Climate Risk Analysis in FSAPs

OCTOBER 25, 2022

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Objective

Objective of Presentation

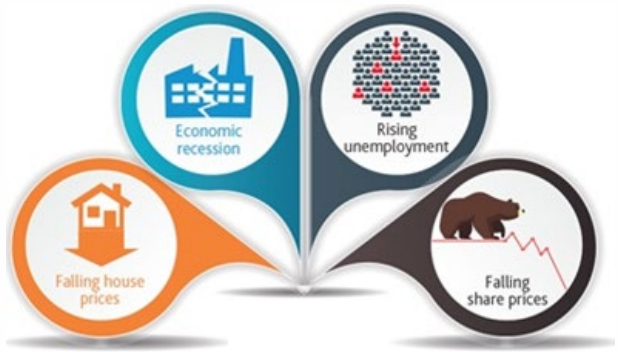
- To present the IMF's current approach in FSAPs to assess the implications of climate change for the stability of banking systems
  - Explain the general approach to stress testing and climate risk analysis
  - Present analysis of climate physical and transition risks, drawing on recent FSAP examples
- The Staff's approach is not a standard stress test and seeks to:
  - Raise awareness of the risk and adaptation needs
  - Illustrate potential pressure points for the financial system due to physical climate shocks and in the transition to a low-carbon economy

Climate Risk Analysis in FSAPs

Standard FSAP Risk Analysis: Scenario-Based Solvency Stress Testing of Banks

R A M

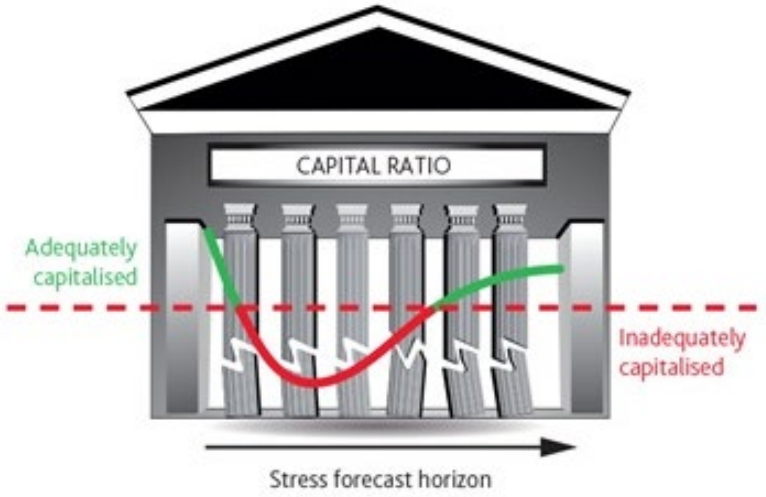
Macro scenario



Risk factors

- Credit, market, interest, FX
- Historical relationships
- 3-5 year horizon

Bank solvency stress test



Corporate & household sensitivity analysis or stress test

Adapting FSAP Risk Analysis to Incorporate Climate Risk

Stage 1

Climate risk diagnostics + C and emissions NGFS scenarios*

Stage 2

Climate scenarios design

Stage 3

Bank stability assessment

C
R
A
M

Physical Risk Scenarios Transition Risk Scenarios

Macro approach

Macro (& sectoral) scenario

Risk factors

Bank solvency stress test

Corporate & household sensitivity analysis or stress test

Micro approach

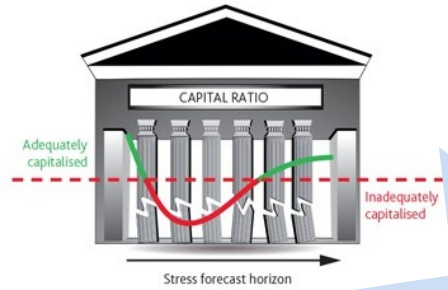
* Disorderly, Orderly; Hot house

NEW: Climate Module

- High data granularity--geography of physical hazards and sectoral impact of carbon tax
- Long horizons (up to 2100), uncertainty, modeling complexity

Physical Risk Analysis

Physical Risk Analysis



NGFS ^{0}C and emissions scenarios

Hazards projections

Losses/damages (capital, TFP shocks)

Macro approach

Macro scenario

Bank stress test

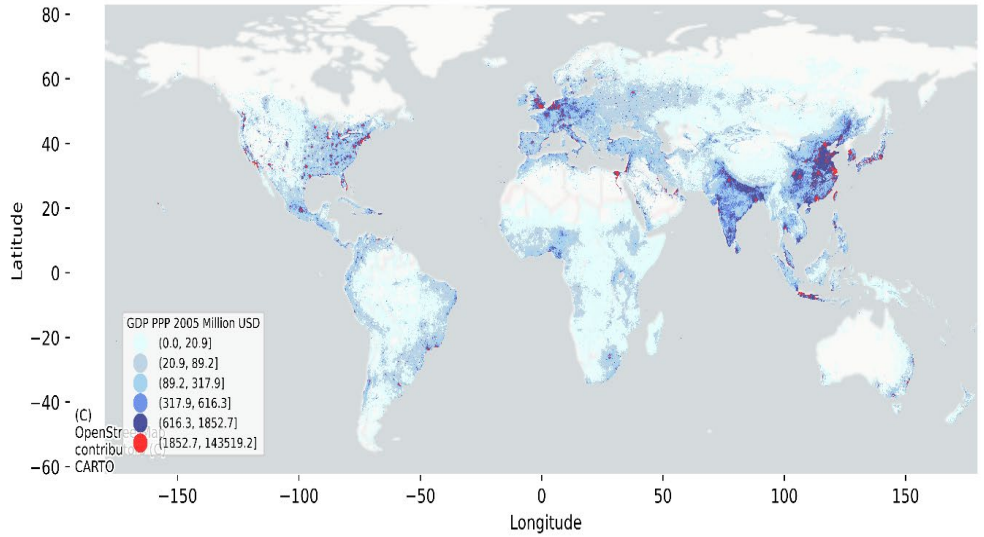
Micro approach

HAZARDS DATA

Physical Risk Analysis: Estimating Damages

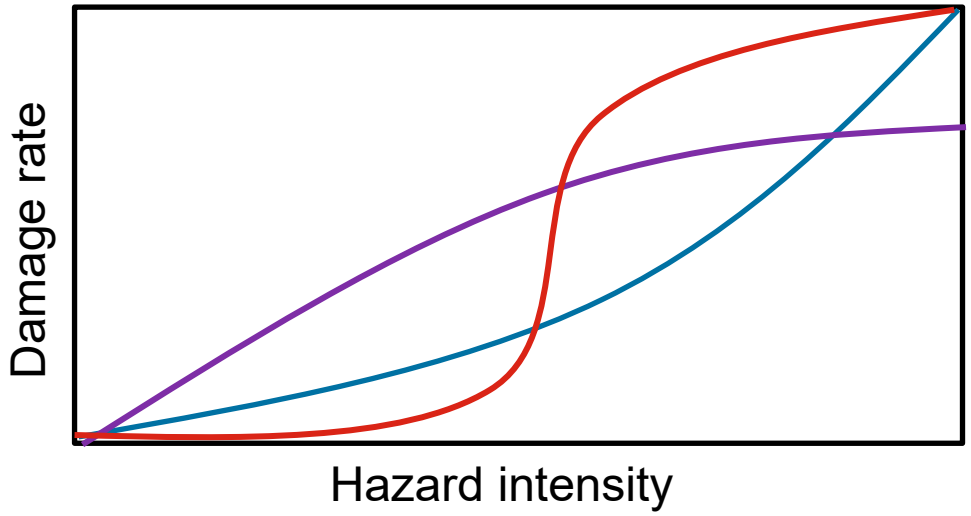
Hazard projections → Exposures → Vulnerability → Damages

Gridded GDP: projections of GDP in 2040 under SSP2 downscaled at grid level.



Geiger et al. (2017)

Drawing from the literature on damage functions.



Physical Risk Pilot: Philippines FSAP

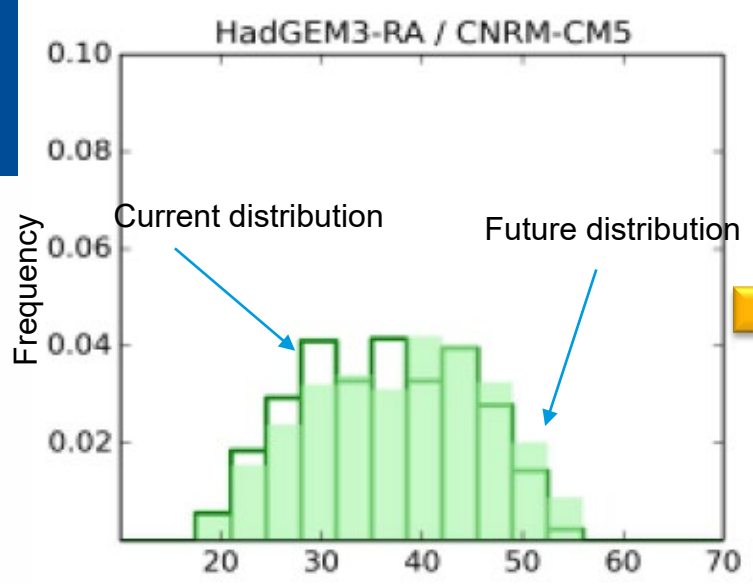
Macro approach to physical risk: Typhoon intensity and frequency in Hot house world scenario

CAT risk model: lost capital due to typhoons with various likelihood—once in 10-500 years

WB and PHL government: unique data of exposures and vulnerabilities

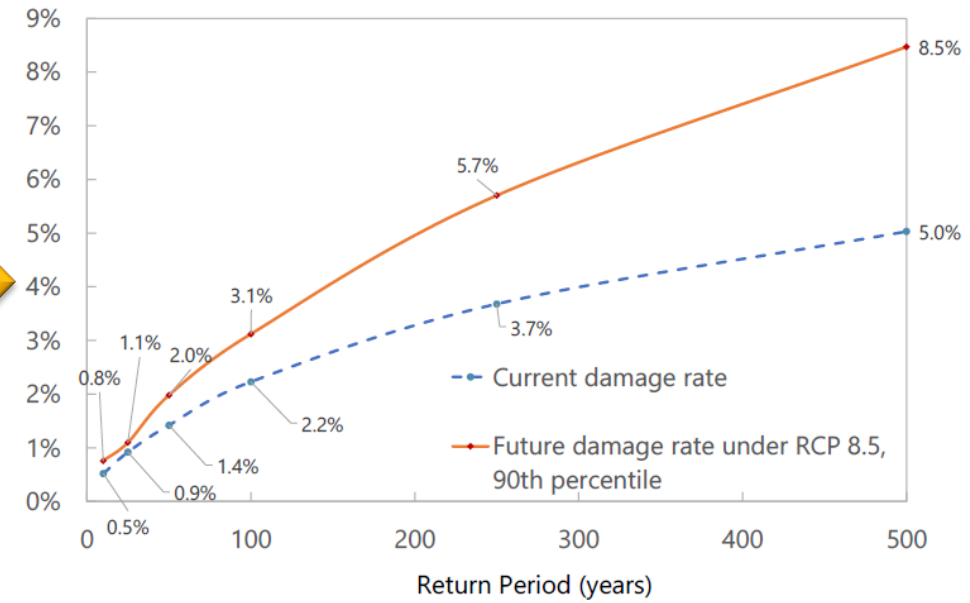
DSGE model calibrated for PHL (capital depreciation & productivity shocks): damage rate increase by 20-70 percent (depending on severity) due to climate change

Distribution of Windspeed Intensity



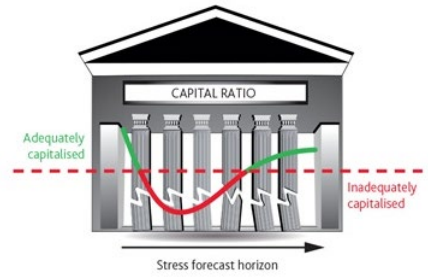
Physical Capital Damage Rate for the Philippines

(In percent)



Macro Scenarios

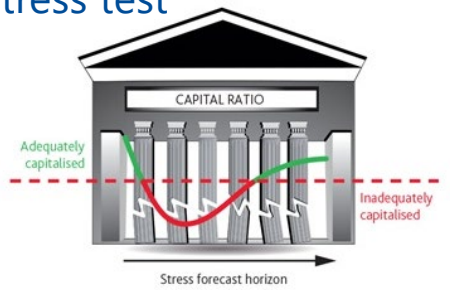
Bank Stress Test



Transition Risk Analysis

Transition Risk Analysis

Bank stress test



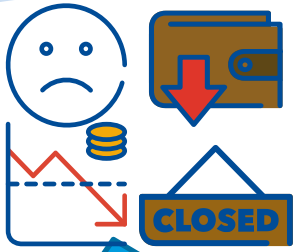
Macro scenario & Transition to clean energy

Carbon price increase

NGFS vs CGE

Macro approach

Impact on corporates' health



EMISSIONS DATA

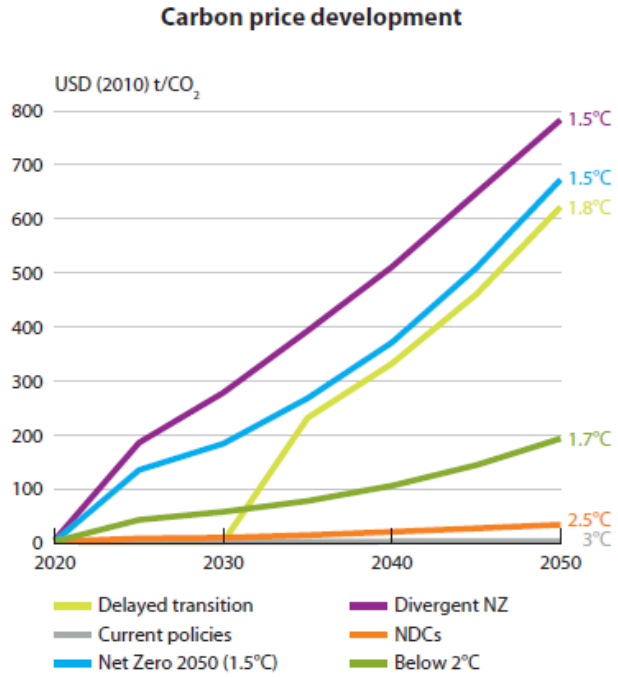
NGFS ^{0}C and emissions scenarios

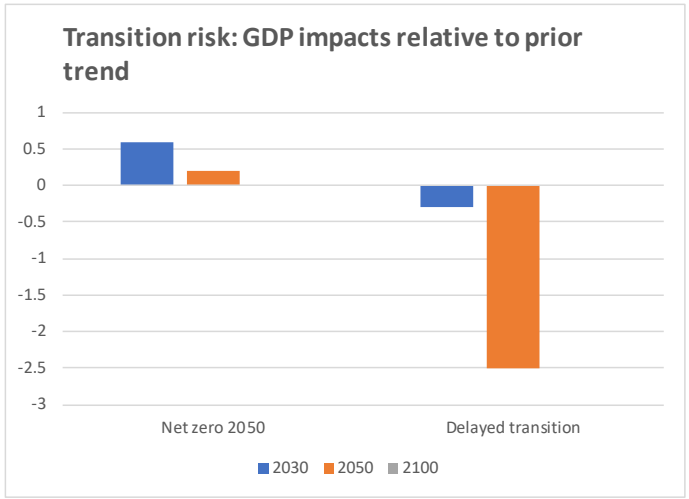
Micro approach

Scenario Design: Where do Carbon Tax Paths (And Other Variables) Come From?

NGFS

- Carbon taxes derived via Integrated Assessments Models for a given GDP





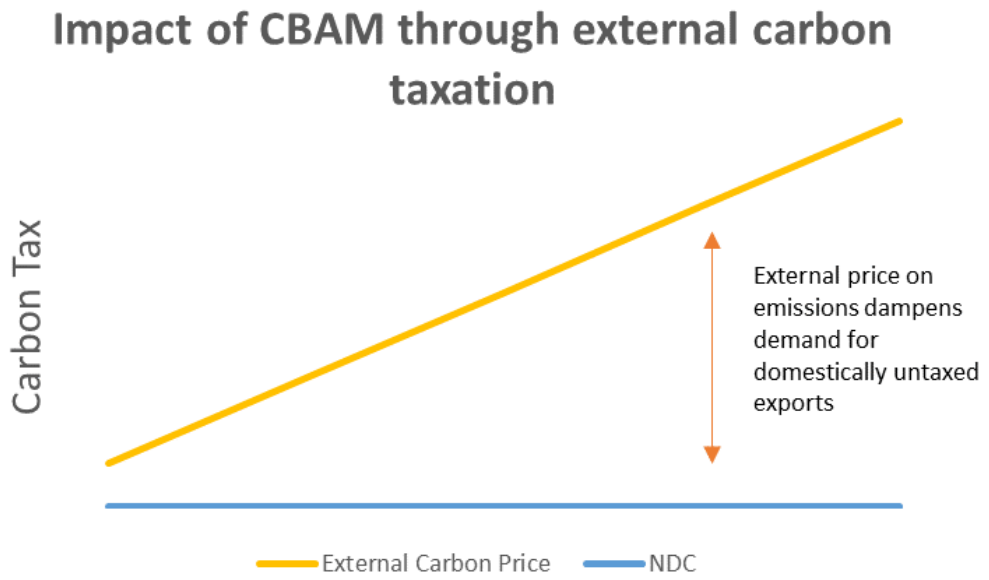
Source: IIASA NGFS Climate Scenarios Database, NiGEM based on REMIND. IAM data and damage estimates from Kalkuhl & Wenz (2020).

IMF

- Option 1: Carbon taxes and GDP taken from NGFS
- Option 2: Fully endogenous carbon taxes and GDP-derived using CGE model for a given NGFS ºC and emissions scenarios
  - Further sectoral analysis
  - Could result in different carbon taxes and (larger) GDP losses over the near term

Transition Risk Scenarios Design: EMs and External Carbon Taxes

- A structural micro simulation for firms and banks connected to a climate-macro CGE model



Global CGE model

Obtain carbon taxes, impacts on domestic economies and trade → split between tradeable vs. non-tradable

Firms

Impact on their exports vs. domestic sales

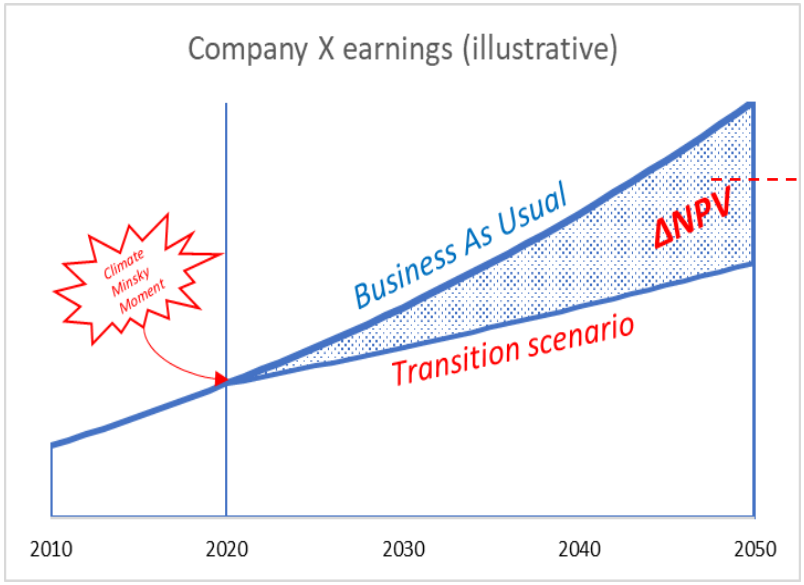
Output: PDs, LGDs, and credit spreads for all firms

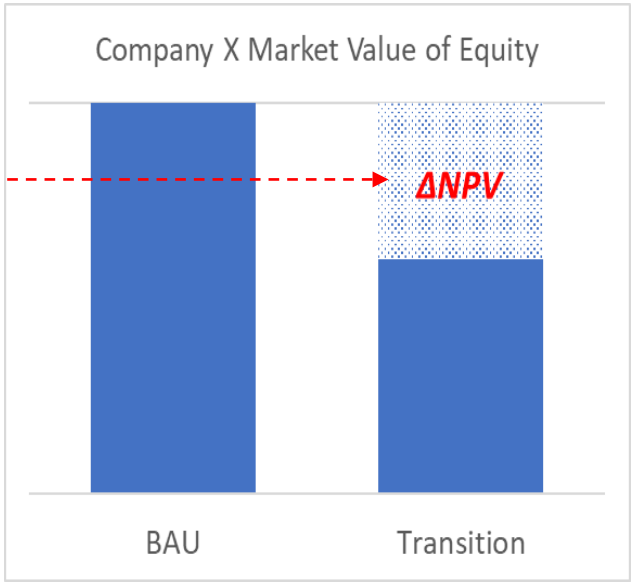
Banks

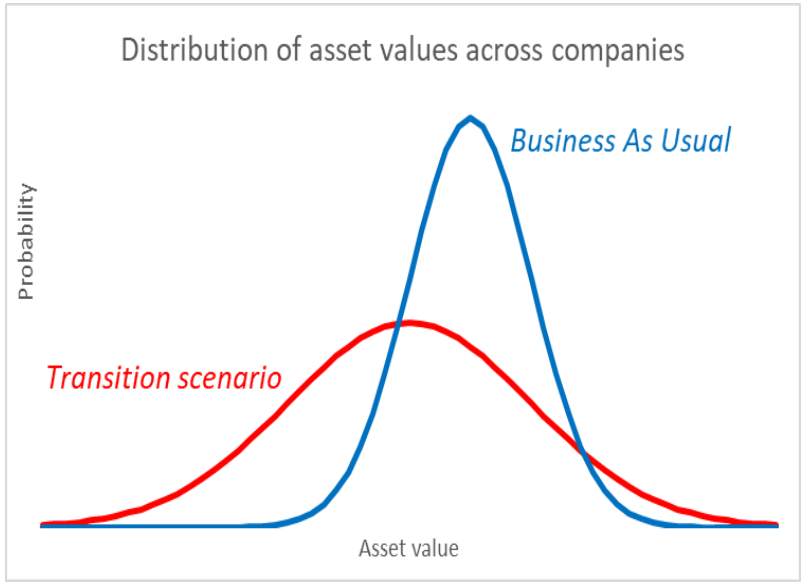
Impact from firms on banks

Climate Minsky Moment: UK FSAP

"A wholesale reassessment of prospects, as climate-related risks are re-evaluated, [that] could destabilize markets, spark a pro-cyclical crystallization of losses and lead to a persistent tightening of financial conditions" (Carney 2016: "Resolving the climate paradox")







What Else Has Been Done so Far in FSAPs

PHYSICAL RISK

Chile
Philippines
South Africa
UK
Mexico*
Ireland
Uruguay*

TRANSITION RISK

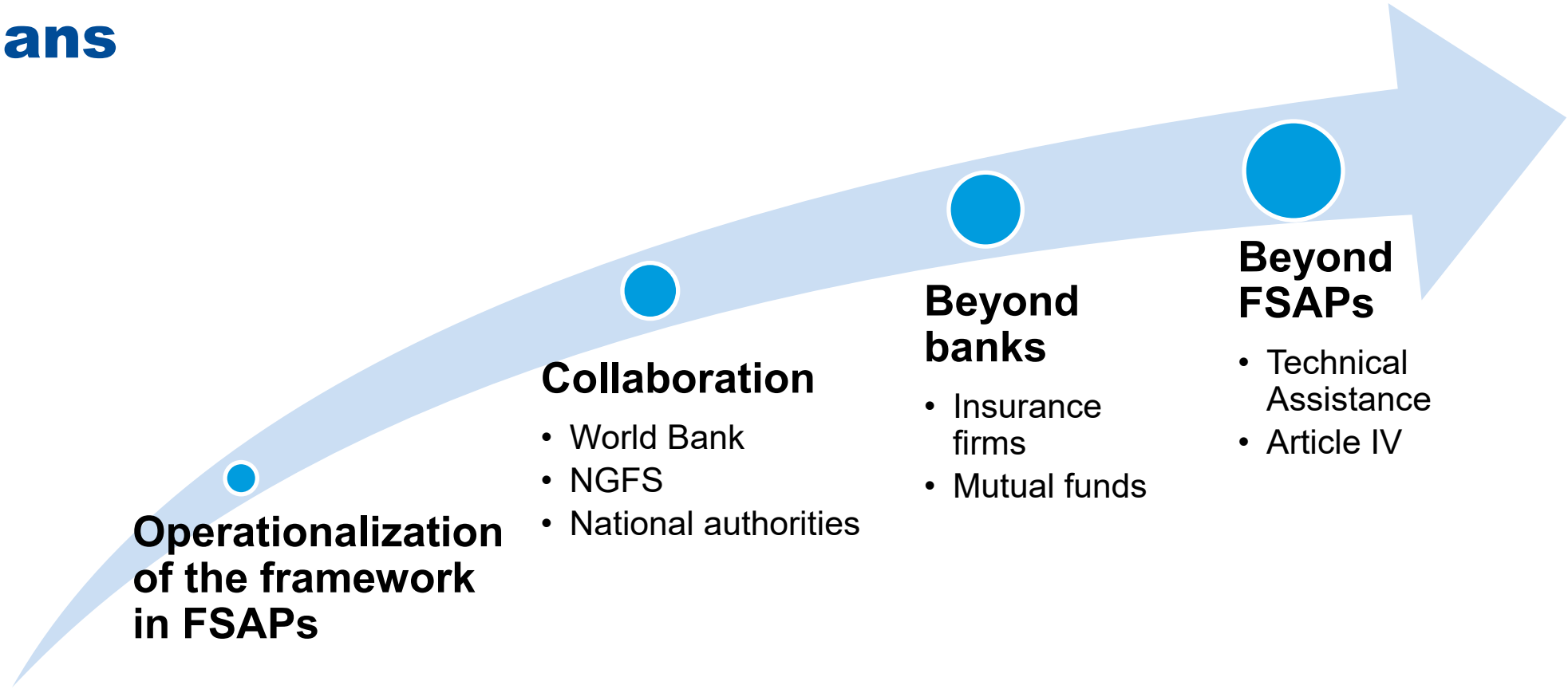
Norway
South Africa
UK
Colombia
Chile
Mexico*
Ireland

* Ongoing FSAPs

Climate Risk Analysis & Financial Policies

	Standard Stress Test	Climate risk Analysis
Horizon	• **Short-term horizon**	• **Short- and long-term horizon**
Disclosure	• **Extensive disclosure**	• **Limited disclosure**
Methodology	• **Significant experience over last 30 years** • **Standardized methodology—new challenges** • **Significant expertise available**	• **Very early days and limited experience** • **Methodologies under development; climate science challenging** • **Limited expertise available**
Use in supervision (qualitative findings)	• **Supervisory actions to improve banks' risk management, governance and controls**	• **Supervisory actions to flag potential areas to improve banks' risk management, governance and controls**
Use in supervision (quantitative findings)	• **Risk monitoring; inputs to supervisory planning; binding constraints and regulatory requirements**	• **Risk monitoring; inputs to supervisory planning; indicative data for supervisory dialogue**

Plans



Operationalization of the framework in FSAPs

- Finalize climate modelling techniques
- Apply framework in upcoming FSAPs
- Use and assess climate data

Collaboration

- World Bank
- NGFS
- National authorities

Beyond banks

- Insurance firms
- Mutual funds

Beyond FSAPs

- Technical Assistance
- Article IV