Climate Risk Analysis in FSAPs

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Overview

Scenarios, data and models

Framework

Progress and future work
I. Overview

a) Understand **pressure points for the financial system** due to climate change and the transition to a low-carbon economy

b) Enhance **risk management** for the resilience of the financial system
Special characteristics

Medium-term and long-term horizon

Higher uncertainty

Sectoral and geographic diversity

New data and models

New types of risk: **Physical risk** and **Transition risk**
Transition risk
II. Scenarios, data, and models

Representative Concentration Pathways (RCPs)
- Emission and temperature paths
- Introduced by IPCC
- Adopted by NGFS
II. Scenarios, data, and models

Physical risk data

- Global temperature
- Sea level rise
- Hazards
  - Precipitation, Cyclones, Floods, Droughts, Wildfires, Heatwaves

Transition risk data

- Corporate specific emissions
  - Projections
  - Reduction targets
- Temperature alignment
- Renewables
- Energy mix
- Fossil fuel reserves
- Energy prices
II. Scenarios, data, and models

Macro-models with build-in climate risk components

- Econometric models
  - E.g. National Institute’s Global Econometric Model (NiGEM)

- Computable general equilibrium (CGE) models
  - E.g., Environmental Impact and Sustainability Applied General Equilibrium (ENVISAGE)

- Climate – DSGE models

- Integrated assessment models (IAM)
  - E.g., Integrated Model to Assess the Global Environment (IMAGE)

Other types of models

- **Satellite-models** to estimate impact of climate risk on exposure level and gauge the effects on assets
III. Framework

Stage 1
- Climate risk diagnostics

Stage 2
- Climate scenarios design

Stage 3
- Economic scenarios design

Stage 4
- Financial stability assessment
I. World climate risk HeatMaps development

II. Identification of country specific climate related risks and vulnerabilities
Country-specific simulation aligned with NGFS scenarios

**Physical risk:** Extreme weather events and sea-level rise

**Transition risk:** Carbon prices, GHG emissions, and renewables

**Sudden transitions (“Minsky moment”):** Shocks to carbon prices, technological breakthroughs, and change in market expectations
From climate to the economy

Physical
- Damages
- Country temperatures

Transition
- Carbon taxation
- Energy prices
- Technological change

Macroeconomy
- GDP growth
- Infrastructure/human capital
- Productivity

Capital markets
- Equity prices
- Energy derivatives

Sectoral
- Profitability
- Default frequency
III. Framework

Micro-approach
- Exposure-level data
- Corporate & household level PD and LGD estimation
- Direct impact of climate risk on banking assets

Macro-approach
- Aggregate data
- Climate scenarios → economic scenarios
- Indirect impact of climate risk on banking system through the economic scenario
Challenges

General
- Long-term horizon
- Forecasts are not derived by historical data

Climate scenarios modelling
- Methodological complexity

Economic scenarios modelling
- Climate to economy linkage
- Sector and geographical specific focus
- Social and technological change

Data gaps
- High sectoral and geographical granularity is required
What has been done so far...

Bahamas
Philippines

Norway
Future steps

Operationalization of the framework
- World Bank
- NGFS
- National authorities

Collaboration
- Insurance firms
- Mutual funds

Beyond banks

Beyond FSAP
- TA
- Article IV