

# Climate stress-testing

## *Overview and modelling issues*

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# Three main challenges

1. Need for complementary exercises ([\*climate risk assessment toolkit\*](#)) to guide intuition concerning the short, medium and long run
2. Need to evaluate [short-run](#) consequences of [long-run](#) risks
3. Need for [firm-level data](#), which is not available

# Challenge #1: Climate risk assessment toolkit

## Scenario analysis

**Long term:** 30 years

**Objective:**

Structure thought on implications of emission pathways.

How might policy-induced climate paths impact the fin. system?

Provide forward-guidance to financial sector

## Efficacy / feasibility assessment

**Medium term:** 5-8 years

**Objective:**

Identify bottlenecks to the green transition.

Are households constrained?

Are climate-risks macro-critical factors (impact on sovereign)?

Efficacy of the financial system to finance green transition

## Climate stress test

**Short term:** 3-5 years

**Objective:**

Assess short-term vulnerabilities of the financial system.

Key tool for policy

# Why focus on short-run?

*In the long run we are all dead.*

*John Maynard Keynes*

- Financial stability:
  - Time horizon required for PD estimation is one year
  - Capital buffers/add-ons are set based on current risks
  - Constant balance sheet assumption hardly holds over more than 1 year
- Green transition:
  - Shift from harmful to sustainable activities only happens if future losses are factored in current business strategy

## Challenge #2: nature of the shocks

- **Physical risks** (e.g. extreme weather) less likely to pose systemic risks for larger economies, but dependent on geography
- Need to evaluate short-run consequences of long-run risks
- In traditional stress testing the negative shock hits the real economy, then we look at impacts on the financial system
- Climate-related shocks spreading via the real economy and hitting the financial sector: not credible in the short-term
  - Policy implementation is always very gradual
  - There will be winners and losers, but no negative impacts at the aggregate level

# Financial shocks related to climate

## Portfolio reallocation: *Monasterolo and De Angelis (2020), Alessi et al. (2021)*

- After Paris Agreement markets have considered low-carbon indices as less risky and hence more appealing for investment opportunities.
- Evidence that investors have reduced their exposures to carbon-intensive assets after the PA.

## Asset repricing: *Alessi et al. (2021), Alessi et al. (2022)*

- If investors fail to price climate-transition risks would imply losses at the global level.
- Losses when transition risks are material and not fully incorporated, under a scenario of fire-sale dynamics triggered by a small depreciation of fossil-fuel and high-carbon assets.

## Credit crunch: *Kacperczyk and Peydro (2022)*

- Firms with higher carbon footprint receive less bank credit once banks made a commitment to decarbonize subsequently.

## Systemic financial impacts: *Caporin et al. (2022)*

- Oil and natural gas companies have become more systemic.

# Challenge #3: granularity of the data

- Need for firm-level data
- Winners and losers can be within the same sector
  - E.g. energy
- Even within high-carbon sectors firms can be green
  - E.g. cement and steel

# Sector-level data not ideal

- Approximations are needed
- In the case of climate risks, working at the sectoral (NACE) level can be misleading
  - High risk related to communicating the wrong message (that sectors might be at risk), which would be also a very strong assumption
  - Not credible that policymakers will allow entire sectors to default
    - In the EU taxonomy, a steel producer can be fully green
    - No sector fully at risk, taking approximations of entire sectors risky route
    - Not even very polluting companies fully at risk, when they have credible transition plans
  - Working at sector level might hide risk concentration
- Estimation methodologies soften these problems



# Data requirements

## Financial data:

- Securities holdings (bonds, equities & fund shares)
- Loans

- Transition risk:

- Firms:

- Disclosure requirements on qualitative and quantitative transition plan
    - Production process / greenhouse gas emissions
    - Specific sector classification and size of business segments

- Economy:

- Energy certificates of buildings

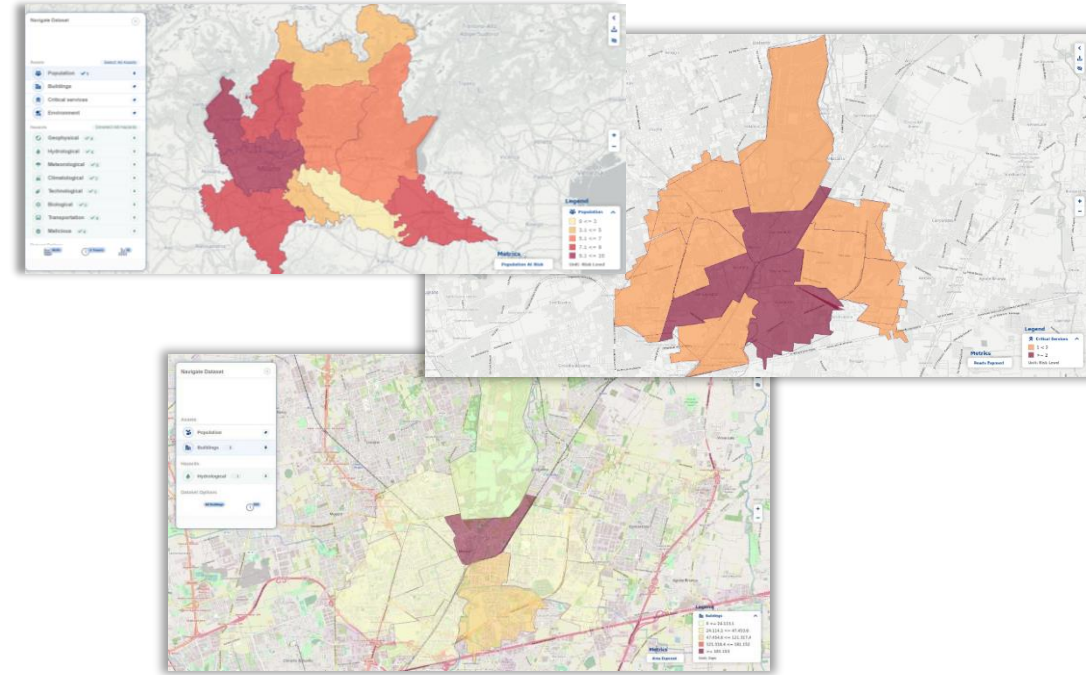
- Physical risk:

- Data on natural disasters and risk assessments
  - Locational data (incl. resid. buildings and plant-level assets per business seg.)
  - Granular insurance data

## 3.3 Data quality

- Commercial data providers sell firm-level data...
- ...but if it's averages, better be transparent
- ...and underlying scenarios not always clear
- [JRC Risk Data Hub](#) official EU repository for disaster risk data
  - Publicly available at NUTS 3
  - 100m resolution for floods (hazard and exposure) available for use cases

### Potential impacts from floods based on JRC and local data



# Thank you



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