

# From **research** to **practice**:

## How can financial institutions assess **climate transition risk**?

**Moderator:** Irene Monasterolo (WU Wien)

**Speakers:** Keywan Riahi (IIASA), Stefano Battiston (UZH), Petr Jakubik (EIOPA), Lucia Alessi (EC JRC)

# Issues at stake: climate risks and financial stability

1. Achieving the **Paris Agreement** climate targets requires to **align investments** to sustainability (scaling up green/divesting from brown)
2. **But market reaction is not enough:** investors are highly exposed to carbon-intensive assets (Battiston ea. 2017), potential mispricing of risk in the market
3. **Policies** advocated to signal the market, but countries delay their introduction
4. In this context, a disorderly low-carbon transition could drive new sources of risk for financial stability: **climate Minsky Moments** (Carney ea. 2019)
5. **Main gap:** lack of operational, transparent metrics and methods to price forward-looking climate risks in investors' portfolios
6. **A transparent assessment of climate-financial risk is** crucial to support investors' decisions and financial supervisors to preserve financial stability.

# Growing awareness of climate-related financial risks by central banks and supervisors

Mark Carney tells global banks they cannot ignore climate change dangers

Financial sector warned it risks losses from extreme weather and its stakes in polluting firms



Network for Greening the Financial System  
First comprehensive report

**A call for action**  
Climate change  
as a source of financial risk

April 2019



IMF Will Include Climate in Country Analysis, Georgieva Says  
[bloomberg.com](https://www.bloomberg.com)

11:58 AM · Oct 17, 2019 · [Twitter Web App](#)

IMF Managing Director K. Georgieva at 2019 annual meeting: IMF is gearing up to integrate climate risks in surveillance duty, including **climate stress-tests**, **climate risk pricing**

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Climate Changed

**ECB Says Mispricing Climate Change May Hurt Financial Stability**

By [Piotr Skolimowski](#)

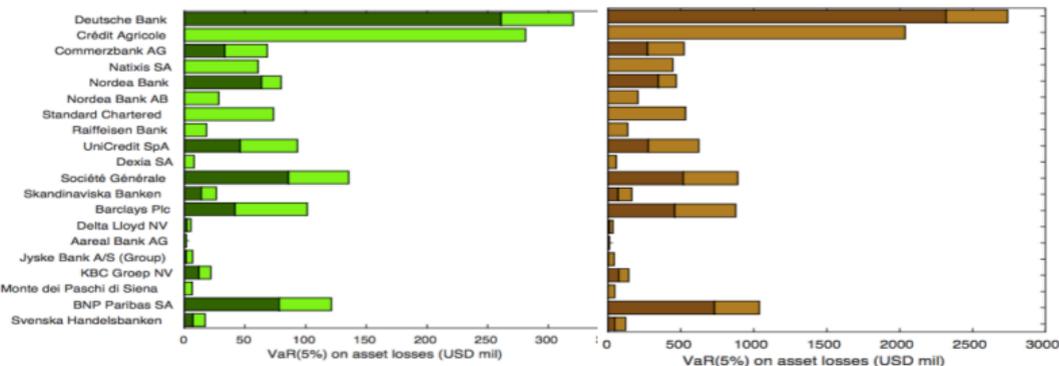
29 May 2019, 01:00 GMT-7

# Should supervisors worry? Yes, look at the Climate Stress-test

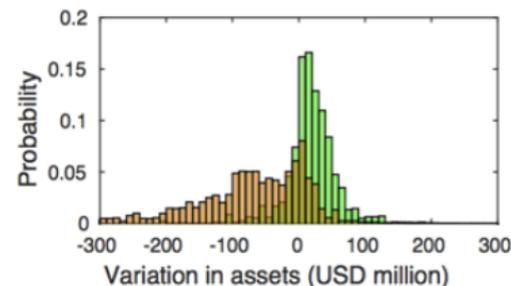
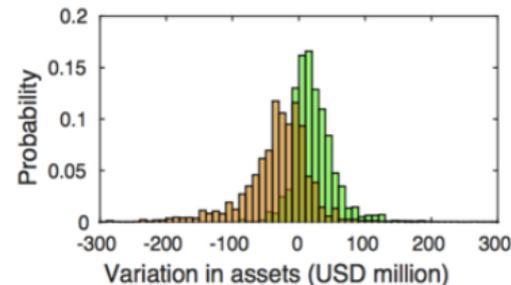
## A climate stress-test of the financial system

Stefano Battiston<sup>1\*</sup>, Antoine Mandel<sup>2</sup>, Irene Monasterolo<sup>3</sup>, Franziska Schütze<sup>4</sup> and Gabriele Visentin<sup>1</sup>

**1<sup>st</sup> round (top):** brown bank incurs more losses.  
**Adding 2<sup>nd</sup> round (bottom)** polarizes distribution of losses.



**Value at Risk (5% significance) on equity holdings of 20 most affected EU banks under scenario of green (brown) investment strategy. Dark/light colors: first/second round losses.**



# Why is it challenging for supervisors?

## Characteristics of climate and financial risks

1. **Deep uncertainty and non-linearity of climate-related impacts:** past events are not a good proxy of future shocks, and events not normally distributed -> need to consider tail risk and complexity (Weitzman 2009, Ackerman 2017)
2. **Endogeneity of risk:** transition depends on governments' policies and firms' investments. But both decisions depend on their risk perception:
  - **Risks differ across the possible transition scenarios.** But occurrence of scenarios depends on the perception of risks (Battiston ea. 2017)
3. **Financial interconnectedness** and complexity drive financial risk (Battiston ea. 2016)
4. What risks are you considering? **ESG** different from **climate** risk

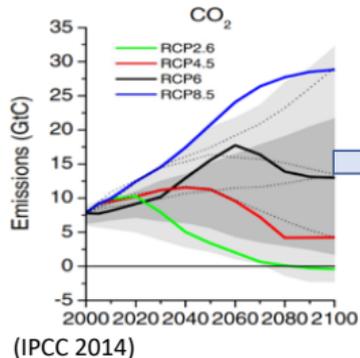
*Battiston S, Monasterolo I. 2019. A climate risk assessment of sovereign bonds' portfolios. In collaboration with the Austrian National Bank (OeNB) working paper available at [SSRN #3376218](#)*

# Research developments to inform climate finance decision making under uncertainty

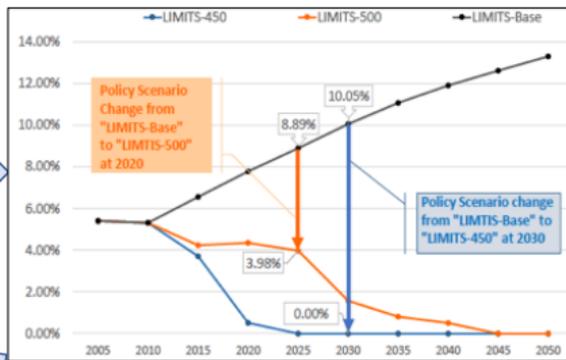
- Research has introduced operational metrics (**Climate VaR**, **Climate Spread**) and methods (**Climate Stress-test**) to assess investors' exposure to **forward-looking climate transition risks**:
  - **Interdisciplinary**: collaboration between researchers in financial risk (UZH, WU, PSE), climate-economics (IIASA)
  - **Policy-relevant**: collaboration with EU institutions (JRC), financial supervisors (OeNB, Banco de Mexico, ECB, EIOPA)
- It allows to **bridge traditional** economic and financial risk **models and supervisory tools** with climate **uncertainty** and **endogeneity**
  - **Combines forward-looking climate** scenarios based on climate models used by IPCC with climate financial risk metrics (**Climate VaR**) and financial network models (**DebtRank**) used by scholars and practitioners.

# A climate finance risk assessment framework under uncertainty

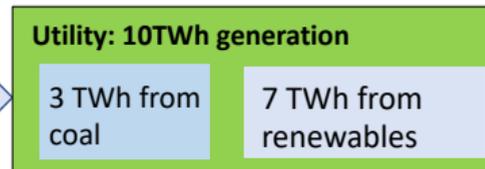
## M1: CLIMATE SCENARIOS (EMISSIONS TARGETS)



## M2: SHOCKS ON SECTORS' FORWARD-LOOKING TRAJECTORIES (market shares, GVA)

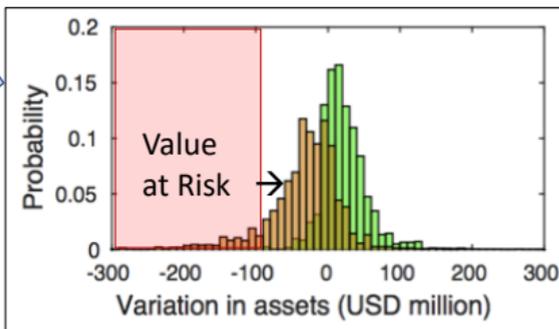


## M3: SHOCK ON FIRM'S CASH FLOWS AND FISCAL REVENUES



FEEDBACK ON ECONOMIC STRUCTURE

## M4: CLIMATE VAR AND CLIMATE STRESS TEST CONDITIONED TO CLIMATE SCENARIOS



## M3: SHOCKS ON PD AND PRICE OF FINANCIAL CONTRACTS

Country	WITCH: bond shock (%)	WITCH: yield shock (%)
Austria	1,3	-0,16
Australia	-17,36	2,45
Canada	-5,21	0,67
Norway	-14,82	2,05
Poland	-12,85	1,75

Sources: Battiston & Monasterolo 2019, Monasterolo et al 2018

- **Keywan Riahi**, Director of the Energy Program of IIASA, lead author of IPCC report. Keywan will discuss how Integrated Assessment Models have contributed to inform climate science and policy discussion, their opportunities/challenges
- **Stefano Battiston**, Prof. of Banking at the University of Zurich and director of FINEXUS center. Stefano will present science-based climate finance risk metrics and methods to assess forward-looking climate risks in investors' portfolios
- **Petr Jakubik**, Team Leader of the Financial Stability department at the European Insurance and Occupational Pensions Authority (EIOPA). Petr will present the climate risk assessment of sovereign bond portfolio of European insurers, joint research-policy collaboration (EIOPA Financial Stability Report)
- **Lucia Alessi** is Project Leader at the European Commission, Joint Research Centre Ispra (IT). She will talk about the green taxonomy and the results of the research-policy collaboration on the financial assessment of the green taxonomy