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Measuring European Banks' Exposure to Climate Transition Risk

Based on Giacchetta, Gianandrea, and Rosella Giacometti. "Measuring European banks' exposure to climate risk." ***Review of Corporate Finance*** 4.1–2 (2024): 151-176.

Executive Summary

Climate change has become a systemic driver of financial instability. European banks, given their central role in credit provision and investment, are highly exposed to risks associated with the transition to a low-carbon economy. This study applies the CRISK methodology to estimate potential capital shortfalls under a severe climate stress scenario.

The results are striking: by the end of 2022, European banks faced an aggregate potential shortfall of €165 billion, heavily concentrated in France (€130 bn) and Germany (€27 bn). The exposure peaked in 2020 at almost €270 bn, a moment marked by the combined shock of the COVID-19 crisis and the energy turmoil triggered by geopolitical tensions. Although leverage and equity remain the dominant drivers of systemic risk, climate transition risk is increasingly material. Moreover, financial markets appear to recognize this: banks with

BOX1

Climate change is a systemic financial risk with growing implications for European banks. Using the **CRISK methodology**, this study estimates potential capital shortfalls under a severe climate transition stress scenario.

- Aggregate **European CRISK = €165 billion (2022)**.
- Concentrated in **France (€130 bn)** and **Germany (€27 bn)**.
- Systemic exposure peaked in **2020 at ~€270 bn**, during COVID-19 and the energy crisis.
- **Bank fundamentals (debt, equity)** remain dominant drivers, but **transition risk** is increasingly material.
- A **negative climate risk premium** is observed: investors accept lower returns for banks with higher transition risk.

Policy takeaway: Stronger regulation, disclosure, and portfolio rebalancing are needed to safeguard stability and align finance with decarbonization.

higher transition exposures tend to offer lower returns, revealing the existence of a negative climate risk premium.

These findings underscore the urgency for supervisors, policymakers, and financial institutions to strengthen disclosure, integrate transition risk into prudential frameworks, and support a strategic rebalancing of portfolios toward sustainable assets.

Background

Climate risks are now widely recognized as central to financial stability. Supervisors distinguish between physical risks, linked to extreme weather events and long-term climatic changes, and transition risks, arising from policy measures, technological shifts, and evolving market preferences in the move toward decarbonization. For banks, transition risk is particularly relevant, since they maintain large exposures to carbon-intensive industries. When these industries lose value due to stricter regulations or declining demand, banks face higher probabilities of default and significant capital shortfalls.

The European Central Bank has already highlighted these vulnerabilities in its climate stress tests. The exercise revealed that although banks are improving their methodologies, gaps in data and inconsistencies remain pervasive. It is within this context that the CRISK methodology offers a transparent and comparable way to measure systemic exposures.

Methodology

The CRISK framework estimates the capital that would be required to stabilize banks in the event of a climate transition shock. It proceeds in three steps: first, identifying a transition risk factor based on the relative performance of stranded assets versus the wider equity market; second, calculating dynamic betas that capture banks' sensitivities to this factor; and third, estimating the capital shortfall that would result from a severe repricing of these assets.

The logic can be summarized in a simple formula:

$$CRISK = k \cdot Debt - (1 - k) \cdot Equity \cdot (1 - LRMES)$$

where k represents the prudential capital ratio (5.5%), Debt is total liabilities net of deposits, Equity is the market value of capital, and LRMES captures the long-run marginal expected shortfall in a climate stress scenario.

This approach has the advantage of relying on publicly available data, making it transparent and replicable, while also offering a monetary measure of systemic exposure that can be aggregated across banks and countries.

Findings

The analysis reveals that climate transition risk increased sharply in 2020, when European banks expanded lending to energy firms to meet urgent liquidity needs. This behavior

amplified their exposure to carbon-intensive assets precisely at a time when markets were under stress.

At the country level, exposures are far from evenly distributed. French banks dominate the picture, with an estimated capital shortfall of around €130 billion, followed at a distance by German banks at €27 billion. Other banking systems, including those of Italy and Spain, display much smaller figures, while Norwegian banks appear comparatively resilient, possibly reflecting both their regulatory environment and the specific characteristics of their energy sector.

When the results are viewed over time, systemic CRISK shows clear dynamics. In 2019 it stood at about €120 billion, before surging to nearly €270 billion in 2020 at the height of the pandemic and the energy crisis. It then declined but remained elevated, reaching €200 billion in 2021 and €165 billion in 2022. This persistent vulnerability indicates that climate transition risk has become embedded in the European financial system.

A further finding concerns market pricing. By analyzing banks' returns, the study identifies a negative climate premium: institutions more exposed to transition risk tend to deliver lower returns to investors. This suggests that markets assign value to climate resilience and that investors are willing to trade off yield for reduced exposure to systemic risks linked to decarbonization.

Policy Implications

The implications for policy are immediate. Supervisors should formally integrate transition risk into prudential regulation, ensuring that capital requirements and stress tests reflect the vulnerabilities highlighted by CRISK. Harmonization of disclosure standards across Europe is equally urgent, as consistent and comparable reporting on exposures to carbon-intensive sectors is still lacking. Regulators may also consider differentiated capital charges to discourage excessive lending to high-emission industries.

For banks, the findings underline the importance of strengthening risk management frameworks. This means developing forward-looking models that incorporate climate scenarios, reducing reliance on carbon-intensive borrowers, and aligning portfolios with long-term sustainability objectives. Improved disclosure will be crucial both to satisfy regulatory requirements and to maintain the confidence of investors and clients.

For market participants, the existence of a climate risk premium should be factored into investment decisions. Tools such as climate betas and CRISK indicators can provide valuable guidance in assessing vulnerabilities and reallocating capital.

Conclusion

By the end of 2022, the European banking system faced a potential €165 billion capital shortfall under a severe transition stress scenario. While traditional balance sheet risks remain central, climate transition risk is now a material driver of systemic vulnerability, with particularly acute exposure in France and Germany.

The message is clear: climate transition risk is not a distant concern but a present and measurable threat to financial stability. Addressing it requires a combination of stronger prudential regulation, greater transparency, and proactive adaptation by banks and investors. Doing so will not only protect the resilience of the European financial system but also help steer capital toward the decarbonization goals that are essential for the future of Europe's economy and society.

BOX2

Policy Implications BOX

- **Regulators**:
  - Integrate transition risk into capital requirements and stress tests.
  - Harmonize disclosure standards (EU taxonomy, EBA rules).
  - Consider differentiated capital charges for high-emission exposures.
- **Banks**:
  - Strengthen climate risk models and scenario analysis.
  - Reduce reliance on carbon-intensive borrowers.
  - Enhance ESG disclosures.
- **Investors**:
  - Use CRISK and climate betas to assess vulnerability.
  - Price in the climate risk premium when valuing assets.