May 2023
Financial Stability Review

SAFE-CEPR

5 June 2023

Directorate General Macroprudential Policy and Financial Stability

ECB Financial Stability Review, May 2023

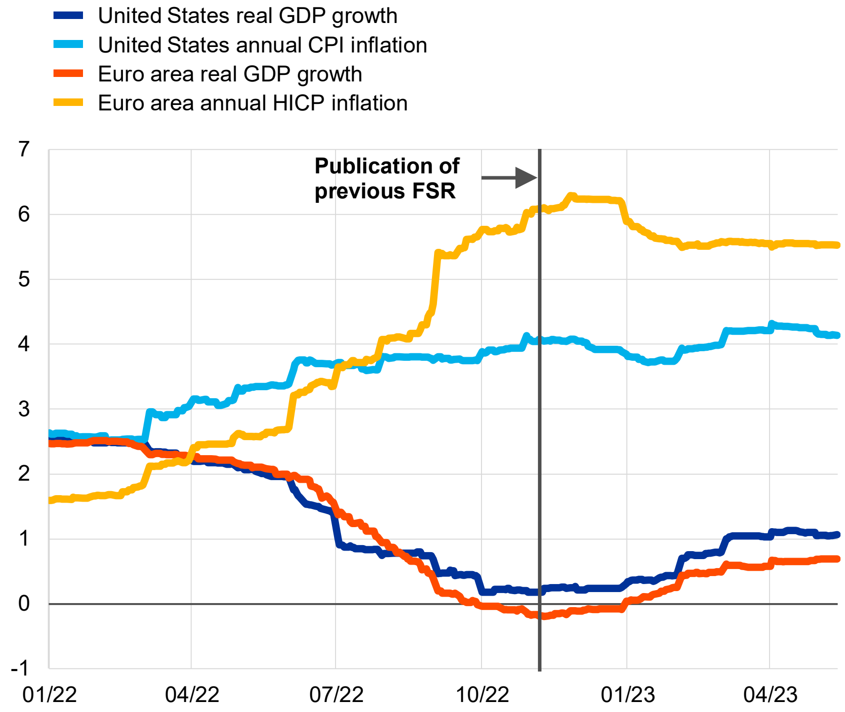
1. Euro area financial stability risk outlook

Context: A fragile macro-financial environment

- Despite some improvement at the turn of the year, weak macro-financial prospects remain a challenge
- Banking sector stresses in the US and Switzerland had limited spillover to large euro area banks, financial markets and sovereigns

Real GDP growth and inflation forecasts for the euro area and United States in 2023

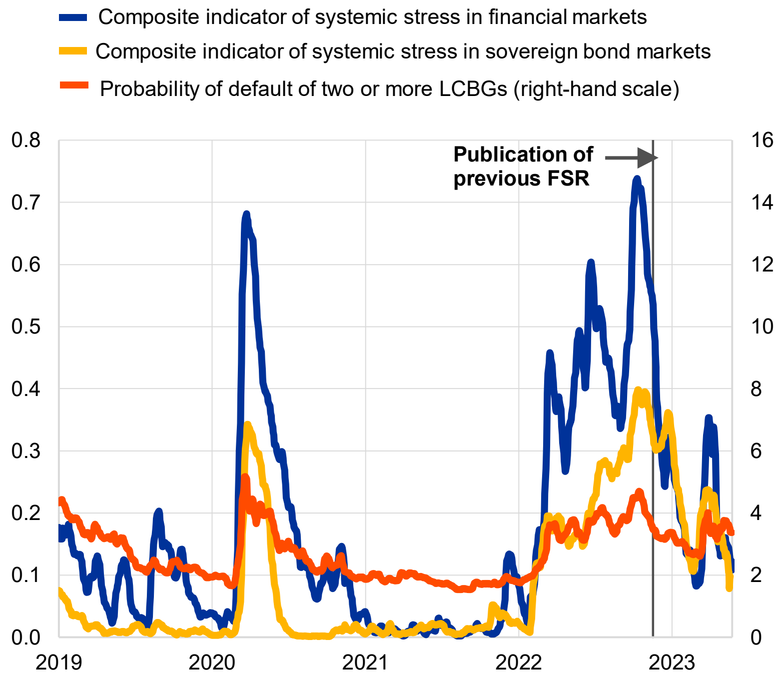
10 January 2022 - 22 May 2023, percentages



Source: Consensus Economics.

Near-term financial stress indicators for banks, financial markets and sovereigns

2 January 2019 - 23 May 2023, percentages and probability of default (banks)



Sources: Bloomberg Finance L.P., ECB and ECB calculations.

Key messages of the May 2023 FSR

Euro area financial stability outlook remains fragile

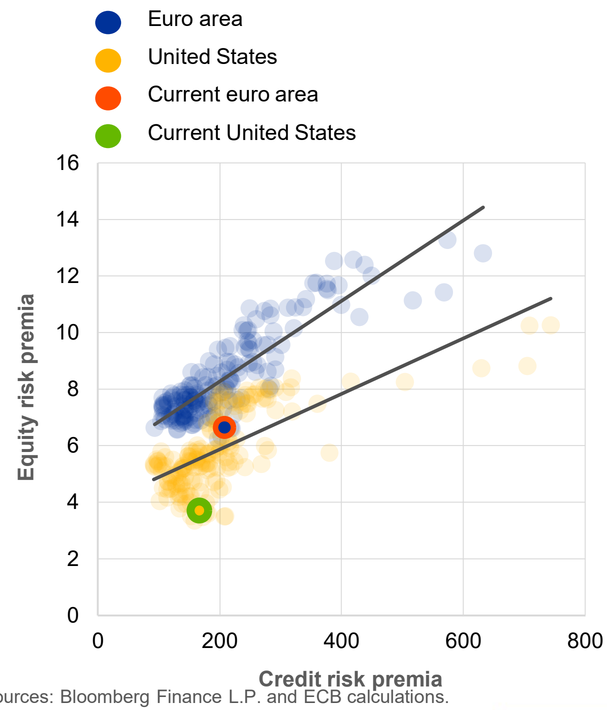
1. High valuations and low market liquidity make markets vulnerable to negative surprises
2. Resilience of corporates, sovereigns and households is being tested by higher interest rates
3. Euro area banks resilient to stress, although liquidity and asset quality concerns are surfacing

Theme 1: High valuations and low market liquidity make markets vulnerable to negative surprises

- Risk premia in financial markets are compressed, both in absolute and relative terms
- Decline in market liquidity leaves financial markets more vulnerable to adverse dynamics

Equity and credit risk premia for the euro area and the United States

3 Jan. 2009-23 May 2023, percentages, basis points

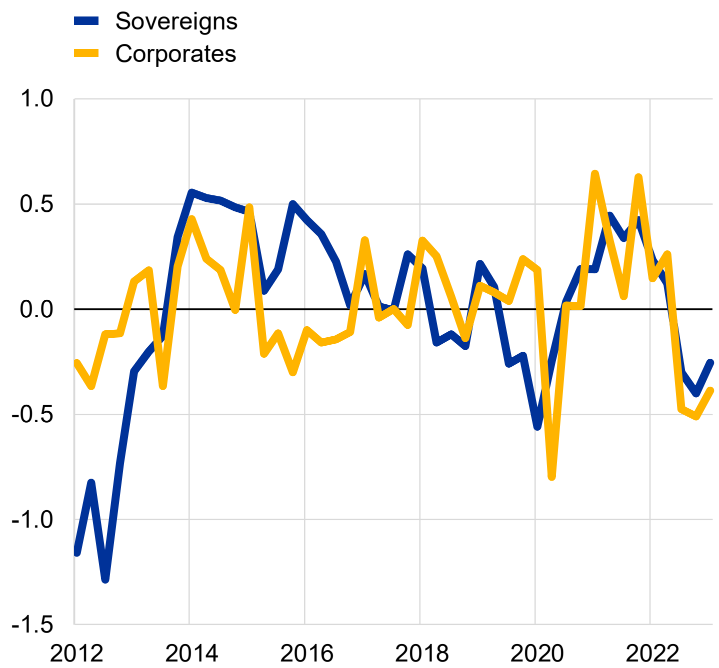


Sources: Bloomberg Finance L.P. and ECB calculations.

Notes: Risk premia calculated as 5-year cyclically adjusted price earnings (CAPE) yield for the EURO STOXX less 5Y real (inflation swap adjusted) German government bond yield; credit risk premia calculated as option-adjusted spread for EUR denominated BBB-rated corporate bonds with residual maturities of 5-7 years.

Composite indicators for euro area bond market liquidity

Q1 2012-Q1 2023, z-scores



Sources: Bloomberg Finance L.P. and ECB calculations.

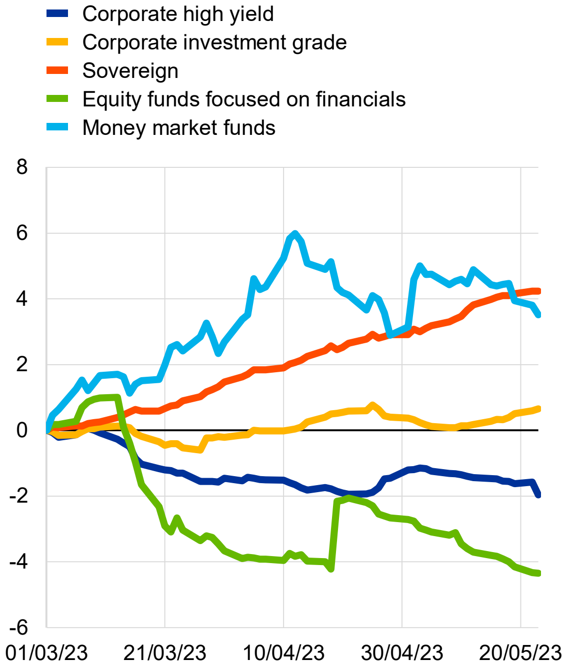
Note: Market liquidity indicators comprise tightness, immediacy, depth, breadth and resilience indicators.

Theme 1: High valuations and low market liquidity make markets vulnerable to negative surprises

- Banking sector stresses and market volatility had limited impact on investment flows, as funds are gradually de-risking
- Low liquid asset holdings remain a source of risk for forced asset sales in adverse market conditions

Cumulative daily euro area money market, bond and equity fund flows

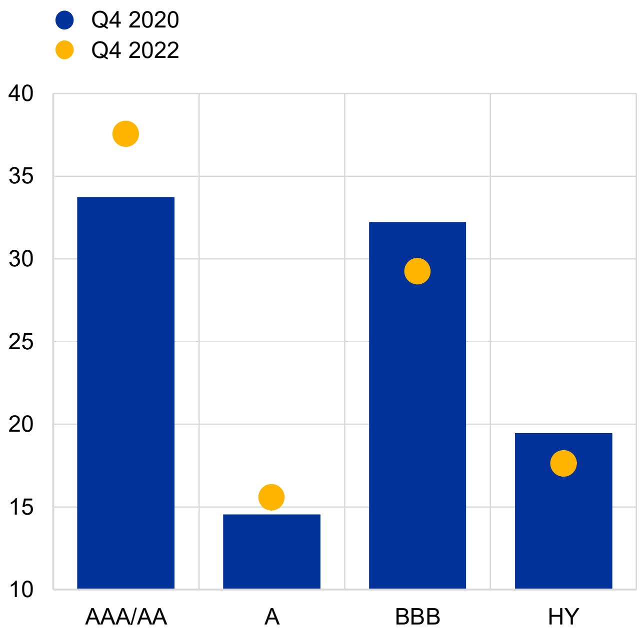
1 March-23 May 2023; percentage of total net assets



Sources: ECB, S&P Global Market Intelligence, European Commission and ECB calculations.

Share of investment funds' bond holdings in total rated bond holdings

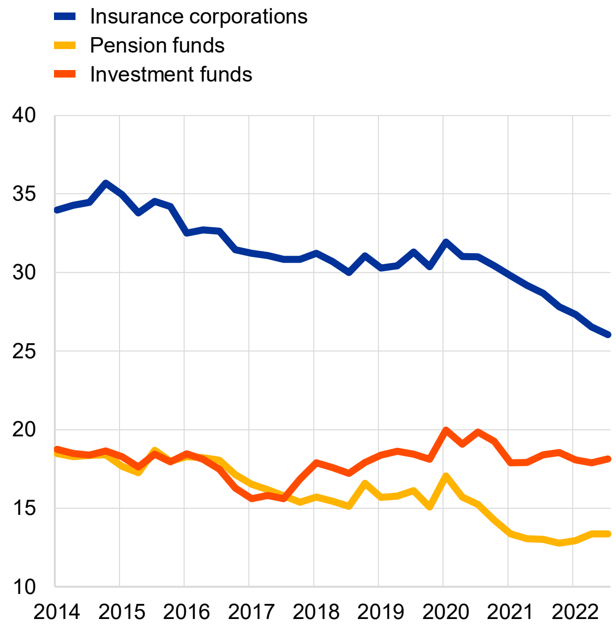
Q4 2020, Q4 2022, percentages



Sources: EPFR Global, ECB and ECB calculations.

Share of high-quality liquid assets in total securities holdings, by sector

Q1 2014-Q4 2022, percentages



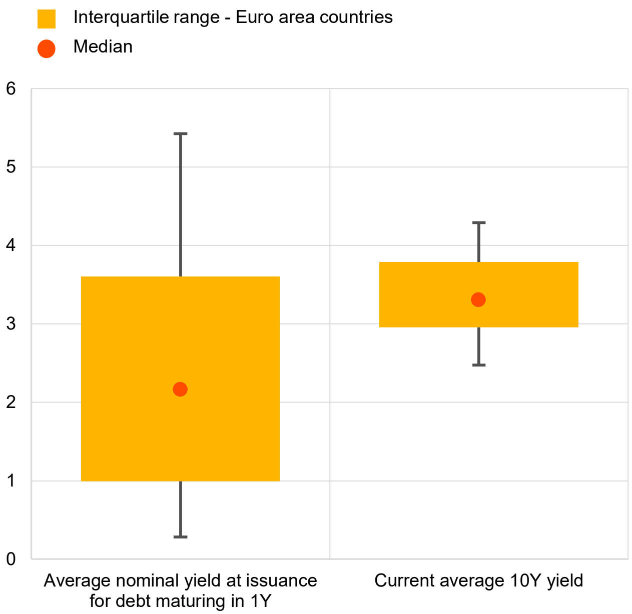
Sources: ECB and ECB calculations.

Theme 2: Resilience of corporates, sovereigns and households is being tested by higher interest rates

- Over time, higher interest rates are likely to put pressure on sovereigns, notably those with high rollover needs
- Rapidly declining interest coverage ratios of firms suggests highly indebted ones are being tested by tightening financial conditions

Sovereign bond yields on debt maturing within one year and current 10-year yield

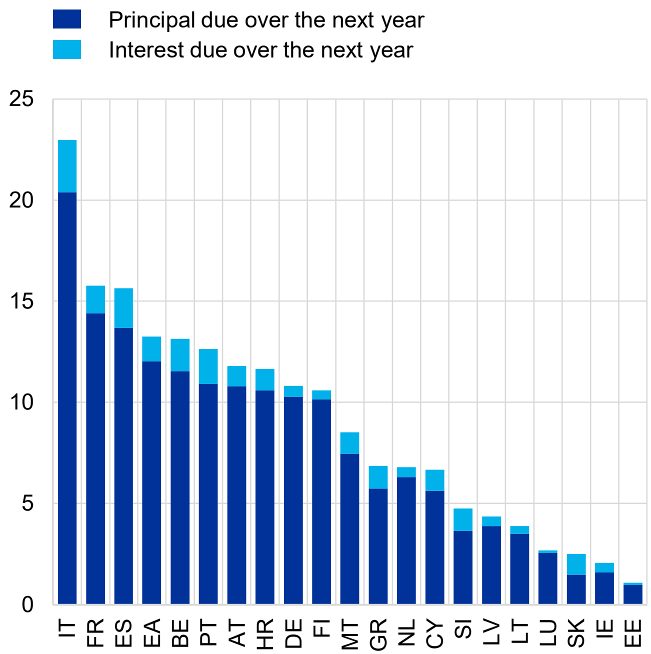
April 2023, percentages



Sources: ECB and ECB calculations.

Gross servicing of sovereign debt over the next 12 months

March 2023, percentages of GDP

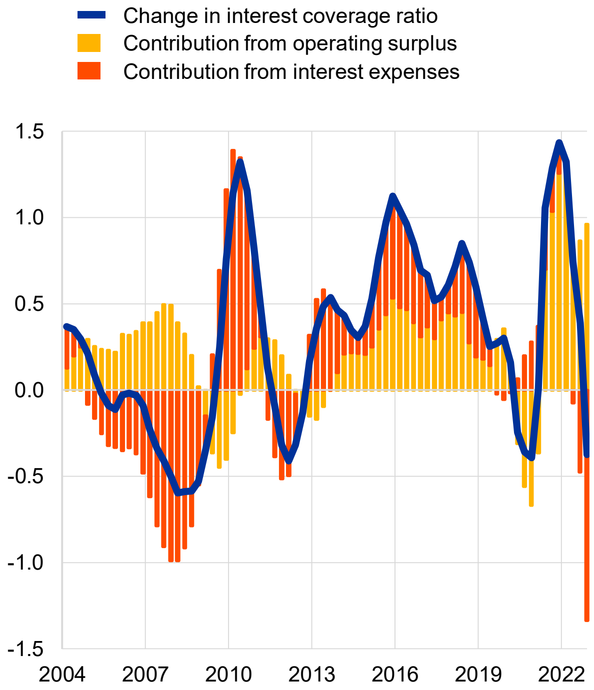


Sources: ECB and ECB calculations.

Note: Sovereign debt servicing needs capture all marketable securities instruments and all original maturities with residual maturity less than 1 years in gross terms.

Change in corporate interest coverage ratio and drivers

Q1 2004-Q4 2022, percentage point changes



Sources: ECB and ECB calculations.

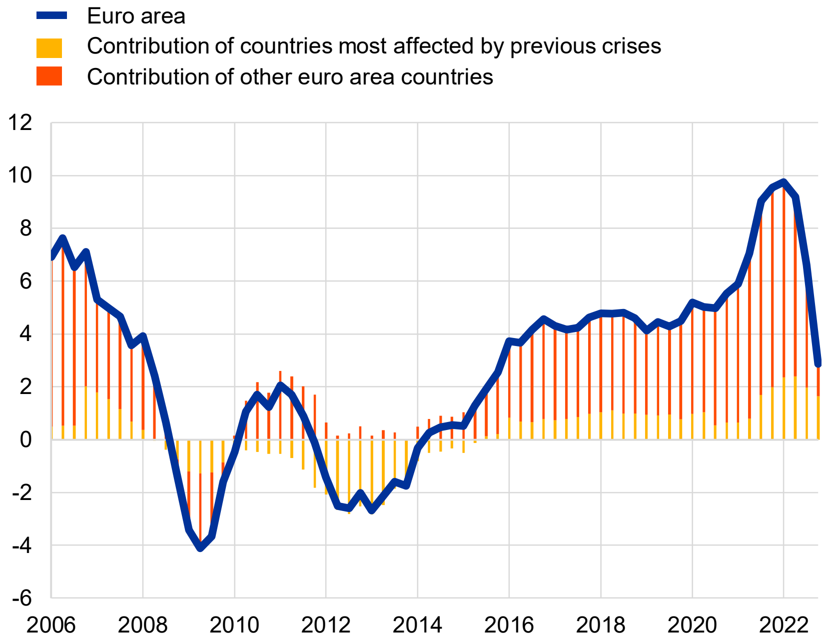
Note: the interest coverage ratio is defined as the ratio of gross operating surplus to gross interest payments before the calculation of FISIM (financial intermediation services indirectly measured).

Theme 2: Resilience of corporates, sovereigns and households is being tested by higher interest rates

- The property market cycle is turning, as higher interest rates are weighing on affordability
- Increasing challenges for commercial real estate, with cyclical factors compounding structural changes in demand

Euro area residential property price growth

Q1 2006-Q4 2022, annual percentage changes

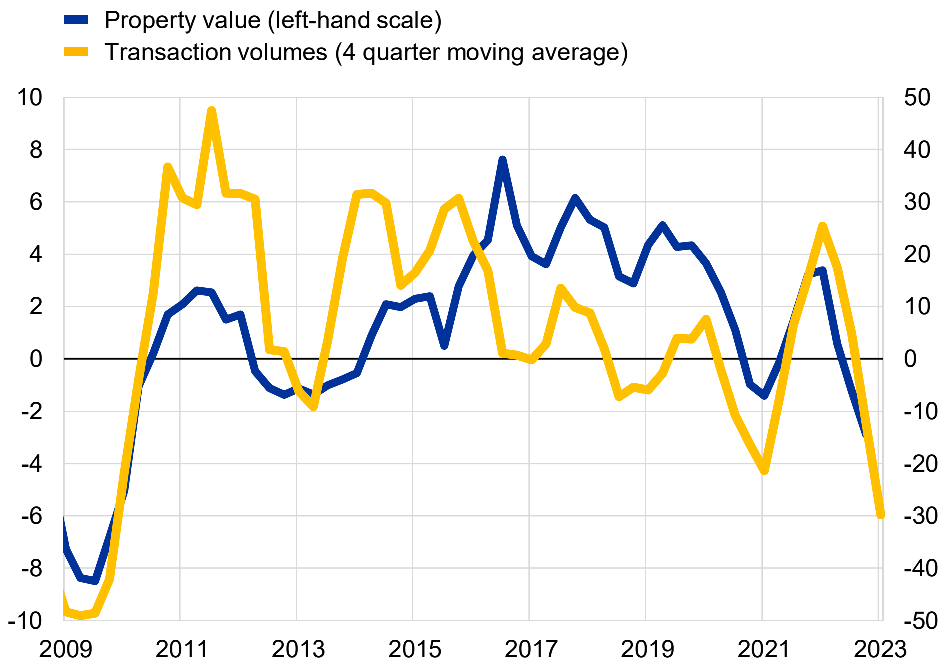


Sources: ECB and ECB calculations.

Note: Previous crises episodes include the global financial crisis and the euro area sovereign debt crisis.

Euro area commercial property values and transaction volumes

Q1 2009-Q1 2023, annual percentage changes

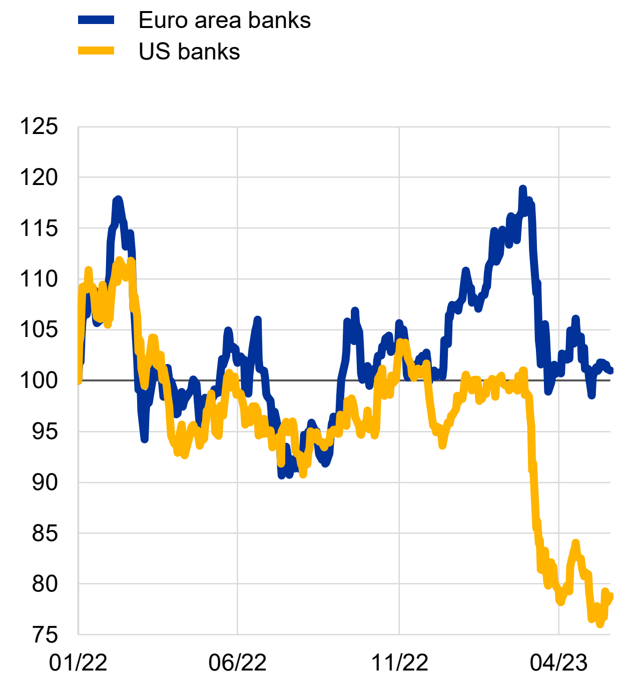


Sources: ECB, RCA and ECB calculations.

Theme 3: Euro area banks resilient to stress, although liquidity and asset quality concerns are surfacing

- Strong fundamentals at the sector level have helped insulate euro area banks from US and Swiss banking sector stresses
- Funding liquidity for euro area banks has, however, been showing signs of deterioration

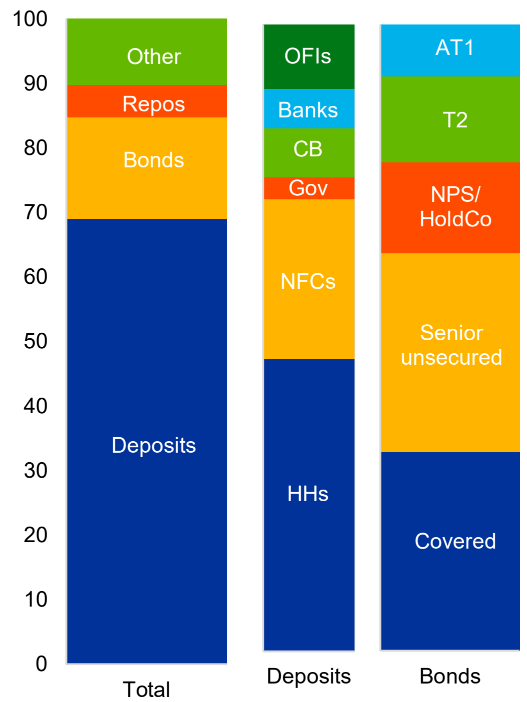
Euro area and US bank stocks relative to the broad market
3 Jan. 2022-22 May 2023, index, 3 Jan. 2022=100



Sources: Bloomberg Finance L.P. and ECB.

Note: Index relative to the broad market. Values above (below) 100 indicate bank stocks outperforming (underperforming) the market.

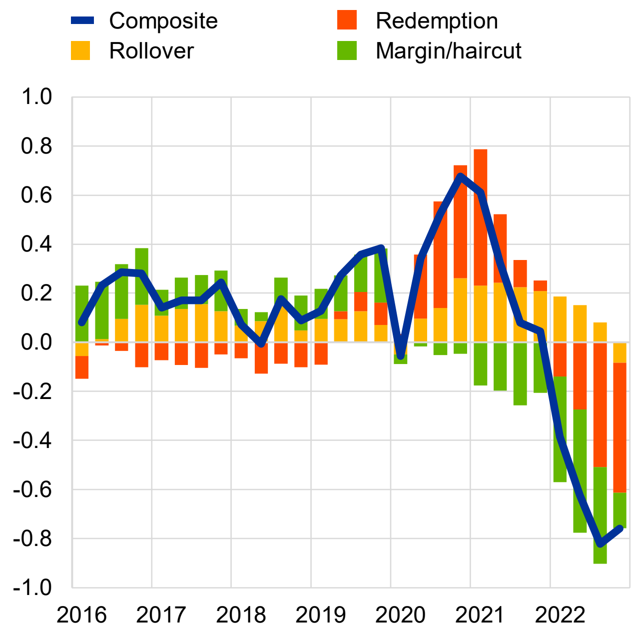
Aggregate liability structure of euro area significant institutions
Q4 2022, percentages



Sources: ECB and ECB calculations.

Note: OFIs – other financial institutions. CB – central banks. Gov. – governments. NFC – non-financial corporations. HHs – households. AT1 – Additional Tier 1 instruments. T2 – Tier 2 securities. NPS/HoldCo – senior non-preferred securities.

Composite funding liquidity index for euro area banks
Q1 2016-Q4 2022; z-scores

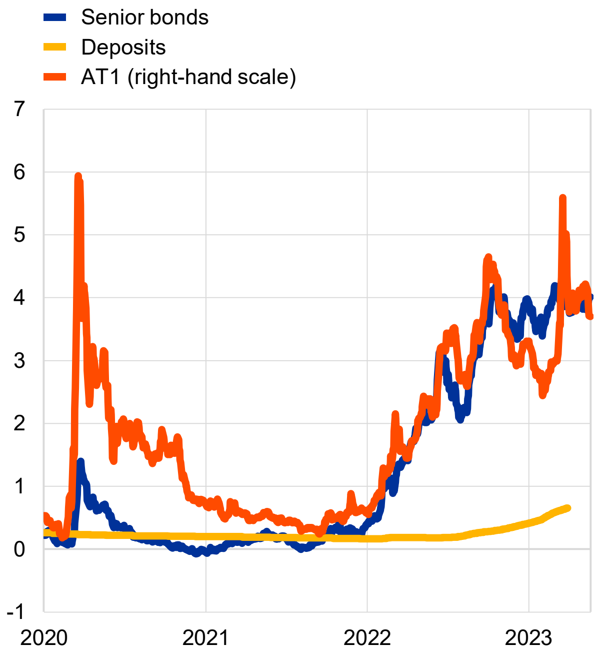


Sources: ECB, Bloomberg Finance L.P. and Refinitiv.

Theme 3: Euro area banks resilient to stress, although liquidity and asset quality concerns are surfacing

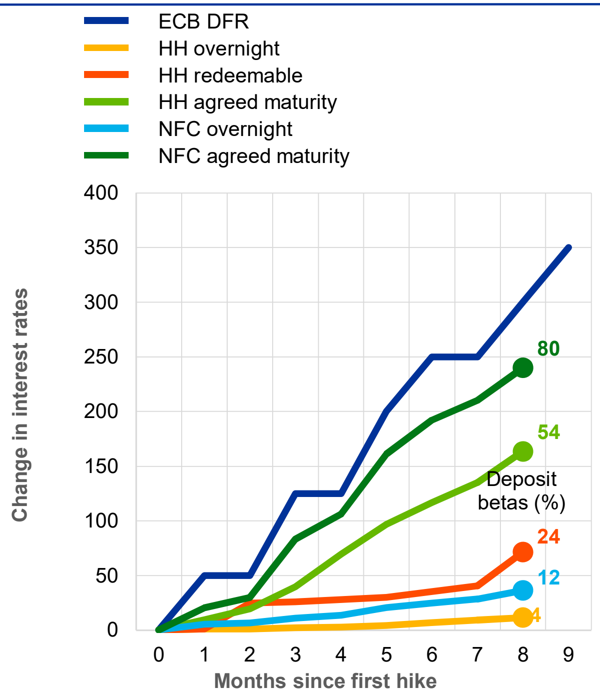
- Higher funding costs will inevitably pass through to the funding instruments of banks
- Incipient signs of deteriorating asset quality may also create challenges going forward

Bank funding costs by type of instrument
2 January 2020 - 22 May 2023, percentages



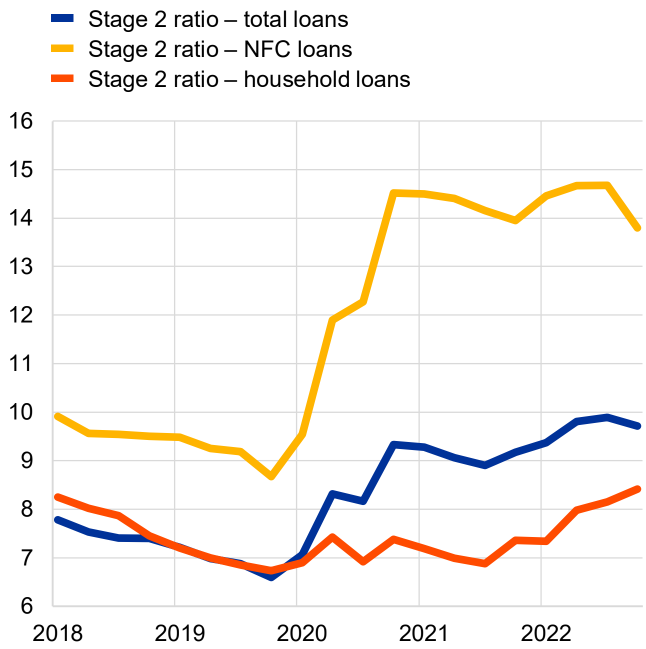
Sources: Refinitiv and ECB calculations.

Pass-through of policy interest rates to household and corporate deposit rates
basis points, deposit betas as percentages of changes in deposit facility rate (DFR)



Sources: ECB (MFI Interest Rate Statistics, MFI Balance Sheet Items, Supervisory Banking Statistics) and ECB calculations

Stage 2 ratios for total loans (with breakdown for firms and households)
Q1 2018-Q4 2022, percentages

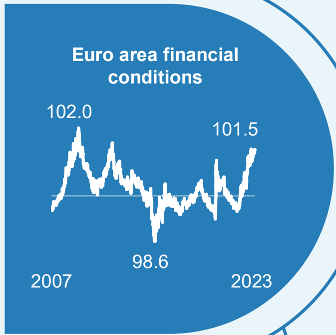


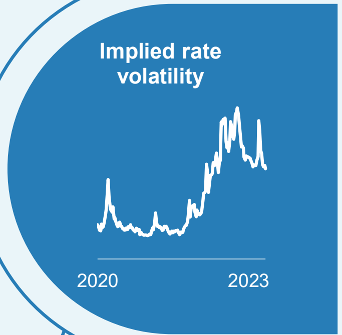
Sources: Bloomberg and ECB supervisory data (based on 102 significant institutions).

Summary

Financial conditions are testing the non-financial sector's debt servicing ability

- Inflation fuelling tighter financial conditions
- Risk of a disorderly property price correction
- Uneven corporate recovery
- Sovereign funding costs set to increase



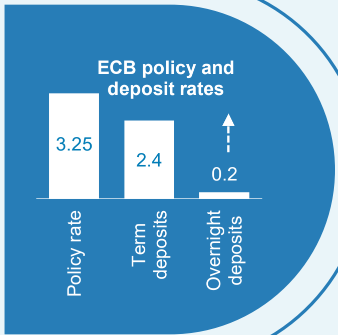


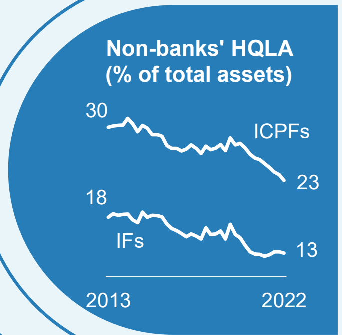
Markets remain vulnerable amid elevated rates volatility

- Sticky inflation may add volatility
- Recession fears re-emerge
- Equity risk premia may widen
- Global risks are rising

Higher bank funding liquidity and credit risk

- Looming asset quality concerns
- Muted lending activities
- Lingering cost inefficiencies
- Rising cyber risks





Economic uncertainty may raise liquidity and credit risk in non-banks

- Significant holdings of high-risk assets
- Vulnerabilities in real estate exposures
- Liquidity risks from fund outflows
- Inflation may weigh on non-life insurers

Active use of prudential policies in recent years means the euro area banking system is well-placed to withstand shocks.

Targeted macroprudential policy action and completion of the banking union could further enhance resilience.

Structural vulnerabilities in non-banks continue to require a comprehensive and decisive policy response.

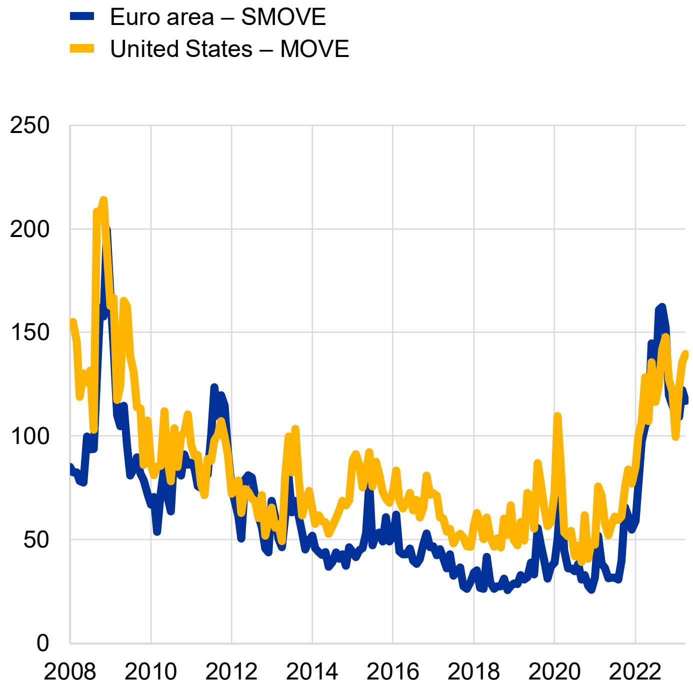
2. Gauging the interplay between market liquidity and funding liquidity

(Special feature A)

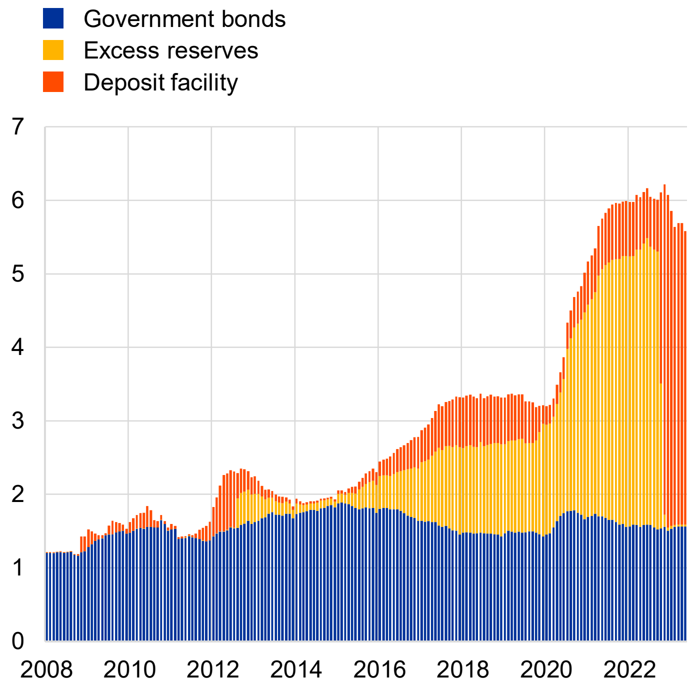
Cyclical market and funding liquidity factors turn more restrictive as policy normalises

- Volatility in bond markets has increased in an environment of high uncertainty over the path of future monetary policy.

Volatility indices for the euro area and US bond markets
Jan. 2008-Apr. 2023; indices



HQLAs of euro area banks
Jan. 2008-May 2023; € trillions



Notes: Left: SMOVE is the Merrill Lynch 1M EUR Swaption Volatility Estimate index; MOVE is the Merrill Lynch 1M UST Option Volatility Estimate Index..
Sources: Bloomberg Finance L.P., ECB calculations.

Dimensions of market liquidity and funding liquidity

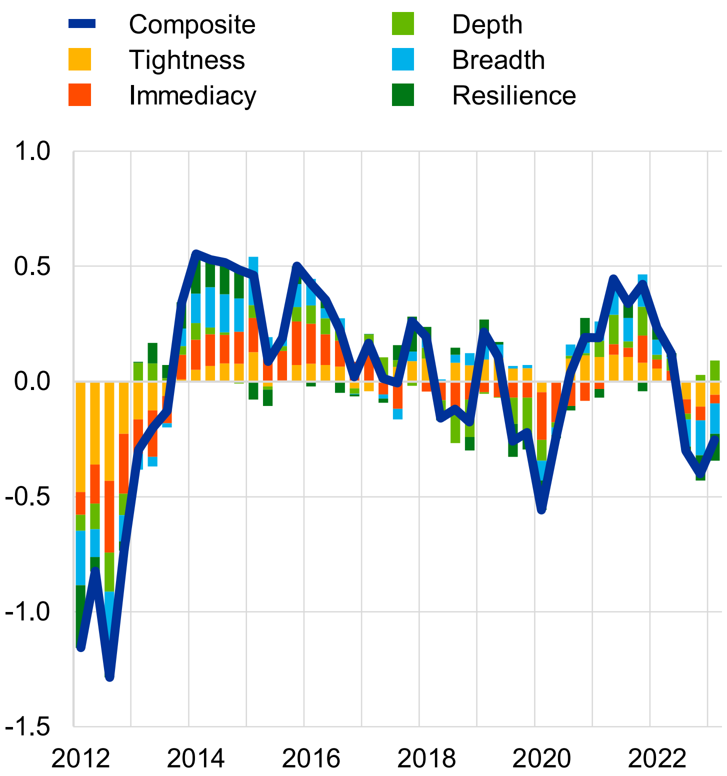
Market liquidity	Funding liquidity
• Immediacy – the pace of trade execution • Breadth and depth– the scope and size of transactions • Tightness – the cost and price impact • Resilience – the ability to remain robust during market stress	• Rollover risk – risk associated with the refinancing of debt • Redemption risk – risk associated with deposit and liquidity outflows • Haircut/margin risk – risk associated with asset/collateral valuations
Market liquidity indicator	**Funding liquidity indicator**

Sources: ECB.

Market liquidity: *Evolution of a composite indicator*

Composite indicator for market liquidity

Q1 2012-Q1 2023, z-score



- Market liquidity deteriorated as volatility increased in an environment of high uncertainty around the future monetary policy path
- *Market breadth* declined the most as bid-ask spread dispersion increased substantially due to lower willingness or capacity to hold them by the dealers
- Widened quoted spreads and reduced quoted volumes undermined *market tightness and depth*

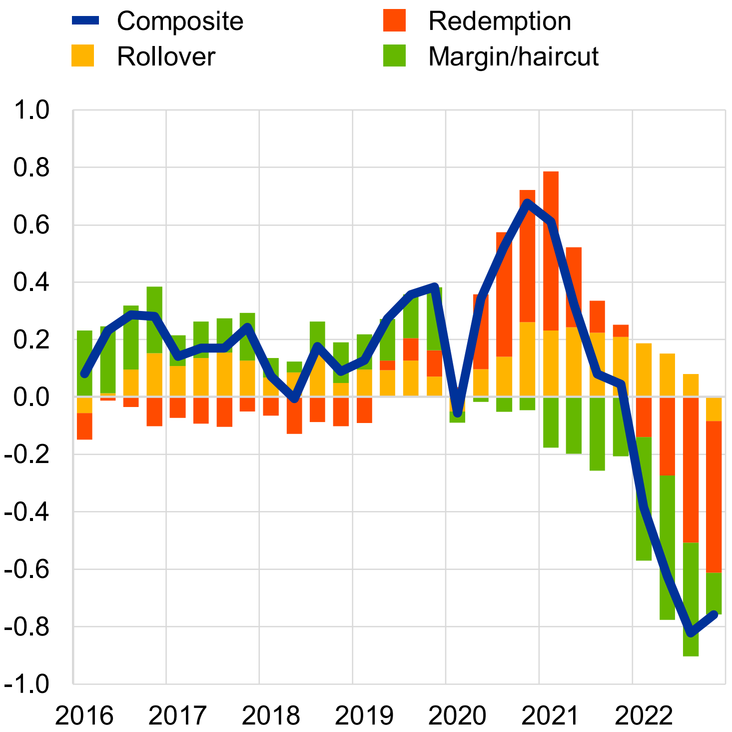
Source: iBoxx, MTS, Trax, SHSS, CSDB, ECB calculations

Note: Indicators aggregated by the dimension of market liquidity they measure. Based on various indicators: number of market makers, share of non-quoted or non-traded securities, transaction frequency, trade size, dealer inventory, quote slope, quoted volume, traded volume, turnover ratio, Amihud ratio, effective spread, spread dispersion, volume concentration, market efficiency coefficient, Bloomberg Liquidity Index, liquidity of bond collateral, NAV spread. Weights applied for aggregation are based on expert judgment on how (i) how closely an indicator measures a particular dimension and (ii) the data quality. Applying equal weights for aggregation does not change the overall picture. Composite measure calculated as simple average of aggregates for individual liquidity dimensions. Annual average for 2012 – 2019, monthly as of 2020.

Funding liquidity: *Evolution of a composite indicator*

Composite indicator for funding liquidity

Q1 2012-Q4 2022, z-score



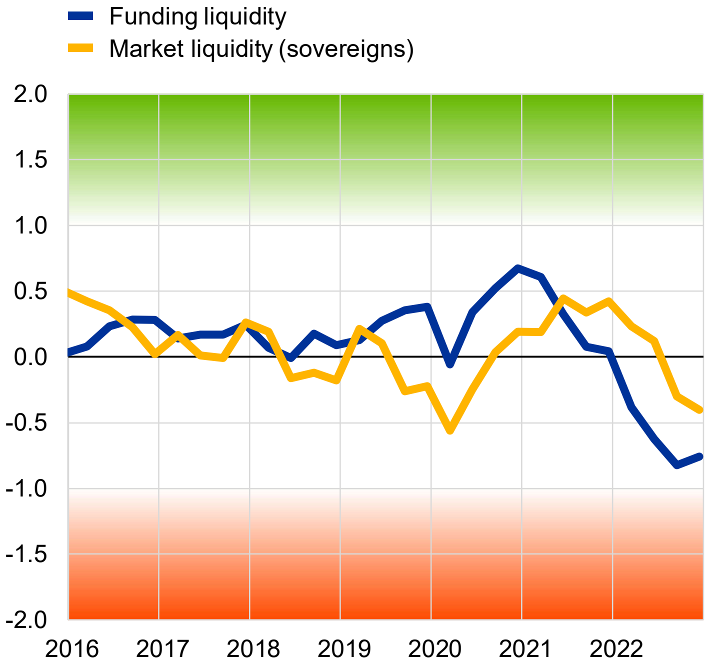
- Funding liquidity indicators have deteriorated since the start of 2022, consistent with cyclical factors
- *Margin and haircut risk* increased due to higher volatility in government bond markets and higher asset encumbrance ratios.
- *Rollover risk* is perceived lower as the increase in deposit rates remains contained so far and (interbank) money markets function largely orderly
- *Redemption risk* increased amid lower deposit growth rates and weaker relative competitiveness of deposits compared to money market rates

Source: ECB calculations based on FINREP/COREP, SDW, SHS, iBoxx

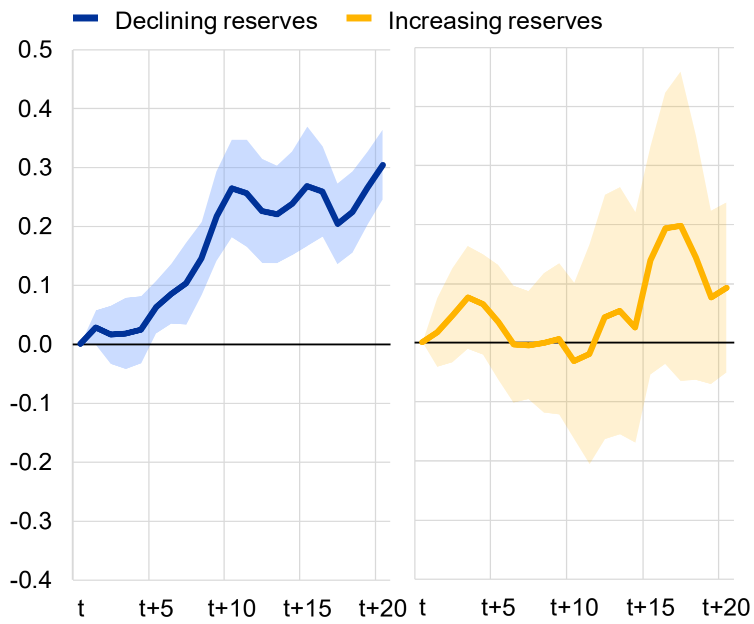
Notes: Composite liquidity indicator based on: for margin and haircut risks: asset encumbrance ratio, collateral reuse ratio, market funding encumbrance ratio, share of covered bonds in total bond issuance volume, Schatz volatility; for rollover risk: deposit flows agreed maturity, overnight and term deposit rates to households and non-financial corporations, non-deposit funding as a share of total funding, yields on covered, senior bail-inable and senior unsecured debt, repo rates, repo market depth, interbank repo volumes, the Euribor-OIS spread, position in the monetary corridor (floor versus corridor), euro-dollar cross currency basis; for redemption risk: deposit growth rates for households, non-financial corporations and non-MFIs, ESTR rate minus agreed deposit rate for households and non-financial corporations and the liquidity coverage ratio (LCR). The indicators are first aggregated for deposit rates, yields and deposit growth, then taken as a simple average over all indicators to construct the composite indicator.

Market liquidity and funding liquidity show stronger co-movement lately

Composite funding and market liquidity indices
Q1 2016-Q4 2022; z-scores



Impulse response of a standard deviation shock in funding liquidity on market liquidity
Index points, weeks



Sources: ECB, Eurostat, Bloomberg Finance L.P., Refinitiv and ECB calculations.

Notes: Panel a: for a description of the indicators, see the notes for Charts A.2 and A.3. Panel b: the chart shows impulse response functions with their respective 95% confidence bands for market liquidity – as proxied by the Bloomberg Liquidity Index for German sovereign bonds – after a shock in funding liquidity, as proxied by the EURIBOR-OIS spread. Higher values mean lower liquidity. The results are corrected for implied volatility (VSTOXX), log returns in the EURO STOXX Banks index and economic surprises (Citi Economic Surprise Index). Increasing and decreasing reserves are defined by changes in excess liquidity. Excess liquidity is defined as deposits at the deposit facility net of the recourse to the marginal lending facility. The impulse response functions were estimated using a non-linear local projection model* on weekly data between 1 January 2008 and 31 February 2023. The shaded areas represent 90% confidence intervals using Newey-West standard errors robust to heteroscedasticity and autocorrelation

(*) See Jordà, Ò., "Estimation and Inference of Impulse Responses by Local Projections", American Economic Review, Vol. 95, No 1, March 2005, pp. 161-182.

Summary: "*Gauging the interplay between market liquidity and funding liquidity*"

- **Systemic (il)liquidity risks can stem from prospect of market-funding liquidity spirals**

- **Currently, there are tentative signs for the euro area that**
  - market liquidity is deteriorating across several dimensions
  - funding liquidity is also deteriorating for *redemption risk* and *margin/haircut risk*

- **Market and funding liquidity are closely linked and reenforce each other**
  - Both market and funding liquidity deteriorated since the end of last year
  - An environment with declining reserves might create the potential for illiquidity spillovers
  - Banks might not be able to adjust the maturity of their liabilities overnight once QT is underway, and they might have exposure to liquidity claims by non-banks or non-financial corporations.

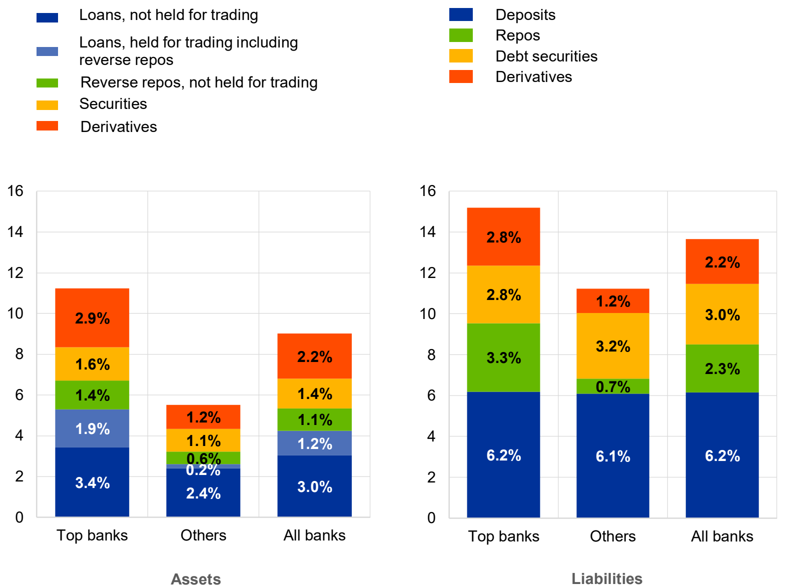
2. Key linkages between banks and the non-bank financial sector

(Special feature B)

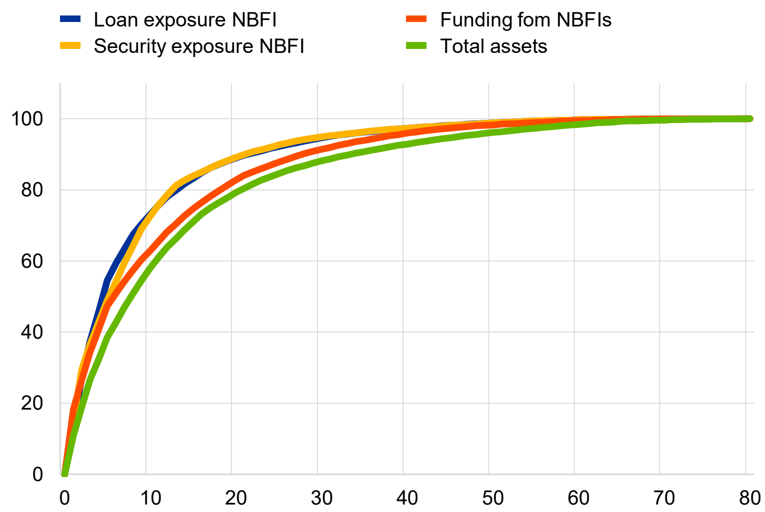
Banks’ assets and liabilities’ exposures to NBFIs are significant

- Almost 14% of bank funding comes from NBFIs and asset exposures to NBFIs represent on average 9% of bank total assets
- Large banks are more linked to NBFI as 80% of the funding and about 90% of asset exposures are concentrated in less than 20 banks

Asset- and liability-side exposures of the euro area SIs to NBFIs
(Q4 2022, lhs: percentage of total assets, rhs: percentage of total liabilities)



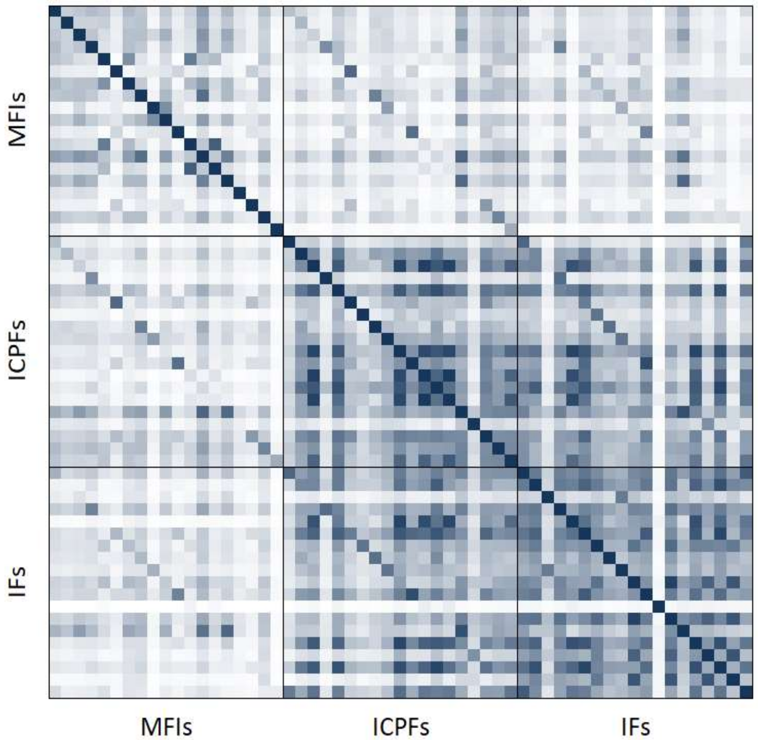
Concentration of exposures of euro area SIs to NBFIs
(Q4 2022, x-axis: number of banks; y-axis: cumulative share in exposure, percentage)



Source: Anacredit, ECB securities holdings statistics, ECB supervisory data, ECB calculations.
Notes: the analysis is based on a sample of 98 banks (lhs) and a sample of 80 banks (rhs) reporting in COREP/FINREP at consolidated level. Top banks include the 13 euro area banks that are among the ten most exposed banks to NBFIs in terms of either loan or securities exposure as depicted on the rhs. The value of derivatives is reported using carrying amounts.

Common exposures between NBFI entities and banks appear rather limited

Similarity of securities holdings for countries and sectors
(Q4 2022, Cosine similarity indicator)



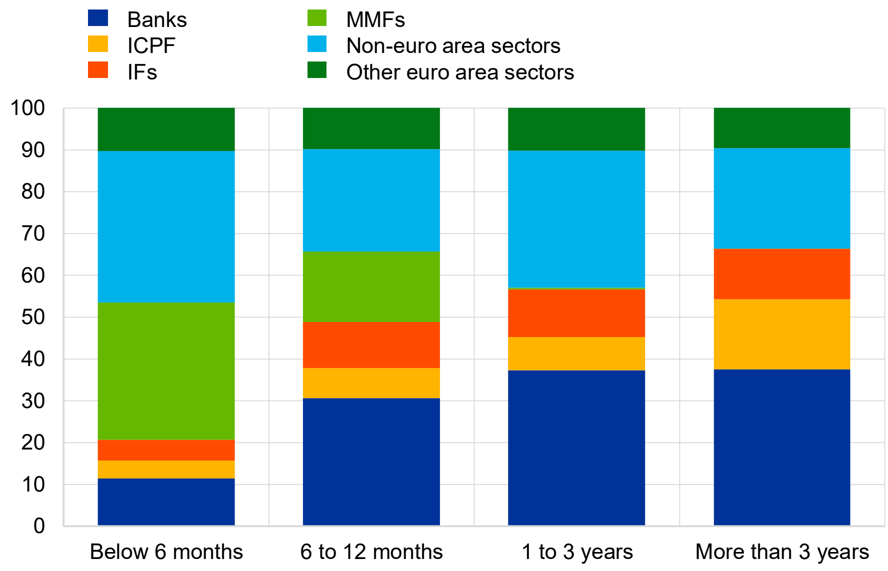
Source: ECB securities holdings statistics and ECB calculations
Notes:Based on the cosine similarity indicator, which measures the level of commonality between pairs of portfolios. The indicator equals zero (white colour) if the portfolio allocations of two country-sectors are uncorrelated and equals one (dark blue colour) if they are the same. Colours within this range quantify the degree of similarity. Assets belong to the same group if they are issued in the same country/region and by the same sector. The chart is symmetric.

- Asset price deterioration due to sell-off by one sector could imply portfolio losses for others
- Banks tend to display a greater home bias in securities portfolios than ICPFs and IFs

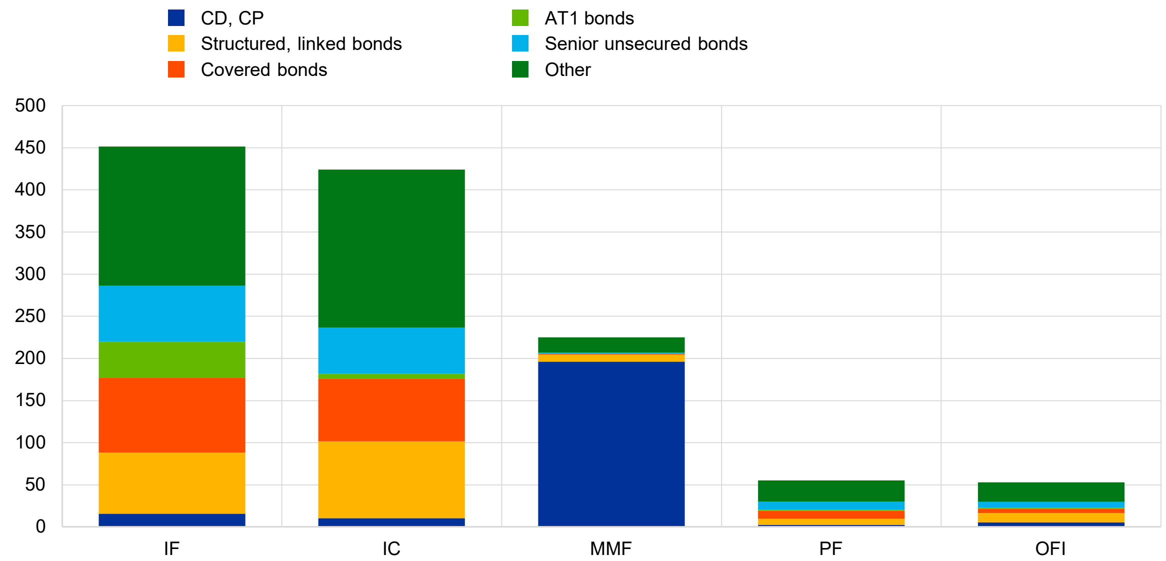
NBFI entities are significant investors in bank bonds

- NBFIs hold around 30% of bank debt securities, with a larger role in short-term funding from MMFs
- Liquidity shocks to non-banks could lead to bond sell-offs and spill-overs to other bank funding instruments

Sectoral and maturity structure of bank debt securities funding
(Q4 2022, percentages)



Euro area NBFI holdings of bonds issued by euro area banks
(Q4 2022, lhs: EUR billion, rhs: percentage)

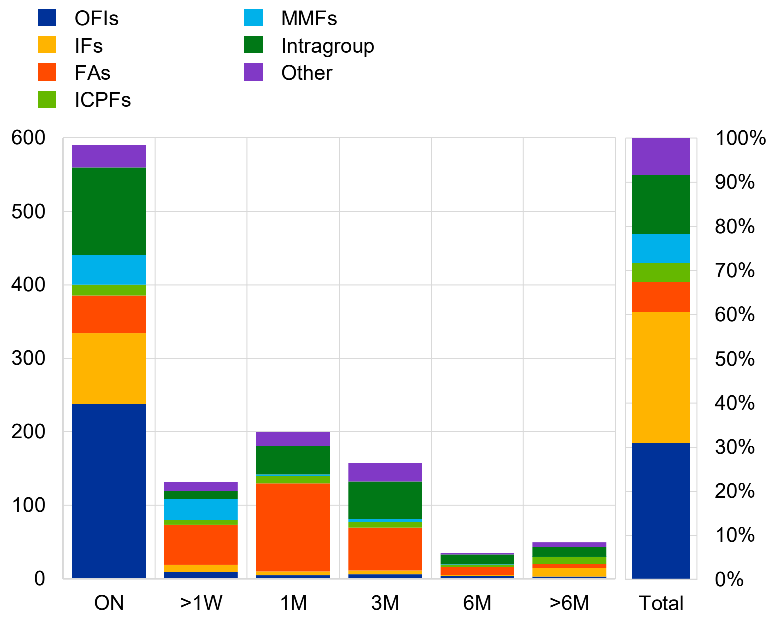


Source: Bloomberg, ECB Centralized Securities Database, ECB securities holdings statistics, ECB supervisory data, ECB calculations.

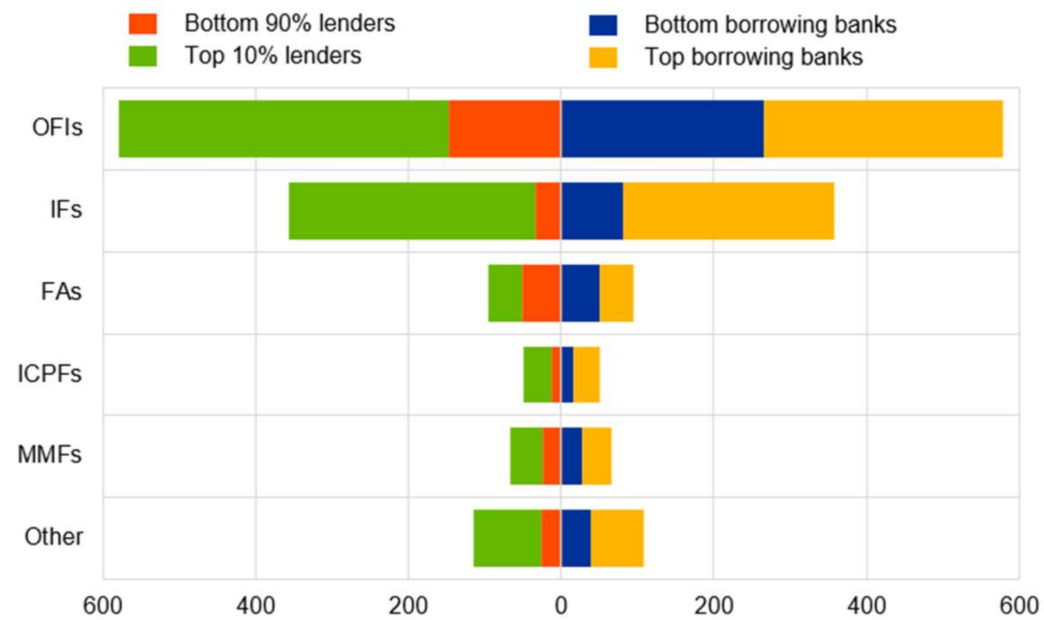
NBFI entities are the most important source of repo funding for banks

- Banks' repo funding is subject to high roll-over risk and is concentrated in few institutions
- Liquidity strains in NBFIs (e.g., outflows from investment funds) can lead to funding strains for banks

Repo funding of euro area banks from NBFIs by maturity and counterparty sector
(Q1 2023, EUR billion, percentage)



Concentration of euro area banks' repo funding from NBFIs on borrowing and lending side
(Q1 2023, EUR billion)



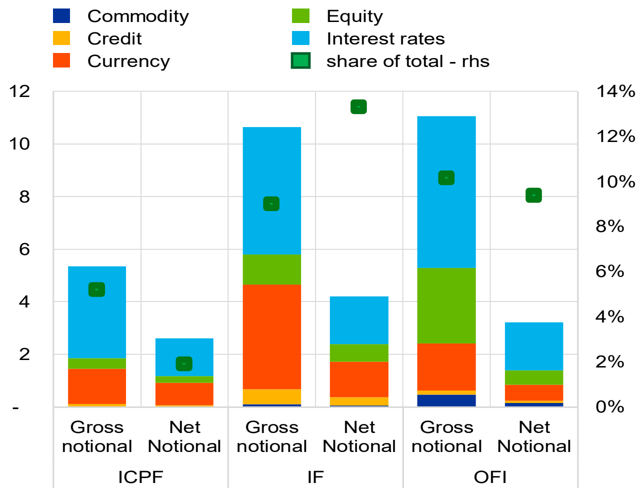
Sources: ECB Securities Financing Transactions Data Set (SFTDS) and ECB calculations.

Notes: Analysis is based on a sample of 120 euro area banks with 1529 counterparties. Data are medians over daily values in 2023 Q1. Transactions include the stock of repurchase agreements and buy-sell-backs. OFI: Other fin cial institutions; FA: Financial auxiliaries. Top borrowing banks consist of 10 systemically-important institutions.

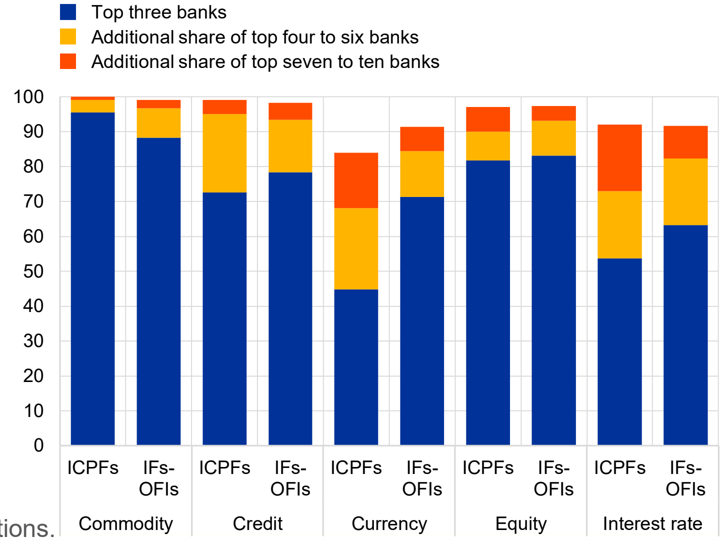
Banks provide clearing services to NBFIs and make the market for derivatives traded over the counter

- Banks trade more than 20% of their gross notional derivatives exposures with NBFIs, mainly investment funds and OFIs
- Few, large banks provide market access to NBFI for derivatives trading, with banks specialising on derivative types

Gross and net absolute notional derivatives positions of euro area banks towards NBFIs
(Q1 2023, lhs: EUR trillion, rhs: % as share of total derivatives positions)



Concentration in euro area banks derivatives exposures with NBFIs, by asset classes
(Q1 2023, % share of outstanding gross notional)



Source: ECB supervisory data, EMIR, EMIR sector classification based on Lenoci, Letizia (2021) and ECB calculations.
Notes:the analysis is based on a sample of 110 euro area banks directly supervised by the ECB and active in the euro area derivatives market which have outstanding derivatives positions with NBFIs. ICPF includes insurance companies and pension funds, IF includes investment funds and money market mutual funds, and OFI includes other financial institutions. Net notional is computed at counterparty, asset class, contract type and clearing level, and absolute values are aggregated at NBFI sector and asset class level.

Summary: “*Key linkages between banks and the non-bank financial sector*”

- Banks’ **asset and liability exposures to NBFIs are significant and concentrated** in small group of systemically important banks – **liquidity risk** being the main concern

- Stronger **liquidity and leverage management** would make NBFI entities more resilient, also benefitting and reinforcing the banking sector

ECB Financial Stability Review, May 2023

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Chapter 2 – Financial Markets

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Special Feature A – Market and funding liquidity in the context of monetary policy normalisation

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Special Feature B – Key linkages between banks and non-bank financial institutions

Special Feature C – Climate change and sovereign risk (incl. box on climate stress test)