Climate-related Risks

Overview on the design and execution of Climate Risk Stress-Testing

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STRATEGY & MANAGEMENT CONSULTING

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Context

Climate risks

Stakes around climate change are tremendous and banks are expected to play a key role in financing the transition to a low-carbon economy.

As pointed out by the ECB in its SSM (Single Supervisory Mechanism) Risk map, climate change and transitioning into a more sustainable economy are inducing significant risks for financial institutions. Consequently, **climate risk management and assessment is becoming a central topic for central banks, regulators and financial firms.**

The ECB has thus issued its "guide on climate related and environment risks" in November last year aiming that financial institutions would comply with expectations set out in the guide by mid-2022. The EBA has been mandated to assess how ESG risks could be incorporated into three pillars of prudential supervision and published subsequently discussion papers on "management and supervision of ESG risks for credit institutions and investment firms" (November 2020) and on "Pillar 3 disclosures of ESG risks" (March 2021).

Moreover, Basel committee has released two reports on transmission channels of climate risks to the banking system and measurement of climate-related financial risks.

Given climate risks specific features and its long-term forward-looking nature, **Stress-Testing is seen as the key tool to assess their financial impacts**. Besides, several supervisors are conducting or planning conduct bottom-up stress-tests Involving financial institutions: ACPR's climate stress-testing exercise was conducted in the second part of last year, Bank of England's exercise from June this year and EBA/BCE's exercise is planned for next year… Moreover, as stated in its guide, ECB is expecting that institutions with material climate-related risks will incorporate these in their ICAAP and accordingly analyze their impacts as part of internal stress-testing.

It is becoming so essential for Financial Institutions to improve their capabilities to assess and manage climate-related risks and invest on the design and execution of climate risks stress-testing.

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Main features to be considered in the design and execution of climate risk stress-testing

Assessment of climate-related financial risks has many specificities. The following paragraph outlines several of the main features which must be taken into account within the design and execution of climate risk stress-testing:

- Impact of climate-related financial risks **materializes in the form of traditional risk categories:** credit risk, market risk, liquidity risk, operational risk.
- The focus is on **the exposure of financial institutions to clients and investees that may be negatively impacted by climate risk drivers.**
- Climate risk is split in two main types:
  - **Transition risks**, "risks to the company that arise from transition to a low-carbon and climate resilient economy".
  - **Physical risks**, "risks to the company that arise from physical effects of climate change".
- There is **significant uncertainty on the evolution of transition and physical risk drivers**, interaction between these drivers, non-linearities (such as "tipping points") **and how to translate these into macroeconomic and financial impacts**.
- **Institutions cannot really rely on historical data to predict the future and calibrate models** as climate events and risks have not really occurred in the past or at least not at the pace and intensity it should now happen.
- It underlines the **need to design several plausible scenarios to assess the potential impacts of both physical and transition risk drivers**. Results will depend on scenario hypotheses.
- **Sufficient variability between the range of scenarios is required** as pointed out by institutions participating to the recent ACPR climate pilot exercise.

  Moreover, for this exercise, all scenarios used to assess transition risks, assumed that the carbon neutrality target would be reached in 2050 and none triggered an economic downturn by 2050; the choice of more extreme scenarios may be relevant.
- Selection of a baseline scenario itself, to use as a reference, is not obvious/subject to debate.
- **Climate risks occur on a much longer timeframe than usual risks/scenario analysis requiring long term projections/impact assessments**. Current bank stress methodologies will surely need to be adapted as there are not really built to provide forecasts on such horizons neither to integrate smooth evolutions of economic and financial variables instead of severe sudden shocks.
- **Impacts vary significantly between sectors, geographies, potentially counterparties, requiring a much more granular analysis than usual stress-testing**. This implies challenges in terms of referential data, identification of impacted sectors, sector assignment particularly for multi-activity companies, calibration of sector (transition matrixes for example) and geography (real estate collateral for instance) specific stressed parameters. The results of the ACPR pilot exercise highlighted besides very different dynamics between probabilities of default projected by institutions for most affected sectors, surely due to significant differences between the methodological approaches used by institutions to compute sectoral impacts.
- Furthermore, the ACPR pilot exercise concluded that **calculation at sector level does not enable consideration of differences in terms of climate risk exposure between companies belonging to the same sector**. Some examples are within electricity sector (how electricity is generated – different technologies) and automotive sector (how advanced is the company in the development of electric cars). **Counterparty level analysis approach** advocated by the BOE for its climate exercise (currently being launched), although data and resource intensive, **may be more appropriate to assess climate-related risks and scenario impacts** as it allows to capture the counterparty positioning regarding climate risks, including their current mitigation and adaptation plans.
- Given the long-term horizon of the analysis, institutions **need to define the most appropriate way to incorporate risk mitigation actions, particularly assumptions about the evolution of the institutions balance sheets**.

  For instance, the recent ACPR climate pilot exercise is relying on a dynamic balance sheet assumption from 2025, enabling institutions to define how they expect their portfolio mix to shift from 2025 to 2050 before computing the climate risk impacts.

  The BOE climate exercise would rather be split in two parts: first, test the resilience of financial firms' current business models to climate change (static balance sheet), then explore how these might change in response (dynamic balance sheet reflecting managerial actions).

Main steps to design and execute climate risk stress-testing

1. **Build** a climate risk cartography for the institution

As it is broadly accepted that climate financial risks materialize in the form of traditional risk categories, the aim would be to **analyse how sensitive are the activities and the "traditional" risk exposures of the financial institution to climate risk drivers and identify material climate risks the organisation is facing**. Obviously, this review will be dependent on the institution business and magnitude of each risk type for the institution.

The work to comply with the ESG risks disclosure requirements advocated by the EBA should play a significant role in this analysis as **risk exposures will be grouped through dimensions assumed to be the most relevant in terms of climate risk**.

But it will not be enough to get a full picture on the climate risks the institution is exposed to. These disclosure requirements are mainly covering impacts on credit risk and investment risk, scope in terms of collateral is focusing on immovable properties and as previously discussed a more granular analysis at counterparty level, potentially through the assignment of a climate risk rating, will surely be needed.

The Basel committee guide on "climate risk drivers and their transmission channels" may be helpful in this exercise by providing some insight on the climate risk drivers and how these may impact each risk type.

This cartography should **highlight key climate risk vulnerabilities of the financial institution's portfolio**.

2. **Select** the main characteristics of the climate risk stress exercise to be performed

Several choices must be made upfront:

- **Which risks types should be considered in the stress analysis?** It would make sense to apply the scenarios to all material risks as per the outcome of the climate risk cartography. It should be noted that ACPR and BOE's exercise were only focusing so far on credit and market risks.
- **What assumptions should be made regarding the evolution of the institution's balance sheet** and should it differ between risk types and trading book vs banking book? Particularly for credit risk, should climate stress runs be performed using a static balance sheet assumption, a dynamic balance sheet assumption, or both in two steps as per the BOE's exercise?
- **Which metrics should be used to quantify the impacts?** Should it be limited to expected losses/revaluation of portfolio or should it be widened to cover impact on internal capital?
- **At what level of granularity** (in terms of sector, geography, counterparty, type of collateral) should the assessment be conducted?
- **The time-horizon for the exercise** (so far usually 2050) and **the reporting snapshots** (potentially every 5 years)

Main steps to design and execute climate risk stress-testing

3. **Design** scenarios for assessing climate related financial risks

The first step is to **define climate scenarios, usually along two dimensions, the climate outcome and the type of transition**. The type of transition will be driven by assumptions regarding the speed and timing of policy action, the type of policies implemented, the progress in technology and shifts in behaviour from companies, investors, and consumers.

The climate outcome usually corresponds to an increase in temperature compared to a reference period. **The scenarios will then be expressed in terms of transition variables** (particularly carbon price and emission pathways) **and physical variables** (mainly changes in frequency and severity of weather events). **Scenarios will usually cover paths along a long-term horizon (at least 30 years) given climate risk realisation timeframe**.

To define these scenarios, institutions can **leverage on externally generated scenarios**, notably those designed by the NGFS (Network for Greening the financial system), as done by French and UK supervisors for their climate risk stress-testing exercise. Nevertheless, **scenarios may need to be tailored based on outcome of the climate risk cartography to focus on the key climate risk vulnerabilities of the financial institution's portfolio.**

These scenarios will then need to **be translated into macroeconomic and financial market variables** and these variables will need to be calibrated at the appropriate granularity (sectoral, geographic) to be able to quantify adequately the financial impacts of the designed climate scenarios on the financial institution's portfolio. The climate risk cartography should inform the granularity required.

These topics are still work in progress and there is no real consensus so far but as highlighted by the TFCR (Task Force on Climate financial Risks) supervisory survey, most supervisors seemed to be using a macroeconomic model to translate the climate variables into macroeconomic and financial outcomes, a network model to derive sectoral impacts and financial models to derive asset price shocks.

4. **Assess** financial impacts of these climate scenarios

Calibrate stressed risk parameters (transition matrices, LGDs, market shocks…) and then estimate impacts of the scenario on the reporting metrics chosen. The calibration approaches and stressed methodologies used by the institution for macroeconomic stress-testing will surely need to be amended/modified to cater for the specific features of the climate stress-testing described above.

5. **Review** of the results by senior management

Some "managerial actions" may have already been included if a dynamic balance sheet assumption has been implemented. Results should influence the strategy of the bank, its risk appetite, and its risk management.

How Capteo can assist you?

- **Capteo can support you on the set up of each of these steps**. We could undertake a **gap analysis** and support you in the **implementation of the known or identified gaps**.

- Our assistance could notably cover:
  - ✓ **Framing and leading the setup** of the climate financial risks stress-testing programme
  - ✓ **Steer and oversee** regulatory and internal climate financial risks stress-testing
  - ✓ **Lead and/or support the improvement of methodologies and processes** used to compute economic capital and all types of stress-testing impacts to cater for climate risks features
  - ✓ **Implement metrics and methodologies** to perform any types of climate risk assessments
  - ✓ **Review existing risk management frameworks** and assist institutions on using climate risk stress-testing results as part of the strategy of the bank, its risk appetite, and its risk management
  - ✓ **Assist organisations on the set up** of climate risk framework (process, metrics, methodologies, tools) to comply with ECB's expectations on climate risks.

- More broadly, Capteo is a strategy and management consulting company specialised in the transformation of financial institutions. We are providing subject matter expert advice on risk and finance topics to financial institutions

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Michael has eighteen years of international experience in Risk management. Throughout his career, he has developed a strong expertise across risk disciplines (market, counterparty, credit …). He has extensive experience managing quantitative risk teams, leading risk and capital projects (IMM, IMA, IRBF, AMA, FRTB CVA…) and driving the implementation of risk management and stress-testing frameworks across the risk sector.

He joined CAPTEO in 2018 as a Director to develop the advisory risk management and the stress testing and Capital optimization offerings. He is assisting financial institutions on risk and capital management topics and projects. He has notably framed and directed the FRTB CVA project of a large French investment bank and over the last year he was responsible for the steering and oversight of internal and regulatory stress-testing (STEBA, ICAAP, Covid 19, climate stress-testing) across risk disciplines of a large French investment bank.