

# Climate finance needs adequate risk assessment.

**Prof. Stefano Battiston**

Univ. of Zurich, Dept. of Banking and Finance

Univ. of Venice, Dept. of Economics

IPCC Lead Author, AR6 WGIII

CLIMATE FINANCE WORKSHOP

Leveraging Climate Finance to Achieve Agenda 2030: a Focus on SDG 13

Neaples, October 7, 2024

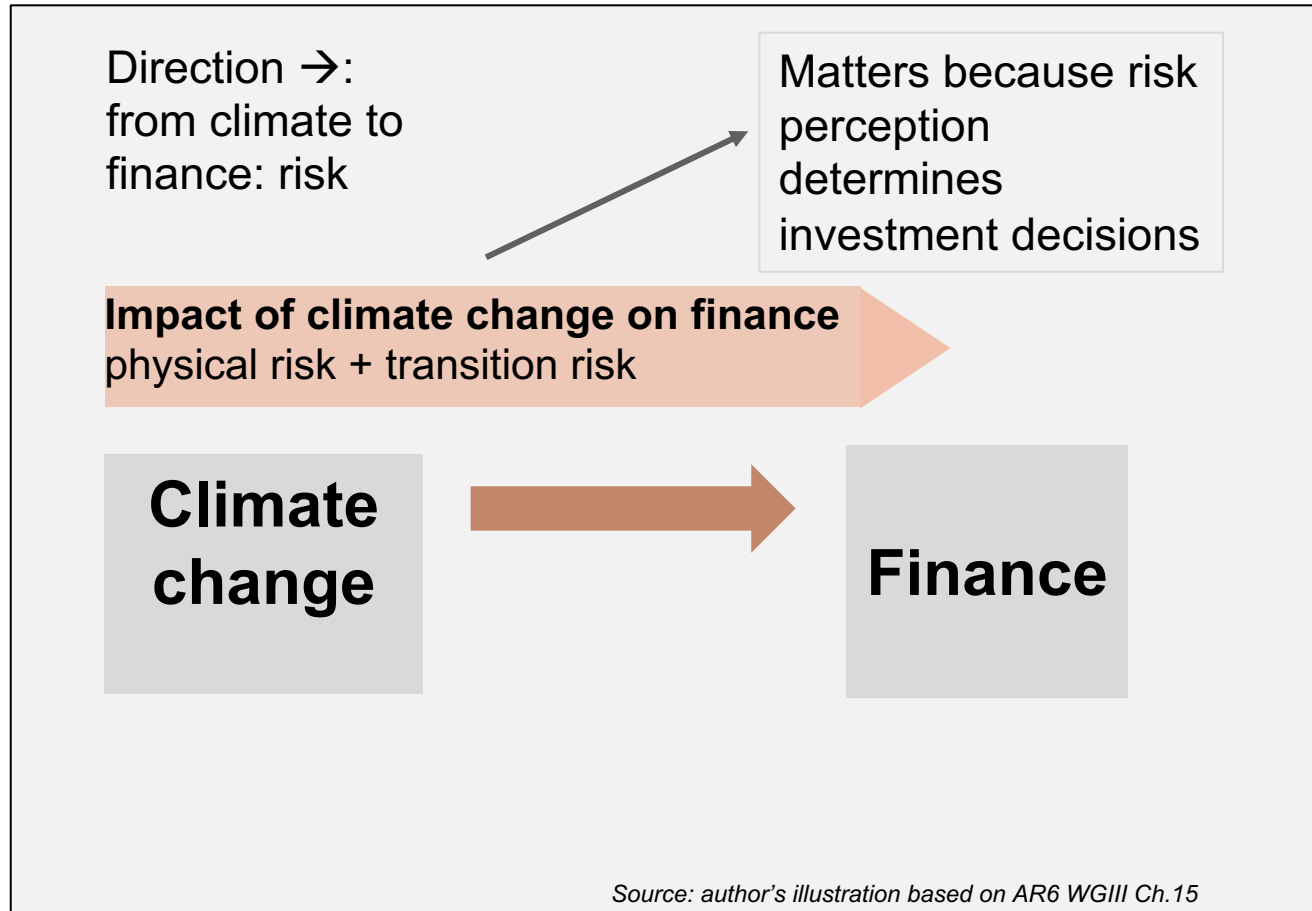
# Outline

---

- 2030 Agenda: meeting investment needs requires “adequate” risk assessment
- “Adequate” risk assessment: forward-looking, science-based, derived from climate scenarios.
- Climate stress testing need to be based on forward-looking scenarios. In presence of market failures, market-based risk indicators are not well-suited to inform risk management policies.
- Climate stress-test: key tool to support investment decisions in public and private finance.

# **1) Meeting investment needs of 2030 Agenda requires “adequate” risk assessment**

# Why climate matters for finance: climate-related financial risks



## Climate-financial risk

### Physical risk:

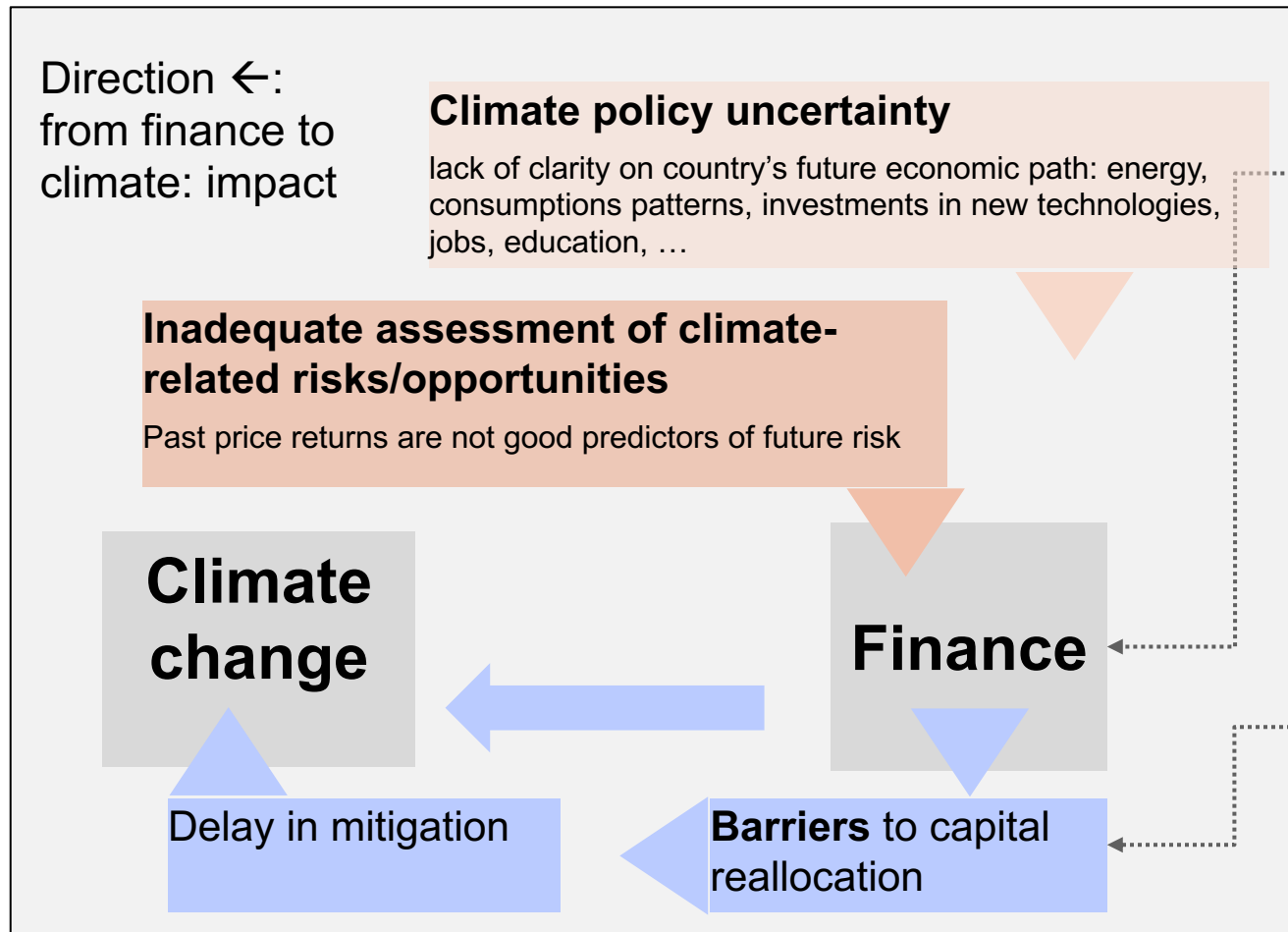
- **Direct:** increased frequency/magnitude of climate-related hazards and chronic impacts → losses on physical assets and human lives
- **Indirect:** reduced food and water security → increased risk of conflicts → decreased value of land and businesses in affected areas

### Transition risk:

- **Orderly** transition is ideal scenario.
- **Disorderly** transition: complexity of policy process implies possibility of late and sudden transition with unanticipated effects on prices and financial stability.
- The purpose of assessing transition risk is to avoid its materiality.

*Source: Kreibiehl et al. Investment and Finance, Ch15 in IPCC AR6 WGIII*

# Why finance matters for climate: climate investments



Source: author's illustration based on AR6 WGIII Ch.15

## Impact of financial investments

- Firms make investment (CAPEX) decisions in high/low carbon equipment (e.g. wind vs coal power plants)
- Financial actors influence these decisions by making capital more/less expensive for firms

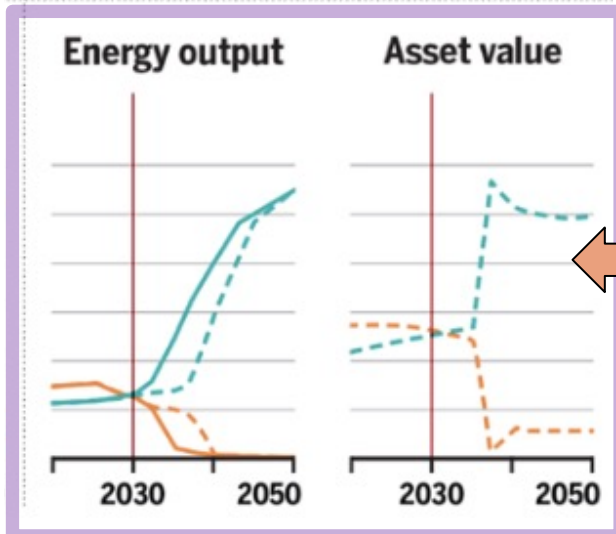
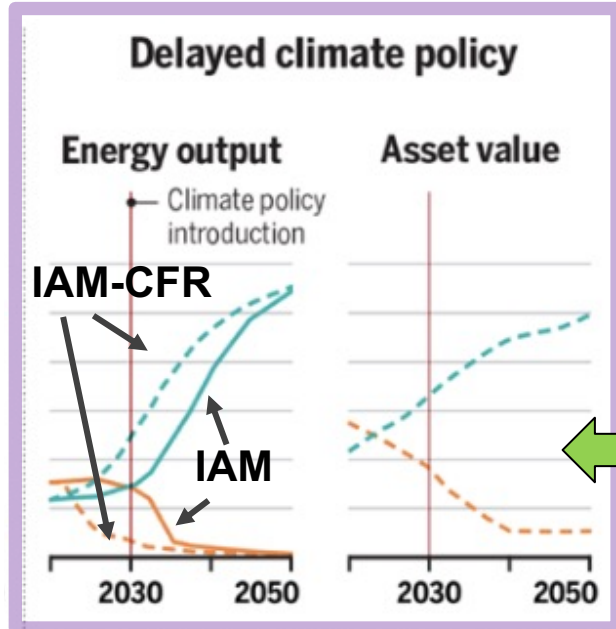
## Barriers to mitigation

- Inadequate assessment of climate-related risks/opportunities
- When adequate, unattractive risk-return profiles because of national/regional conditions
- Weak regulatory environments, limited standardization (disclosure), lack of track record

Most barriers relate to **uncertainty** on decarbonization plans and transition risks for the private sector.

Source: Kreibiehl et al. Investment and Finance, Ch15 in IPCC AR6 WGIII

# Investors' expectations: enabling or hampering?



Science

> SCIENCE > VOL. 372, NO. 6545 >

Accounting for finance is key for climate mitigation pathways

STEFANO BATTISTON, IRENE MONASTEROLO, KEYWAN RIAHI, AND BAS J. VAN RUIJVEN

**Enabling role of finance:** investors' perception: high physical risk, **credible climate policies**, high transition risk (but opportunities from successful transition)

→ They reallocate capital into low-carbon investments early and gradually and anticipate policy impact

**Hampering role of finance:** investors' perception: low physical risk, **climate policies not credible**, high-carbon firms as risk low-carbon.

→ Capital reallocation insufficient to fund investments required for 2C scenario. Transition either failed or more costly for society due to abrupt reallocations of capital and price adjustments.

Low-risk perception makes scenario unfeasible (self-defeating prophecy)

Legend

Trajectories from IAM scenarios

Renewable energy

Coal

Trajectories from IAM-CFR framework

Renewable energy

Coal

IAM: Integrate Assessment Model

CFR: Climate Financial Risk

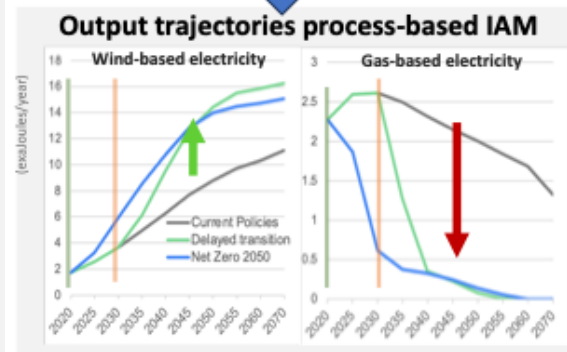
---

**2) “Adequate” risk assessment:  
forward-looking, science-based,  
contingent to climate scenarios.**

# Forward-looking climate stress testing

## Adequate risk assessment:

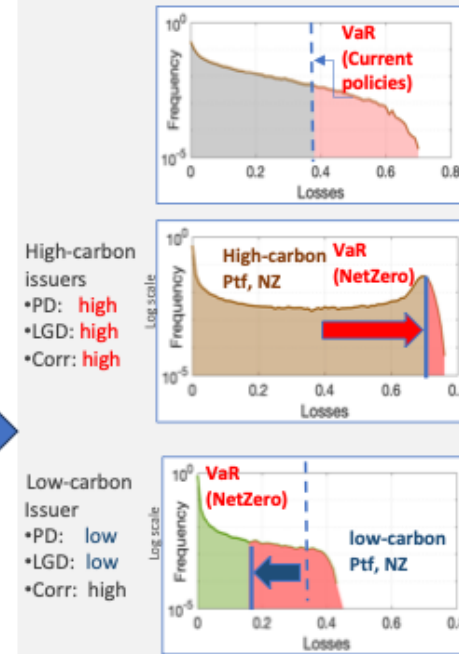
- Forward-looking scenarios based on science and policy development
- Fundamental of firms
- Changes in **investors' expectations over future production trajectories** can translate in differences in future credit risk, depending on the technological profile of the firm
- Narrative and models: Battiston ea. Science 2021; 2023 ssrn (Climacred); Bressan ea. 2024 Nature Comm.
- Policy applications: Battiston FSR BdF 2019; EIOPA Fin. Stab. Rep. 2019; FINMA Annual Report 2021; Roncoroni 2021 JFS; NGFS STS 2025



## Climate-related financial data:

- Firms characteristics:
- emissions/tech
- Portfolios: holdings

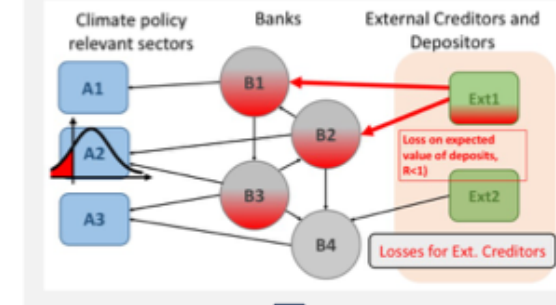
## Climate Credit Risk model: correlated defaults under NGFS



## Climate financial risk Models

Adjustments to future cashflows  
Adjustments to equity/bond valuation  
Adjustment to risk measures for financial portfolios

## Financial network effects



- Climate scenarios (physical, transition risk)
- Estimates of sectors' production by energy technology, cash-flow streams of securities
- Scenario-contingent valuation adjustment of issuers' default probability, bond spread, credit risk etc. based on firms' exposure (asset-level) to climate risks
- Adjustment in financial risk measures (e.g. VaR) considering network effects

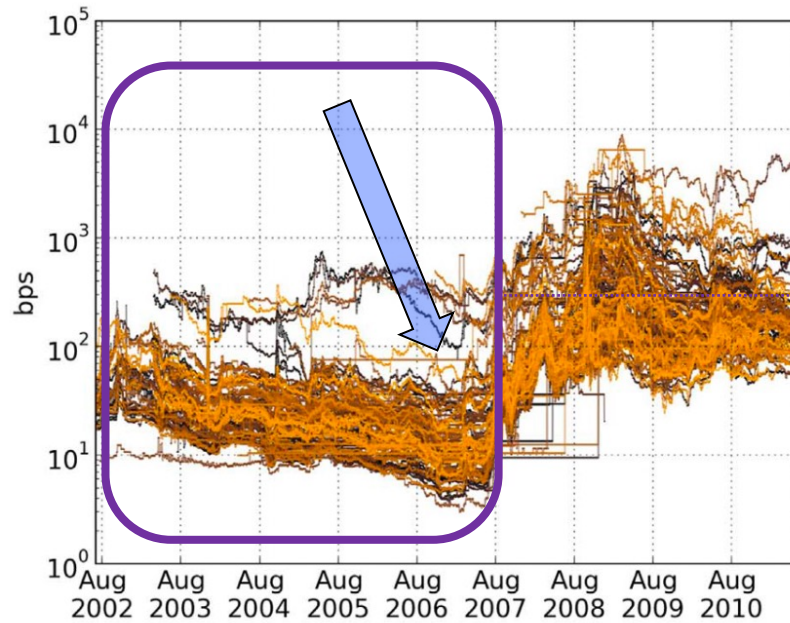


---

**3) In presence of market failures, market-based risk indicators are not well-suited to inform risk management policies.**

# Markets are always right. Until they are wrong

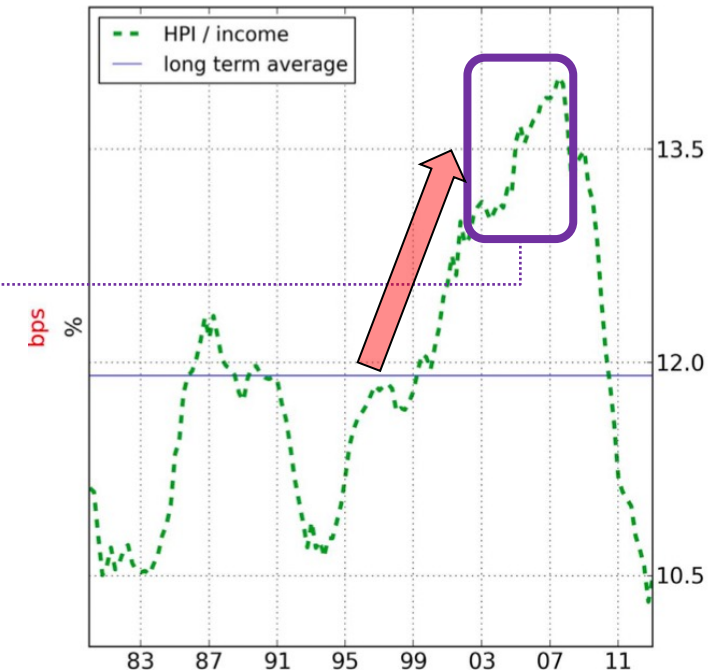
- In presence of market failures, market-based risk indicators are not well-suited to inform risk management policies.
- In 2007, market-based indicators of risk forecasted lowest risk ever in the financial system, even on a 5 years time horizon.
- Financial supervisors responsible for financial stability need to look at indicators based on fundamentals and macro-trends



*Puliga, Battiston, Caldarelli 2014, Credit Default Swaps networks and systemic risk, Sci. Reports*

Spread of a Credit Default Swap (CDS): reflects perceived probability of default of underlying entity.  
5-years CDS spreads of top 170+ global financial institutions in 2002 2011:

- Historical minimum in early 2007.
- However, during 2000-2007, fundamentals were changing and risk was building at macro-level, as shown e.g. by House Price Index (HPI) deviation from long term.



---

## **4) Climate stress-tests: key tool to support investment decisions in public and private finance.**

# Example: EU Project “ESG UPTAKE”

- **Project goal:** To strengthen capacity of EU Member States National Competent Authorities (NCA) to address climate and ESG risks in the financial sector.
- **How:** by providing operative workflow, based on science and policy development
- **Funder:** EU Commission DG REFORM

## Consortium

- Ca' Foscari University of Venice (UNIVE)
- Leibniz Institute for Financial Research (SAFE)
- Vienna Univ. of Economics and Business (WU)
- European Commission (JRC)



- Develop a science-based supervisory **approach** to **ESG risks management** enabling NCAs to perform analyses of materialization of specific ESG risks
- Develop workflow to conduct ESG risks (**stress-test**) on stability of concerned financial (sub)sectors.
  - Banking: Basel III + EBA guidelines (on ESG and climate risks)
  - Insurance: Solvency II + EIOPA guidelines (e.g. on climate risks)

# Example: NGFS Short term scenarios 2025



Climafin leads a consortium that is developing the new vintage of short-term scenarios aimed for financial institutions to assess physical risk and transition risk

New vintage of scenarios to be released by early 2025

Network for Greening the Financial System  
Technical document

## Conceptual note on short-term climate scenarios

October 2023

Central ideas in climate-related financial risk (Battiston et al. 2021; 2023) :

- approach of forward-looking risk assessment
- role of investors' expectations and policy credibility
- scenario-contingent valuation of firms

