0.463*** | -0.572*** | -0.499*** |
| | (0.0739) | (0.0737) | (0.0738) | (0.0788) | (0.0793) | (0.0729) | (0.0818) | (0.0711) |
| Highly polluting * High CCPI * Post | 0.0793 | 0.0880 | 0.189 | 0.737** | 0.712*** | 0.560** | 0.759*** | 0.605*** |
| | (0.236) | (0.198) | (0.267) | (0.311) | (0.193) | (0.215) | (0.178) | (0.194) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 | 3,024 |
| R-squared | 0.686 | 0.680 | 0.689 | 0.685 | 0.688 | 0.681 | 0.688 | 0.681 |
| Adj. R-Squared | 0.658 | 0.653 | 0.662 | 0.658 | 0.661 | 0.653 | 0.661 | 0.654 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Borrower's country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is the logarithm of loan amount (converted in thousands USD). We follow Ehelers et al., 2021 for the definition of carbon-intensive industries which is progressively expanded to include more industries. In particular, Highly polluting 1 includes Oil, Coal, Gas SIC subindustries; Highly polluting 2 also includes Utilities; Highly polluting 3 also includes Materials; Highly polluting 4 comprises Transport-related subindustries as well all the previous ones. Borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided).

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table A 17: Checks on the dummy variable analysis: Highly polluting industries. Loan share.*

| | Highly polluting 1 | | Highly polluting 2 | | Highly polluting 3 | | Highly polluting 4 | |
|---|---|---|---|---|---|---|---|---|
| **Loan share (%)** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** | **High CCPI top50** | **High CCPI top25** |
| Highly polluting | -21.37*** | -25.22*** | -22.32*** | -26.25*** | -23.78*** | -25.65*** | -23.80*** | -25.65*** |
| | (3.661) | (4.086) | (3.723) | (4.092) | (4.036) | (4.145) | (4.043) | (4.145) |
| High CCPI | 2.340** | 6.052*** | 2.321* | 5.691*** | 2.266* | 5.884*** | 2.263* | 5.881*** |
| | (0.907) | (1.261) | (1.189) | (1.335) | (1.260) | (1.367) | (1.266) | (1.366) |
| Highly polluting * High CCPI | -2.242** | -5.906*** | -0.923 | -3.227* | -0.834 | -3.744** | -0.802 | -3.748** |
| | (0.906) | (1.235) | (1.296) | (1.688) | (1.361) | (1.759) | (1.373) | (1.758) |
| Post | 1.122** | 1.518*** | 1.208*** | 1.691*** | 1.405*** | 1.630*** | 1.422*** | 1.660*** |
| | (0.434) | (0.413) | (0.442) | (0.421) | (0.441) | (0.389) | (0.481) | (0.422) |
| Highly Polluting * Post | -0.727 | -1.267* | -0.844 | -1.496*** | -1.334** | -0.864 | -1.173** | -0.816* |
| | (0.683) | (0.697) | (0.543) | (0.572) | (0.562) | (0.524) | (0.522) | (0.470) |
| High CCPI * Post | 3.157*** | -5.000*** | 3.088** | -5.041*** | 1.483 | -4.406*** | 1.482 | -4.422*** |
| | (1.168) | (1.356) | (1.393) | (1.491) | (1.442) | (1.540) | (1.454) | (1.544) |
| Highly polluting * High CCPI * Post | 4.154** | 13.99*** | 3.070 | 11.75*** | 6.282*** | 7.146*** | 6.115*** | 7.093*** |
| | (1.783) | (1.912) | (2.019) | (2.313) | (1.939) | (2.215) | (1.933) | (2.189) |
| Observations | 4,378 | 4,378 | 4,378 | 4,378 | 4,378 | 4,378 | 4,378 | 4,378 |
| R-squared | 0.526 | 0.527 | 0.526 | 0.526 | 0.527 | 0.524 | 0.527 | 0.524 |
| Adj. R-Squared | 0.496 | 0.496 | 0.496 | 0.496 | 0.497 | 0.494 | 0.497 | 0.494 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | NO | NO | NO | NO | NO | NO | NO | NO |
| GDP controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Borrower's country FE | NO | NO | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank | Bank | Bank |

The dependent variable is Loan Share (total syndicated lending from bank j to borrower i in a given year as a share of bank j's total gross loans in that year). We follow Ehelers et al., 2021 for the definition of carbon-intensive industries which is progressively expanded to include more industries. In particular, Highly polluting 1 includes Oil, Coal, Gas SIC subindustries; Highly polluting 2 also includes Utilities; Highly polluting 3 also includes Materials; Highly polluting 4 comprises Transport-related subindustries as well all the previous ones. Borrowers' countries are classified into high-climate sensitive countries and low-climate sensitive according to whether their CCPI score in a year falls above a given threshold (either the median or the 75$^{th}$ percentile value of CCPI computed among all countries for which the measure is provided).

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

*Table A 18: Checks on the dummy variable analysis: EU borrowers.*

| | Loan margin (bps) | | Loan amount (log) | | Loan share (%) | |
|---|---|---|---|---|---|---|
| **Variables** | **Vulnerable top50** | **Vulnerable top25** | **Vulnerable top50** | **Vulnerable top25** | **Vulnerable top50** | **Vulnerable top25** |
| Vulnerable | -7.897 | 8.165 | 0.292*** | 0.0463 | 1.962*** | 2.534*** |
| | (7.760) | (9.440) | (0.0945) | (0.0864) | (0.572) | (0.489) |
| EU borrower | -2.081 | 14.82* | 0.640*** | 0.448*** | 1.490 | 0.827 |
| | (9.300) | (7.769) | (0.122) | (0.120) | (1.308) | (1.032) |
| Vulnerable * EU borrower | -6.345 | -61.30*** | -0.497*** | -0.191 | 1.092 | 4.575*** |
| | (12.31) | (14.91) | (0.174) | (0.141) | (1.011) | (1.270) |
| Post Paris | 2.343 | 6.365 | 0.589*** | 0.380*** | 1.577*** | 0.704 |
| | (5.016) | (4.812) | (0.0874) | (0.0831) | (0.417) | (0.472) |
| Vulnerable * Post Paris | -13.80 | -42.30*** | -0.610*** | -0.399** | -0.807 | 0.847 |
| | (9.030) | (12.85) | (0.115) | (0.199) | (0.576) | (0.643) |
| EU borrower * Post Paris | -0.948 | -12.83* | -0.603*** | -0.403*** | 0.418 | 2.055** |
| | (7.414) | (6.709) | (0.107) | (0.0961) | (1.219) | (0.867) |
| Vulnerable * EU borrower * Post Paris | 5.151 | 30.07 | 0.625*** | 0.440 | 1.508 | -3.805* |
| | (12.94) | (19.95) | (0.127) | (0.270) | (1.650) | (2.200) |
| Observations | 3,024 | 3,024 | 3,024 | 3,024 | 4,436 | 4,436 |
| R-squared | 0.575 | 0.590 | 0.682 | 0.680 | 0.526 | 0.532 |
| Adj. R-Squared | 0.538 | 0.554 | 0.655 | 0.652 | 0.450 | 0.493 |
| Loan Purpose FE | YES | YES | YES | YES | YES | YES |
| Loan Type FE | YES | YES | YES | YES | YES | YES |
| Firm's Sectors FE | YES | YES | YES | YES | YES | YES |
| GDP controls | YES | YES | YES | YES | YES | YES |
| Bank FE | YES | YES | YES | YES | YES | YES |
| Borrower's country FE | NO | NO | NO | NO | NO | NO |
| Clustered SE | Bank | Bank | Bank | Bank | Bank | Bank |

Vulnerable borrowers are defined as having CO2 emissions above a certain threshold in a given year: the two distinct definitions employed are based on the median and on the 75$^{th}$ percentile as reference values. All specifications include loan, firm and bank controls, loan purpose and loan type fixed effects, firms' industry fixed effects, and GDP controls for the borrowers' country. Furthermore, all specifications include bank fixed effects.

Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.