EUROPEAN CENTRAL BANK

EUROSYSTEM

Financial stability in an age of disruption:

Old wine, new bottles …

… or genuinely new wine?

Central Bank of Malta Financial Stability Seminar
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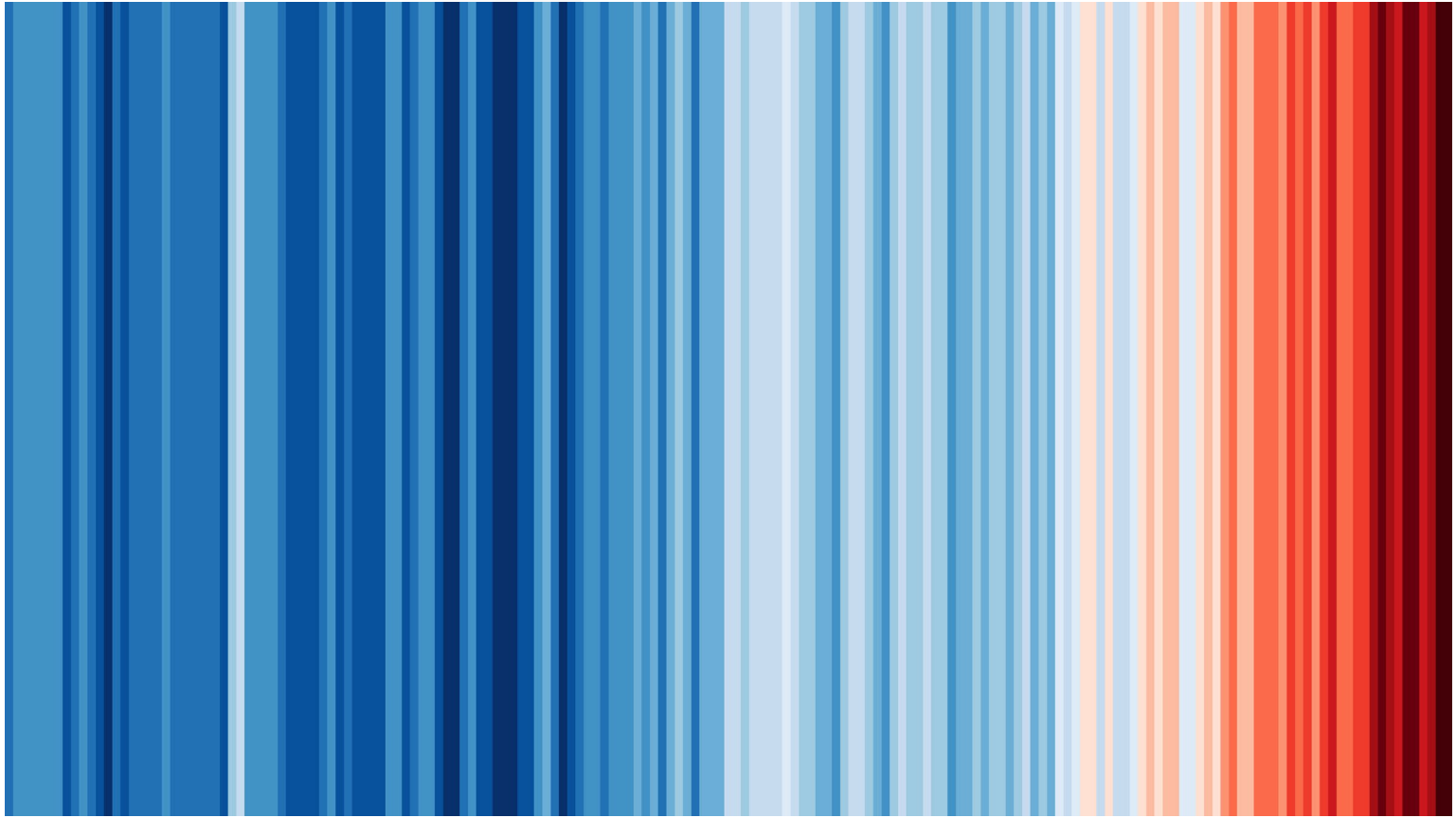
Note: The views in this presentation are those of the presenter, and do not necessarily reflect those of the ECB

Contents

1 | The disruptors

Disruptor #1: **Climate**: *Shocks to come (physical, transition … or both)*

Global average surface temperatures relative to the average temperature, (1850-2024)

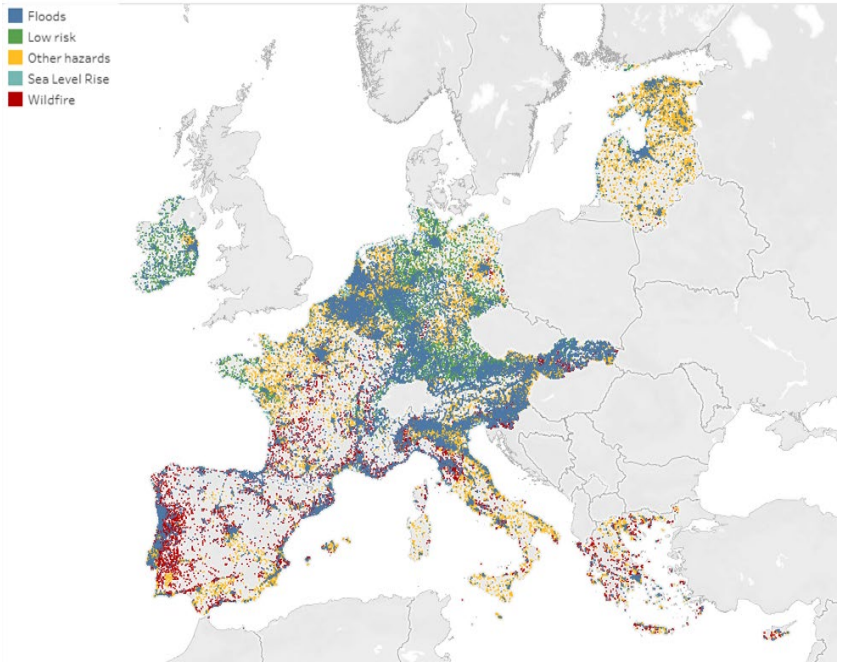


Source: showyourstripes.info.

Notes: Average temperature set as the boundary between blue and red colours, and the colour scale varies from +/- 2.6 standard deviations of the annual average temperatures over the period.

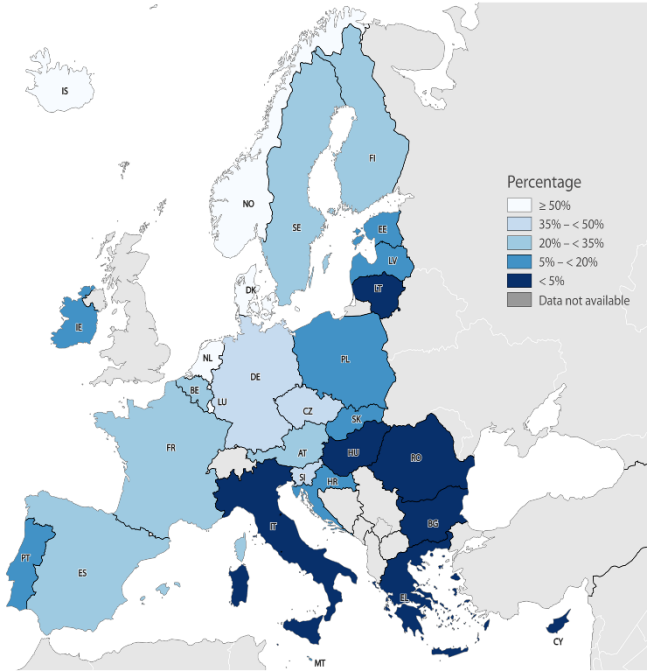
Disruptor #1: **Climate**: *Shocks to come (physical, transition … or both)*

Mapping firm exposures to physical hazards



Sources ECB/ESRB (2021), Climate-related risk and financial stability based on AnaCredit, 427, ECB calculations. Notes: Physical risk hazard scopes reflect a 20-year horizon.

Share of insured economic losses caused by weather-related events

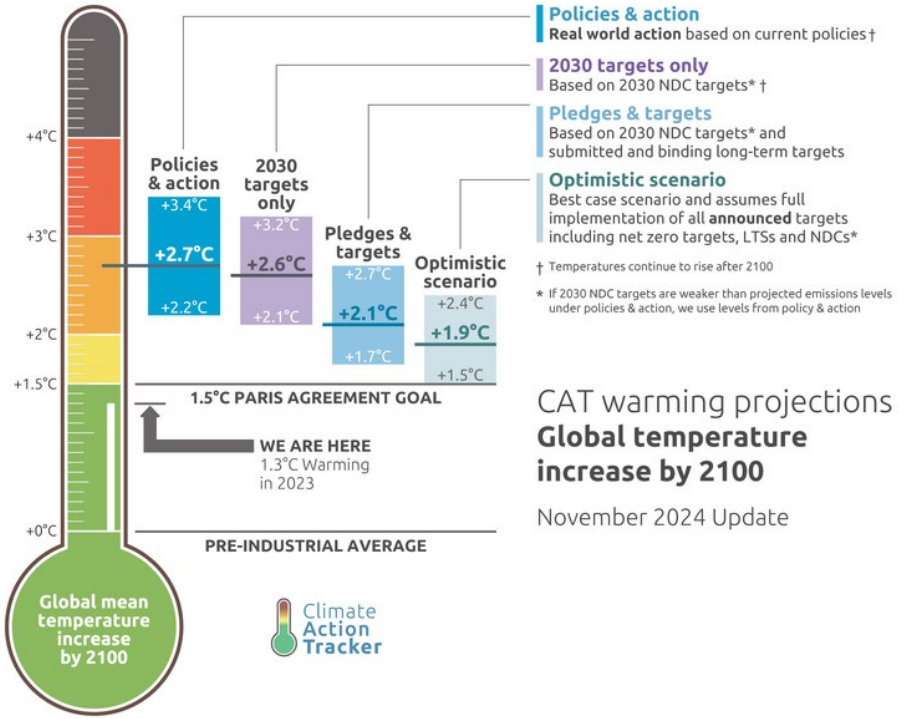


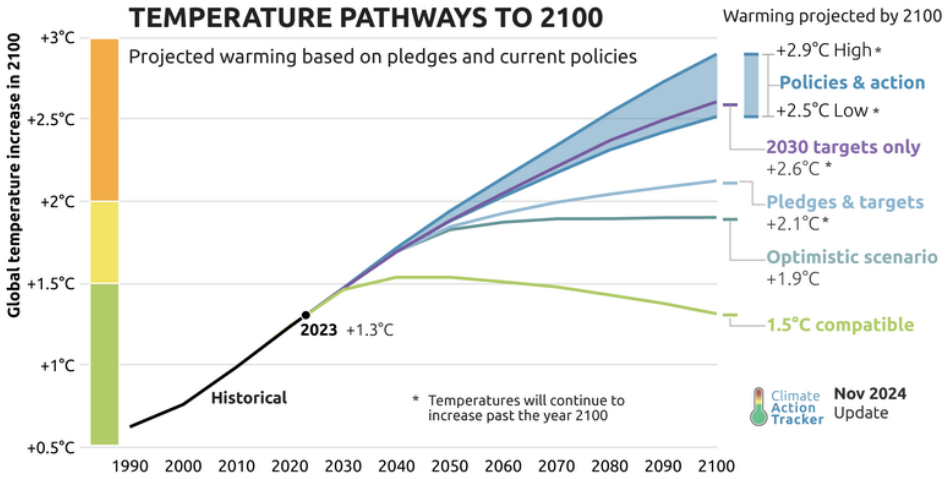
Source: EIOPA dashboard on insurance protection gap for natural catastrophes, European Environment

Disruptor #1: **Climate**: *Shocks to come (physical, transition … or both)*

Projections for carbon emissions & warming

(Emissions in gigatonnes of CO2 per year)



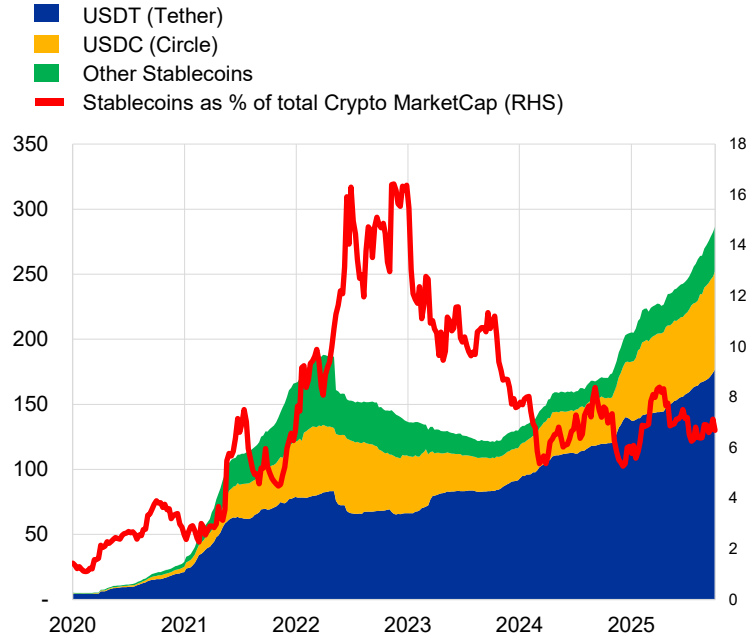


Source: Climate Action Tracker.

Disruptor #2: **Digital finance**: *Blockchain … and all its possibilities*

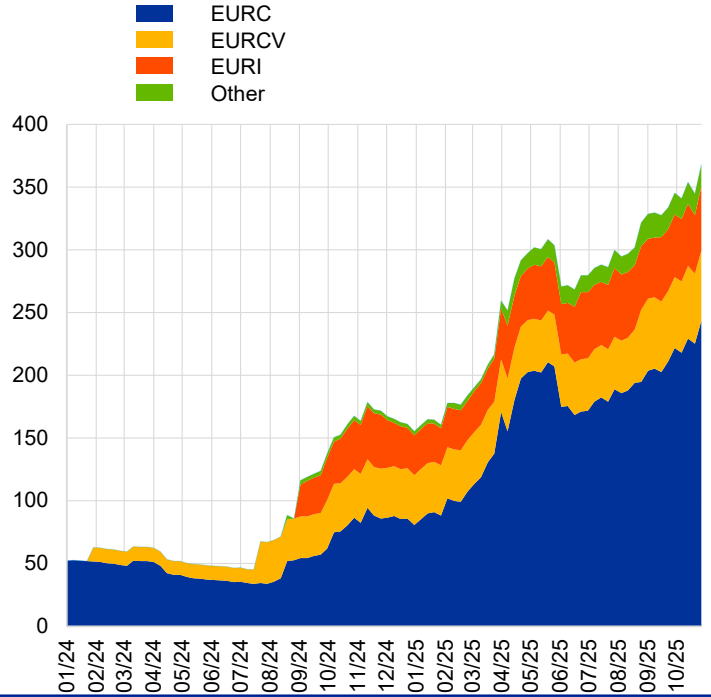
Size of USD-denominated stablecoins

January 2020-October 2025, USD billions and percentage



Market capitalisation of euro-denominated MiCAR-authorized stablecoins

January 2024-October 2025, EUR millions



Sources: CoinDesk, IntoTheBlock, CoinMarketCap and ECB staff calculations. Circulating supply used for stablecoin market capitalization.

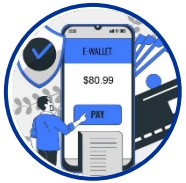
Disruptor #2: **Digital finance**: *Blockchain … and all its possibilities*

Use in crypto-asset **ecosystem**:

- Transaction within crypto-asset ecosystem and used as so-called **"on-/ off- ramp"** to move in and out of **other crypto-investments**
- **Collateral** for crypto-asset derivatives and within decentralised finance

Use in **tokenisation**:

- As potential **settlement** asset



Use for **payments**:

- **Cross-Border** Payments and Remittances
- Merchant Payments and E-Commerce

Use as store of **value**:

- Access to **stable foreign currency** (mostly for EMDEs)

Disruptor #3: **AI**: *Imagining a new steady state, and what of the transition?*

FSB: While AI can drive efficiency and innovation, also potential to amplify vulnerabilities:

(i) Third-party dependencies and service provider concentration
eg reliance on a few dominant providers for AI hardware and cloud services

(ii) Market correlations
eg widespread use of similar AI models and training data

(iii) Cyber vulnerabilities
eg lower barriers for cyber criminals, enabling sophisticated attacks, such as model poisoning and disinformation campaigns

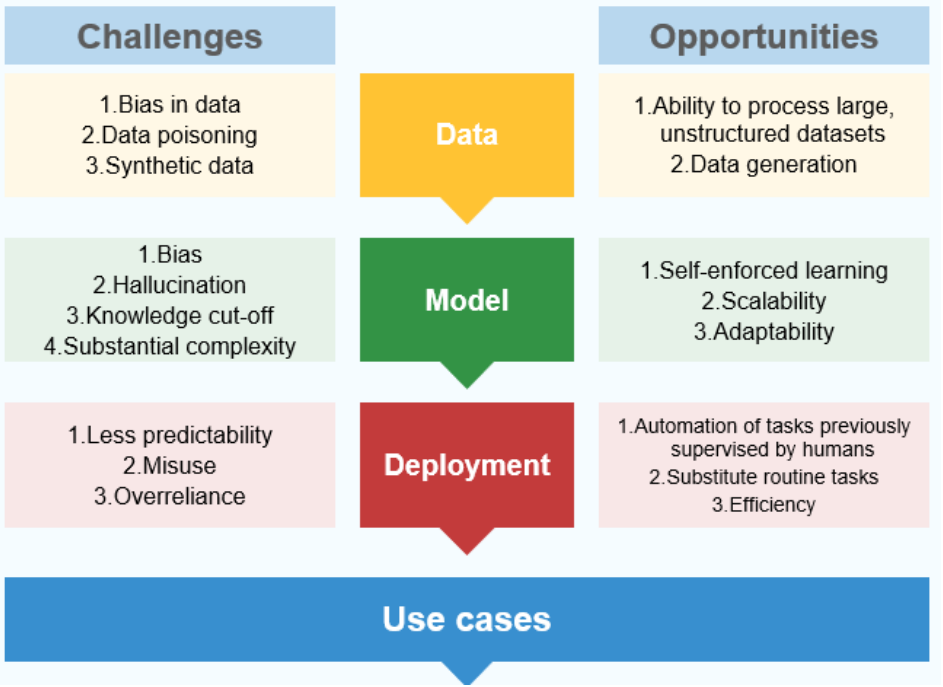
(iv) Model risk, data quality and governance
eg lack of explainability of AI models and opaque training data, complicating validation and monitoring

(v) Other factors
eg gen AI facilitating fraud, such as deepfakes, synthetic identities and disinformation campaigns capable of triggering flash crashes or bank runs

Source: FSB (2024), *The financial stability implications of artificial intelligence*, November.

*Disruptor #3: **AI**: Imagining a new steady state, and what of the transition?*

Stylised development and deployment cycle of AI models



Source: "The rise of artificial intelligence: benefits and risks for financial stability", ECB Financial Stability Review (May 2024)

2 | Tracing out implications for financial stability

Surveillance and assessment challenges

Time varying correlations

Combined loss *likelihood*

Warrants contextualising climate shocks

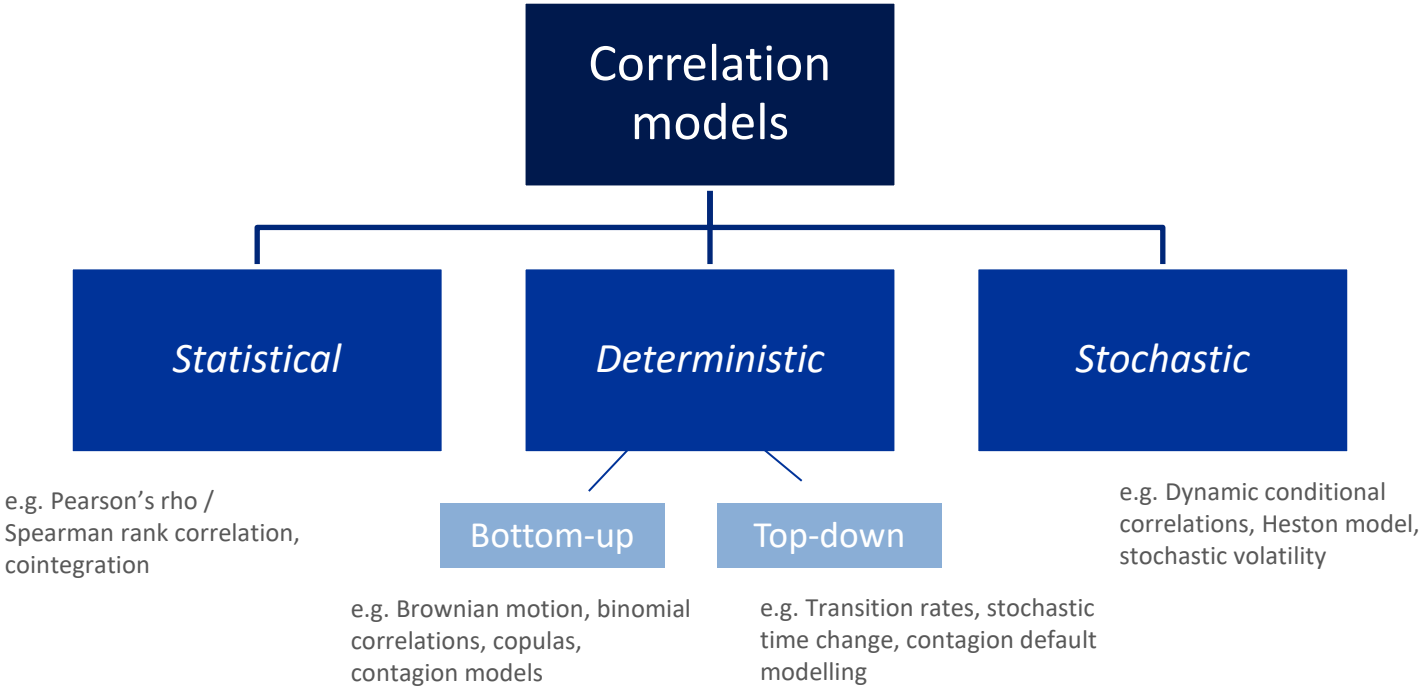
Temporal dimension: Risk buildup

Compound shocks

- Combined loss *magnitude*
- Warrants interacting climate shocks
- *Spatial dimension:* Risk materialisation (correlation nested)

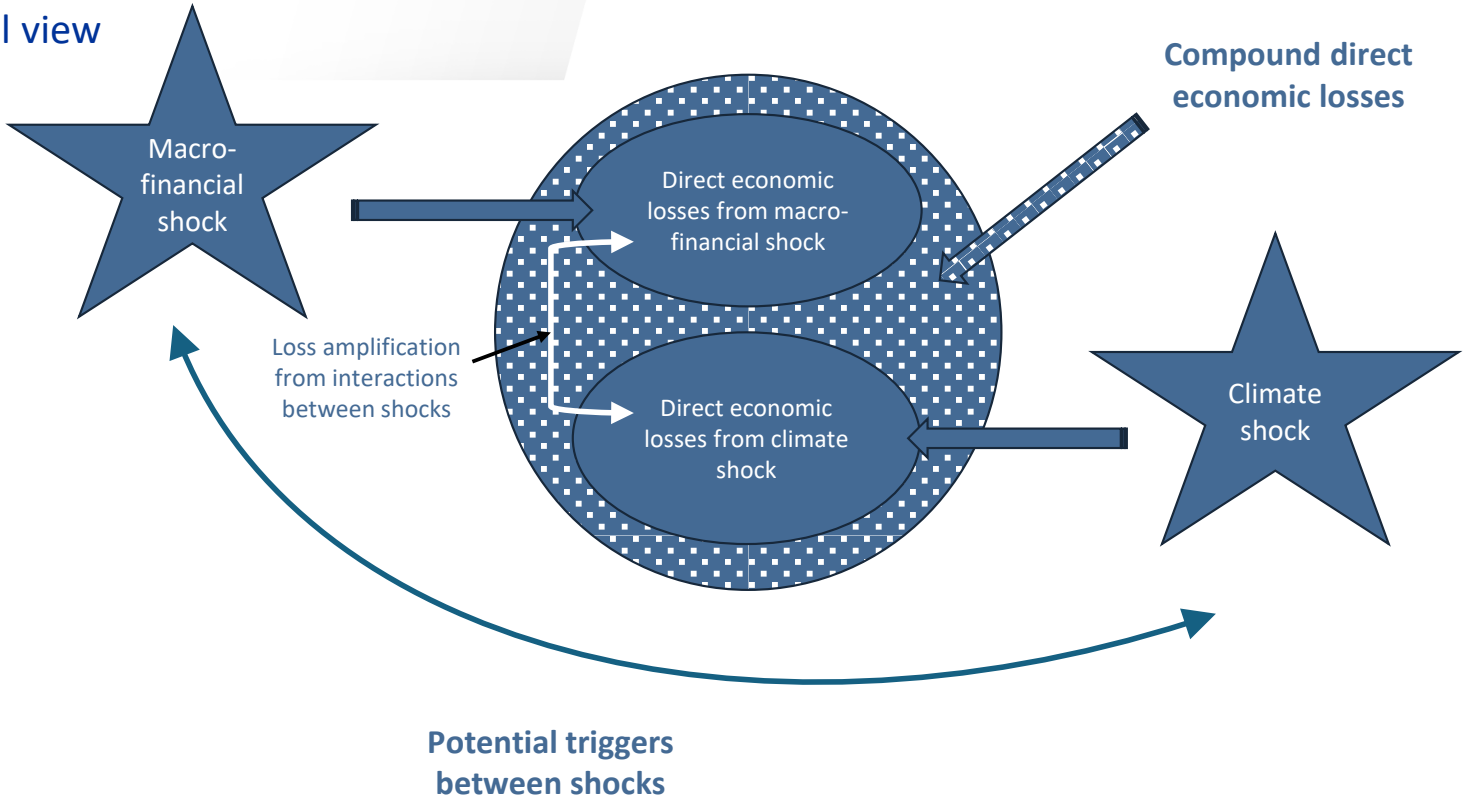
Source: Hiebert and Monnin (2025), "A macroprudential approach to compound climate risk, LSE Policy Publication (Sep).

Time varying correlations:
Multiple existing approaches to capture



Source: Adapted from Meissner G. (2019). *Correlation Risk Modelling and Management.* Risk Books; 2nd Edition. (link)

Compounding shocks:
A conceptual view



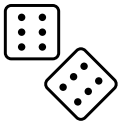
Source: Hiebert and Monnin (2025), "A macroprudential approach to compound climate risk, LSE Policy Publication (Sep).

Layering in uncertainty: Limits to perfect foresight

Epistemic (systematic) uncertainty

- Lack of knowledge or incomplete information
- Reduced through further information or data
- *Option:* Average across different approaches to reduce scope for misspecification

Aleatory (stochastic) uncertainty



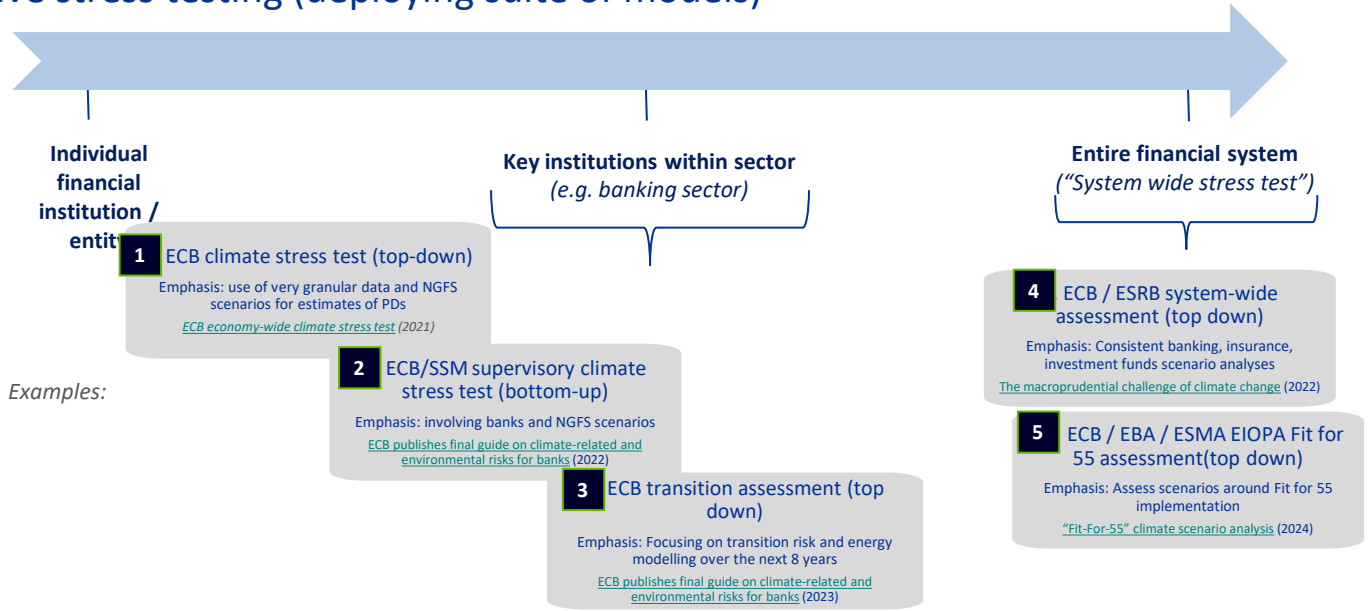
- Intrinsic randomness
- Inherent = irreducible
- *Option:* Seek to understand (even if not reducing) potential for contingent risk

Source: Hiebert and Monnin (2025), "A macroprudential approach to compound climate risk, LSE Policy Publication (Sep).

Layering in uncertainty:

Limits to perfect foresight

Narrative stress testing (deploying suite of models)

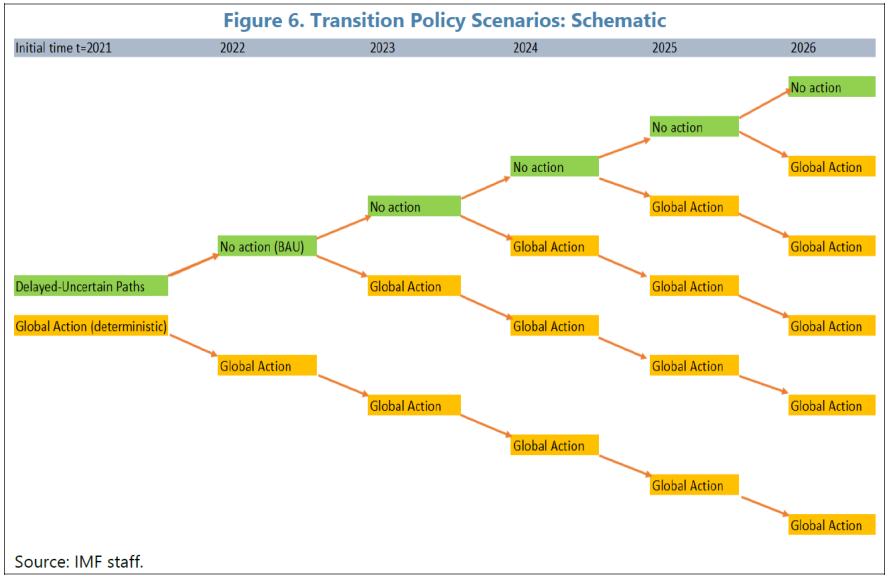


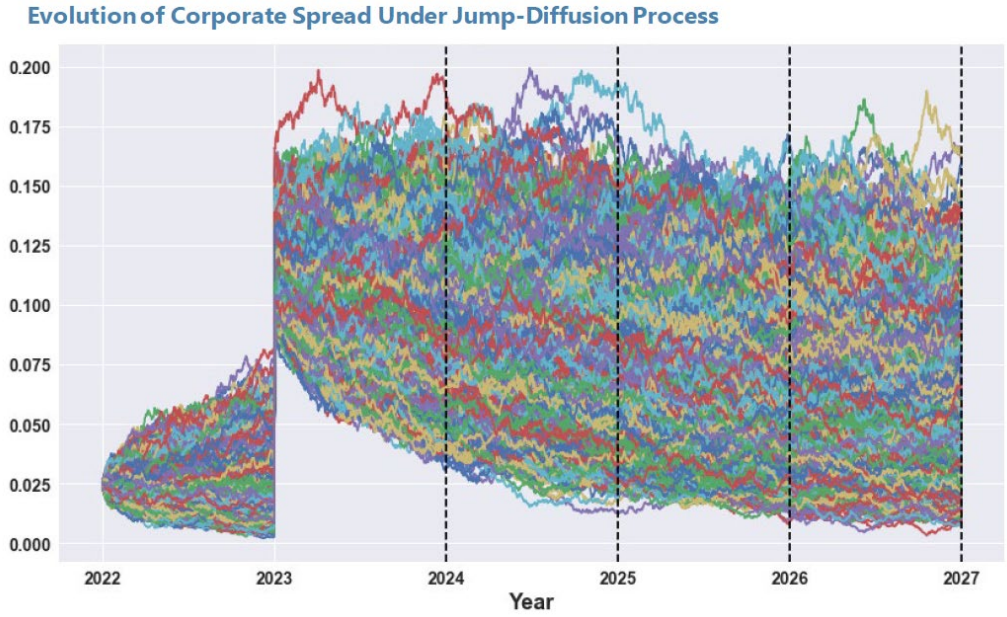
Source: Hiebert and Monnin (2025), "A macroprudential approach to compound climate risk, LSE Policy Publication (Sep).

Layering in uncertainty:
Limits to perfect foresight

Stochastic stress testing (employing blue sky contingencies)

IMF FSAP Mexico (2023): A decision tree approach to modelling climate loss



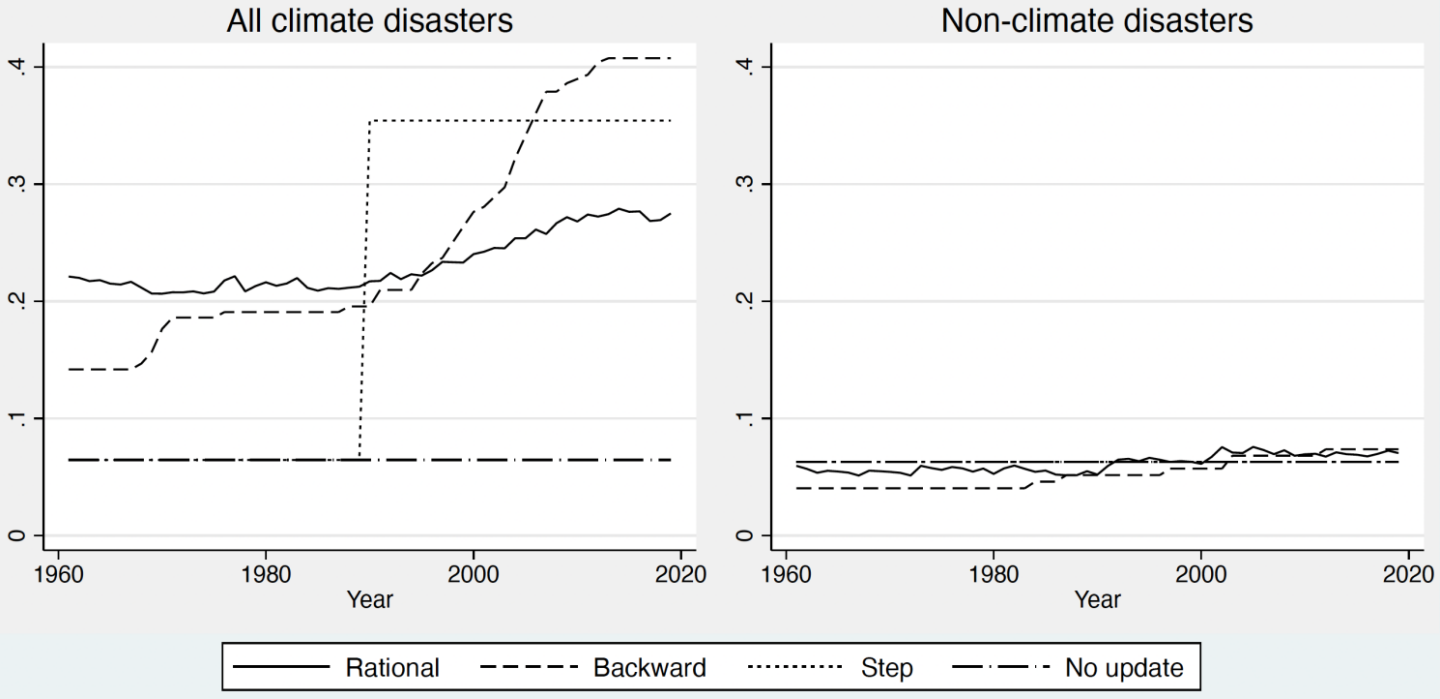


Source: Hiebert and Monnin (2025), "A macroprudential approach to compound climate risk, LSE Policy Publication (Sep).

Importance of learning:

Interplay of shocks with prior beliefs

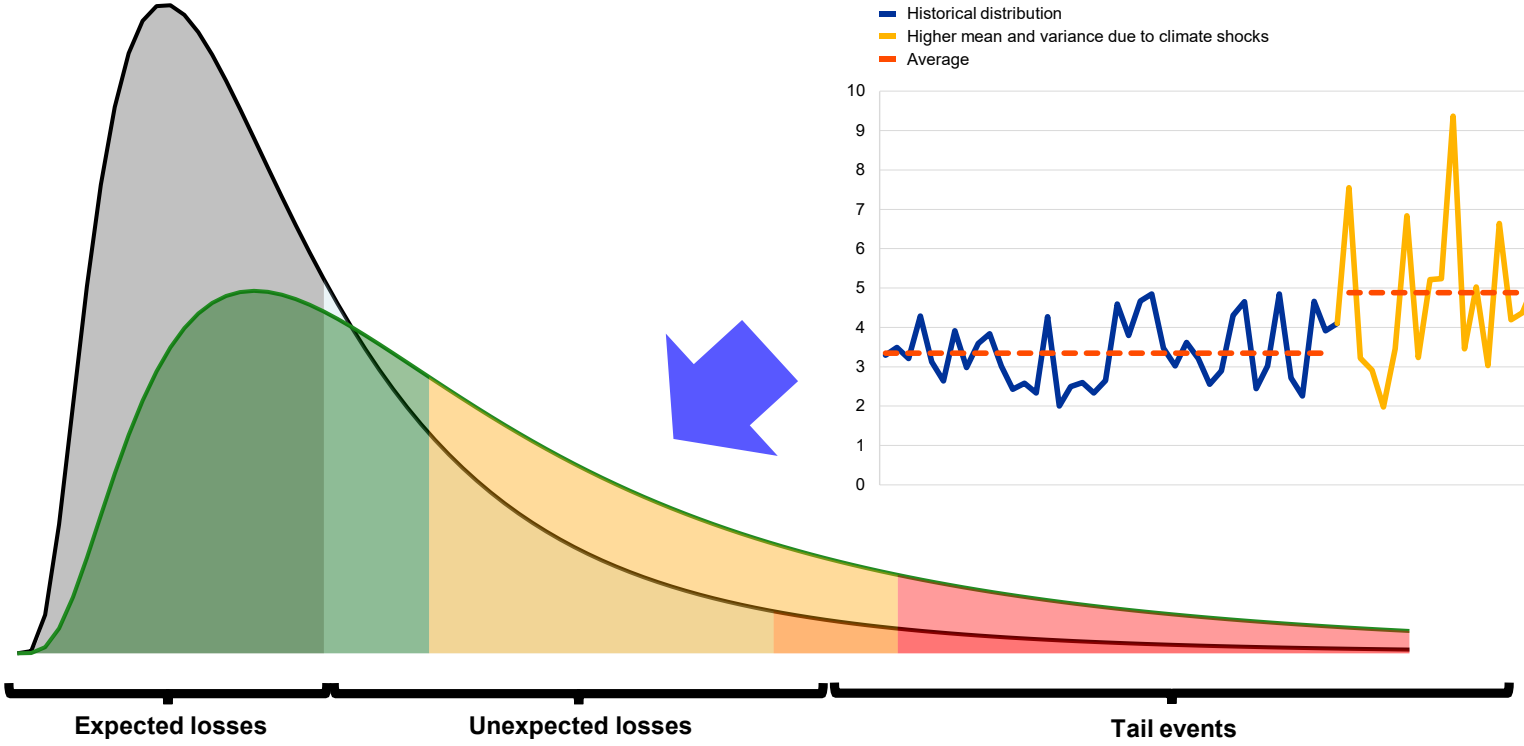
Climate disaster probability: Belief dynamics



Source: Hale G. and B. Sharma (2024). Climate beliefs and asset prices. VoxEU column (October).

3 | Macroprudential policy options

Capital (and unexpected loss)

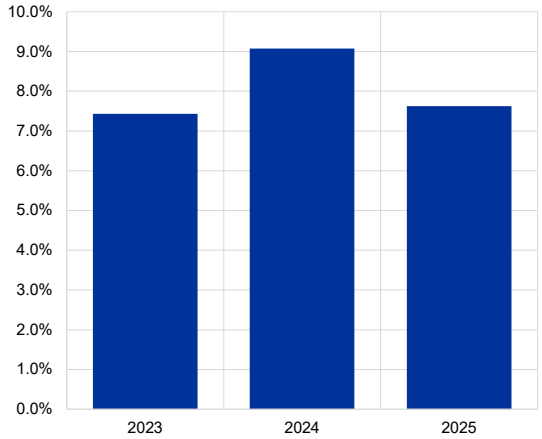


Source: ECB/ESRB (2023), Towards macroprudential frameworks for managing climate risk

Alternatives to capital based measures

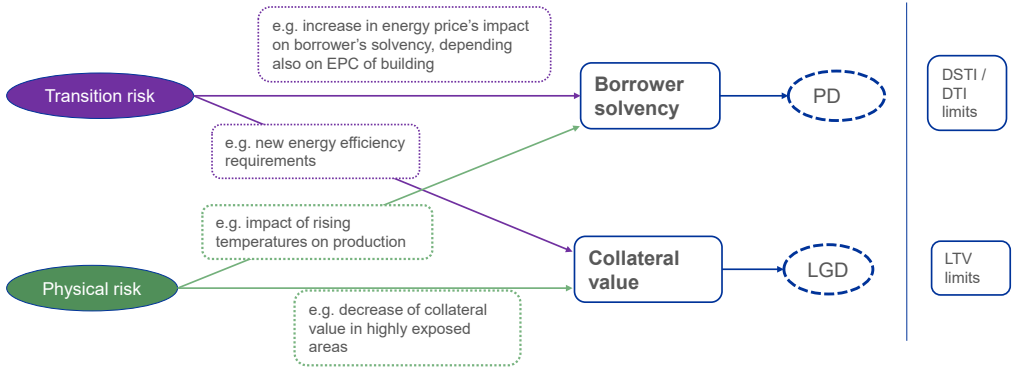
Concentration measures

Projected decrease in cumulative losses caused by reducing concentration to the level of the threshold (75th percentile)
(x-axis: year; y-axis: percentage decrease in losses due to compliance)



Borrower based measures

Transmission channels of climate risk to borrow-based measures



Source: ECB/ESRB (2023), Towards macroprudential frameworks for managing climate risk

Note: Sample of 100 SIs. Calculations based on the new 2023 ECB top-down. High emitting firms are defined as firms scoring above the 75th percentile of relative emissions. If the thresholds is exceeded, exposures to high emitters are pro rate redistributed to non-high emitting firms until the limit is satisfied. The change in expected losses due to diversification is then attributed to compliance with the limit.

Perimeter

Preserving resilience of banks and non-banks essential in an uncertain environment

For banks

- Maintain macroprudential buffers, ensure releasability and usability
- Policy should remain agile and focus on financial stability
- Simplify the supervisory and regulatory framework *without* compromising resilience
- Support completing Basel III reforms and the banking union

For non-banks

- Implement internationally-agreed reforms, e.g. for MMFs
- Strengthen NBFI policy framework from a macroprudential perspective
- Introduce additional macroprudential tools and enhance policy coordination at EU-level
- Progress with the European Commission's savings and investment union strategy

4 | Summary

1 | Multiple sources of disruption

- Climate
- Digital finance / blockchain
- Artificial Intelligence

2 | A robust financial stability framework

- Surveillance: Mind the correlations (risk buildup)
- Assessment: Mind the interactions (risk materialization)
- … factoring in *uncertainty*, and importance of *learning*

3 | Macroprudential policy options

- Role of capital in leveraged systemic institutions
- Alternative macroprudential policy measures (concentration limits, borrower-based measures)
- Perimeter issues amid growing nonbank financial intermediation