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Basel Committee on Banking Supervision
Bank for International Settlements
CH-4002 Basel
Switzerland

Dear Basel Committee on Banking Supervision (BCBS),

Thank you for your attention to climate-related financial risk and for the opportunity to consult on the BCBS Discussion Paper, *The role of climate scenario analysis in strengthening the management and supervision of climate related financial risks.* This comment is submitted on behalf of Public Citizen, Americans for Financial Reform Education Fund, and Sierra Club. Developing forward-looking tools to inform climate risk identification and mitigation for financial institutions and the financial system writ-large is an urgent and imperative task. The attached paper addresses the consultation questions in the discussion paper as follows.

1. *Climate scenario analysis models suffer from significant limitations, which can produce inadequate or misguided regulatory action* aims to answer the second and third consultation questions:
    - "What are the key challenges in the application of CSA and how can they be overcome?"
    - "What are the key areas where CSA methodologies and capabilities need to be further developed to be useful and relevant for the different objectives listed in this paper?"

    This section addresses three challenges to current scenario analysis approaches: the underestimating of risk, the endogeneity of climate risk to the financial system, and the propensity for quantitative exploratory scenarios to create false precision and overconfidence.

2. *Scenarios must accurately assess climate risk to be useful for banks and regulators* aims to answer the eighth consultation question:
    - "What features and measures could be adopted in the future to enhance the utility of currently available scenarios (eg NGFS, IEA, IPCC)?"

    This section recommends scenario providers better calibrate scenarios to climate science, incorporate tipping points and nonlinear impacts, limit reliance on unproven technologies, incorporate second-order climate impacts and correlated risks, and improve data specificity.
3. *A more decision-useful scenario analysis involves shifting from speculative "what-if" questions to actionable "how-to" strategies* aims to answer the second, third and sixth consultation questions:

- "What are the key challenges in the application of CSA and how can they be overcome?"
- "What are the key areas where CSA methodologies and capabilities need to be further developed to be useful and relevant for the different objectives listed in this paper?"
- "What additional usage-specific considerations are relevant for each of the different objectives of CSA listed in this paper and why?"

This section recommends financial institutions and regulators move beyond scenario analysis as solely a predictive and exploratory tool and incorporate scenario analysis as a "how to" tool for transition planning and adaptation.

4. *A distinct macroprudential approach to scenario analysis should be used to assess climate risk in the financial system* aims to answer the first and ninth consultation questions:
   - "How does the role of CSA vary based on the objectives listed above, and are there other prudential objectives where CSA could be relevant?"
   - "What alternative or novel approaches could supervisors consider for CSA and how might these be used for prudential purposes?"

   This section addresses the need for macroprudential applications of scenario analysis– a need which is largely overlooked in this discussion paper.

Thank you for your attention to this important matter. For questions please contact Mekedas Belayneh at mbelayneh@citizen.org and Elyse Schupak at eschupak@citizen.org.

Sincerely,
Public Citizen
Americans for Financial Reform Education Fund
Sierra Club

Towards Decision-Useful Climate Scenario Analysis

Introduction

Climate change is expected to bring about severe, frequently recurring, and interrelated financial risks for both financial institutions and the financial system as a whole. Central banks therefore face an imperative to conduct the best possible climate scenario analysis to inform climate risk mitigation strategies and bolster the stability of major banks and the global financial system. Due to the radical uncertainty of climate change, with long tail risks that will manifest in significant, unpredictable, and non-linear ways, backward-looking risk identification and management tools are insufficient to effectively address climate risk. Instead, mitigating climate risk necessitates a forward-looking approach. Leading financial regulators have begun responding to this challenge by adopting scenario analysis as a tool to assess and manage climate risk over longer time horizons, which are rarely captured by traditional financial risk models.[1]

While forward-looking approaches to climate risk are essential, scenario analysis is a flawed and insufficient tool to fully assess and mitigate these risks. This paper addresses the significant limitations of exploratory scenario analysis— the current framework for scenario providers and regulators. Exploratory scenario analysis is oriented around a "what if" set of questions designed to explore the impact of a range of possible futures. This paper proposes moving from a "what if" to a "how to" framework, laying out a proposal to significantly enhance the current scenario analysis tool-set, rendering it more useful for financial institutions and better suited to help regulators mitigate risk in the financial system. Furthermore, while scenario analysis can be a helpful tool for supervision, it is just one of many tools. Scenario analysis must be complemented by action suited to the size and scope of risks created by the climate crisis.

This paper is structured in four sections: first, it lays out several limitations of exploratory scenario analysis conducted by central banks, including the systematic underestimation of risk, the assumption that climate risk is solely exogenous to financial institutions, and the propensity for quantitative scenario analysis to suggest false precision, resulting in overconfidence. It turns next to specific improvements needed on scenarios themselves. Third, the paper puts forth an alternative approach to make scenario analysis more decision-useful for financial institutions and regulators. By taking into account how the action or inaction of financial institutions contributes to future risk scenarios, financial regulators and entities should use scenario analysis for planning and aligning actions with climate risk mitigation objectives. The final section of this paper addresses the use of scenario analysis as a macroprudential tool to mitigate risk in the financial system and offers recommendations for regulators to consider.

[1] Principles for the effective management and supervision of climate-related financial risks, Basel Committee on Banking Supervision, (June 2022), https://www.bis.org/bcbs/publ/d532.pdf.

Section 1: Climate scenario analysis models suffer from significant limitations, which can produce inadequate or misguided regulatory action.

The existing framework of exploratory scenario analysis has significant limitations. First, model assumptions are disconnected from climate science, causing scenario analysis to significantly underestimate risks. Second, the framework of exploratory scenario analysis fails to treat climate risk as endogenous to the financial system, even though financial institutions have the ability to impact the course of climate change. Climate risk does not simply happen to financial institutions; rather, financial institutions create climate risk for themselves and the system as a whole. Finally, the quantitative nature of exploratory scenarios, which rest on assumptions and uncertainties, can create false confidence for financial institutions and regulators.

Existing exploratory scenarios underestimate risk: Exploratory scenario analysis grossly underestimates risk at present, and this flaw has no adequate remedy on relevant timescales. Model assumptions underestimate the impacts of climate change on the economy and financial system and remain disconnected from climate science. Existing models also fail to incorporate tipping points and nonlinearities, second-order impacts, and correlated risks. These shortfalls will be further discussed in the following section. This chronic underestimation of risk can lull financial institutions and regulators into a false sense of security about the risks climate change creates for the financial system. Many financial institutions and regulators rely on the same scenario providers, so underestimations in these risk models can have far reaching effects.

Climate risk is endogenous to the financial system: A central shortcoming of climate scenario analysis is the treatment of climate risk as exogenous in models without recognizing how financial actors and regulators are able to change scenario outcomes. As the Financial Stability Oversight Council (FSOC) acknowledges, threats to financial stability can emerge from the actions banks and other financial institutions take.[2] Through financing and investment in fossil fuel companies and other climate-intensive industries, banks create transition risk while also exacerbating physical risk by worsening the climate crisis. Transition risks created by banks can migrate throughout the financial system, both directly through the pooling and selling of loans, mortgages, and other assets to investors and indirectly through funding markets, credit exposures, and other transmission channels. These risks are not inevitable— regulators can require banks to end practices that create undue risks for themselves and the system. Rather than view their role as simply responding to risks outside of their control, financial regulators should see themselves as a key variable in creating realities that safeguard the financial system.

Quantitative scenario analysis can create false precision and overconfidence: The quantitative nature of exploratory scenario analysis can lead to a false sense of precision and accuracy on the part of banks and regulators. Current climate scenario analysis produces granular loss estimates

[2] Analytic Framework for Financial Stability Risk Identification, Assessment, and Response 88 FR 78026, https://www.govinfo.gov/content/pkg/FR-2023-11-14/pdf/2023-25055.pdf.

for banks, but these estimates are based on assumptions about unknowable future events and rest on incomplete data. As with any tool, scenario analysis results should be used with appropriate acknowledgment of the uncertainty and limitations of the exercise. As such, loss estimates produced through scenario analysis should be considered with large margins of error and be accompanied by clear disclaimers of what is missing from them. Without a clear articulation of their limits, current scenario analysis exercises have the potential to be misused by regulators, who may mistake granularity for accuracy in the absence of other tools to supplement risk assessments.

Section 2: Scenarios must accurately assess climate risk to be useful for banks and regulators.

In addition to the shortfalls discussed above, scenarios themselves require significant enhancements to be useful. Scenario providers should better calibrate scenarios to climate science, incorporate tipping points and nonlinear impacts, limit reliance on unproven technologies, incorporate second-order climate impacts, network effects, and correlated risks, and improve data specificity. Without these improvements, scenario analysis will continue to underestimate climate risk, providing false comfort to financial institutions and dangerous legitimacy for inaction by regulators.

Scenarios should be calibrated to align with climate science: Existing scenarios underestimate climate risk. Typical "hot house" scenarios overlook tail risks, failing to assess the financial system's resilience to extreme events. This omission conceals large vulnerabilities and exposures within the financial system. In addition, many physical risks are not incorporated into scenarios. Basic ongoing impacts like sea-level rise, heatwaves, cyclones, and floods are often absent from scenarios, leading to an incomplete understanding of climate-related risks. Climate scientists must be engaged proactively in the process of creating, reviewing, and designing scenario models, and the assumptions that underpin them, such that they align with accepted climate science. To the extent reflecting the full scope of climate-related risks is unfeasible with quantitative modeling, regulators should rely on qualitative approaches for these hard to model climate risks, rather than omitting them entirely.

Scenarios should incorporate tipping points and nonlinear impacts: Tipping points, including the consequences of sea-level rise or the destruction of the Amazon rainforest, are often excluded from scenarios.[3] Non-linear impacts are increasingly likely to be triggered as temperatures go past the 1.5°C level.[4] Instead of quadratic damage functions that show smooth increases to

[3] Marsden, L., Ryan-Collins, J., Abrams, J., and Lenton, T. (2024). Ecosystem tipping points: Understanding risks to the economy and financial system. UCL Institute for Innovation and Public Purpose, Policy Report 2024/03. Available at: https://www.ucl.ac.uk/bartlett/public-purpose/2024/apr/ecosystem-tipping-points

[4] David I. Armstrong Mckay et al., Exceeding 1.5°C global warming could trigger multiple climate tipping points, 377 Science no. 6611, (2022), https://www.science.org/doi/10.1126/science.abn7950.

impacts, scenario analysis exercises should use exponential and logarithmic damage functions that show the dramatic increase of damages, potentially even 100% GDP loss, at a certain degree of warming. This aligns with climate scientists' view of climate change as an existential irreversible risk.[5] Non-linear impacts can also occur for transition risk, with the possibility of mutually reinforcing fire sales and a climate "Minsky moment" that makes fossil fuel assets obsolete.[6] As noted previously, if tipping points and other nonlinear impacts cannot be modeled, qualitative approaches should be used to approximate these risks. Excluding these impacts because of their modeling complexity limits the utility of the scenario.

Scenarios should limit reliance on unproven technologies: Existing net-zero scenarios may overestimate the role of fossil fuels in the future by assuming that emitted carbon dioxide can be removed on a large scale by yet unproven technologies such as carbon capture. Models from both the Network for Greening the Financial System (NGFS) and the Intergovernmental Panel on Climate Change (IPCC) assume continued use of fossil fuels in net-zero scenarios, as they assume carbon capture technology will be both effective and scalable in removing emitted carbon.[7] Assuming the usefulness of these technologies at scale means that scenarios both transition and physical risks. Until carbon capture technology is proven and scalable, scenarios should not incorporate these technologies in net-zero scenarios. While scenarios comparing climate risk in a world with and without carbon capture technology are useful, assuming effective and scalable carbon capture technology in base-case scenarios is inappropriate at this stage.

Scenarios should incorporate second-order climate impacts and correlated risks: A major gap in existing scenarios is the neglect of second-order impacts, such as shocks to global food supplies or mass migration that create risks for banks in less direct ways, and the limited modeling of climate risk transmission channels. Climate change is not a series of discrete events, but existing scenarios often treat it as such. Scenario analysis is frequently unable to identify correlated risks between different industries and organizations, or model overlapping climate disasters that will arise in parallel or in series. Understanding the interconnections and dependencies between various sectors and entities is crucial for a meaningful assessment of climate-related risks, especially for assessing financial stability.[8] To consider possible contagions of risk, models must

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[5] Sandy Trust, Sanjay Joshi, Tim Lenton, and Jack Oliver, "The Emperor's New Climate Scenarios: Limitations and Assumptions of Commonly Used Climate-Change Scenarios in Financial Services," Institute and Faculty of Actuaries, University of Exeter (July 2023). https://actuaries.org.uk/media/qeydewmk/the-emperor-s-new-climate-scenarios_ifoa_23.pdf.

[6] Miller, Hugh, and Simon Dikau. "Preventing a 'Climate Minsky Moment': Environmental Financial Risks and Prudential Exposure Limits." Green Central Banking. Published March 3, 2022. Accessed July 5, 2024. https://greencentralbanking.com/research/climate-minsky-moment-financial-risks-prudential-exposure-limits/.

[7] Monasterolo, Irene and Nieto, Maria J. and Schets, Edo, The Good, the Bad and the Hot House World: Conceptual Underpinnings of the NGFS Scenarios and Suggestions for Improvement (December 6, 2022). Banco Espana Working Paper No. 2302 , Available at SSRN: https://ssrn.com/abstract=4211384 or http://dx.doi.org/10.2139/ssrn.4211384

[8] Managing Climate Risk in the U.S. Financial System, U.S. Commodity Futures Trading Commission, (September 9, 2020),

include network effects, multiple feedback loops, and interactions across policy, technology, economies, and finance. If these cannot be incorporated into existing quantitative frameworks, qualitative exercises must be introduced to supplement existing models.

Scenarios require improved data specificity: Scenario analysis often lacks geographic, temporal, and sectoral granularity, limiting its practicality to inform decisions. Without this granularity, it is challenging to translate scenarios into accurate impacts to specific financial firms or financial instruments. Granular, firm-specific data is most appropriate for scenario analysis used to inform firm-level risk management. Without this data, qualitative exercises may be more appropriate.

Section 3: A more decision-useful scenario analysis involves shifting from speculative "what-if" questions to actionable "how-to" strategies.

As a result of these deficiencies, results of existing scenario analysis exercises should be treated with caution and scenario analysis should be considered one of several risk management tools. The radical uncertainties and existential threats posed by climate change necessitate adopting a precautionary approach—shifting the burden to the regulated entity to demonstrate why they should be allowed to proceed with status quo activities, instead of expecting regulators to provide proof, through exploratory scenario analysis or other tools, that those activities are risky.[9] To date, U.S. regulators have not adopted measures, such as enhanced capital requirements or liquidity buffers, to mitigate climate risk. It is our view that limited regulatory interventions are not the result of limited risk, but rather the result of limited tools well suited to measure these risks, and unwillingness to act proactively to avert a clear threat.

Many of the shortfalls of scenario analysis laid out above are well documented. To date, the attention of regulators and scenario providers has been on improving these scenarios rather than on questioning their utility. To the extent scenario providers can address the previously discussed limitations, they should do so, but regulators should not wait on these improvements to act. Alternate approaches to scenario analysis can help bridge data and methodological gaps and are an important addition to regulator toolkits.

Climate scenario analysis has thus far focused on predictive and exploratory dimensions, where regulators or financial institutions ask “what if” questions to identify and assess potential climate change impacts. As exemplified by the Federal Reserve’s recent exercise, models have failed to

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https://www.cftc.gov/sites/default/files/2020-09/9-9-20%20Report%20of%20the%20Subcommittee%20on%20Climate-Related%20Market%20Risk%20-%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System%20for%20posting.pdf.

[9] Hilary J. Allen, A New Philosophy for Financial Stability Regulation, 45 Loy. U. Chi. L. J. 173 (2013), https://lawecommons.luc.edu/luclj/vol45/iss1/4.

adequately answer these predictive questions.[10] The complexity and radical uncertainty of climate risk renders this kind of exploratory scenario analysis ineffective for accurate predictive risk modeling. Focusing only on improving data and modeling for scenario analysis misses a more useful approach: using the exercise for needed regulatory action and strategic planning.[11]

Climate-related risk is systemic and endogenous to the financial system, impacted by banks and other financial actors through their activities. Physical and transition risk are worsened through the continued underwriting, financing, and investment of fossil fuels and other carbon-intensive industries. Scenario analysis can help mitigate increasingly extreme and recurrent climate-related financial risks, but only if the use of the exercise is shifted to make it suitable to inform actions. Scenario analysis should encompass risk assessment that is calibrated to account for its inherent limitations, as well as robust target-setting and strategic planning. It also ought to be used to align portfolios with preferred risk outcomes.

At its best, scenario analysis can enable financial institutions to answer "how to" questions, facilitating robust strategic planning for transitioning and adaptation to mitigate and prevent climate risk.[12] Ultimately, the findings from scenario analysis exercises are effective when they inform actions, regulatory interventions, or transition planning, as well as the risks of inaction on these fronts. As the IPCC describes, scenarios are "a picture of the world achievable (or avoidable) only through certain actions. The scenario itself becomes an argument for taking those actions." Scenarios are not just forecasts of exogenous risks, but roadmaps of actions that lead to specific future outcomes. The goal should be to use scenario analysis to identify the actions banks must take to mitigate climate-related financial risks and inform policy accordingly.[13] Regulators and financial institutions should use scenario analysis to manage and identify risks of transition pathways to reach a preferred scenario.

For instance, scenario analysis can be used to identify bank actions that misalign with net-zero transition plans, which directly contribute climate risk to the financial system and individual financial institutions. Considering climate-related financial risk as endogenous will accurately reframe how financial institutions identify and manage risk by addressing how their investment and underwriting policies contribute to their own climate risk. While conducting scenario

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[10] Board of Governors of the Federal Reserve System. "Federal Reserve Board Releases Summary of the Exploratory Pilot Climate Scenario Analysis (CSA) Exercise That It Conducted with Six of the Nation's Largest Banks." Federal Reserve, 9 May 2024, www.federalreserve.gov/newsevents/pressreleases/other20240509a.htm.
[11] David Arkush, "Unsafe at Any Charge," Roosevelt Institute, May 26, 2021. https://rooseveltinstitute.org/publications/unsafe-at-any-chargewhy-financial-regulators-should-actively-mitigate-climate-related-risk/
[12] Huiskamp, U., ten Brinke, B., & Kramer, G. J. (2022). The climate resilience cycle: Using scenario analysis to inform climate-resilient business strategies. *Business Strategy and the Environment*, 31(4), 1763–1775, https://doi.org/10.1002/bse.2982.
[13] Intergovernmental Panel on Climate Change. "Climate Change 2001: Impacts, Adaptation, and Vulnerability." In Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, edited by James J. McCarthy et al. Cambridge University Press, 2001. https://archive.ipcc.ch/ipccreports/tar/wg2/index.php?idp=126.

analysis, financial institutions should understand how their actions shape climate scenario outcomes. This can take the form of actively using scenario analysis as a means of informing and shaping transition and adaptation planning.

A recent NGFS report identified the need for more research on the connection between scenario analysis and target-setting for supervision.[14] More work needs to be done on how scenario analysis by prudential regulators can be used to assess and inform risks associated with transition plans and other climate-related risk mitigation actions.[15] Conducting scenario analysis across a variety of scenarios can help regulators and financial institutions understand the risks and dynamics of different transition pathways. The extent of transition risk will depend on the extent to which the energy transition will be orderly or disorderly. Results of scenario analysis can point to climate-related risks and opportunities that will inform strategic planning, including adaptation and decarbonization.[16] This analysis can inform transition plans and operational resilience for a financial institution, as well as inform supervision and prudential regulation.

Financial institutions and regulators should evaluate potential outcomes of various future decarbonization pathways under uncertain conditions by using available forward-looking data. By conducting scenario analysis, financial institutions can determine the appropriate level of decarbonization needed for setting targets and assess how well these targets align with scientific net-zero trajectories.[17] It is worth noting that HSBC has already begun using scenario analysis as a means of aligning capital with emissions outcomes and net-zero strategic planning.[18] Other banks could easily follow suit.

Additionally, encouraging banks to use climate scenario analysis to inform transition planning will allow supervisors to gather critical macroprudential information about the potential feedback loops, interactions, and cumulative effects of multiple fossil finance drawdown processes occurring simultaneously. These drawdowns could be orderly to minimize instability, or they could occur along unstructured timelines in which the possibility of fire sales and a climate "Minsky moment" are heightened. A subsequent macroprudential scenario exercise based on climate-related policy interventions would help supervisors identify transmission channels and

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[14] Network for Greening the Financial System. "NGFS Credible Transition Plans." April 17, 2024. https://www.ngfs.net/sites/default/files/media/2024/04/17/ngfs_credible_transition_plans.pdf.
[15] Volz, Ulrich, and David Lunsford. "Sustainable Central Banking Toolbox Paper 15." Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, September 2023. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/09/INSPIRE-Sustainable-Central-Banking-Toolbox-Paper-15.pdf.
[16] U.S. Environmental Protection Agency. "Climate Transition Planning." Accessed July 3, 2024. https://www.epa.gov/climateleadership/climate-transition-planning#:~:text=Scenario%20analysis%20that%20identifies%20climate,related%20transition%20risks%20and%20opportunities.
[17] WWF. "Net Zero Scenario Analysis for Finance Sector." February 2022. https://www.wwf.org.uk/sites/default/files/2022-02/net-zero-scenario-analysis-for-finance-sector.pdf.
[18] HSBC. "Net Zero Scenario Analysis." Accessed July 3, 2024. https://www.business.hsbc.com/en-gb/insights/sustainability/net-zero-scenario-analysis.

second-order financial risks to develop a better understanding of the ways in which the energy transition will impact financial stability.

Blending in more goal-oriented and intervention-based uses of scenario analysis will significantly aid effective risk management, strategic planning, and organizational resilience. At a macroprudential level, scenario analysis should also be used by supervisors for policy implementation and ameliorating protection gaps. Supervisors can implement policy through intervention-based scenarios that define benchmarks or set targets for regulated entities, such as scenarios that inform prudential management of achieving Paris-aligned transition plans.

Section 4: A distinct macroprudential approach to scenario analysis should be used to assess climate risk in the financial system.

Many financial regulators have largely ignored the need for effective scenario analysis to shed light on the macroprudential risks of climate change. The fallacy of composition, or the misguided view that regulators can understand risks to the system by understanding risks to specific institutions, applies to climate risk as well.[19] Regulators cannot understand climate risk in the financial system as a whole only by measuring the risks climate change poses to specific institutions. To make scenario analysis an effective tool for risk management on the institutional level as well as sectorally and system-wide, regulators must incorporate macroprudential objectives into the design of scenario analysis. To improve financial stability, financial regulators and those developing standards for them, like the Basel Committee on Banking Supervision (BCBS), should make the following distinctions and recommendations regarding the applicability and usefulness of scenario analysis as a macroprudential risk management tool:

1. Emphasize that designing scenario analysis for macroprudential risk management is distinct from and needed in addition to designing scenario analysis solely as a microprudential tool.

2. Highlight that the misuse of quantitative microprudential scenario analysis will lead to an underestimation of climate risk in the financial system.

3. Encourage supervisors to assess climate-related risk to the financial system through qualitative exercises in the absence of robust quantitative climate risk models.

Scenario analysis designed to inform macroprudential supervision is methodologically distinct from scenario analysis designed to inform firm-level risk identification and management. It may be appropriate for scenario analysis designed to inform macroprudential supervision to be geographically and sectorally high-level, with a low level of granularity, while microprudential

[19] Andrew Baker, The Bankers' Paradox: The Political Economy of Macroprudential Regulation, The London School of Economics, https://eprints.lse.ac.uk/61998/1/dp-37.pdf.

scenario analysis without granular, bottom-up data is likely to be of little decisional value to individual financial institutions and their supervisors.[20] Crucially, macroprudential scenario analysis must incorporate contagion effects and account for the flow of risks between financial institutions and sectors. While it is appropriate for financial institutions to be primarily concerned with identifying and mitigating their own risks, regulators must also be attuned to aggregate risks in the system.[21] Banks can originate climate-related risks and distribute those risks throughout the financial system. These originate-to-distribute risks are not captured in microprudential models. That risks move off of a bank's balance sheet does not mean they cease to exist, or even that the originating institution is necessarily insulated from them. As the 2008 Global Financial Crisis revealed, risks that a bank moves off its balance sheet can remain relevant through the bank's interconnectedness with other financial institutions or through other systemic channels.

This paper has highlighted significant shortfalls in the current design of microprudential exploratory scenarios. These flaws, which lead to the underestimation of climate risks on the institutional level, can be compounded when micro scenarios are used to measure risks on a sectoral level or in the financial system as a whole. If supervisors aggregate the results of microprudential models as a proxy for climate risk in the system, they are certainly underestimating risk.[22] Aggregating these models will also fail to fully capture the flow of risks throughout the financial system and the contagion effects that can arise when an interconnected financial institution becomes impaired. Moreover, reliance on microprudential models that underestimate risks can itself be a contributor to financial instability. Should all 100 members of NGFS rely on flawed scenarios, this itself can contribute risk to the global financial system.[23]

Current approaches to scenario analysis are not suitable for measuring climate risk in the financial system. In the absence of robust macroprudential climate risk models, financial institutions should be required to take stock of their vulnerabilities to climate risk through qualitative exercises. Professor Hillary Allen recommends regulators craft narratives about climate-related financial crises to break free from model-dependent thinking that encourages

[20] Matthias Täger and Simon Dikau, Purposeful scenario analysis: A framework to guide central banks and financial supervisors in the selection and design of climate scenarios, The Grantham Research Institute on Climate Change and the Environment, (May 2023), https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/05/Purposeful-scenario-analysis_Policy-insight.pdf.
[21] Moritz Baer et al., "All scenarios are wrong, but some are useful"—Toward a framework for assessing and using current climate risk scenarios within financial decisions, 5 Front. Clim., (2023), https://www.frontiersin.org/journals/climate/articles/10.3389/fclim.2023.1146402/full.
[22] Sandy Trust et al., The Emperor's New Climate Scenarios, Institute and Faculty of Actuaries, (July 2023), https://actuaries.org.uk/media/qeydewmk/the-emperor-s-new-climate-scenarios.pdf.
[23] A J Pitman el al., Acute climate risks in the financial system: examining the utility of climate model projections, Environ. Res.: Climate 1 (2022), https://iopscience.iop.org/article/10.1088/2752-5295/ac856f/pdf.

overconfidence.[24] In these scenarios, banks should be required to identify their exposures to risks that may materialize in the event of a climate-related financial crisis, including losses to loan and investment portfolios, exposure to impacted economic sectors and financial markets, insurance market disruptions or failures, interruptions or changes to government subsidies and programs, damage to physical and digital infrastructure, failures in short term funding markets, losses of credit availability, and a downturn in macroeconomic conditions, among other risks. Qualitative exercises help regulators avoid the trap of false precision and encourage financial institutions to consider the full scope of potential climate vulnerabilities. This approach rather than firm-level risk identification and management should inform a regulatory framework designed to mitigate threats to financial stability caused by the climate crisis.

Conclusion

Exploratory climate scenario analysis has offered some value for financial regulators, but the significant limitations of current scenarios make it an inadequate standalone tool to effectively identify and manage climate-related risk. The radical uncertainty, interconnectedness, and complexity of climate risk makes traditional quantitative financial modeling ill-suited for measuring this risk; and the size, scope, and irreversibility of climate impacts makes assessing risks accurately all the more essential. To address the critical shortcomings of exploratory scenario analysis, regulators should more closely align scenarios with climate science by including tipping points, second-order effects, and nonlinearity, among other improvements. However, improving scenarios themselves without addressing the conceptual and methodological shortcomings of scenario analysis exercises is insufficient. Regulators must recognize that financial institutions create climate risk. In doing so, it is appropriate to shift the focus of scenario analysis and use the exercise to inform strategic planning for mitigating climate risk through adaptation and transition planning.

While there are clear steps that can be taken to make climate scenario analysis more decision-useful, even in the best of circumstances it should be contextualized as one of several tools, not the central approach, and regulators should move to incorporate other forward-looking risk management tools to address climate-related risk. Regulators should urgently take precautionary actions to manage climate-related financial risk, such as requiring banks to create binding transition plans to facilitate an orderly transition away from climate-risky industries, implement portfolio limits for financing and investing in fossil fuel companies that create systemic risk, incorporate climate-related risks into capital requirements, or require systemically important banks to maintain a higher equity cushion to address the inevitable financial instability that will be created as a result of the climate risk.

[24] Hilary J. Allen, Regulatory Managerialism and Inaction: A Case Study of Bank Regulation and Climate Change, 86 Journal of Law and Contemporary Problems, no. 3, 71 (2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4377363.