

Workshop on Climate Stress Testing for Central Banks

CEMLA, Mexico City, November 29 – December 3, 2024

Objectives

The Climate Financial Risk Center (CFRC) is organizing a Workshop on Climate Stress Testing for Central Banks. The workshop is part of the CFRC Workstream on Climate Stress Testing and aims at enhancing central banks' methodological capacities to assess climate-related financial risks. It will focus in particular on forward-looking climate risk assessment under different scenarios for physical and transition risk. The workshop's objective is to develop use cases with applications of climate stress testing that central banks can incorporate as an analytical tool for financial stability monitoring.

The workshop will take the form of an intensive 4-day course in which central bank researchers and analysts with experience in quantitative modeling will learn about state-of-the-art approaches to conduct scenario-contingent financial valuation and climate stress tests. Thus, the workshop will enable participants to familiarize with modeling approaches and to identify the financial stability implications at the level of individual institutions and of the financial system as a whole. In this regard, the course will entail both theoretical classes and hands-on sessions on models' applications. The course is motivated by the current efforts of central banks to incorporate climate stress testing in their risk management tools.

The workshop will be lead by Prof. Irene Monasterolo (Utrecht University) and Prof. Stefano Battiston (University of Zurich and University of Venice), world-renown scholars in the field of climate risks and financial stability. The workshop is restricted to teams from 10 central banks, with 2 participants representing each institution. Following up the workshop, participants will work in country teams to prepare policy notes summarizing use cases of climate stress testing tailored to each jurisdiction. During online meetings that will take place in the first semester of 2025, participants will receive feedback on their policy notes and prepare their articles to be submitted to a special issue of the Latin American Journal of Central Banking. The publication in the journal will be conditional on the evaluation of the policy notes by independent referees.

Format

The workshop will take place over four days with morning and afternoon sessions in person at CEMLA's premises in Mexico City between November 29 and December 3, 2024. The CFRC is inviting teams consisting of two participants per central bank, who will get their travel costs (flight in economy class and accommodation) plus a travel allowance covered to facilitate their participation. The workshop is being coordinated by CEMLA's Financial Stability Directorate in cooperation with Prof. Irene Monasterolo and Prof. Stefano Battiston, who will lead the workshop's lessons, guide the country teams, and provide feedback on the policy notes to be derived from the workshop. Participants can expect to have an intense interaction with Prof. Monasterolo and Prof. Battiston during the workshop, which will be restricted to a maximum of 20 participants.

Participants are expected to deliver in country teams a policy note paper (between 10-15 pages long) within the six months following the workshop, based on a working schedule that will be provided in

advance. Participants will be invited to participate in online calls to discuss advances in their policy note. These notes will summarize use cases of climate stress testing in each participating jurisdiction.

Agenda

This in-person workshop spans over 5 days with teams of researchers from 10 central banks from Latin America and the Caribbean. Two researchers with experience in financial stability and quantitative modeling per central bank will participate in the workshop. The agenda of the workshop follows the one of an advanced (i.e., Ph.D. level) short course, including an introduction to stress testing, the inclusion of climate-related risks in stress tests, and applications with climate risk/scenarios in hands-on exercises. Each day of sessions is organized as follows:

09:30 – 11:00 Session 1
11:00 – 11:30 Break
11:30 – 13:00 Session 2
13:00 – 14:00 Lunch Break
14:00 – 15:30 Session 3
15:30 – 16:00 Break
16:00 – 17:30 Session 4

Day 1 – November 29, 2024

Getting started

- **09:00 – 09:30. Welcome remarks.**
Matias Ossandon Busch, *Director Financial Stability, CEMLA*
Mirco Schroeder, *Programme Officer, Delegation European Union in Mexico*
- 09:30 – 11:00. Lecture 1. Introduction to the course. Macrofinancial critically of climate risks: concepts
- 11:00 – 11:30. Coffee break and group photo
- 11:30 – 13:00. Lecture 2. Macrofinancial critically of climate risks: modelling
- 14:00 – 15:30. Lecture 3. Carbon budget, Cost-benefit vs Target based approach. Application: GHG corporate reporting.
- 16:00 – 17:30. Exercise 1. TCFD carbon footprinting metrics for financial portfolios.

Day 2 – November 30, 2024

Climate risk assessment in the economy and finance

- 09:30 – 11:00. Lecture 4. Climate economics and limitations fo DICE model. Aggregate IAM vs Process-based IAM.
- 11:30 – 13:00. Exercise 2. Simulation with the DICE model and critical analysis of results.
- 14:00 – 15:00. Lecture 5. Introduction to NGFS scenarios. Scenario-contingent financial valuation for equity and bonds.
- 16:00 – 17:30. Exercise 3. Assessing climate transition risk equity instruments using NGFS scenarios.

Day 3 – December 1, 2024 Climate stress tests for transition risks

Working in groups on assignments

Day 4 – December 2, 2024

Climate stress tests for transition risks

- 09:30 – 11:00. Lecture 6. IPCC scenarios. NGFS scenarios, IEA scenarios. NGFS Long-term vs Short-term scenarios. Financial valuation modeling at portfolio level contingent to transition scenarios. Market expectations and adjustments of risk measures at portfolio level. Climate stress testing for transition risk: workflow and data needs.
- 11:30 – 13:00. Exercise 4. Climate stress test for example portfolios of equity investments in Latin America using NGFS scenarios. Participants carry out the exercise under the supervision of the instructors.
- 14:00 – 15:30. Group work 1. Preparation of short reports on climate stress test exercise on transition risk.
- 16:00 – 17:30. Interactive session 1. Participants are encouraged to present and discuss the preliminary results from the exercise and discuss limitations and policy implications.

Day 5 – December 3, 2024

Climate stress tests for physical risk

- 09:30 – 11:00. Lecture 7. Climate physical impact scenarios in ISIMIP. Use of Copernicus Climate Stress Testing. NGFS scenarios for physical risk. Financial valuation modeling contingent to climate physical risk scenarios. Market expectations and adjustments of risk measures at portfolio level. Climate stress testing for physical risk: workflow and data needs.
- 11:30 – 13:00. Exercise 5. Climate stress test for example portfolios of equity investments in Latin America using NGFS scenarios. Participants carry out the exercise under the supervision of the instructors.
- 14:00 – 15:30. Group work 2. Preparation of short reports on climate stress test exercise on physical risk.
- 16:00 – 17:15. Interactive session 2. Participants are encouraged to present and discuss the preliminary results from the exercise and to discuss limitations and policy implications.
- 17:15 – 17:30. Wrap up and next steps
In this final session, participants will reflect on the key insights gained throughout the course and discuss how to apply these concepts in their own institutions. The session will provide an opportunity to address remaining questions, review best practices for climate risk assessment, and explore future challenges. Participants will also discuss next steps, including the steps for developing the policy note.

Academic materials/references

1. Battiston, S., Monasterolo, I. (2024). *Enhanced scenarios for climate stress tests. INSPIRE Sustainable Central Banking Toolbox – Policy Briefing No.16*. Available at: <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/04/INSPIRE-Sustainable-Central-Banking-Toolbox-Paper-16.pdf>
2. Battiston S, Monasterolo, I., Riahi, K., and van Rujiven, B. (2021). *Accounting for finance is key for climate mitigation pathways*. *Science*, 372(6545), 918-920.
3. Battiston, S., Dafermos, Y., and Monasterolo, I (2021). *Climate risks and financial stability*. *Journal of Financial Stability*, vol. 54, June 2021.

4. Battiston S., Mandel A, Monasterolo I., Schuetze F. & G. Visentin (2017). A Climate stress-test of the EU financial system. *Nature Climate Change*, 7, 283–288.
5. Bressan, G., Duranovic, A., Monasterolo, I., Battiston, S. (2024). Asset-level climate physical risk assessment matters for adaptation finance. *Nature Communications*, 15, 5371 (2024).
6. Bressan, G., Monasterolo, I, Battiston, S. (2022). Sustainable investing and climate transition risk: a portfolio rebalancing approach. *Journal of Portfolio Management*, special issue “Novel risks” ed. by F. Fabozzi (<https://jpm.pm-research.com/content/early/2022/07/14/jpm.2022.1.394>).
7. Gourdel, R., Monasterolo, I, Dunz, N., Mazzocchetti, A. and Parisi, L. (2024). The double materiality of climate physical and transition risks in the euro-area. *Journal of Financial Stability*, 71, 101233.
8. European Central Bank/European Systemic Risk Board (2021): *Climate-related risk and financial stability*, July 2021
9. European Central Bank/European Systemic Risk Board (2022): *The macroprudential challenge of climate change*, July 2022.
10. Monasterolo, I., Nieto, M., Schets, E. (2023). *The good, the bad and the hot-house world. Conceptual underpinnings of the NGFS Scenarios and suggestions for improvement. Banco de España working paper series.*
<https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSerias/DocumentosOcasional/23/Files/do2302e.pdf>
11. Network for Greening the Financial System (2019): *A call for action – Climate change as a source of financial risk, First comprehensive report*, April 2019
12. Network for Greening the Financial System (NGFS) (2023). *Recommendations towards the development of scenarios to assess nature-related financial risks.*

Required readings before the course

1. Battiston, S., Monasterolo, I. (2024). *Enhanced scenarios for climate stress tests. INSPIRE Sustainable Central Banking Toolbox – Policy Briefing No.16.* Available at: <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/04/INSPIRE-Sustainable-Central-Banking-Toolbox-Paper-16.pdf>
2. Battiston S., Mandel A, Monasterolo I., Schuetze F. & G. Visentin (2017). A Climate stress-test of the EU financial system. *Nature Climate Change*, 7, 283–288.