EUROPEAN CENTRAL BANK

EUROSYSTEM

Climate related risks and euro area financial stability

"Space for Finance: How Space Technology can Support the Digitalisation and Greening of the Financial Sector"

European Space Agency Downstream Gateway Workshop

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Positively green: *Measuring climate change risks to financial stability** (June 2020)

Main findings

1. Climate shocks are inevitable (physical or transition, or both)
2. Limited financial market pricing of climate risk (as yet), but scale building rapidly
3. Euro area financial sector exposures contained, concentrated, and abating only mildly
4. Transition measures to tackle climate change (e.g. carbon pricing or technology adoption) entail near-term costs for banks that contained relative to physical risks

Progress since

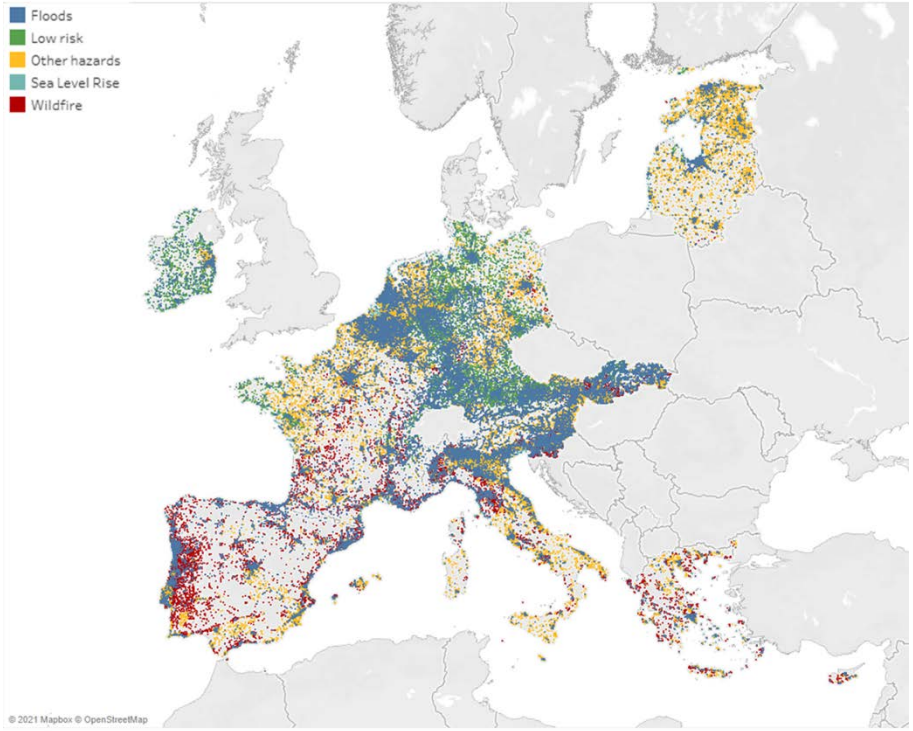
- Measurement
  - granularity of financial sector exposures | climate metrics
- Methodologies
  - horizon | channels macro-finance / climate

* See full ESRB report at: *https://www.esrb.europa.eu/pub/pdf/reports/esrb.report200608_on_Positively_green_-_Measuring_climate_change_risks_to_financial_stability~d903a83690.en.pdf*

European firms' exposure to climate hazards by geography

Climate-related hazards for euro area firms

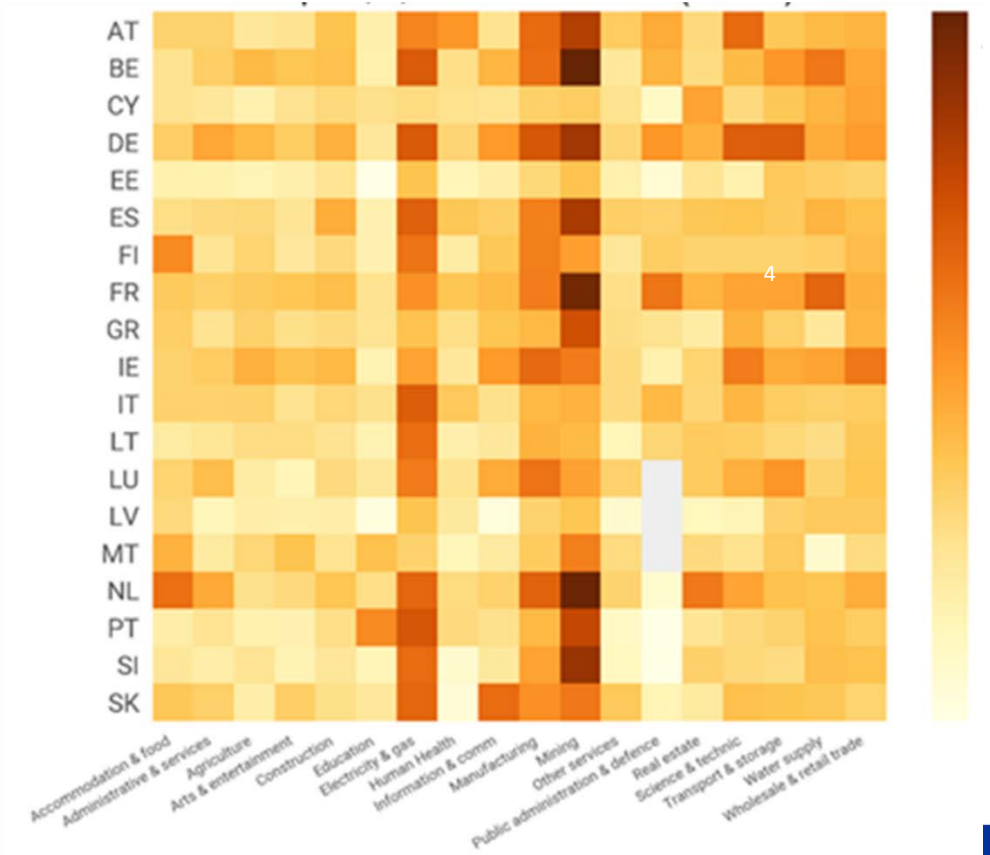
(geolocated physical risk scores)



Source: 427 and ECB calculations. **Notes**: Each dot corresponds to a firm in the sample. Gaps in the mapping are due to (a) economic activities being concentrated in specific industrial areas in some countries, and (b) Four Twenty Seven data not being available for latitudes above 60 degrees for flood risk. Other hazards include water stress, heat stress and hurricanes and typhoons. For simplicity only euro area firms are displayed in the chart.

Emission intensity across country sectors

Carbon footprint of European firms averaged by country-sector (2018)



Source: urgentem and ECB calculations. **Notes**: CB calculations based on the Urgentem dataset. For simplicity only euro area firms are displayed in the chart`.

ECB climate stress test

Top-down exercise
30y horizon, based on NGFS

Climate scenarios

Rich climate data worldwide

Counterparty level analysis
~4 mn firms worldwide: financials, emissions and physical risk score (geolocated)
>2,000 consolidated banks (all MFIs)

Climate specific:
- *Damages to physical capital*
- *Impact of energy prices/efficiency and technology substitution*
- *Mitigants and amplifiers: insurance, insurance premia*

Novel models to assess climate risks

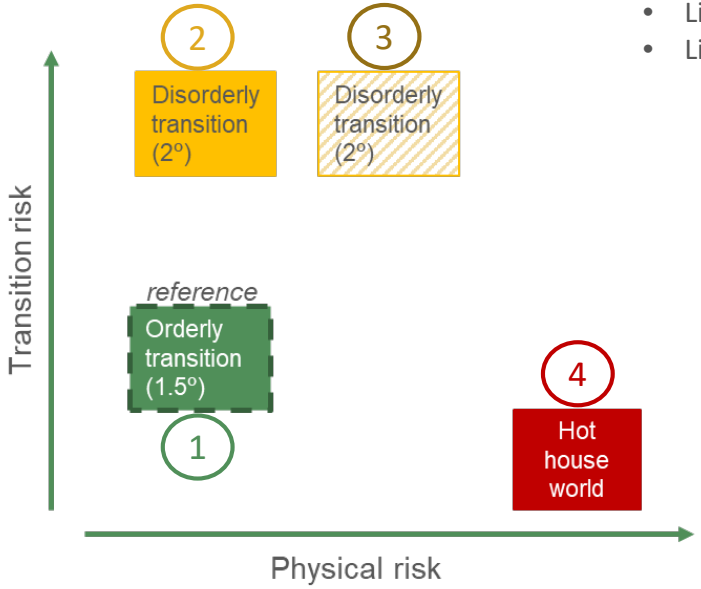
Climate stress-test of non-financial and financial institutions

Feedback loop to real economy

Economy wide

Source: ECB (2021), "Shining a light on climate risks: the ECB's economy-wide climate stress test"

Scenarios



Expected impact

1. Orderly transition with limited physical risk

- Early and effectively implemented policies
- Limited costs associated with the transition
- Limited costs from damages from physical risk

2. Disorderly transition … *with limited physical risk*

- Delayed and ineffective policies implemented
- High costs associated with the transition
- Limited costs from damages from physical risk

3. Disorderly transition … *with higher physical risk*

- Delayed and ineffective policies implemented
- High costs associated with the transition
- Higher costs from damages from physical risk

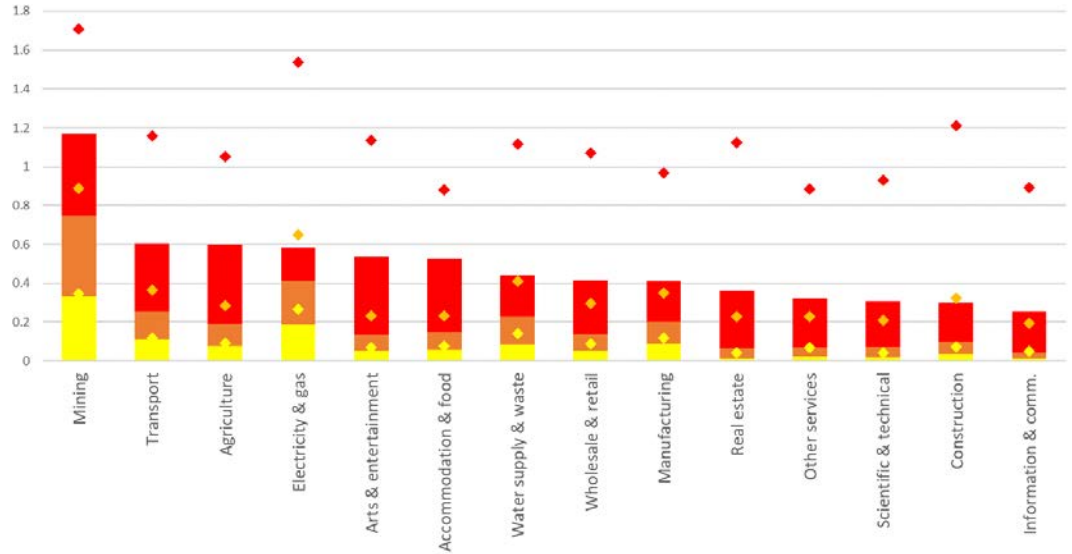
4. Hot house world with extreme physical risk

- No new policies implemented beyond current policies
- Limited costs associated with the transition
- Extremely high costs from damages from physical risk

Source: ECB (2021), "Shining a light on climate risks: the ECB's economy-wide climate stress test"

Preliminary findings

Differences in PDs over 30y with respect to reference scenario, by sector and for different sets of firms (%)



Median firms

- 2. Disorderly Transition - limited physical risk
- 3. Disorderly Transition - higher physical risk
- 4. Hot House World

Firms most vulnerable to physical risk

- 2. Disorderly Transition - limited physical risk
- 3. Disorderly Transition - higher physical risk
- 4. Hot House World

Impact of climate risks asymmetric across sectors and regions: most polluting firms and firms most geographically vulnerable to physical risk could have up to **four times** as much climate risk as the average firm

Source: ECB (2021), "Shining a light on climate risks: the ECB's economy-wide climate stress test"