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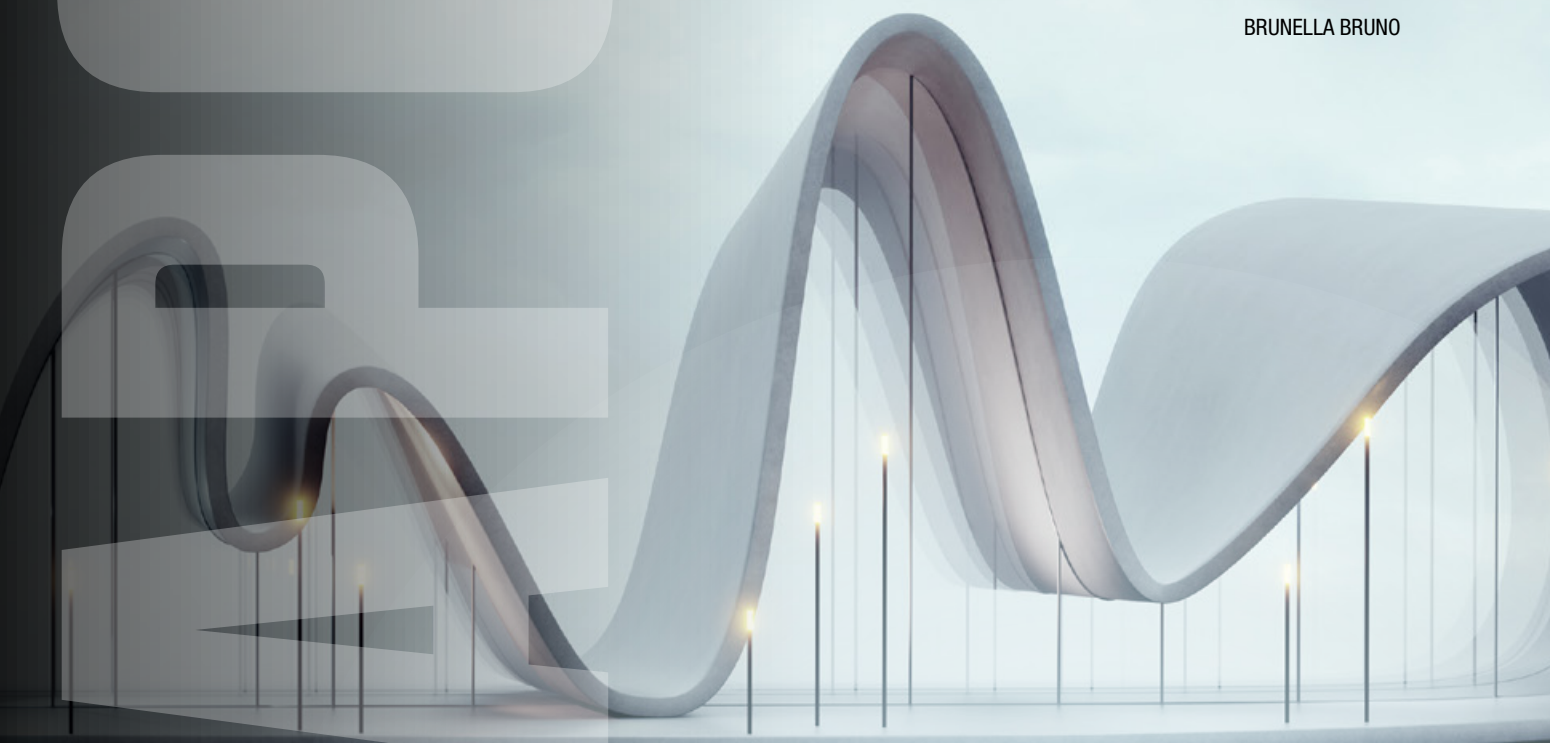
GOVERNANCE OF SUSTAINABILITY

How banks respond to climate transition risk

BRUNELLA BRUNO



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DEAR READER,

In my new role as CEO of Capco, I am very pleased to welcome you to the latest edition of the Capco Journal, titled **Balancing Innovation and Control**.

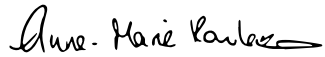
The financial services and energy sectors are poised for another transformative year. At Capco, we recognize that this is a new era where innovation, expertise, adaptability, and speed of execution will be valued as never before.

Success will be determined based on exceptional strategic thinking, and the ability to leverage innovative new technology, including GenAI, while balancing a laser focus on risk and resilience. Leaders across the financial services and energy industries recognize the transformative benefits of strong governance while needing to find the optimal balance between innovation and control.

This edition of the Capco Journal thus examines the critical role of balancing innovation and control in technology, with a particular focus on data, AI, and sustainability, with wider corporate governance considerations. As always, our authors include leading academics, senior financial services executives, and Capco's own subject matter experts.

I hope that you will find the articles in this edition truly thought provoking, and that our contributors' insights prove valuable, as you consider your institution's future approach to managing innovation in a controlled environment.

My thanks and appreciation to our contributors and our readers.



Annie Rowland, **Capco CEO**

HOW BANKS RESPOND TO CLIMATE TRANSITION RISK

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ABSTRACT

We investigate whether and how banks in the global syndicated loan market adjusted the pricing and supply of credit to account for higher climate transition risk. We provide a comprehensive measure of exposure to climate transition risk, considering three important risk drivers: the borrower's carbon emissions, a policy shock represented by the 2015 Paris Agreement, and climate resilience and policy stringency of the country in which borrowers are located. The evidence is mixed and points to non-linear relations between lending variables and CO_2 emissions. Policy events such as the Paris Agreement and government environmental awareness are significant climate risk drivers that, when combined, may amplify banks' perception of climate transition risk.

1. INTRODUCTION

Coping with climate risks, whether they are physical or transition-related, has become a priority for various stakeholders in the financial services sector. Banks, particularly, play a unique role, because the success of the transition toward a greener economy depends on how effectively they can channel credit towards low-emission borrowers and industries.

Climate change impacts bank balance sheets through macro- and microeconomic transmission channels stemming from two distinct types of climate risk drivers. First, banks may incur economic costs and financial losses due to the escalating severity and frequency of physical climate risk drivers. Second, they may be affected by how shifts in government policies, technological advancements, and changes in investor and consumer sentiment steer the economies' efforts in curtailing carbon emissions. In both scenarios, increased climate risk can manifest directly through banks' exposures to borrowers and countries facing climate-related shocks, or indirectly through the repercussions of climate change on the broader economy and the feedback effects within the financial system. The impacts of climate risk drivers on banks can be observed through "traditional" risk categories, as they become evident through amplified default risks in loan portfolios or decreased values of assets.

A mechanism by which climate change affects bank balance sheets is through the lending channel. To explain this mechanism, increased physical risk may directly impact businesses and households. Extreme weather events can damage properties and other physical assets, as well as impair agricultural productivity and human labor. Consequently, banks more exposed to these households and businesses may suffer from increased default rates and collateral deterioration. Regarding transition risk, the adoption of mitigation policies and changes in sentiment toward climate change may impact polluting companies' businesses through asset stranding, property deterioration, and higher capital expenditure due to transitioning. Once again, banks exposed to industries and businesses more involved in the transition process may experience increased credit losses.

If banks hold climate sentiments, meaning they form expectations about the impact of climate change on their exposures, they could in principle adjust their investment decisions by reallocating resources across borrowers and industries, thereby influencing the outcome of the transition.

In practice, however, there are several factors that make banks' reaction to climate risk hard to predict. First, it is unclear whether models commonly used by banks to measure credit risk are actually able to capture tail-events related to

the repercussions of environmental issues on bank balance sheets. This is partly due to the challenge of quantifying climate change risk, especially when referring to the risks of transitioning to a lower-carbon economy.

Second, perceptions of climate change risk may be intertwined with the credibility of climate policy implementation. For example, delays in enforcing climate policies and policy inconsistencies may affect how climate-related financial risks are perceived. This, in turn, could influence banks' propensity to invest in carbon-intensive firms.

Third, bank investors and stakeholders may prioritize maximizing returns over environmental concerns, as the recent expansion of anti-environmental, social and governance (ESG) laws in certain U.S. states suggests [Donefer (2023)]. As a consequence, instead of promoting it, the banking system may actually hinder the green transition by impeding the financing of innovation in industries most exposed to green technology externalities.

All these explanations underline the fact that the evidence on whether banks incorporate climate risk in their lending decisions is far less clear than the evidence regarding the pricing of climate risk in bond and stock markets [see, for example, Bolton and Kacperczyk (2021)].

2. CLIMATE TRANSITION RISK AND BANK LENDING

2.1 Research questions and the problem of measuring climate transition risk

Bruno and Lombini (2023) contribute to the debate on the role played by banks in coping with climate-related issues by investigating whether and how they adjust the price and amount of credit in reaction to amplified climate change risk. Do banks apply higher interest rates on riskier borrowers and industries? Do they curtail lending to these borrowers and industries?

To address these questions, we focus on climate transition risks, which pertain to the challenges associated with the adjustment process towards a low-carbon economy. This is important because most existing research on climate risk in banking is either qualitative in nature or interested in the effects of physical risks.

The scarcity of empirical evidence on climate transition risks mainly deals with the challenge of measuring banks' and borrowers' exposure to climate transition. The difficulty arises because of the multiple risk drivers influencing the intensity of bank balance sheet exposure to climate risks [BIS (2021)]. First, not only firms but also economic sectors may have different sensitivities towards the transition to a low-carbon economy. Second, climate transition risks can get ignited by specific macro-events (such as changes in government policies and technological improvements) that can either mitigate or exacerbate a single firm's and industry's exposure to the risk of transition. Third, the same macro-shock may affect differently companies and industries based on the geographic locations of either banks or their borrowers. For example, a country's specific commitment to climate-related issues can make the same climate goals potentially more compelling, and related actions more incisive, than in other countries.

> *"Policy shocks, such as the Paris Agreement and government commitments to environmental issues, are important climate risk drivers that, when combined, amplify banks' perception of transition risk."*

To account for multiple risk drivers and interactions that are inherent to climate transition risks, we provide a three-pronged, comprehensive measure of exposure to climate transition risk that encompasses (1) carbon emissions at the borrower levels, (2) a macro-policy shock, and (3) an indicator of a country's commitment to engaging with climate change issues.

The underlying idea of using carbon emissions as a first proxy of borrower exposure to climate transition risk is that more polluting firms are more likely to be targeted by climate regulation, which may entail costs and losses for banks as a result of the mechanism illustrated in the previous section.

The macro-policy shock we exploit in the empirical analysis is the ratification of the Paris Agreement at the closing of the 21st Conference of the Parties (COP21) on December 12th, 2015, an event commonly regarded as a major spark of climate transition risk. 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 warming. To achieve this 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 the first-ever universal and legally binding climate change agreement on a global basis.

2.2 Sample and data

We collect bank-firm data from the global loan syndication market, along with firm-level CO_2 emissions data, to measure bank exposures to large corporations across various industries and countries showing broad cross-sectional heterogeneity between green and brown firms.

We rely on multiple sources of data. We retrieve data on syndicated loans from Thomson Reuters DealScan. The unit of observation is the loan (or facility), which is usually grouped into deals or packages. Loan data include details on the lender (name and loan share), the loan (maturity, amount, cost, origination date, presence of collateral, and covenants), and the borrower (name and location). We use this data to construct our lending variables, namely the cost (basis points) and amount (as logarithm of total amount and as a share of total loans) of syndicated loans granted by a given bank to a specific borrower in a year.

We then employ a few direct and indirect indicators of firms' and countries' vulnerability to transition risk. We measure firm-level pollution through the total annual amount of CO_2 emissions (in thousands of tons), as retrieved from Thomson Reuters Eikon, which provides data on total CO_2 emissions (in tons) along with Scope1, Scope2, and Scope3 CO_2 emissions.

In order to capture information on government environmental awareness, we resort to Germanwatch's Climate Change Performance Index (CCPI), which tracks the countries' efforts to combat climate change.[1] This indicator is considered a long-standing and reliable tool for identifying leaders and laggards in climate protection [Delis et al. (2023)]. The CCPI is published annually and gathers several dimensions that are relevant for a country's engagement with climate change. It is constructed as a 0-100 indicator, where the country's commitment to environmental goals increases with the score. The overall indicator is calculated from the weighted sum of four components: per capita GHG emissions (40% weighting), renewable energy (20% weighting), energy use (20% weighting), and climate policy (20% weighting), totaling 14 indicators. The rationale behind choosing these four components is that effective climate policy will influence energy use and renewable energy over a few years, ultimately reducing GHG emissions.

After data cleaning and matching, the final sample comprises deals originated between 2011 and 2018, resulting in 8,488 observations. These observations correspond to 1,951 unique deals granted by 185 distinct lenders to 556 unique borrowers headquartered in 33 countries. The borrowing firms operate in 56 two-digit SIC industries, corresponding to 11 industrial sectors, including the most carbon-intensive ones (oil, coal, gas, utilities, and materials).

2.3 Methodology and main variables

We run a fixed-effects panel regression analysis where the dependent variables are the cost, the amount, and the share of syndicated loans granted to polluting companies.

To account for the interlinkages of multiple risk drivers, we combine the measures of borrower pollution, the borrower's country's resilience to climate risk, and the binary variable "post-Paris Agreement", which constitutes the third prong of our CTR indicator. Our comprehensive measure of exposure to climate transition risk is, therefore, the following triple interaction:

$$CO_2 \text{ emissions}_{t,f,C} \times CCPI_{t,C} \times Post_t$$

where CO_2 emissions quantifies the total carbon emissions in thousands of tons for borrowing firm f in country C in year t, CCPI is the Germanwatch's Climate Change Performance Index of the borrower's home country in year t, and Post is a dummy variable taking the value of one after the signing of the Paris Agreement (years 2016 to 2018).

The intuition is that for each level of pollution, firms located in countries that are more environmentally conscious are more likely, since the Paris Agreement, to incur in sanctions and limitations designed to mitigate their carbon impact. This could affect firms financially and require expensive investments to adjust practices and business models. In turn, lenders should adjust their policy as an effect of higher transition risk, for example, by charging higher interest rates and/or allocating less credit to more exposed borrowers.

[1] Germanwatch provides measures for 57 countries and the E.U. (germanwatch.org)

We also investigate the non-linearity of banks' reactions to climate transition risk by looking at the cost and amount of credit to extremely vulnerable counterparties, namely highly polluting firms located in countries strongly committed to environmental issues. Our main explanatory variables become:

$$\text{Vulnerable}_{t,f} \times \text{High CCPI}_{t,C} \times \text{Post}_{t}$$

where vulnerable to transition risks are firms with CO_2 emissions above a given percentile in a specific year and High CCPI are countries with a climate index score above a given percentile in the index distribution in a given year. For both, the relevant thresholds are the 50th and the 75th percentiles of the distribution.

In investigating lending policies, we control for several time-varying and time-invariant factors at the loan, bank, firm, and country level that may influence bank lending policies. In particular, loan-level controls include the loan amount and maturity, 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). We also include bank fixed effects, so as to allow for time-invariant characteristics that may affect spreads and lending choices. To better control for peculiar characteristics on the demand side, we employ fixed effects for borrower industry as well as time-varying controls at the country level (namely, the GDP growth and the change in monetary policy rates). Moreover, we include year fixed effects to capture year-specific movements that may influence the corporate loan market and are common to all banks in the sample.

3. MAIN RESULTS

We obtain several findings.

First, we document a positive association between CO_2 emissions, loan prices, and loan supply over the entire time span considered. This suggests that banks were already mindful of their borrowers' environmental impact, as indicated by the higher interest rates applied to larger emitters, even before COP21. Simultaneously, credit to these borrowers has increased as CO_2 increased.

Second, the direction of the relationships between loan variables and CO_2 emissions reverse in the years following COP21, with both credit availability and loan prices decreasing as emissions increase. This indicates a shift in lending practices since the Paris Agreement, with banks granting less credit but at a lower price to larger emitters.

Furthermore, the relationship between loan variables and climate risk is non-linear and depends on both the climate vulnerability of the borrowers (proxied by high level of CO_2 emissions) and the climate resilience of the government in the borrowers' home country (proxied by high level of CCPI index). Specifically, we document a positive correlation between loan prices and borrowers' carbon emissions for highly vulnerable firms located in highly climate-resilient countries after COP21. These firms receive, on average, larger loan amount, but a lower share of loans after the Paris Agreement, suggesting a reallocation effect within the loan portfolio mix.

When we measure vulnerability not as firm-level CO_2 emissions, but by grouping borrowers based on the industry-level carbon intensity, we observe that the price effect of increased transition risk becomes stronger. Borrowers from more polluting industries headquartered in climate resilient countries are charged higher prices following the Paris Agreement. At the same time, banks have increased their exposure to these more polluting industries, not only in terms of the amount but also in the share of loans allocated to them, with no evidence of reallocation within the loan portfolio. These contrasting results underscore the importance of having detailed data that captures the climate sensitivity of bank exposures at different levels.

The baseline results concerning loan price and loan amount seem to be driven by European banks. Interestingly, we find no evidence that banks adhering to green standards are incorporating increasing climate transition risk in their lending practices differently from non-green banks.

4. CONCLUSION

We examine bank lending behavior in a context of increasing climate transition risks. By using 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. Our objective is to determine whether banks incorporate climate transition risks into loan pricing and whether they reduce credit (both in terms of loan amount and share of total loans) to borrowers that are more exposed to climate transition risk.

We provide a comprehensive measure of exposure to climate transition risk, considering three important risk drivers: the borrower's carbon emissions, a policy shock represented by the 2015 Paris Agreement, and climate resilience and policy stringency of the country in which borrowers are located.

After controlling for all these factors, we uncover that policy shocks, such as the Paris Agreement and government commitments to environmental issues, are important climate risk drivers that, when combined, amplify banks' perception of transition risk.

However, banks' responses to increased climate transition risk are neither uniform nor straightforward, and the relations among relevant variables are not linear. In terms of policy implications, our findings underscore the importance of comprehensively measuring firms' exposure to climate transition risk, considering both idiosyncratic and country-specific factors. Similarly, banks' exposure to climate-related risk needs to be assessed at both firm and industry levels, as evidence on banks' reactions to climate-related issues may vary depending on the proxy used.

Our findings do not support the hypothesis that banks labeled as "green" react to climate transition risk differently than non-green banks. This points to banks' greenwashing and suggests that not all initiatives promoted as environmentally friendly are equally effective.

More empirical evidence, supported by cleaner data on banks' and firms' exposure, would be helpful to clarify the role played by banks in the transition process, including whether any reallocation across firms and within industries has actually been taking place.

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ABOUT CAPCO

Capco, a Wipro company, is a global technology and management consultancy focused in the financial services industry. Capco operates at the intersection of business and technology by combining innovative thinking with unrivalled industry knowledge to fast-track digital initiatives for banking and payments, capital markets, wealth and asset management, insurance, and the energy sector. Capco's cutting-edge ingenuity is brought to life through its award-winning Be Yourself At Work culture and diverse talent.

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