

May 15, 2024

Federal Reserve Releases Results of Its Pilot Exercise on Bank Climate Scenario Analysis

Findings Highlight Differences in Participating Banks' Approaches and Significant Data and Modeling Challenges

SUMMARY

On May 9, 2024, the Board of Governors of the Federal Reserve System [released](#) a report summarizing the findings of its exploratory Pilot Climate Scenario Analysis Exercise. The Federal Reserve conducted the pilot exercise in 2023 with the six largest U.S. banks to learn about their climate risk management practices and challenges and to enhance the ability of large banks and supervisors to identify, monitor, and manage climate-related financial risks.

The report describes how participating banks are using climate scenario analysis to explore the resiliency of their business models to climate-related financial risks. The Federal Reserve observed that participants took a wide range of approaches in the exercise and that the exercise highlighted data gaps and modeling challenges that arise when estimating the financial impacts of highly complex and uncertain climate-related financial risks over various time horizons. The exercise does not have capital consequences or supervisory implications for the participants. The Federal Reserve noted that it will draw on lessons learned from the exercise and continue to engage with participants regarding their capacity to measure and manage climate-related financial risks.

DISCUSSION

A. OVERVIEW OF THE PILOT EXERCISE

The six largest U.S. banks (Bank of America, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, and Wells Fargo) participated in the Federal Reserve's 2023 Pilot Climate Scenario Analysis Exercise. The pilot exercise comprises two independent modules: (1) a physical risk¹ module and (2) a transition risk² module. Each module described forward-looking risk scenarios. Each participant estimated the effect of these scenarios on a relevant subset of credit exposures:

- The physical risk module focused on estimating the credit risk impact of common and idiosyncratic shocks of varying levels of severity on residential real estate ("RRE") and commercial real estate ("CRE") loan portfolios over a one-year time horizon in 2023. All participants were required to use a hurricane event in the Northeast National Climate Assessment ("NCA") region as the common shock. For the idiosyncratic shock, participants were asked to select a hazard event in an NCA region based on materiality to their business models and exposures.
- The transition risk module focused on estimating the credit risk impact of two macro economic transition pathways (*i.e.*, Current Policies and Net Zero 2050) on corporate and CRE loan portfolios over a 10-year time horizon from 2023 to 2032.

See our January 24, 2023 [publication](#) for details on the design of the pilot exercise.

B. PILOT EXERCISE INSIGHTS

The Federal Reserve summarized the following key insights from the pilot exercise:

- Participants use climate scenario analysis to consider the resiliency of their business models to a range of climate scenarios and to explore potential vulnerabilities across short- and long-term time horizons.
- Participants' approaches to the pilot exercise varied significantly. Differences in approach were driven largely by participants' business models, views on risk, access to data, and prior participation in climate scenario analysis exercises in foreign jurisdictions.
- Participants generally used existing credit models to estimate the impact of climate-related risks on credit risk parameters (*i.e.*, by adjusting the inputs to their existing credit risk model frameworks to better capture climate-related risks, rather than adjusting the models themselves).
- Participants faced data challenges as they conducted the exercise, including data gaps related to real estate exposures, insurance, obligors' transition risk management, and infrastructure.
- Most participants worked with third-party vendors to conduct the pilot exercise. Some participants indicated a desire to further develop in-house modeling capabilities in order to reduce reliance on third-party vendors, while others plan to continue to explore vendor solutions.
- Most participants considered indirect impacts and/or chronic risks (*e.g.*, the effects of higher insurance premiums) in the physical risk module but faced modeling challenges, although this was not required as part of the exercise.
- Participants noted the importance of understanding insurance market dynamics (*e.g.*, the evolution of insurance pricing and its impact on property prices and obligors' cashflows) when modeling the impact of physical risk hazards on credit exposures.

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- Some participants conducted deep dive analysis to understand how obligors expect to manage transition risks over time, although this was not required as part of the exercise.
- Participants intend to incorporate climate scenario analysis into their risk-management processes over time, while noting that the use of scenario analysis results going forward is impacted by the high degree of uncertainty inherent to climate risk modeling, which creates challenges to reliably and consistently quantify the impact of climate-related risks.
- Designing climate scenario analysis exercises requires consideration of tradeoffs. While standardized scenarios may result in greater consistency and comparability across participants, standardization limits participants' ability to tailor scenarios to risks most material to their portfolios and could obscure idiosyncratic risks and stifle innovation as practices continue to evolve.
- Key design choices—including scope of the shock, scenario severity, starting point (*i.e.*, the stage of an economic cycle in which an adverse climate shock occurs), insurance assumptions, and balance sheet assumptions—impacted participants' approaches and estimates.
- Additional investment and analysis—for example, in the areas of modeling indirect impacts, chronic risks, and insurance dynamics related to physical risks and modeling the broader macroeconomic and sectoral implications of various transition pathways—could improve participants' risk-management capabilities.
- Climate-related risks are highly uncertain and challenging to measure, and thus are hard to incorporate into risk-management frameworks.

C. PHYSICAL RISK MODULE FINDINGS

In the physical risk module, participants estimated that probabilities of default (“PDs”) generally increased with the severity of the shocks. For most participants, the idiosyncratic shock was more impactful than the common shock. For example, in the common shock scenario, estimates of average PDs across participants for properties in the Northeast NCA region increased by about 40 basis points (“bps”) for CRE and about 10 bps for RRE in the most severe iteration (200-year, no insurance) relative to the baseline, whereas in the idiosyncratic shock scenario, estimates of average PDs across participants for properties in the selected NCA region increased by about 260 bps for CRE and about 110 bps for RRE in the most severe iteration (200-year, no insurance) relative to the baseline.

Insurance mitigated participants' estimates of the impact of physical risk hazards on credit exposures. Assuming no insurance coverage generally increased PDs across RRE and CRE portfolios for most participants. In addition, assuming no insurance coverage had a more pronounced impact in the idiosyncratic shock relative to the common shock. This is because, in general, property damage estimates were lower in the common shock scenario, and the removal of insurance does not have a significant impact on estimated PDs when property-level damages do not exceed insurance deductibles.

D. TRANSITION RISK MODULE FINDINGS

In the transition risk module, the difference in the PD between (1) the Net Zero 2050 scenario, which reflects higher carbon prices and related transition effects, and (2) the Current Policy scenario, which does not, is used to estimate the transition risk impact.

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The estimate of average transition risk impact for corporate loans was about 30 bps, with significant heterogeneity across and within sectors. The estimate of average transition risk impact for CRE loans was about 100 bps across all property types, with meaningful heterogeneity in impact across CRE property types with property types with higher energy intensity showing the largest impact.

E. GOVERNANCE AND RISK MANAGEMENT

The Federal Reserve reviewed the governance and risk-management practices used by participants for the pilot exercise, including those used for existing stress testing exercises. All participants used or adapted existing governance and risk-management practices. Most participants created a working group or council, which was typically responsible for overseeing the conceptual design and execution of the pilot exercise and reported into an existing climate risk committee or a management-level risk committee.

Participants used existing internal controls where applicable and instituted a limited number of new controls for the exercise, which were primarily focused on compliance with the Federal Reserve's participant instructions. Most participants noted that time constraints, data limitations, and the nature of the exercise precluded them from applying a full control framework, which would typically include model validation.

Internal audit coverage of the pilot exercise varied across participants, with primarily limited scope monitoring engagements rather than discrete events. Most participants reported that time constraints precluded full audits of the exercise.

All participants relied on existing model risk-management frameworks to develop the models used for the pilot exercise, but faced several challenges in conducting reviews of modeling frameworks. These challenges included limited data, lack of back-testing capabilities, non-linear risks, scenario horizon, heavy reliance on judgment, limited reliability of model output, and time constraints. Participants focused on conceptual soundness, compensating controls, and overlays, as applicable, and obtained appropriate waivers or exceptions in compliance with their internal policies and procedures.

IMPLICATIONS

Although the Federal Reserve's observations and conclusions apply to only the six largest U.S. banks participating in the pilot exercise, the design and findings of the pilot exercise could inform supervisory expectations related to the use of climate scenario analysis as a risk management tool by banks. Banks using or considering using climate scenario analysis should consider reviewing the design and findings of the pilot exercise, including evaluating whether relevant design or governance elements should be incorporated into their own climate scenario analysis and related risk management frameworks and practices.

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ENDNOTES

- ¹ Physical risks refer to the harm to people and property that may result from acute, climate-related events, such as hurricanes, wildfires, floods, heatwaves, and droughts, as well as longer-term chronic phenomena, such as higher average temperatures, changes in precipitation patterns, sea level rise, and ocean acidification.
- ² Transitional risks refer to stresses to certain institutions, sectors, or regions arising from the shifts in policy, consumer, and business sentiment, or technologies associated with the changes that would be part of a transition to a lower carbon economy.

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