



Approaches to Climate Risk Analysis in FSAPs

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Objective of presentation

- To present the IMF Staff's current approach in FSAPs to assess the implications of climate change (focusing on physical risk) for the stability of banking systems.
- The Staff's approach is not a standard stress test and seeks to:
 - Illustrate potential pressure points for the financial system due to physical climate shocks and in the transition to a low-carbon economy
 - Raise awareness of the risk and adaptation needs in the financial sector

Transition risk

- Transition risk results from changes in climate policy, technological advances, and consumer and market sentiment during the adjustment to a lower carbon economy.
- The IMF staff's approach focuses on **carbon taxes**, both domestic and external, as the main source of transition risk.
- The adverse effects on the financial sector pertain to losses of carbon-intensive industries affected by the carbon tax as well as second-round effect of carbon taxes on the economy.

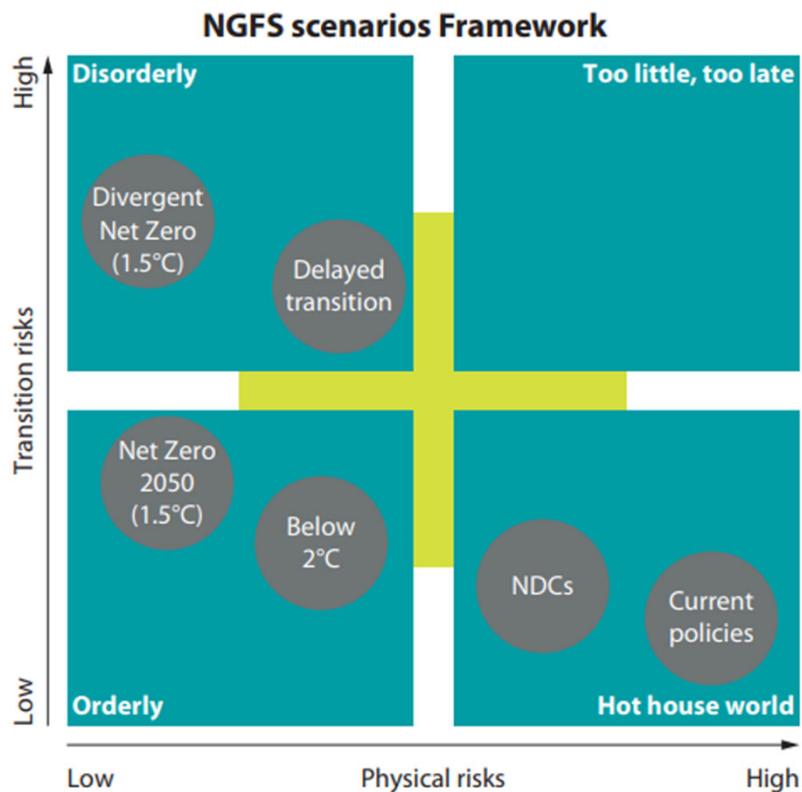


Physical risk

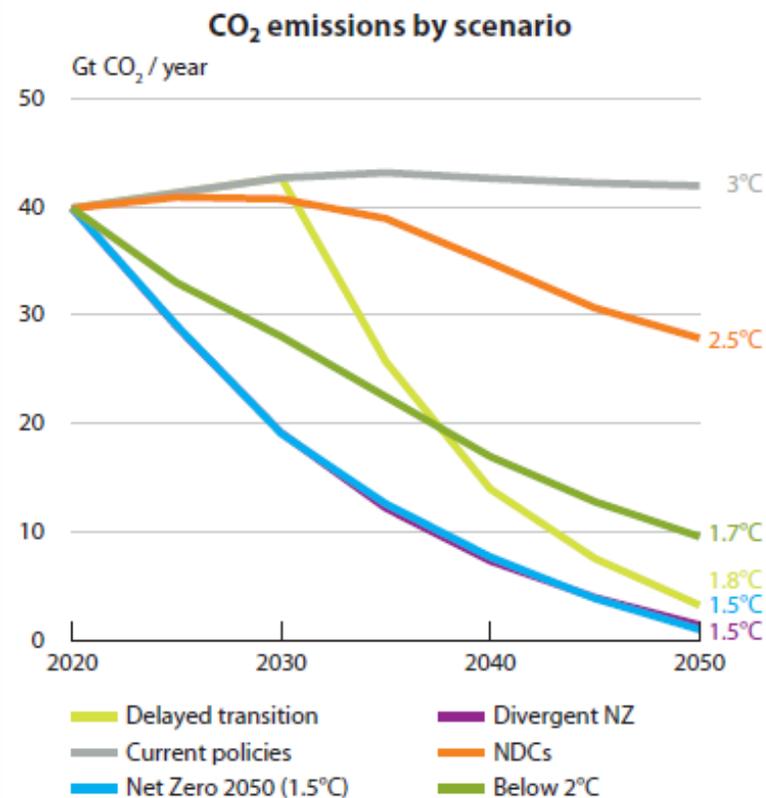
- Physical risk refers to the physical impact of climate change. These risks represent losses due to **increasing frequency and severity of climate-related events, also called “hazards.”**
- These include **acute** risks (such as storms, floods, heat waves) and so called “**chronic**” risks reflecting the effect of long-term changes in climate patterns, such as rising sea levels or changes to precipitation.
- The **losses** include adverse impacts on assets and resulting financial sector losses to the extent it is exposed to the affected assets, as well as negative effects on the economy due to second-round effects.



NGFS scenarios



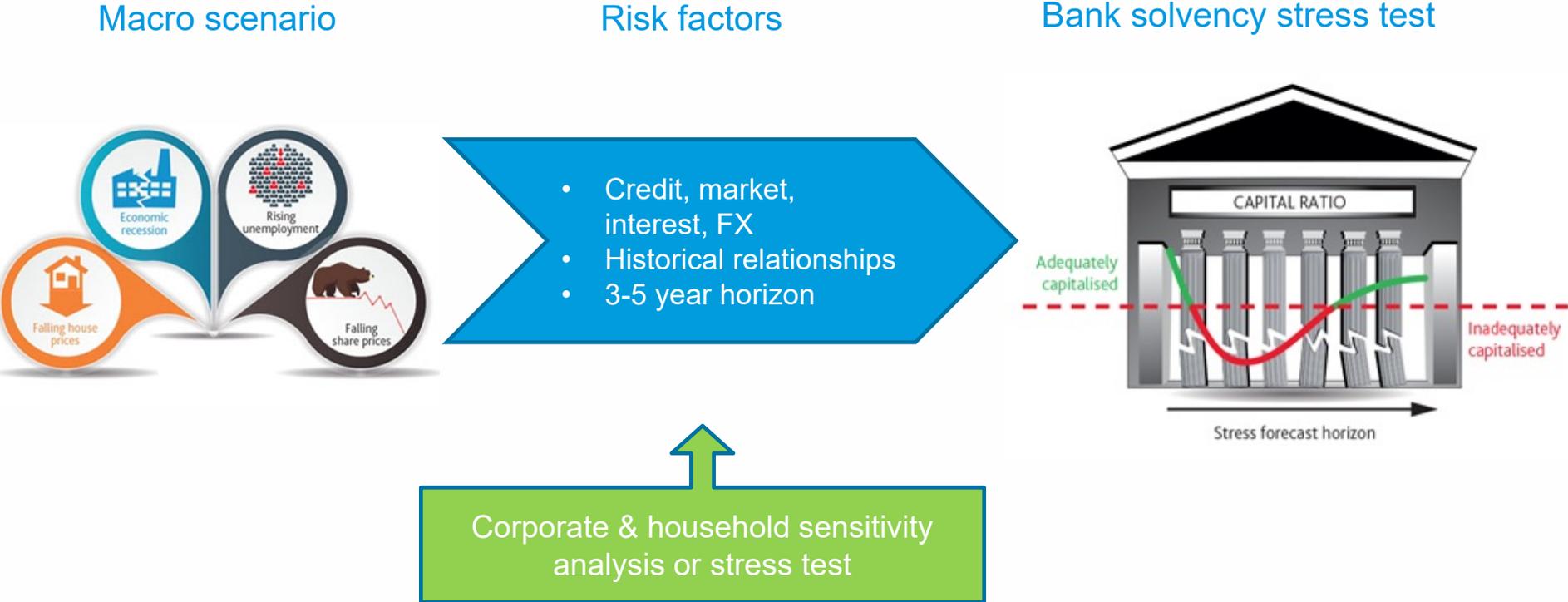
Positioning of scenarios is approximate, based on an assessment of physical and transition risks out to 2100.



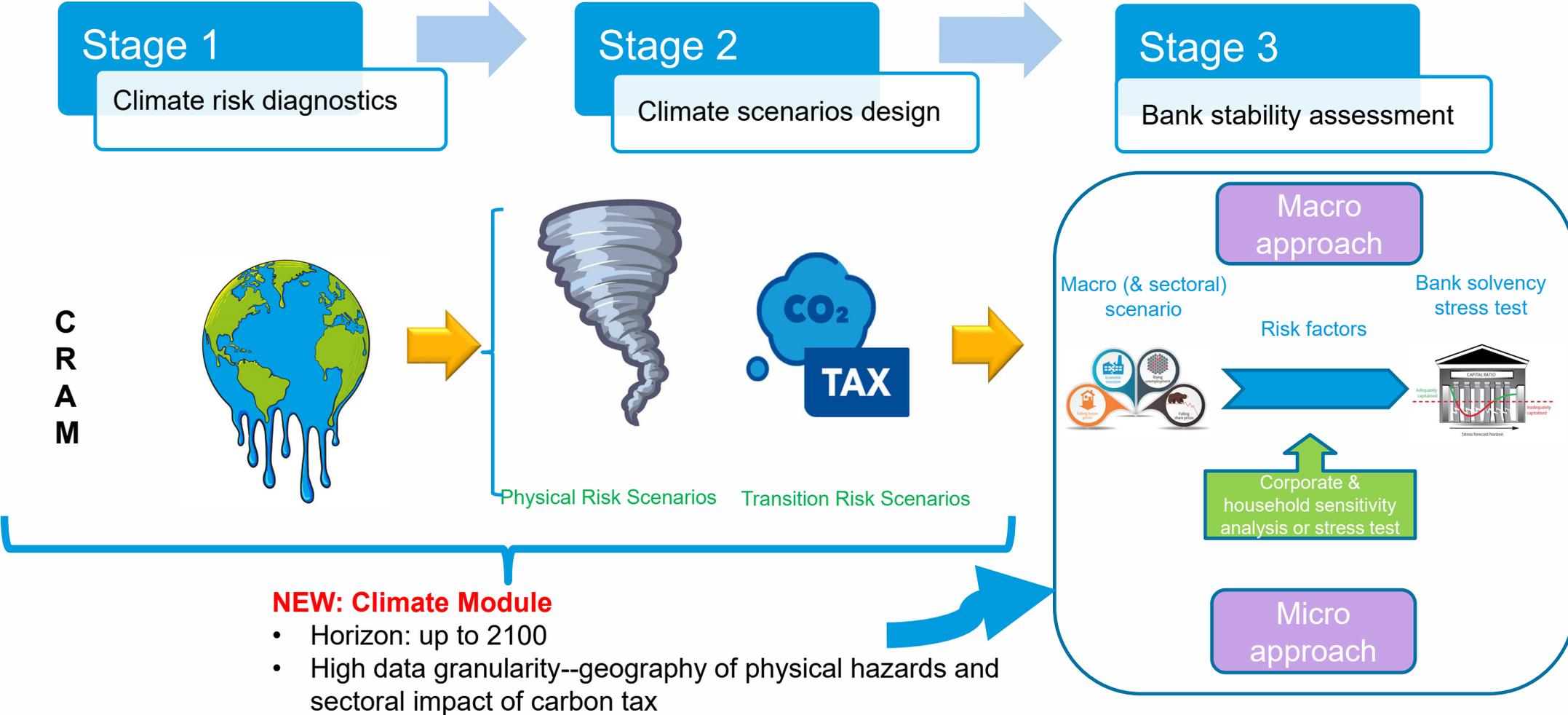
Source: IIASA NGFS Climate Scenarios Database, REMIND model. End of century warming outcomes shown.

Standard FSAP Risk Analysis—Scenario-Based Stress Testing of Financial Institutions

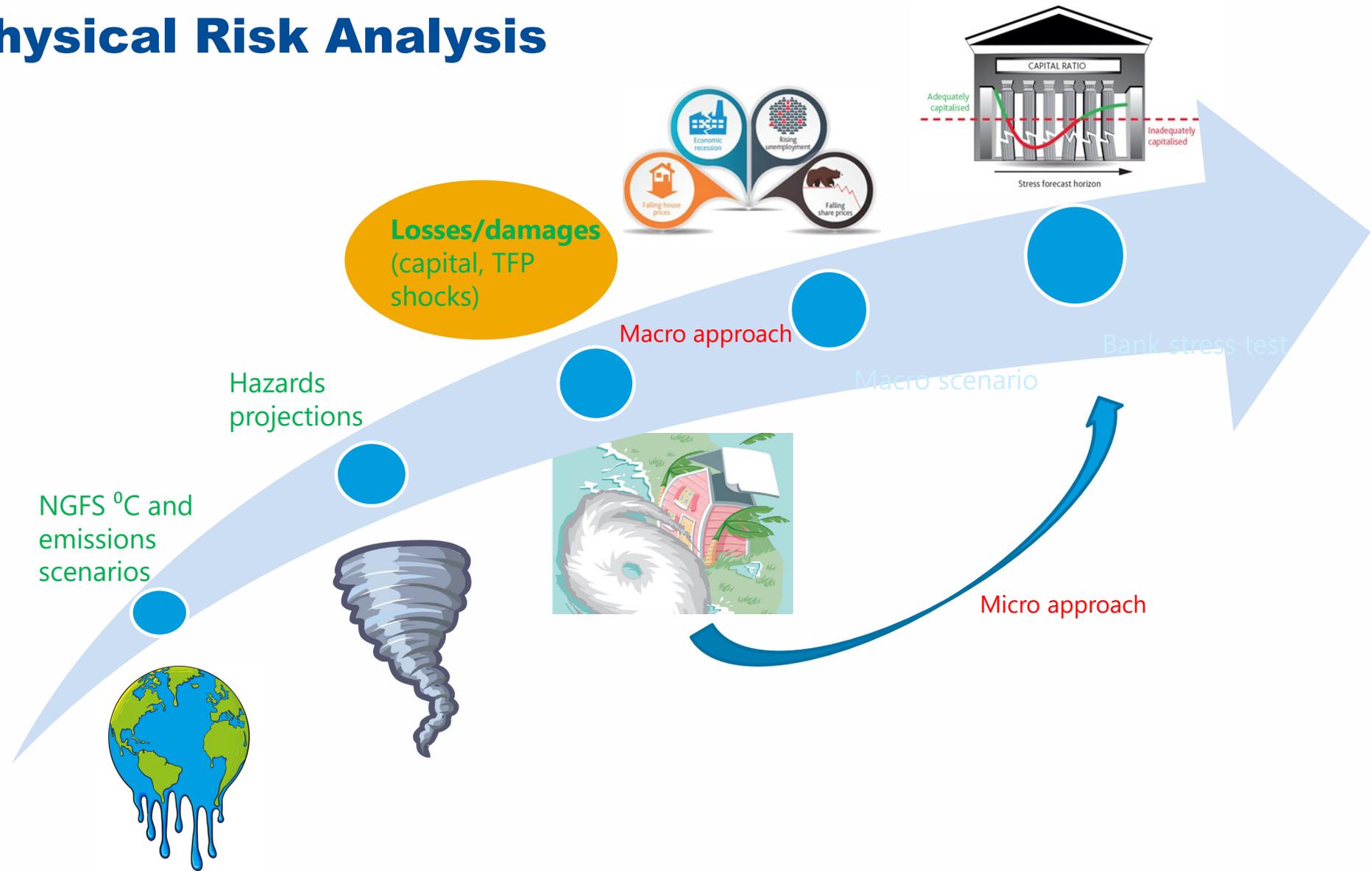
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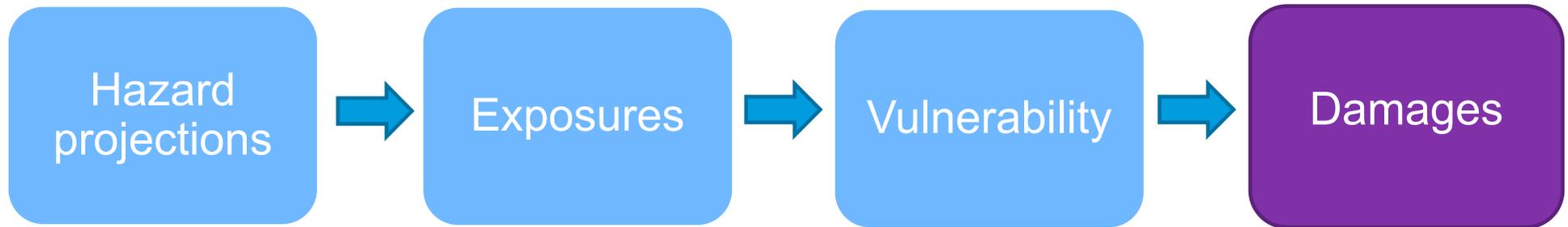
Adapting FSAP Risk Analysis to Incorporate Climate Risk



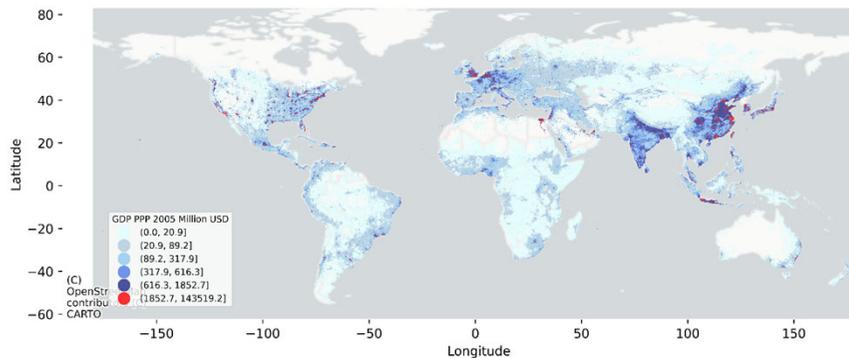
Physical Risk Analysis



Physical Risk Analysis: Estimating Damages

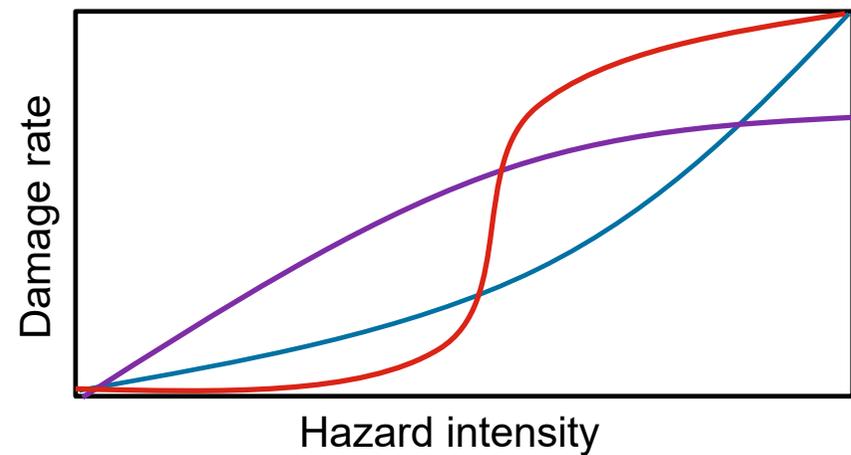


Gridded GDP: projections of GDP in 2040 under SSP2 downscaled at grid level.

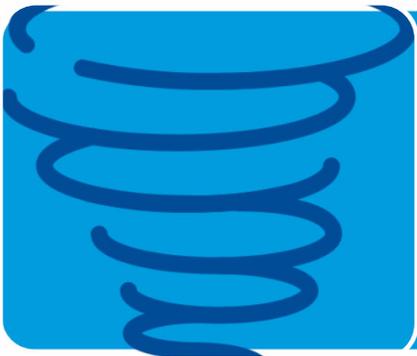


Source: Murakami D, Yoshida T and Yamagata Y (2021) "Gridded GDP Projections Compatible With the Five SSPs (Shared Socioeconomic Pathways)".

Drawing from the literature on damage functions.

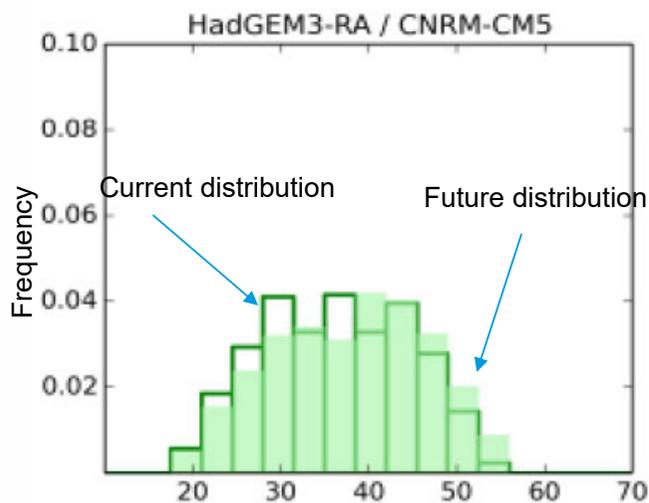


Philippines FSAP

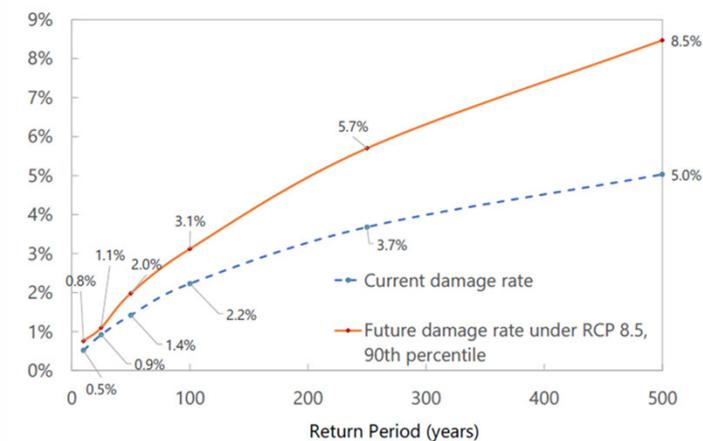


Macro approach to physical risk: Typhoon intensity and frequency in Hot house world scenario
 CAT risk model: lost capital due to typhoons with various likelihood—once in 10-500 years
 WB and PHL government: unique data of exposures and vulnerabilities
 DSGE model calibrated for PHL (capital depreciation & productivity shocks): damage rate increase by 20-70 percent (depending on severity) due to climate change

Distribution of Windspeed Intensity



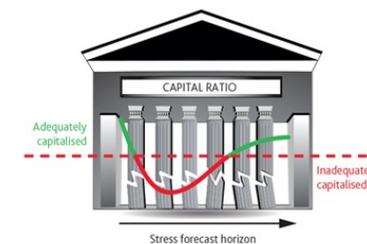
Physical Capital Damage Rate for the Philippines 2/ (In percent)



Macro Scenarios

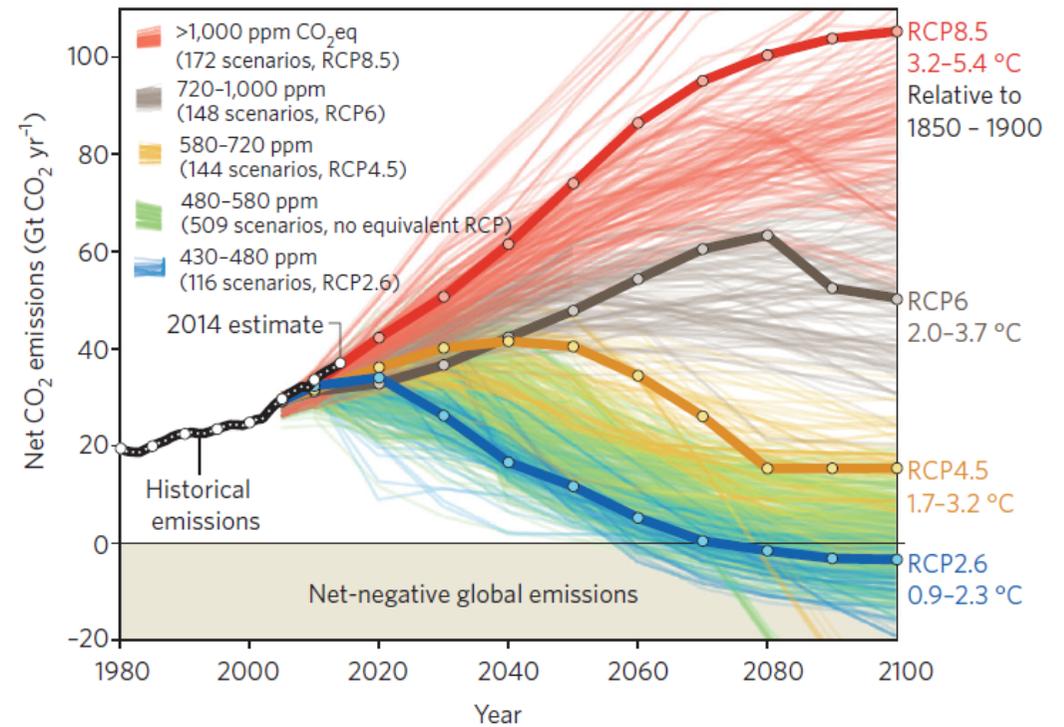


Bank Stress Test



Main Challenges

- **Long time horizon**
- **Uncertainty**
- **Modelling Complexity**
- **Data**



Climate risks in the countries you work with

Please go to www.menti.com and use code 41550251



Thank you!

Q&A



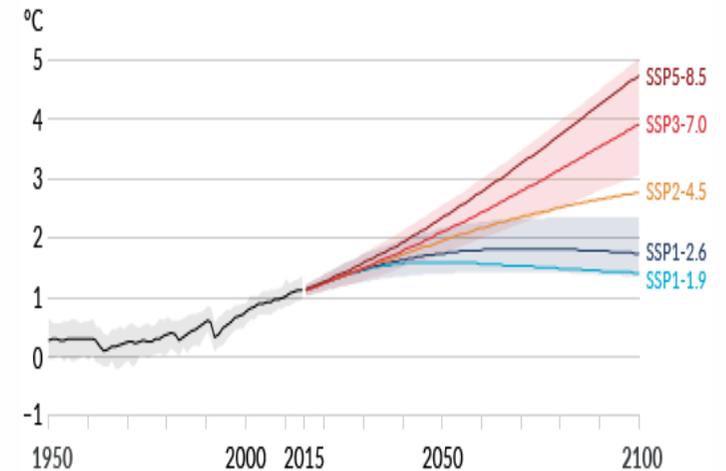
IPCC emissions and temperature scenarios

Commonly used reference scenarios for future paths of emissions and temperatures are those developed by the Intergovernmental Panel on Climate Change (IPCC).

Scenarios combine:

- Representative Concentration Pathways (**RCPs**) that describe paths for future levels of greenhouse gases
- and Shared Socioeconomic pathways (**SSPs**), which look at five different scenarios for how socioeconomic systems around the world might evolve in the absence of policy changes to mitigate climate change.

Figure: IPCC emissions and temperature scenarios



Source: IPCC, 2021 Summary for Policymakers.
1 Global surface temperature change; increase relative to the period



What central banks and supervisors are doing

NGFS Member Institutions Currently Conducting Climate Risk Analysis

CLIMATE SCENARIO DESIGN APPROACHES

		IMF	BoE	BoC	APRA	BdF	ECB	HKMA
Transition Risk	NGFS	■						
	CGE	■	■	■	■	■	■	■
	Other	■						
Physical Risk	NGFS	■						
	Other	■	NA	■				

BoE: Bank of England

BoC: Bank of Canada

APRA: Australian Prudential Regulation Authority

BdF: Banque de France

ECB: European Central Bank

HKMA: Hong Kong Monetary Authority

Asia and Pacific	Middle East and Central Asia	Europe	Africa	Western Hemisphere
Australian Prudential Regulation Authority	Bank Al-Maghrib	Autorité de contrôle prudentiel et de résolution (ACPR)/ Banque de France	South African Reserve Bank	Banco Central de Chile
Bangko Sentral ng Pilipinas		Banca d'Italia		Superintendencia Financiera de Colombia/Banco de la República
Bank of Korea		Banco de España		Banco de México
Hong Kong Monetary Authority		Bank of England		Bank of Canada
Japan Financial Services Agency/ Bank of Japan		Bundesbank		
Monetary Authority of Singapore		De Nederlandsche Bank		
People's Bank of China		European Banking Authority		
Reserve Bank of New Zealand		European Central Bank		
		Malta Financial Services Authority		
		Oesterreichische Nationalbank		
		Seðlabanki Íslands		
		Suomen Pankki		
		Sveriges Riksbank		
		Swiss National Bank / FINMA		

Source: NGFS (2021): Scenarios in Action, NGFS Technical Document, October 2021

What 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

References

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