EUROPEAN CENTRAL BANK

EUROSYSTEM

Macroprudential impact of LMTs for investment funds – a system-wide analysis

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The views expressed in this presentation are those of the authors and do not necessarily represent the views of the European Central Bank and the Eurosystem.

Today’s presentation

1. The ISA network
2. The ISA model
3. Macroprudential impact of LMTs for investment funds

1

The ISA network

System Wide Stress Testing with ISA

Interconnected **S**ystem-wide stress test **A**nalytics

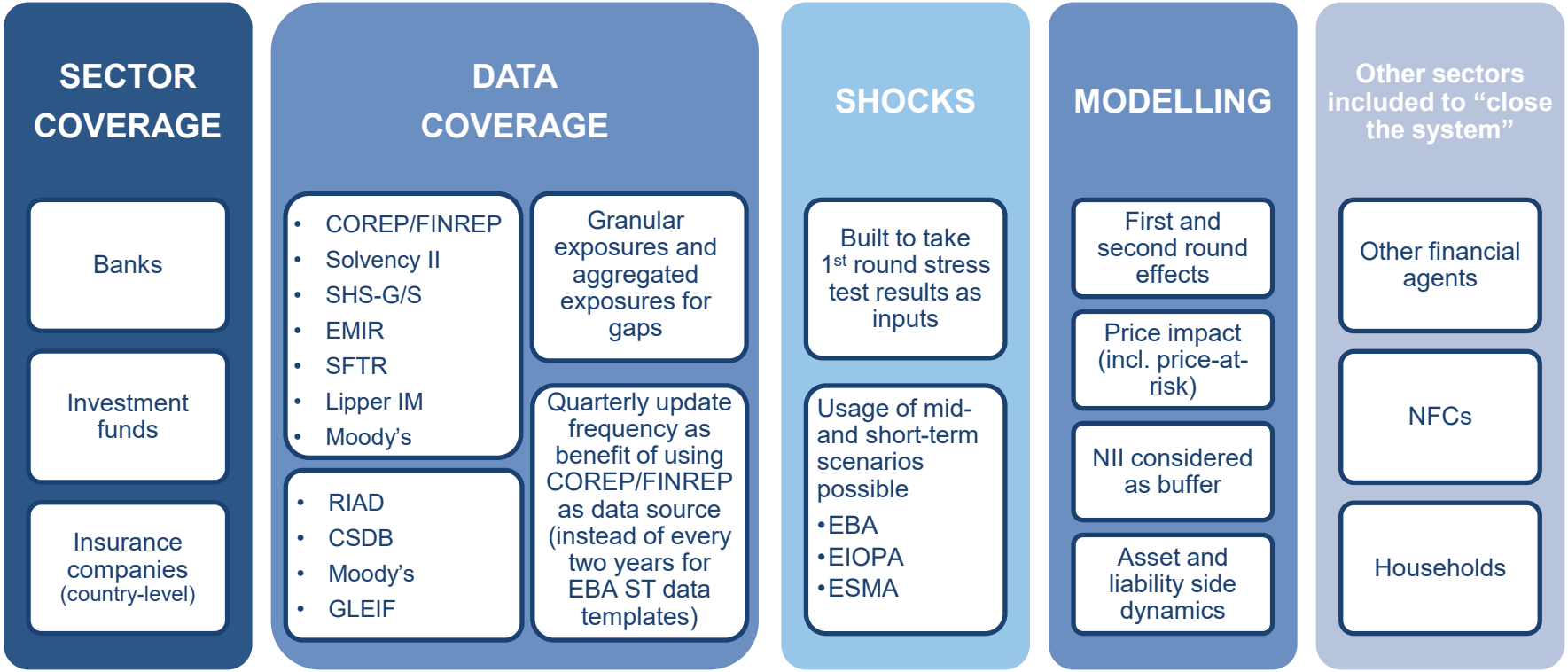
ISA models the ***system-wide impact* of financial risks,** accounting for sectoral interconnectedness, macro-financial linkages, policy and regulations in **euro area countries**

Using network modelling, ISA examines feedback loops between ***banks, funds and insurers***: institutions react to accounting-based (first-round) losses giving rise to **second-round effects**.

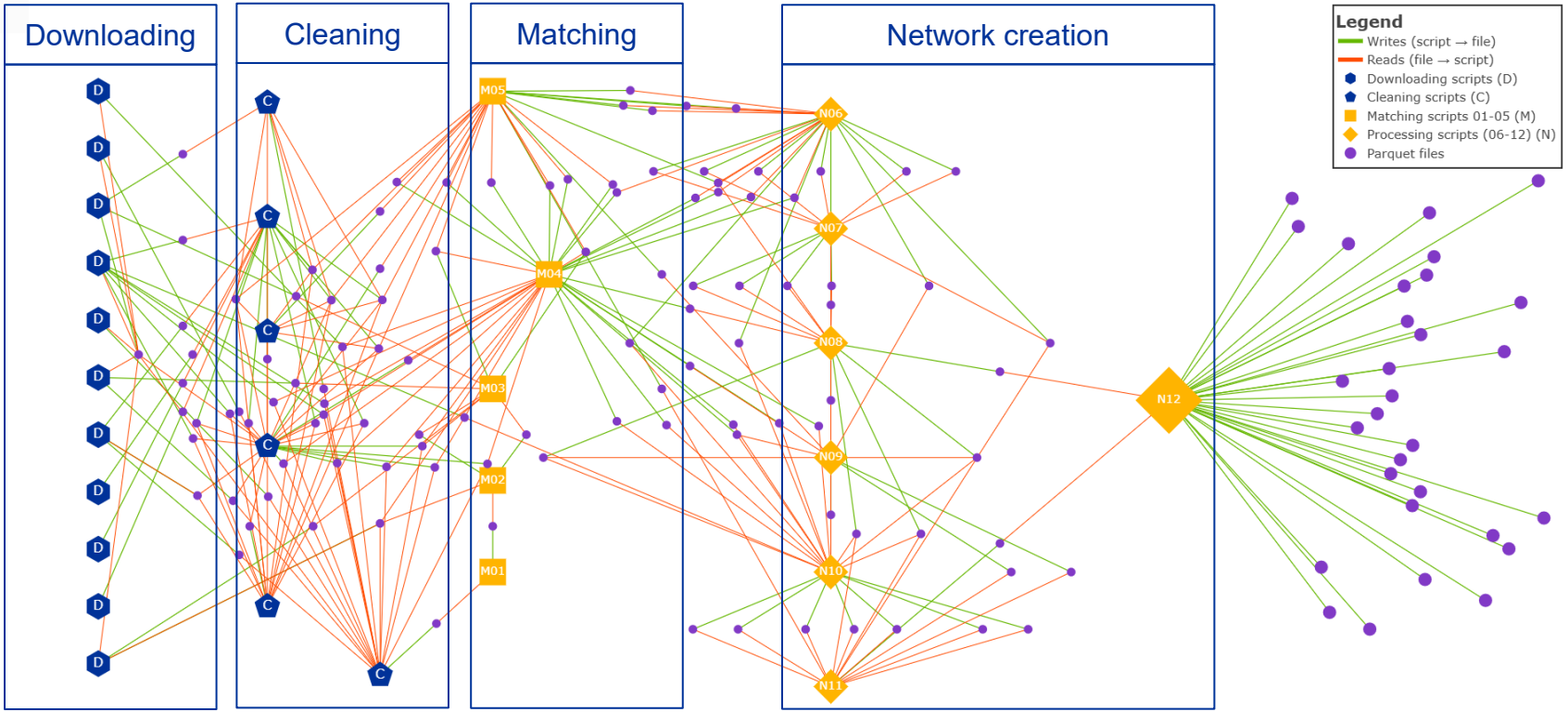
ISA is a ***scalable stress testing tool*** shared with **national central banks** under the ECB Financial Stability Committee for consistent cross-country applications, continuously integrating their feedback

ISA development started in 2019 based on ECB sector-specific, top-down ST models and early bank-focused network models used in financial stability directorate, and is still **ongoing**

Data and sector coverage

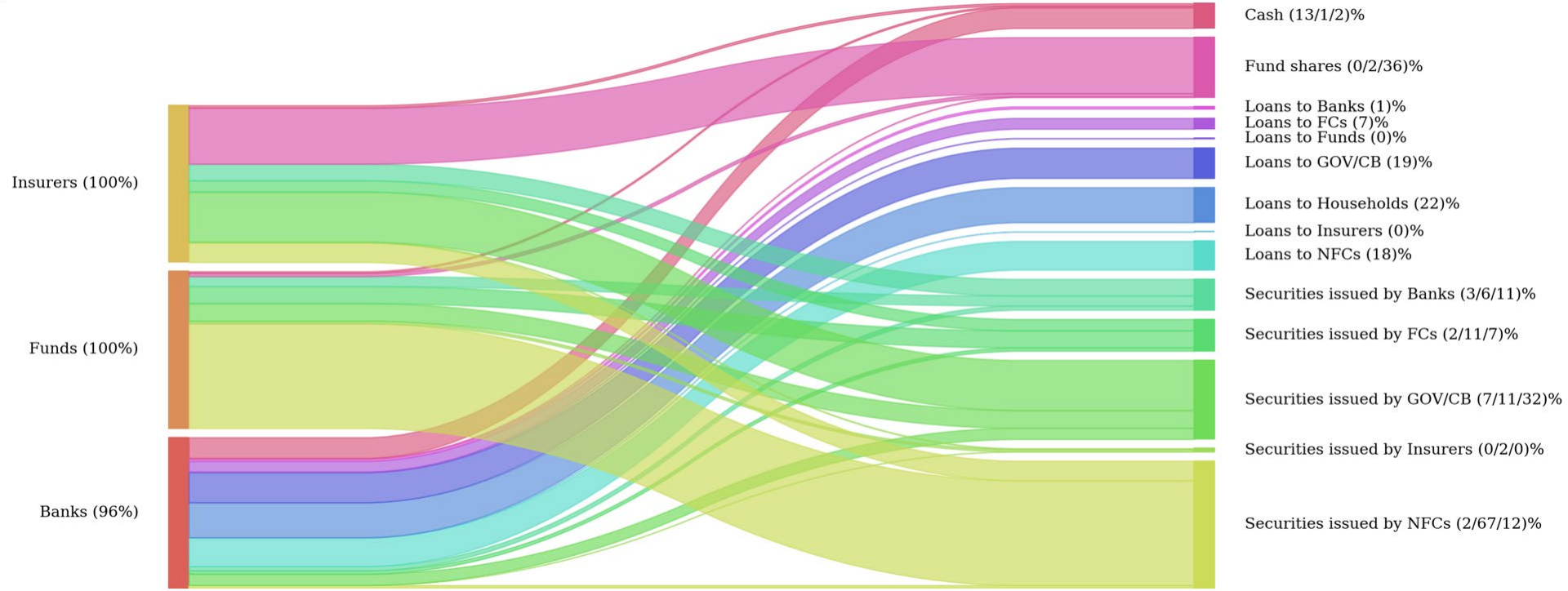


Data model



A complex data generation process with many interim steps to reach the final network output.

ISA coverage: interconnected, granular and system-wide



Notes: Numbers on the right side indicate the respective share of asset category in banks', funds' and insurers' modeled assets in this ordering. Numbers of the left side indicate the share of the portfolio covered.

2

The ISA model

ISA in perspective: building on simple clearing models

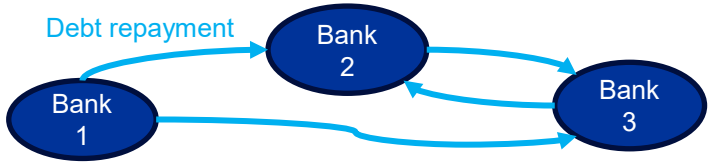
ISA builds on a **family of network** stress test models:

- First models appeared in early 2000s, but developed notably after the GFC
- Involve the **repayment of bank debt**
- Focus on banks' liquidity and solvency dimensions (single layer)

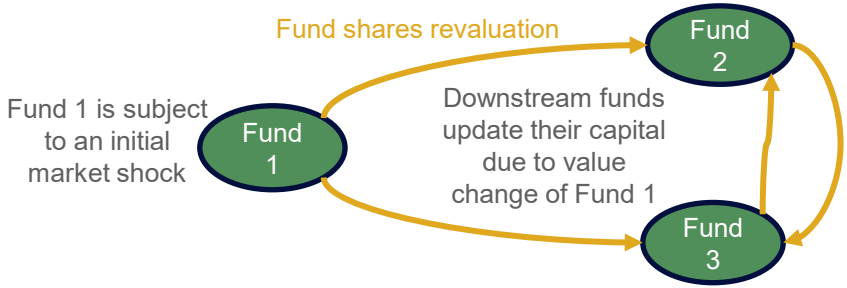
Further work conducted at the ECB:

- Expands focus to **investment funds**
- Looks at process through which fund shares are revalued following a portfolio shock

Early contagion models for banks

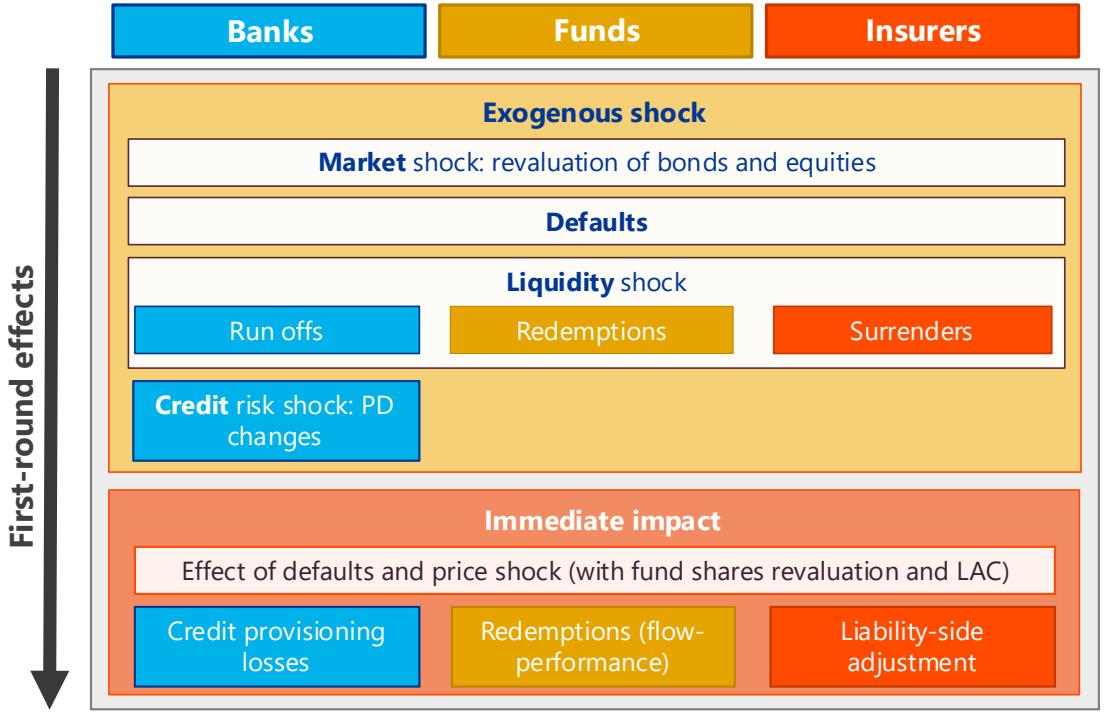


Contagion models for funds



References: Eisenberg and Noe (2001); Battiston et al. (2012); Barucca et al. (2020); Veraart (2020); Gourdel and Sydow (2023).

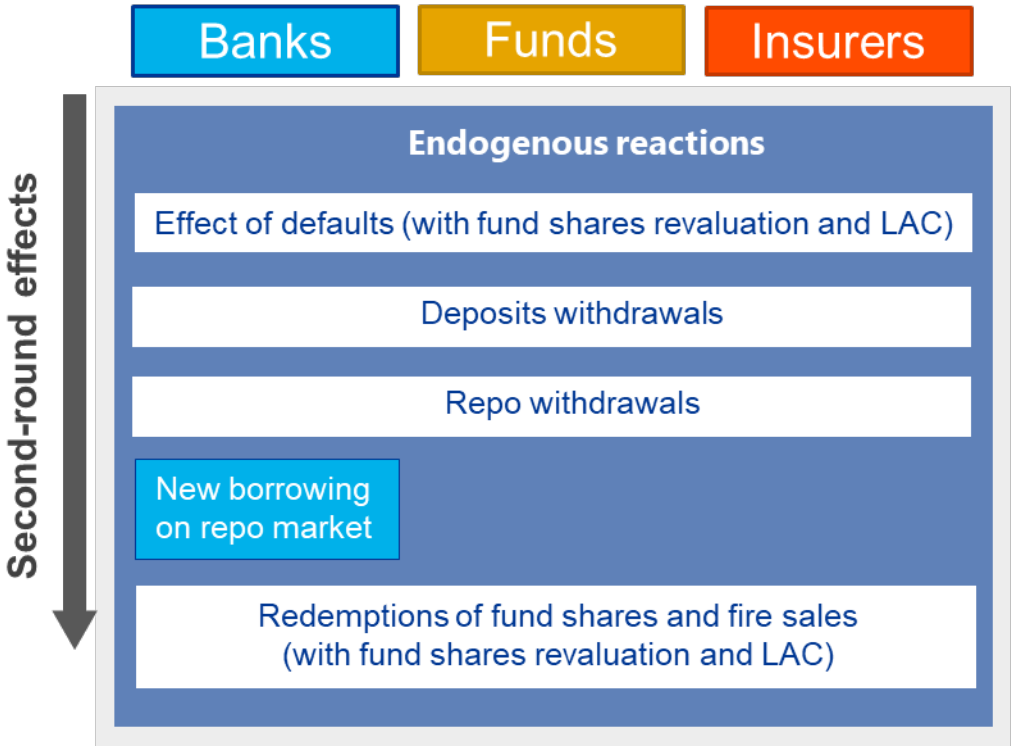
First-round dynamics in ISA: Translating scenarios into entities' granular balance sheet losses



ISA starts with scenario shocks: **market, credit risk, and liquidity shocks** (e.g. bank run offs, fund redemptions and insurance surrenders)

- The scenario produces direct losses in each entity according to sector-specific balance sheet logics
- The scenario may also include pre-calculated first-round losses imported from other stress tests or satellite models

Second-round dynamics in ISA: Order of endogenous reactions



i. Entities follow a pecking order of deposit / repo withdrawals, new repo borrowing, and fund share redemptions to **recover liquidity,** propagating liquidity stress across entities / sectors

ii. Remaining liquidity shortages are met with **fire sales** of tradable assets, triggering a price impact that propagates initial liquidity stress into further market stress

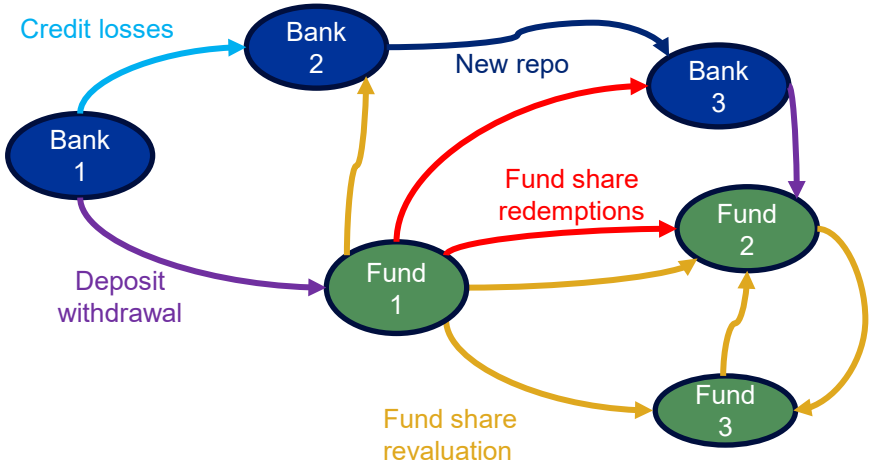
iii. Any resulting (solvency or liquidity) defaults carry stress to the next iteration

Second-round dynamics in ISA: Conceptual approach

Following the first round, ISA simulates system-wide second-round effects by iteratively propagating shocks within and across sectors

- ISA brings together the most relevant contagion channels, with interactions between market risk, liquidity risk, and solvency conditions
- Defaults trigger credit / market losses, and liquidity shortfalls trigger liquidity withdrawals on deposit / repo networks, new repo borrowing, fund share redemptions, and fire sales
- When executing deposit / repo withdrawals, ISA finds liquidity equilibria in which the system settles, and following defaults or fire sales, ISA finds new price equilibria for financial assets (bonds, equities, fund shares)

Stylised contagion model in ISA



3

Macroprudential impact of LMTs for investment funds

Motivation: New liquidity regulation for funds

- **Large-scale redemptions** are a threat to the stability of the investment fund sector
  - The costs of redeeming shares (transaction costs, bid-ask spreads, selling at discounted prices) are borne by remaining investors
  - This creates first-mover advantages, which may result in run-like dynamics
- **Liquidity management tools** (LMTs) are designed to mitigate redemption risks
  - UCITS VI / AIFMD II require funds to operationalise at least two LMTs as of 16 April 2026
  - ESMA recommends funds to adopt at least one quantity-based and one price-based LMT
- **Quantity-based LMTs** delay or limit the amount of redemptions
  - Redemption gates limit total redemptions over a given period (typically one day) to a predetermined percentage of the fund's total net assets
- **Price-based LMTs** transfer redemptions costs to redeeming investors
  - Anti-dilution levies charged to redeeming investors are calibrated to match redemption costs

First-round scenario and **second-round** dynamics

- **First-round scenario**: 2025 EBA adverse scenario for banks, with market risk losses extended to investment funds and insurers
  - **Fund losses** trigger "exogenous" fund outflows, based on past flow-performance relationships
  - **Redeeming investors** not explicitly modelled → negative spillovers to these investors cannot be assessed and therefore these exogenous outflows are not subject to LMTs
  - **Insurers** do not suffer large liquidity shocks under this scenario → so focus on banks and funds
- First-round liquidity shortages trigger **second-round dynamics**
  - Funds' deposits at banks are reduced (a buffer for future outflows is maintained)
  - These deposit outflows create liquidity shortages for banks, triggering inter-bank deposit withdrawals and shifts in interbank repo markets (funds rarely participate in repo markets)
  - Remaining liquidity shortages are resolved through redemptions of funds shares, which are affected by LMTs, and fire sales of tradable securities, which depress market prices and cause (mark-to-market) capital depletions and fund losses

While **LMTs** potentially create **new first-mover advantages**, these are not modelled

Methodology: Impact of LMTs on second-round redemptions

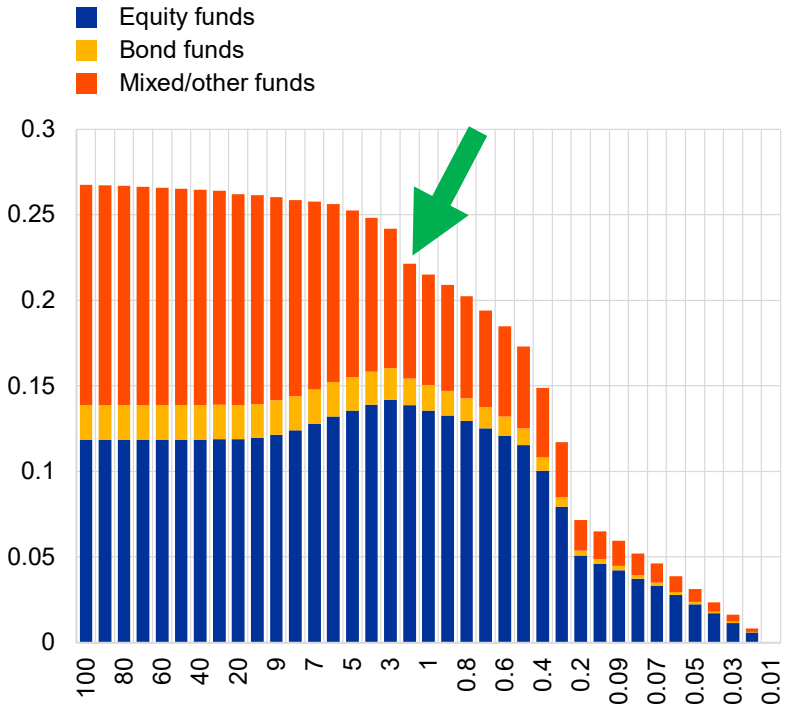
- **Objective**: Evaluate positive impact of **gates and ADLs** on funds suffering large redemptions + potential negative spillovers to redeeming investors
  - **Gates** are modelled to block all subsequent redemptions from a fund when its gating threshold is reached (for the remainder of the simulation)
  - **ADLs** are modelled to match the price impact of the fire sales caused by the redemptions (modeled investors are not discouraged from redeeming, they simply pay the ADLs)
- **LMTs applied** to **redemptions by modelled sectors**: banks, funds and insurers
  - **Second-round redemptions** are driven by liquidity needs of redeeming investors
  - Out of the three modelled sectors, funds have the largest holdings of fund shares
    → LMTs mainly affect inter-fund redemptions in the model
- **LMTs** limit the liquidity recovered by redeeming investors: **gates limit the amount of redemptions**, while **ADLs reduce the proceeds from the redemptions**
  - **Redeeming investors** must raise additional liquidity through further redemptions or fire sales
  - **LMTs** may prevent fire sales by funds suffering redemptions, but may increase fire sales by redeeming investors

Redemption gates reallocate outflows to more resilient funds

- Moderate redemption gates (around 2%) redistribute redemptions towards large equity funds and away from smaller, less liquid funds
- This reduces the risk of localised shocks escalating into fire-sale spirals
- Liquidity available to other sectors is not strongly affected, as total redemptions from the fund sector fall by less than 8%

Second-round fund outflows with gates

(x-axis: redemption gate thresholds as a percentage of each individual fund's total net assets; y-axis: aggregate second-round fund outflows as a percentage of total investment fund sector assets)



Source: "Assessing the macroprudential impact of liquidity management tools for investment funds: a system-wide analysis", Financial Stability Review, ECB, May 2026.

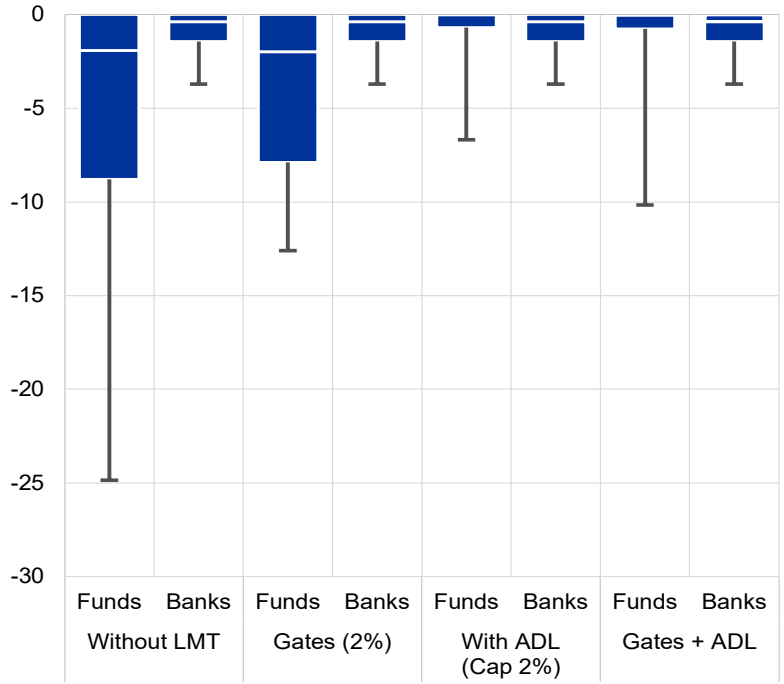
LMTs appear to be effective tools for protecting fragile funds

- Both gates and ADLs reduce second-round losses of the most affected funds
- Banks' second-round losses are not visibly impacted, as their ADL payments and additional fire sales losses are minor
- ADLs appear more effective than gates
  - But gates prevent forced selling of securities below their fundamental value during stress

    → This is not visible in the graph, as it does not distinguish between realised and unrealised losses on marked-to-market securities

Fund losses and banks' capital depletion

(losses for funds: percentages of total assets; losses for banks: percentage points of CET1 ratio)



Source: "Assessing the macroprudential impact of liquidity management tools for investment funds: a system-wide analysis", Financial Stability Review, ECB, May 2026.

Appendix

Related publications

- **Assessing the macroprudential impact of liquidity management tools for investment funds: a system-wide analysis,** 2026, Box 5 in ECB Financial Stability Review
- **Integrating contagion risk into the 2025 EU-wide stress test: a system-wide analysis with amplification effects between banks and non-banks,** 2025, ECB Macroprudential Bulletin
- **Fit-for-55 Climate Scenario Analysis,** by the European Supervisory Authorities and the ECB (2024)
- **Banks and non-banks stressed: liquidity shocks and the mitigating role of insurance companies,** by Sydow et al. (2024), ECB Working Paper No. 3000.
- **Non-banks contagion and the uneven mitigation of climate risk,** by Gourdel and Sydow (2022), ECB Working Paper No. 2757, *published in International Review of Financial Analysis*
- **The macroprudential challenge of climate change**, Report ECB/ESRB Project Team on climate risk monitoring (2022)
- **System-wide amplification of climate risks**, ECB Macroprudential Bulletin Article (2022)
- **Contagion from market price impact: a price-at-risk perspective,** by Fukker et al. (2021), ECB Working Paper No. 2692, *submitted to International Journal of Central Banking*
- **System-wide stress tests: a deep dive into the financial system**, Banque de France Blog (2022)
- **Shock amplification in an interconnected financial system of banks and investment funds,** by Sydow et al. (2021), ECB Working Paper No. 2581 and *published in Journal of Financial Stability (2024)*
- **Amplification of climate scenarios in an interconnected financial system of banks and investment funds,** Box 8 in 'Climate-related risk and financial stability', ESRB Report (2021)