



Climate Scenario Analysis in MAS' Industry-Wide Stress Test

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Overview of presentation

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Introduction to climate scenario analysis

2

MAS' 2022 climate scenario analysis exercise

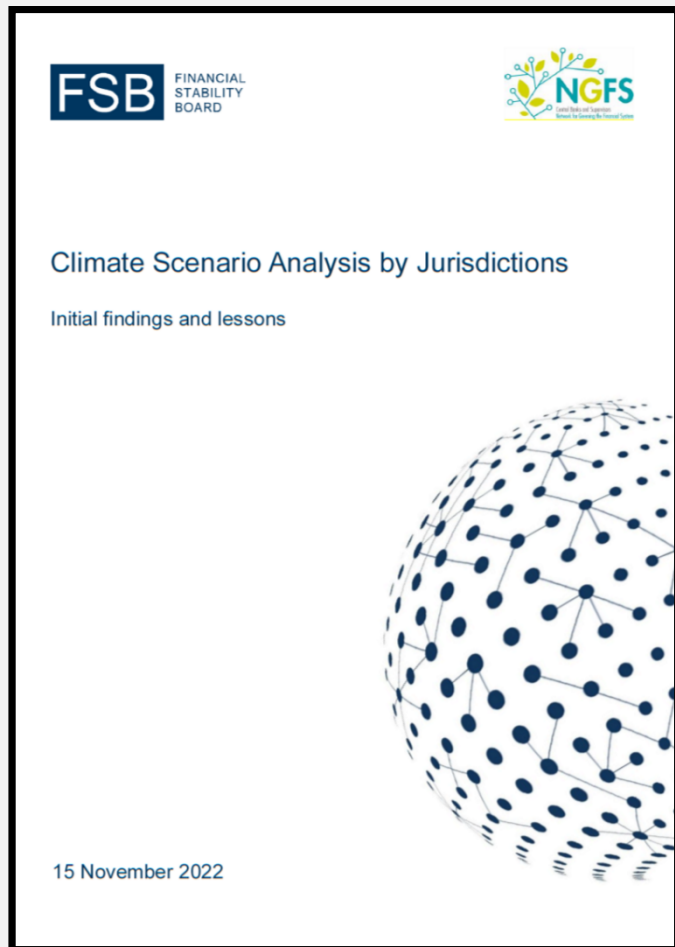
- *Key features*
- *Climate scenarios used*
- *Findings from banks' and insurers' submissions*

3

Possible areas for further study



Scenario analysis has emerged as an important forward-looking tool for assessing climate-related financial risks

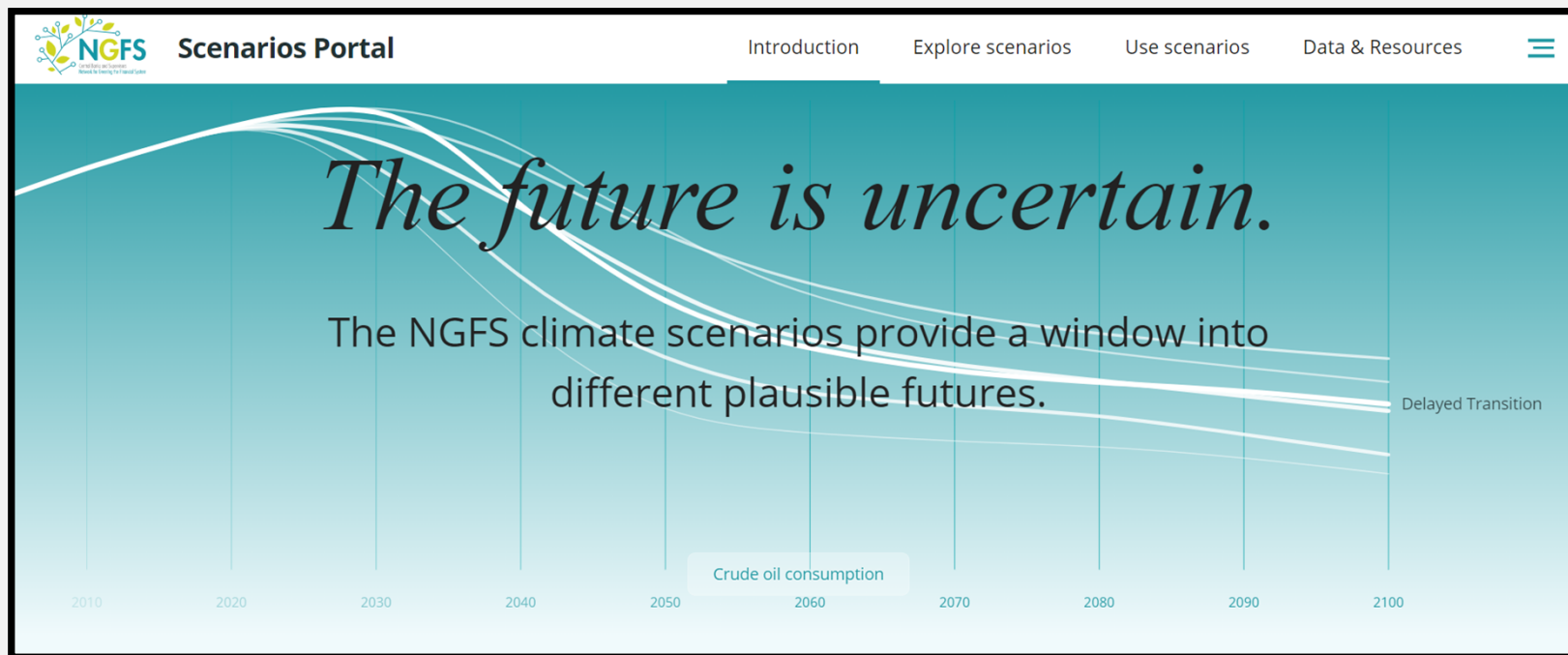


FSB-NGFS joint report on climate scenario analysis (Nov 2022)

- Features information on more than 60 exercises planned or conducted by financial authorities globally
- The **NGFS Scenarios** play a critical role in supporting financial authorities' climate scenario analysis exercises
- Exercises vary widely in terms of scope and objectives, with many aimed at **raising awareness** and **developing capabilities**
- Work is needed to address **data and methodological gaps**, including to better understand potential second-round effects and system-wide implications
- **Sharing of experiences** will be important in supporting capacity building efforts

The NGFS Scenarios provide a common starting point for assessing climate risks under a range of potential pathways...

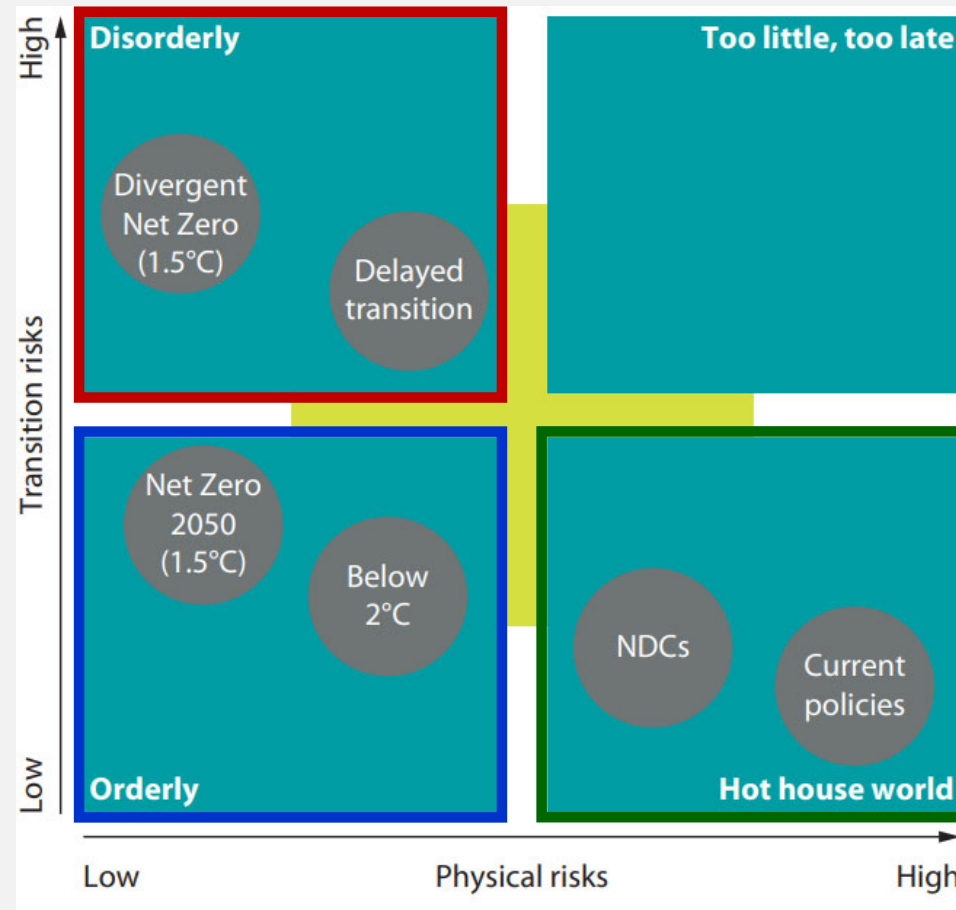
- **Third vintage of NGFS Scenarios** released in September 2022, alongside additional reference documents
- Data and resources are available at **NGFS' Scenarios Portal** (<https://www.ngfs.net/ngfs-scenarios-portal/>)
- Scenarios will continue to be refined as part of ongoing Phase IV work



...and consist of six scenarios with varying levels of physical and transition risk

Disorderly scenarios feature higher transition risk due to policies being delayed or divergent across countries and sectors.

Orderly scenarios assume that climate policies are introduced early and become gradually more stringent. Both physical and transition risks are relatively subdued.



Hot house world scenarios assume that global efforts are insufficient to halt significant global warming. Critical temperature thresholds are exceeded, leading to severe physical risks and irreversible impacts.

Source: NGFS

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MAS conducted a climate scenario analysis exercise for selected key banks and insurers as part of the 2022 Industry-Wide Stress Test

Key features of the exercise:



Designed to **raise awareness** of the potential economic and financial implications of climate risks, and **facilitate learning** for both MAS and FIs



Focused on **credit risk for banks** as well as **market/insurance risks for insurers**



Considered banks/insurers' exposures to six **Climate Policy Relevant Sectors (CPRS)***, sovereign credit exposures, and insurers' insurance policy claims



Banks and insurers made projections under a **static balance sheet** assumption, and provided information on **potential management actions** they would undertake

This exercise featured three long-term climate scenarios over the period 2022-2050, taking reference from the NGFS Scenarios

Orderly Transition



Physical risk drivers

- Global warming limited to within Paris Agreement goals (**↑1.6°C from pre-industrial levels by 2050**)



Transition risk drivers

- Gradual but decisive rise in carbon prices globally (**to about US\$600-900 by 2050**)

Based on NGFS Phase II
“Net Zero 2050”

Disorderly Transition

- Some further warming relative to Orderly scenario (**↑1.8°C by 2050**), due to delayed action

- Policy action delayed to 2031, with a sharp rise in carbon prices after (**to about US\$500-1100 by 2050**)

Based on NGFS Phase II
“Delayed Transition”

No Additional Policies

- Significant warming, beyond median estimates (**↑3.0°C by 2050**)
- ASEAN-5* flood event in H1 2022

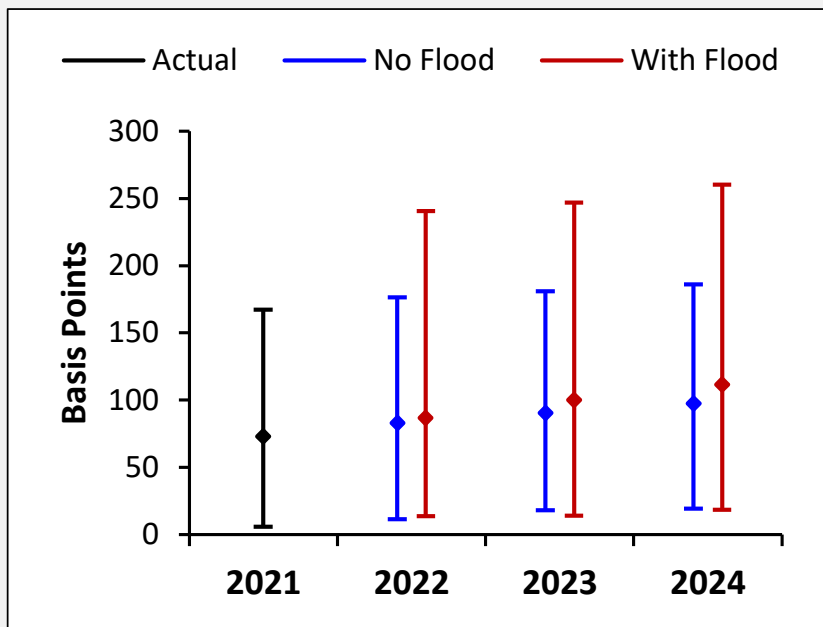
- **No additional policies assumed** (e.g. carbon prices), beyond those implemented by end-2021

Based on NGFS Phase II
“Current Policies”, with an
additional flood event overlay

A severe flooding shock across the ASEAN-5 economies can give rise to material losses for banks and insurers

Banks projected higher credit costs to cover losses from the ASEAN-5 flood...

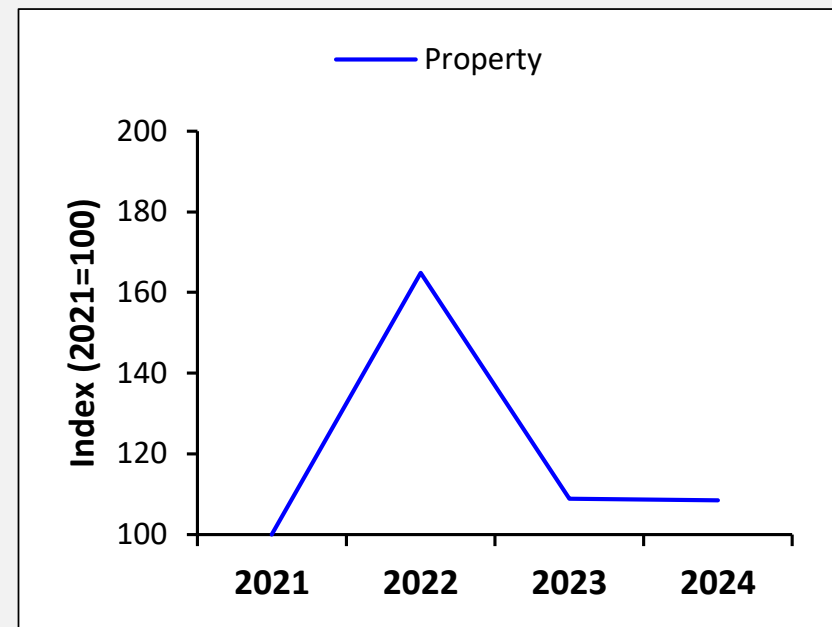
Range and median of banks' projected cumulative credit cost for ASEAN-5 credit exposures under the No Additional Policies scenario



Source: Banks' submissions, MAS estimates

...and insurers estimated a significant increase in property-related claims

General insurers' and reinsurers' projected gross incurred claims for property business line under the No Additional Policies scenario

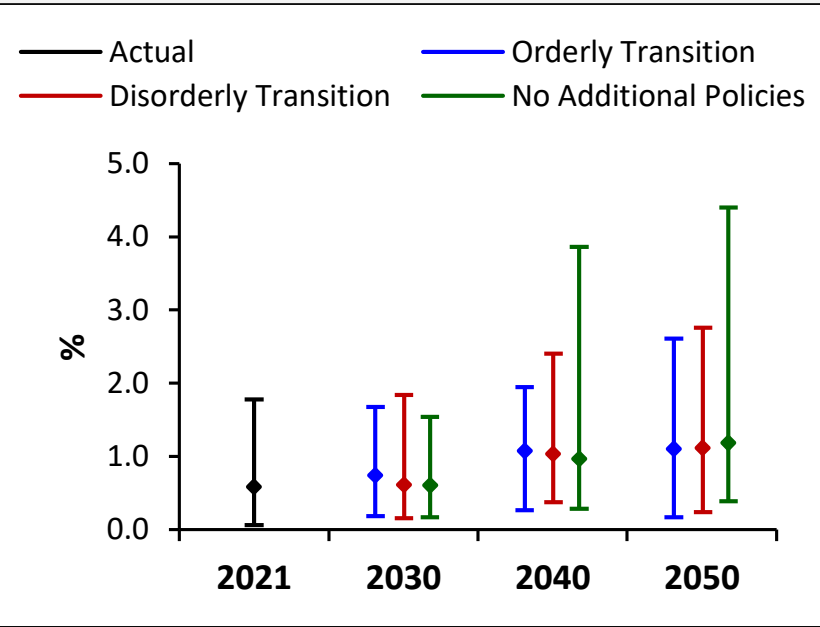


Source: Insurers' submissions, MAS estimates

Physical and transition risks could have a significant impact on the balance sheets of banks...

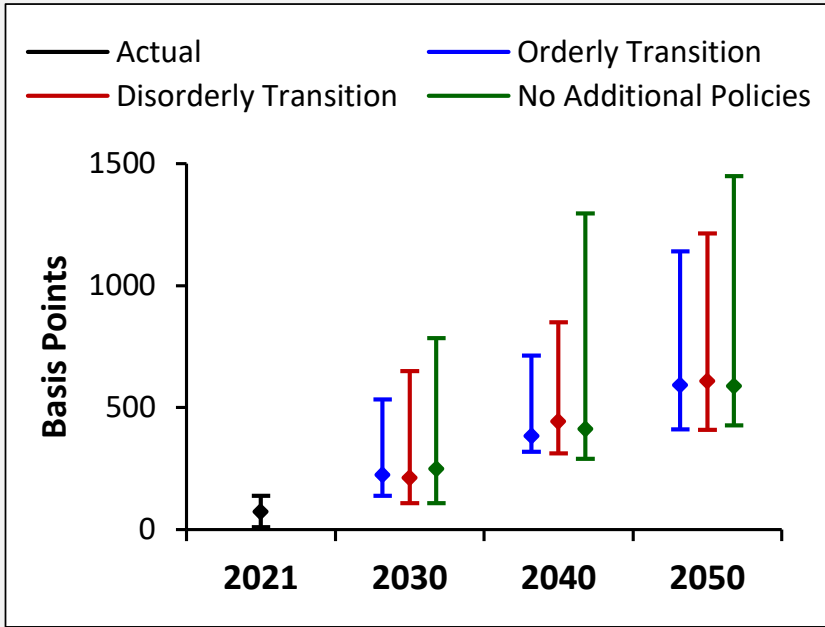
Banks projected their PDs for CPRS credit exposures to increase across all scenarios, resulting in a increase in cumulative credit costs

Range and median of banks' projected PD for CPRS credit exposures



Source: Banks' submissions, MAS estimates

Range and median of banks' projected cumulative credit cost for CPRS credit exposures



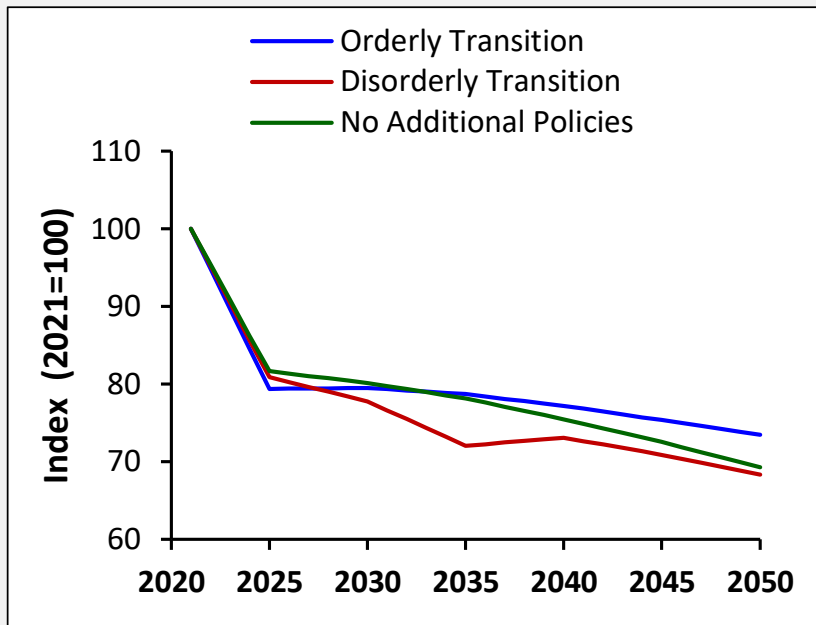
Source: Banks' submissions, MAS estimates



...as well as the balance sheets of insurers

Insurers projected a decrease in the market value of their debt holdings...

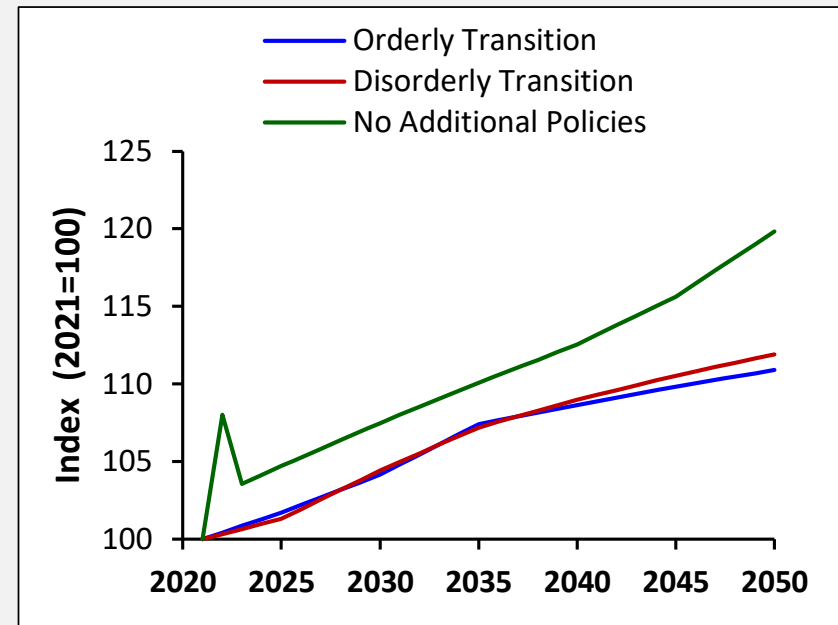
Projected market value of insurers' CPRS debt holdings



Source: Insurers' submissions, MAS estimates

...as well as increased liabilities (in the form of higher unexpired risk reserves)

General insurers' and reinsurers' projected unexpired risk reserves across all business lines



Source: Insurers' submissions, MAS estimates

Banks and insurers have made meaningful progress in addressing data and methodological gaps, but further work is needed

Challenges faced by banks and insurers



Data-related

- Gaps in data relevant for FIs' climate risk assessments (e.g. Scope 1/2/3 GHG emissions, asset locations), especially for smaller and non-listed firms
- Data needs to be drawn from a wide range of sources



Methodological

- Existing macrofinancial modelling frameworks mainly calibrated for shorter-term projections (e.g. 3-5 years)
- Heterogeneity of climate impacts (across regions/firms) not adequately captured in portfolio-level approaches
- Climate scenario parameters (e.g. provided by NGFS) insufficiently granular for FIs' scenario analysis

Efforts undertaken

- Increasing counterparty engagement to obtain entity-level information (e.g. emissions, mitigation plans)
- Tapping on proprietary climate-related databases (e.g. for emissions, physical risk scores)
- Developing new modelling frameworks or refining existing ones, in collaboration with external vendors
- Using granular risk assessment methodologies (e.g. climate-adjusted counterparty credit risk models)
- Undertaking scenario expansion to generate additional parameters (e.g. for economies not in NGFS Scenarios)

Moving forward, MAS will continue to engage banks and insurers as they iteratively improve and validate their climate scenario analysis approaches

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Given the nascent state of climate scenario analysis, there remain many areas which require further study

Some open questions to think about:



What approaches would be most suitable for addressing the **lack of climate-related data**, especially at a granular counterparty level?



How do we develop risk assessment frameworks that better capture **system-wide effects** and account for the **longer time horizons** often associated with climate risk?



How could we foster **greater consistency and comparability** for climate scenario analysis exercises conducted across different jurisdictions?



How should the **results and findings** from scenario analysis exercises be used?
What role should **prudential policy** play in addressing climate risks (e.g. across regulatory, supervisory and disclosure dimensions)?

Thank you!

