Climate-scenario analysis: It's not capital stress testing

Financial institutions (FIs) are adapting existing stress-testing methods and lessons learned from capital-planning exercises to perform climate-scenario analyses to test their resilience to the emerging financial risks associated with climate change.

However, these climate-scenario analyses—imposed by prudential regulators and central banks across the globe—aren't, in fact, prudential capital stress tests since they don't include capital adequacy components and their results don't yet lead to direct prudential requirements. Federal Reserve Chair Jerome Powell recently highlighted this distinction, noting that such analyses won't have immediate implications for banks' capital.[1]

Nevertheless, these climate-scenario analyses are important, and as we outline below, there are a number of steps FIs can take to begin preparing to perform these evaluations. In an October 2021 speech, Federal Reserve Board Governor Lael Brainard[2] pointed out that these analyses will help FIs identify climate risks and suggest useful lessons to inform subsequent improvements in modeling, data, and (climate) financial disclosures. Brainard drew parallels between current climate-scenario analysis and early efforts around stress testing in 2007–2009—that is, the Supervisory Capital Assessment Program, or SCAP.

Although SCAP might now be considered rudimentary compared to today's granular models and complex stress testing infrastructures, it was broadly successful in providing a solid foundation for building out the stress-testing program over the subsequent decade. A similar approach is expected to be followed by the Fed on climate, with climate-scenario analysis being the SCAP on their climate stress testing journey.[3]

These climate-scenario analyses are expected to help FIs improve their understanding of:

- **Vulnerabilities**: The financial risks associated with climate change by industry, sector, and segments
- **Business model and strategy**: How FIs can adjust their business and implement management actions in response to different (climate) scenarios
- **Risk management activities and aspirations**: Enhancements in climate-risk managements across financial/nonfinancial risk stripes given their current data and modeling capabilities (or lack thereof).

[1] Craig Torres and Jesse Hamilton, "Brainard Backs Climate Guidance for Banks, Going Beyond Quarles," *Bloomberg Green*, October 7, 2021.

[2] Governor Lael Brainard, "Building Climate Scenario Analysis on the Foundations of Economic Research," (2021 Federal Reserve Stress Testing Research Conference), Boston, MA, Oct. 7, 2021.

[3] Stefan Walter, letter to CEOs of financial institutions, Oct. 18, 2021.

How is climate-scenario analysis different from capital stress testing?

In both theory and application, climate-scenario analyses and capital stress testing are distinct exercises. Below is a summarized comparison table showcasing these differences, adapted from the UNEP FI[4] and BCBS.[5]

	Capital stress testing	Climate-scenario analysis
Definition	Stress testing is a specific subset of scenario analysis, typically used to evaluate a financial institution's resiliency to economic shocks.	Scenario analysis is a broader concept that can be performed at different levels of granularity to identify impacts on individual exposures or on portfolios.
Scope	Estimating capital needs and planning capital management for a period of two to five years	Identifying and quantifying the potential financial risks from climate change.
Timeframe	Capital planning horizons: two- to three-year forecasts. Strategic planning horizons: three to five years.	Transition and physical climate risks are expected to increase in materiality over a much longer horizon: Short (two to five years), medium (seven to ten), and long term (over decades)
Use	Evaluate the adequacy of a bank's current capital base under a set of economic outcomes in the foreseeable short future for capital or strategic planning.	Understand and evaluate the sensitivity of a bank's current portfolio to climate (i) transition and (ii) physical scenarios to understand whether there should be changes or improvements in the firm's risk management, portfolio composition, and/or organization strategy[6].
Balance sheet assumptions	Balance sheets remain mostly constant over stressed horizons.	Static (illuminates current exposures and vulnerabilities) and/or proportional/dynamic (evaluate options in mitigating climate risks); the latter might require additional modeling.
Underlying scenarios	Macroeconomic scenarios only	Climate-scenarios: greenhouse gas emissions and climate physical scenarios by peril (e.g., frequency and severity of flooding). Economic scenarios that capture effects of climate events on GDP, energy prices, etc.
Geolocation consideration	National- or state-level granularity	City, county, or address level is expected, especially for climate physical risk assessments

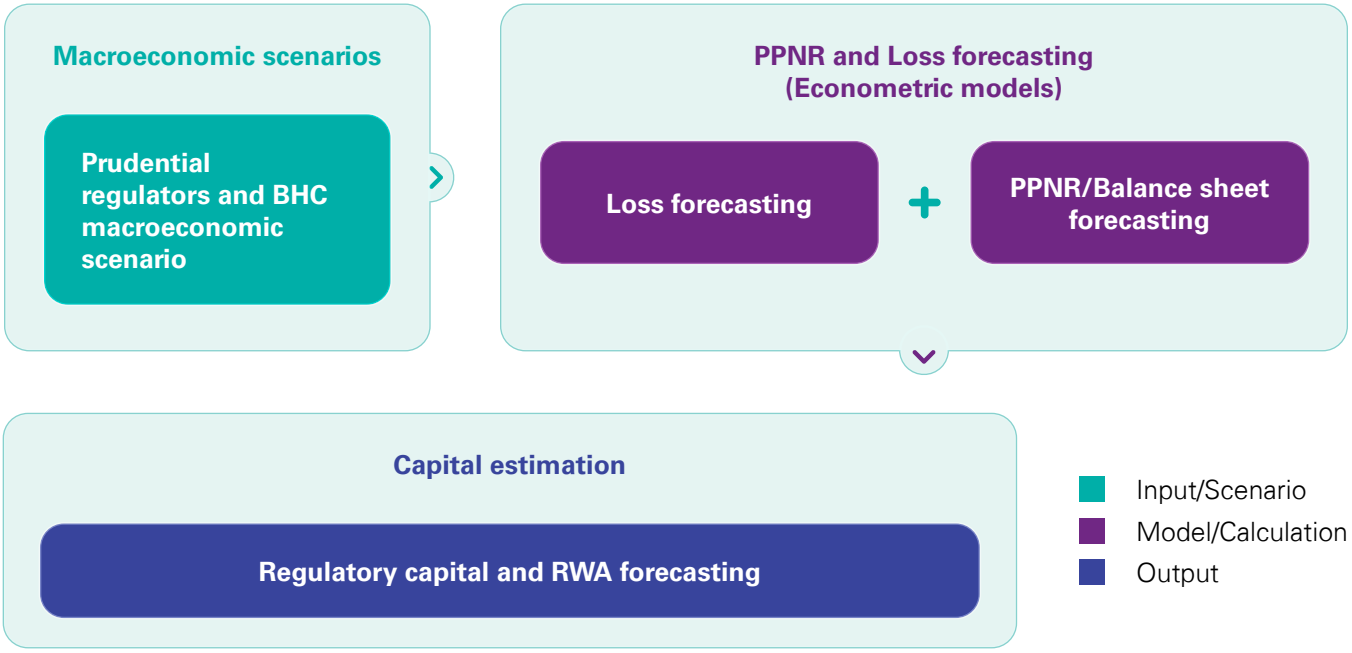
[4] UN Environmental Finance Initiative (UNEP F1), (2018), *Extending Our Horizons: Transition related risk and opportunities*.

[5] Basel Committee on Banking Supervision (2021): "Climate-related financial risks – measurement methodologies," April 2021.

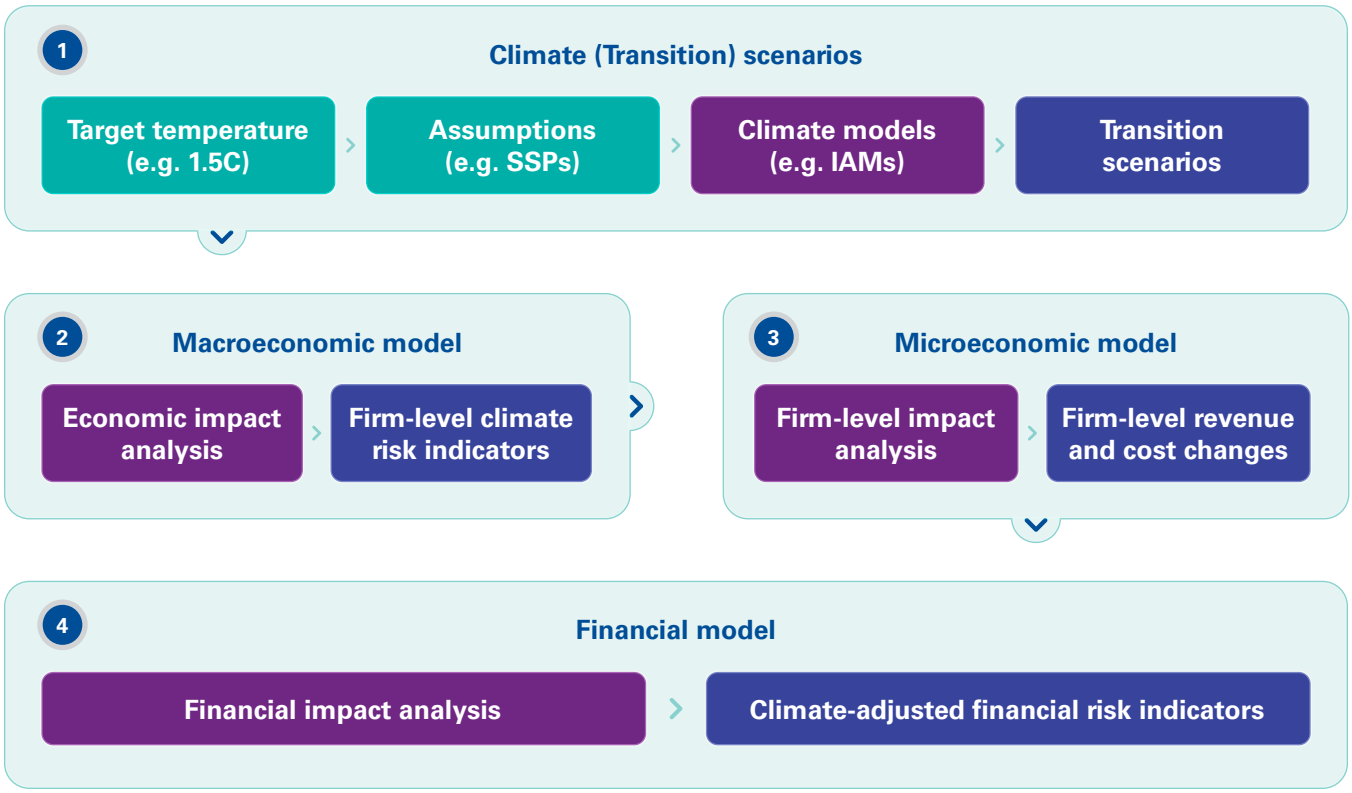
[6] 2021 Third Annual Global Survey of Climate Risk Management at Financial Firms (GARP Risk Institute, 2021), "Basel Committee publishes analytical reports on climate-related financial risks".

Additionally, capital stress testing exercises and climate-scenario analyses differ considerably from a design and process perspective, with the latter being much more laborious and complex as illustrated in the graphical schematic below[7]:

Economic stress testing process



Climate-scenario analysis process (Transition risk example)



[7] Climate-scenario analysis schematic was adapted from J.A. Bingler and C.C. Senni, Taming the Green Swan: How to improve climate-related financial assessments, CER-ETH, 2020.

Climate-scenario assessments to date

Several prudential regulators and central banks have pursued or are pursuing climate-scenario assessments[8] to better understand the country- and region-specific impacts of climate change on their regulated entities. Specifically, they aim at quantifying the potential financial impacts that banks/insurers of the financial system may face by comparing baseline scenarios against scenarios with higher degrees of risk arising from climate change. Several dimensions are taken into consideration when constructing such an exercise, for example:

Scope

Industries and firms to be considered: banks, insurers, asset managers

Approach

Top-down (macroprudential assessment that is managed by a single authority) vs. bottom-up (participating firms produce results through their own modeling and assumptions)

Balance sheet assumption

Static (FIs balance sheet remains mostly unchanged); proportional/ dynamic (FIs balance sheet can adjust throughout the scenario's time horizon).

Below is a summarized comparison table showcasing the differences among a select few of these climate-scenario assessments across different jurisdictions. This was adapted from previous work form the BCBS[9] and APRA[10].

	APRA/CFR CVA	ECB	BoE/PRA	BdF/ACPR
Scope	Banks	Banks and Corporates	Banks and Insurers	Banks and Insurers
Approach	Bottom up	Top down	Bottom up	Bottom up
Exposures	Mortgages and Corporate	Corporate only	Mortgages and Corporate	Corporate only (selected sectors)
Time horizon	2020–2050			
Climate-scenarios	2 NGFS* scenarios	3 NGFS* Scenarios	3 NGFS* Scenarios	Four Scenarios (1 Physical and 3 transition risk scenarios)
Balance Sheet Assumption	Static and Proportional	Static and Dynamic	Static	Combined
Counterparty Assessment	Qualitative	Not Required	Quantitative	Quantitative
Timeline	2022			Completed - 2021

*Network for Greening the Financial System (NGFS)

[8] Based on Network for Greening the Financial System's October 2021 progress report on climate-scenario exercises, 29 prudential regulators and central banks have concluded (4), are in progress (19), or are in planning stages (6).

[9] Patrizia Baudino and Jean-Phillippe Svoronos, Basel Committee on Banking Supervision (2021): "Stress-testing banks for climate change—a comparison of practices," *BIS*, July, 2021.

[10] APRA Climate Vulnerability Assessment (2021).

Other prudential regulators, such as the Federal Reserve's Board of Governors, are currently developing their own climate-scenario analysis for banks. In the same October speech , Fed governor Brainard described the Fed's climate-scenario analysis approach to be a two-pronged one: through its Financial Stability Climate Committee (FSCC), which is studying the complex linkages and systemic impacts of climate change, and its Supervision Climate Committee (SCC), which is engaging with domestic stakeholders and supervisors to provide guidance for large banking institutions in their effort to appropriately measure, monitor, and manage climate risks.

How to begin

As the regulatory momentum around climate risk assessments and reporting increases and more requirements come into effect, we recommend the following eight steps for FIs to get a head start on performing climate-scenario analysis:

Governance: Identify internal stakeholders involved and assign oversight.

Scope: Develop inventory of potential climate events (physical/transition) that would feed into risk assessments.

Assess materiality: Evaluate and prioritize current and anticipated exposures to climate risks.

Identify and define range of scenario: Define parameters, assumptions and analytical choices needed to conduct the exercise (e.g., time horizon, carbon price, etc.).

Select scenarios: Select scenario(s) that suite the exercise scope, material exposures, and ranges defined (e.g., leveraging publicly available scenarios, such as the NGFS ones).

Assess macro-financial impacts: Map energy, GHG, temperature, physical climate events data onto assets and economic activities; translate this into firm-level financial impacts.

Evaluate business impacts: Evaluate effects on the strategic and financial positions under each scenario, detect sensitivities and identify adjustments to strategic/financial plans.

Document and communicate: Document the process and communicate to relevant parties. Repeat.

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