



EUROPEAN CENTRAL BANK

EUROSYSTEM

Financial Stability Review

November 2023



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Foreword



The turbulence seen this last spring, triggered by bank failures outside the euro area, has now abated. While risks to financial stability may appear less acute, they remain elevated. Attention has shifted towards the impact of tight financial and credit conditions and weak economic prospects on the debt servicing capacity of borrowers, the ongoing correction in real estate markets and the resulting risks for banks and non-bank financial intermediaries.

While tight financing conditions help align aggregate demand with supply and ensure that inflation returns to target, they can also push over-extended borrowers into financial distress. Steep increases in interest rates are particularly challenging for borrowers carrying high levels of debt contracted at variable rates or loans that fall due for refinancing in the near term. Disposable incomes, corporate revenues and fiscal positions may suffer an additional squeeze if economic activity disappoints further or if energy prices surge over the coming winter.

Despite such risks, financial markets have remained resilient. This strength reflects expectations of a soft landing, with limited impacts on economic growth as inflation recedes to moderate levels. Sentiment could shift quickly if actual outturns were to deviate from this benign scenario, and disorderly adjustments could be amplified by non-bank financial institutions with elevated credit and liquidity risks. An escalation of the conflict in the Middle East could trigger a sharp increase in risk aversion in financial markets, unravelling the prevailing vulnerabilities. In addition to the potential adverse repercussions for the supply of energy commodities, an escalation could undermine general confidence and slow down economic growth, while pushing inflation rates up in parallel.

Although their lending margins have until now largely benefited from rising interest rates, banks are beginning to face increasing headwinds. Demand for loans is cooling exceptionally quickly and loan losses are starting to rise, albeit from low levels. The ongoing correction in real estate markets – both commercial and residential – may compound these dynamics.

This issue of the Financial Stability Review (FSR) includes two special features. The first examines different strategies employed by euro area banks to manage interest rate risk and the associated implications for bank profitability. The second looks at risks to euro area real estate markets in a turning property market cycle.

The FSR has been prepared with the involvement of the ESCB Financial Stability Committee, which assists the decision-making bodies of the ECB in the fulfilment of their tasks. The FSR promotes awareness of systemic risks among policymakers, the financial industry and the public at large, with the ultimate goal of promoting financial stability.

Luis de Guindos
Vice-President of the European Central Bank

Overview

Euro area financial stability outlook remains fragile

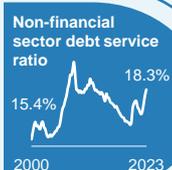
Markets remain vulnerable to adverse dynamics which could be triggered by macro-financial surprises or geopolitical risks and amplified by high credit and liquidity risk in non-banks.

Higher debt service costs are increasingly challenging indebted firms, households and sovereigns, with the real economy impact of tighter financial conditions yet to fully materialise.

Bank profitability has benefited so far from higher interest rates, but headwinds associated with deteriorating asset quality, lower lending volumes and higher funding costs lie ahead.

Weak economic outlook threatens debt servicing capacity of the non-financial sector

- Sovereign debt sustainability concerns resurface
- Higher funding costs could spur corporate defaults
- A turning labour market could hamper debt servicing
- Real estate correction may turn disorderly



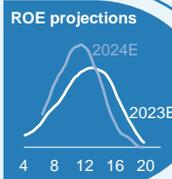
Markets are vulnerable to higher interest rates, slowing growth and geopolitical risks

- Markets see high risk of elevated inflation
- Refinancing risk rises for weaker borrowers
- Slower growth may make risk premia widen
- "AI rally" raises overvaluation concerns



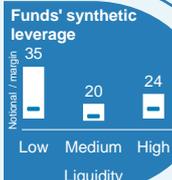
Headwinds to bank profitability as asset quality concerns and funding costs rise

- Further uptick in payment arrears possible
- Sharp decline in lending growth
- Rising cost of deposit funding
- Persistent gap between COE and ROE



Rising credit risk could add to liquidity and leverage concerns in non-banks

- Rising credit risk in portfolios
- Liquidity and leverage risks in funds persist
- Exposures to declining real estate valuations
- Insurers could face profitability challenges



On the back of active prudential policy in recent years, the euro area banking system is resilient and well-placed to face higher risks.

Targeted macroprudential policy action, regulatory reform and faithful implementation of Basel III can help to ensure durable resilience.

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

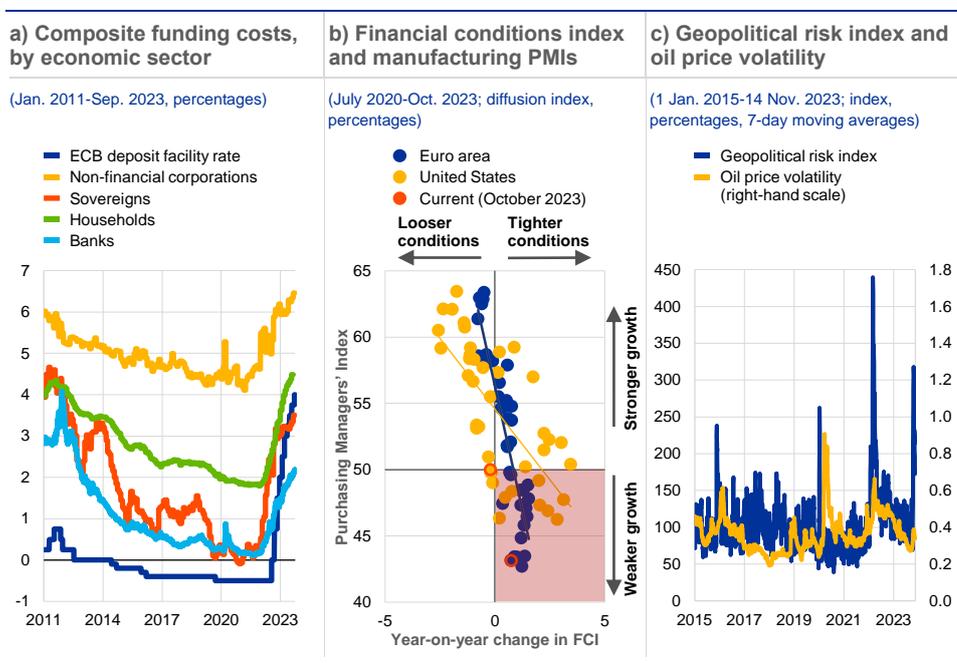
Euro area financial stability outlook remains fragile

Financial stability risks associated with higher interest rates are emerging in the context of a challenging macro-financial outlook and geopolitical tensions.

Financial markets quickly shook off the shock triggered by the bank failures in the United States and Switzerland in March this year and the related expectations of an earlier end to the monetary tightening cycle. Since then, financial stability concerns have pivoted towards the implications of upside risks to inflation and downside risks to growth. Rising ECB policy rates have translated into rising funding costs for all sectors of the economy (Chart 1, panel a). The associated tighter financial and credit conditions are being transmitted to economic activity (Chart 1, panel b). This holds particularly true for the euro area where – unlike the United States – economic outcomes have surprised on the downside since the summer. However, as duration lengthened in the financial system and the real economy during the low interest rate era, a major part of the impact of monetary tightening is yet to materialise, which will pose future challenges for financial and non-financial sectors alike. These concerns are amplified by the recent flare-up of geopolitical tensions in the Middle East. They add to the uncertainty surrounding the macro-financial outlook (Chart 1, panel c), not only because of possible adverse repercussions for energy commodities supply, should the conflict escalate further, but also given their potential to spark risk aversion in financial markets and undermine confidence in the real economy.

Chart 1

Euro area financial stability outlook remains fragile as tighter financing conditions are increasingly propagating to the real economy and geopolitical tensions intensify



Sources: Caldara and Iacoviello*, Bloomberg Finance L.P., S&P Global Market Intelligence, ECB (MIR, PDF) and ECB calculations. Note: Panel a: Non-financial corporations: weighted average of the costs of bank borrowing, market-based debt and equity, based on the respective amounts outstanding. Sovereigns: ten-year government benchmark bond yield. Households: lending rates for new loans for house purchase, consumer credit and other household loans weighted by their respective outstanding credit amounts. Banks: volume weighted average of the cost for banks of collecting deposits and the cost for banks of issuing bonds, weighted by the respective outstanding amounts. Panel b: Goldman Sachs' financial conditions index (FCI) is a weighted average of risk-free interest rates, exchange rates, equity valuations and credit spreads, with weights corresponding to the direct impact of each variable on GDP. *) Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225.

Against this backdrop, three key themes shape the outlook for euro area financial stability.

First, markets and non-banks remain highly vulnerable to adverse macro-financial and geopolitical surprises and associated shifts in market sentiment. Second, tighter financial and credit conditions are increasingly translating into higher debt service costs, weakening the resilience of firms, households and sovereigns. Third, growing vulnerabilities in the real economy can be expected to gradually impair banks' asset quality, and this, together with lower lending volumes and rising funding costs, may challenge their profitability outlook.

Financial markets and non-banks are vulnerable to adverse macro-financial surprises

The pricing in financial markets appears to be predicated on optimistic expectations regarding the future macro-financial outlook and hence remains vulnerable to negative surprises.

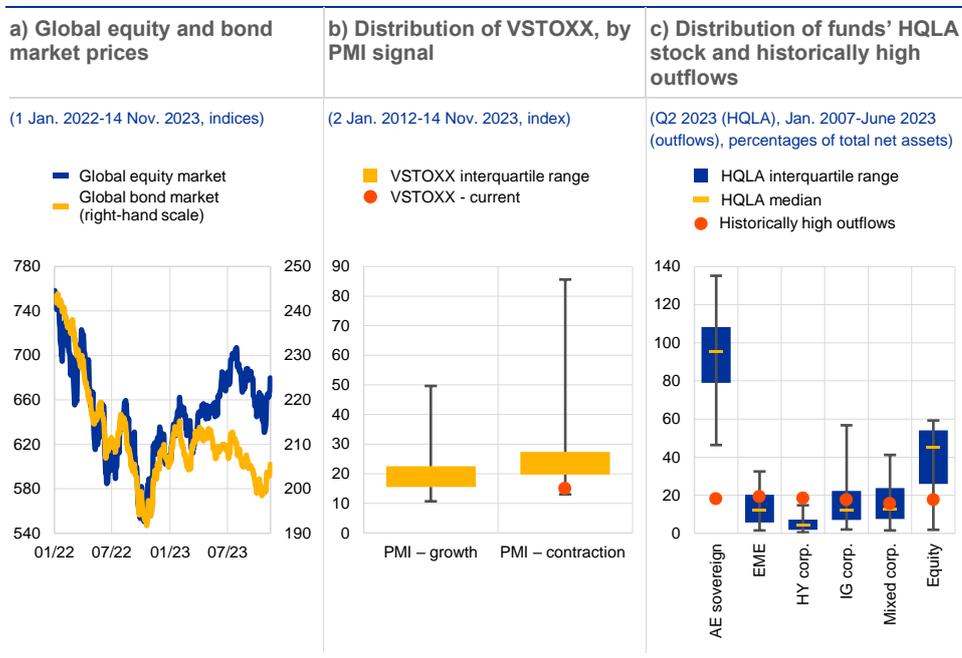
Up until August, expectations that the monetary tightening cycle was nearing its end, with a soft-landing scenario for economic growth and inflation, served to lower market volatility and support investor sentiment (**Section 2.1**). Global equity markets performed particularly strongly after the turmoil triggered by stresses in the US and Swiss banking sectors in March (**Chart 2**, panel a) – albeit driven to a large extent by a US tech industry that has benefited from enthusiasm regarding the opportunities offered by artificial intelligence (**Section 2.3**). In the euro area equity market, volatility has been out of sync with the current weak phase of the economic cycle (**Chart 2**, panel b). At the same time, corporate credit spreads have remained relatively compressed, while liquidity conditions in sovereign and corporate bond markets have improved. In September, the transition of financial markets towards expectations of higher-for-longer rates gained momentum and was accompanied by rising term premia. This led to a rapid increase in long-term government bond yields and higher equity market volatility, which started to weigh on riskier asset valuations as well. However, the market correction proved to be short-lived, as investor confidence benefited again from a downside surprise in inflation.

Risk sentiment in the markets remains fragile and highly sensitive to further surprises regarding the outlook for inflation, growth and, by extension, the path of monetary policy.

If inflation were to prove more persistent than currently anticipated, this could lead to a further increase in long-term interest rates. Coupled with weaker than anticipated economic growth, this, in turn, could trigger a rise in market volatility and risk premia, increasing the likelihood of credit events materialising. Adverse market dynamics could be triggered by unexpected geopolitical shocks and amplified by vulnerabilities associated with the increased digitalisation of financial services (**Box 3**), heightened leverage in equity option markets (**Box 2**) and possible forced asset sales by non-bank financial institutions.

Chart 2

Investor optimism leaves markets vulnerable to disorderly repricing, especially if volatility jumps and funds with low liquidity buffers are forced to sell assets



Sources: Bloomberg Finance L.P., S&P Global Market Intelligence, LSEG Lipper IM, ECB (CSDB) and ECB calculations. Notes: Panel a: global equity markets are reflected by the MSCI All Country World Index and global bond markets by the Bloomberg Barclays Multiverse Index. Panel b: based on Composite PMI with readings above 50 indicating growth. The whiskers correspond to the minimum and maximum values observed. Panel c: the box plots show the distribution of fund-level stocks of high-quality liquidity assets (HQLA), calculated according to the [Basel Liquidity Coverage Ratio Requirements for HQLA](#). Whiskers refer to the 5th and 95th percentiles of the distribution respectively. HQLA Level 1 assets include cash, cash equivalents and qualifying government bonds, while Level 2A and Level 2B assets include less liquid assets such as qualifying covered bonds, corporate bonds, asset-backed securities and equities. The stock of HQLA is calculated by applying a haircut of 0% to cash and Level 1 assets, 15% to Level 2A assets and 40% to Level 2B assets. The red dots show the worst outflows for each fund category – calibrated in line with ESMA's stress simulation for investment funds* – as the 5% expected shortfall, which averages monthly fund-level net flows experienced between January 2007 and June 2023 as a sample of bond and equity funds below the 5th percentile of the distribution. AE stands for advanced economies; EME stands for emerging market economies; HY stands for high yield; IG stands for investment grade. *) See ESMA, "Stress simulation for investment funds", *ESMA Investment Report*, 2019.

Non-banks continue to face high credit risks, despite some rebalancing of their investment portfolios towards safer assets. As of mid-2023 cumulative purchases of investment-grade sovereign and corporate debt by the non-bank financial intermediation (NBFI) sector over one year have been close to the record highs observed during the post-pandemic recovery ([Section 4.1](#)). Shifts by investors towards safer fund types helped mitigate aggregate credit risk in the sector thanks to reduced incentives to search for yield. That said, high economic uncertainty and tighter financial conditions have contributed to a deteriorating credit outlook for several issuers, exposing the NBFI sector to possible revaluation losses stemming from downgrades and an increase in default risk. In particular, some non-banks remain heavily exposed to interest rate-sensitive sectors, such as highly indebted corporates and real estate. Deteriorating corporate fundamentals and the ongoing correction in real estate markets could expose non-banks investing in these sectors to revaluation losses and investor outflows.

Low liquid asset holdings could expose investment funds to the potential risk of forced asset sales if macro-financial outcomes deteriorate. Overall liquidity buffers remain relatively low across the investment fund sector ([Section 4.2](#)), although aggregate figures mask large differences across and within fund types. This

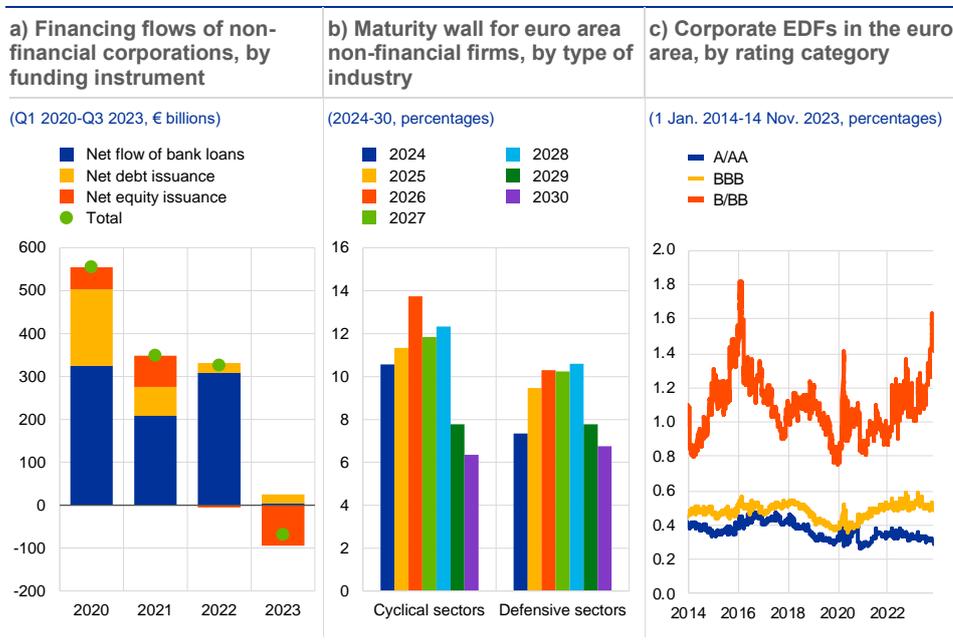
suggests that there is a more vulnerable cohort of funds with inadequate liquidity buffers to meet a redemption shock equivalent in size to the worst recorded outflows (**Chart 2**, panel c). As such, the risk remains high that, in the event of sudden liquidity needs, some funds could amplify adverse market dynamics by exhibiting procyclical selling behaviour. Granular fund-level data on open-ended bond funds suggest that their liquidity resilience to severe redemptions has deteriorated compared with levels observed before the pandemic (**Box 6**). This could introduce risks to wider financial stability, especially when low liquidity buffers coincide with relatively high leverage (**Section 4.2**). All in all, this highlights the importance of strengthening the resilience of the NBFIs sector from a macroprudential perspective (**Chapter 5**).

Tighter financial conditions are testing the resilience of euro area firms, households and sovereigns

Euro area corporate profitability has held up well, but higher interest rates are weighing on the debt servicing capacity of more vulnerable firms. High profit margins have continued to underpin corporate profitability, but activity has been slowing in several sectors (**Section 1.3**). Tighter financing conditions, in terms of both the cost and the availability of credit, coupled with the uncertain business outlook, have led to a material drop in firms' external financing (**Chart 3**, panel a). As the stock of loans continues to reprice, higher debt service costs could challenge cyclical sectors more than defensive sectors. The redemption profiles show that cyclical sectors are generally more exposed to refinancing risk, as a larger share of their bonds matures in the short term (**Chart 3**, panel b). Rollover risk might be further accentuated if the economy were to weaken at the same time. Weaker macro-financial conditions have already started to translate into higher corporate insolvencies: in aggregate, these have now surpassed pre-pandemic levels, albeit unevenly across sectors. While this partly reflects the unwinding of the insolvency backlog that accumulated during the pandemic, defaults are likely to rise even more if yields continue increasing or if energy prices start soaring again, for example. This is already reflected in rising expected default frequencies, in particular for the more vulnerable high-yield segment (**Chart 3**, panel c). Looking ahead, a sharper economic slowdown than currently anticipated could prove challenging for euro area firms, especially if they have high debt levels, subdued earnings and low interest coverage ratios.

Chart 3

Tighter financial conditions are increasingly challenging the debt servicing capacity of firms, given high short-term debt servicing needs and rising corporate insolvencies



Sources: Bloomberg Finance L.P., Moody's Analytics, Intercontinental Exchange, ECB (BSI, CSEC) and ECB calculations.
Notes: Panel b: figures include corporate bonds that are not in default and are issued by euro area entities. Cyclical sectors include consumer discretionary, technologies, energy, materials, industrials and communications. Defensive sectors include consumer staples, health care and utilities. Panel c: EDFs stands for the expected default frequencies of non-financial corporations.

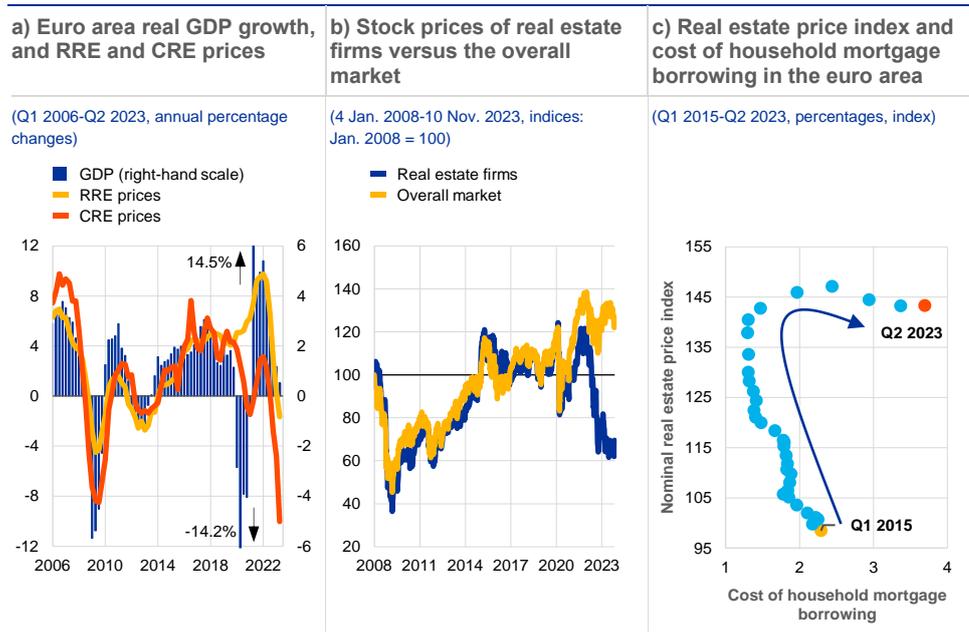
Real estate firms are particularly vulnerable to losses in the light of the ongoing downturn in euro area commercial real estate markets. In an environment of tighter financing conditions and elevated macro-financial uncertainty, commercial real estate (CRE) prices have continued to decline (Chart 4, panel a), with subdued market activity hampering price discovery. The effects of higher interest rates have been compounded by structurally lower demand for some CRE assets following the pandemic. In fact, demand for office space deteriorated sharply in the second quarter of 2023, particularly in the non-prime segment where concerns about the environmental footprint of buildings play a more important role. This mix of cyclical and structural challenges has resulted in real estate firms suffering significant rating downgrades in recent months (Section 1.5). Conditions have been particularly challenging for property developers faced with falling sales prices, contracting order books and rising input costs. As such, the stock prices of real estate firms have continued to underperform the overall market by a large margin (Chart 4, panel b). From a systemic risk perspective, adverse CRE market outcomes on their own are unlikely to cause losses that would take the euro area banking sector below minimum capital requirements, but a significant deterioration in CRE asset quality could pose challenges for some banks that are more heavily exposed to CRE loans (Special Feature B).

Euro area households, especially those with lower incomes and in countries with mainly floating-rate lending, are increasingly being challenged by higher interest rates. Resilient labour markets as well as government support measures and excess savings accumulated during the pandemic have so far mitigated euro

area household vulnerabilities. However, real household incomes and consumption remain under pressure, especially in the lower income segments. At the same time, higher interest rates have begun to feed through to higher debt service costs, notably in countries where the share of variable-rate lending has historically been very high ([Section 1.4](#)). Going forward, households may see their debt servicing capacity erode if energy prices soar again, interest rates remain higher for longer and/or labour market conditions deteriorate significantly.

Chart 4

Residential and commercial real estate markets have continued their simultaneous downturn, as higher funding costs weigh on affordability



Sources: Bloomberg Finance L.P., Eurostat and ECB (MNA), ECB (MIR, RESC) and ECB calculations.
 Note: Panel b: real estate firms are represented by the STOXX Europe 600 Real Estate Price and the overall market by the STOXX Europe 600.

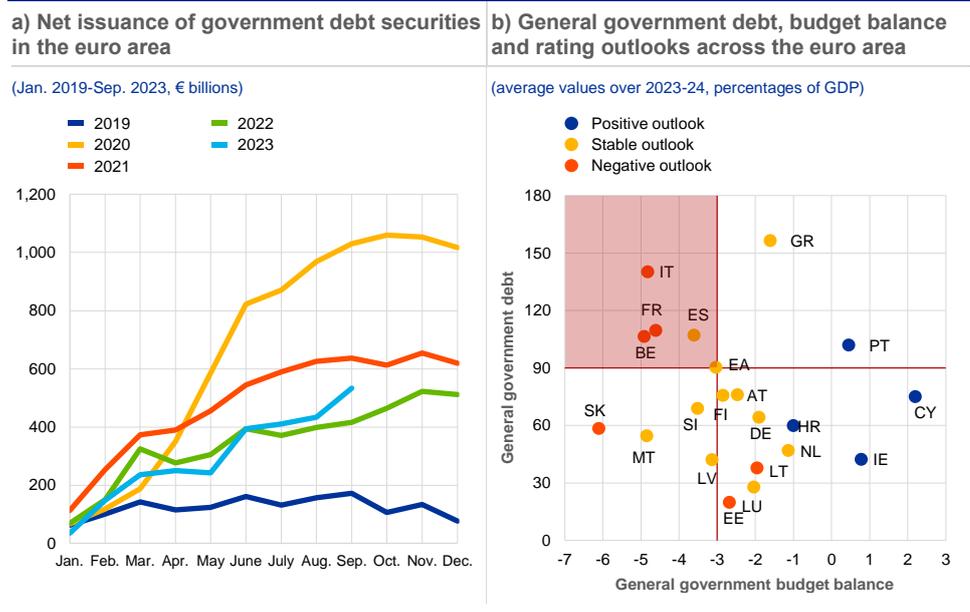
The ongoing correction in residential real estate (RRE) markets may compound pre-existing vulnerabilities of euro area households. Euro area RRE markets continued to cool in the first half of 2023 ([Chart 4](#), panel a), with prices already starting to fall in a number of countries. The steep increase in borrowing costs, coupled with deteriorating consumer confidence and housing market prospects, has had a negative impact on the demand for mortgages. This, together with a substantial tightening of credit standards by banks, led to a sharp drop in new lending ([Section 1.5](#)). On the supply side, challenging housing market conditions are reflected in weak construction confidence and a sharp drop in the issuance of new residential building permits. Despite declining prices in some euro area countries, valuations still seem stretched, suggesting that further falls are possible. In particular, RRE markets could come under severe stress should a material weakening of the labour market add to the affordability challenges arising from tighter conditions in mortgage markets ([Chart 4](#), panel c, [Special Feature B](#)).

Medium-term sovereign vulnerabilities are rising, particularly for jurisdictions where debt levels are already high. With maturing public debt being rolled over at

higher interest rates, sovereign interest payments have started to rise, mainly in countries where short-term refinancing needs are higher. Sovereign issuance activity in primary markets has remained brisk this year (Chart 5, panel a). Increased issuance by euro area sovereigns has been smoothly absorbed by the market despite reduced Eurosystem asset purchases as a result of quantitative tightening. Demand might have been supported by the higher yields offered by sovereign bonds (Box 1). Nevertheless, fiscal fundamentals remain fragile in a number of countries in the light of weaker economic growth prospects, given elevated debt levels and continued high budget deficits (Chart 5, panel b). So far, spreads in the government bond market have remained contained, as many sovereigns managed to secure cheap financing at longer maturities during the period of low interest rates. However, risks of fiscal slippage could reignite sovereign debt sustainability concerns and compel market participants to reassess sovereign risk. Any unwarranted, disorderly sovereign debt market dynamics that may pose a serious threat to the transmission of monetary policy across the euro area can be countered by the ECB's Transmission Protection Instrument if the necessary conditions are fulfilled.

Chart 5

Short-term sovereign stress has remained contained so far, but higher funding costs and less prudent fiscal policies could reignite sovereign debt sustainability concerns



Sources: ECB (GFS), Moody's Analytics, Fitch Ratings, S&P Global Market Intelligence, European Commission (AMECO) and ECB calculations.
Notes: Panel b: rating outlook refers to the average from Moody's Analytics, Standard & Poor's and Fitch and represents the outlook as at 14 November 2023. The vertical red line represents the Maastricht government deficit criterion of 3% of GDP. The horizontal red line represents the threshold of 90% of GDP for sovereign debt and is based on findings in the empirical literature. See, for example, Checherita, C. and Rother, P., "The impact of high and growing government debt on economic growth – an empirical investigation for the euro area", Working Paper Series, No 1237, ECB, 2010.

Higher rates underpin bank profitability, but worsening asset quality and higher funding costs pose headwinds

Euro area banks' profitability has continued to improve on the back of rising interest rates, but uncertainties around the earnings outlook have increased.

Boosted mainly by wider interest margins, euro area banks continued to enjoy robust earnings growth in the first half of 2023. They posted the highest profitability levels witnessed in more than a decade, with an almost double-digit return on equity (**Chart 6**, panel a). The strengthening of profitability was particularly notable for banks in countries where variable-rate lending predominates and where the pass-through of higher policy rates to deposit costs has been slower (**Chapter 3**). Going forward, though, banks will increasingly feel the downside impact of higher interest rates, as tighter financing conditions and a higher cost of living adversely affect borrowers' debt servicing capacity. While banks' non-performing loan ratios remained broadly unchanged at a low level of just above 2% in the first half of 2023, there have been some nascent signs of rising losses on some loan portfolios that are more sensitive to cyclical downturns. In fact, default rates on both corporate and retail exposures have already started picking up (**Chart 6**, panel b), heralding further increases in non-performing loans. As such, banks may face the risk of higher provisioning costs as risks in the non-financial sectors materialise in the context of weaker than anticipated economic conditions, potentially higher-for-longer interest rates or possible disorderly developments in real estate markets.

In addition, lower lending volumes and higher bank funding costs may weigh on euro area bank earnings going forward.

Lending dynamics have slowed markedly as a result of tighter lending standards and weak credit demand, with year-to-date lending flows to households and firms reaching their lowest levels since 2015. Uncertain macro-financial conditions may continue to weigh on volume growth going forward, partly offsetting the positive margin effect of higher interest rates on banks' net interest income. After the stress in the US and Swiss banking markets in the spring of this year, bank bond spreads stabilised at levels above historical averages. At the same time, the gradual shift from overnight to term deposits continued, with some signs of increased deposit competition among banks, but the pace of deposit repricing remains limited compared with previous hiking cycles. Looking ahead, bank funding costs are set to rise further as maturing liabilities reprice at higher levels (**Chart 6**, panel c), targeted longer-term refinancing operation (TLTRO) funds are gradually repaid and the composition of funding moves back towards long-run averages with a higher share of term deposits and bonds (**Chapter 3**). In terms of the management of interest rate risk, euro area banks have made increasing use of the interest rate swaps market since 2021, especially for longer maturities (**Special Feature A**).

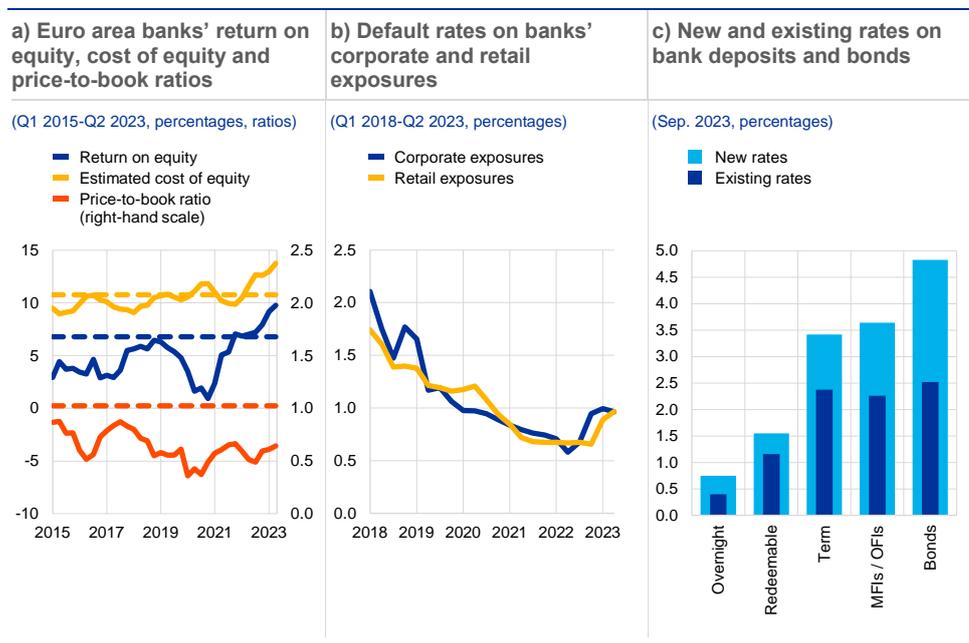
The resilience of the euro area banking sector is, in aggregate, underpinned by strong capital and liquidity positions.

Euro area banks proved resilient to the bouts of stress in the US and Swiss banking markets earlier this year, building on solid bank fundamentals. Standard regulatory metrics point towards strong liquidity resilience overall, despite a recent decline in banks' liquidity coverage ratios following TLTRO repayments. At the same time, with payout ratios increasing only

slightly, capital ratios have risen in line with higher retained earnings. The euro area banking sector's resilience to adverse shocks was also confirmed by the results of the European Banking Authority's 2023 EU-wide stress test. To preserve resilience from a more structural perspective, euro area banks need to carefully manage the implications of climate change and should also address the risks posed by the digitalisation of the financial industry. Such risks include the accelerated pace of bank runs (**Box 3**), the growing threat from cyber risks and the challenges associated with the introduction of digital currencies (**Box 4**).

Chart 6

Rising rates helped bank profitability improve, but the prospect of deteriorating asset quality and higher funding costs increases downside risks to bank earnings



Sources: Bloomberg Finance L.P., Dealogic, ECB (supervisory data, MIR) and ECB calculations.

Notes: Panel a: the dashed horizontal lines represent the long-term averages, i.e. Q4 2000-Q2 2023, for banks' return on equity, cost of equity and price-to-book ratio. Banks' estimated cost of equity is calculated following the methodology set out by Altavilla et al.*

Panel b: annualised quarterly default rates (two-quarter moving averages). Panel c: for all funding sources except bonds, existing rates indicate the average annual rate paid over the last 12 months and the latest monthly observation so as to account for the timing of the recognition of higher expenses in profit and loss. For bonds, "New rates" refers to the weighted average yield at issuance on new issuances within the latest month and "Existing rates" to the weighted average yield at issuance for all outstanding bonds. MFIs/OFIs stands for monetary financial institutions/other financial institutions.

*) Altavilla, C., Bochmann, P., De Ryck, J., Dumitru, A., Grodzicki, M., Kick, H., Melo Fernandes, C., Mosthaf, J., O'Donnell, C. and Palligkinis, S., "Measuring the cost of equity of euro area banks", *Occasional Paper Series*, No 254, ECB, 2021.

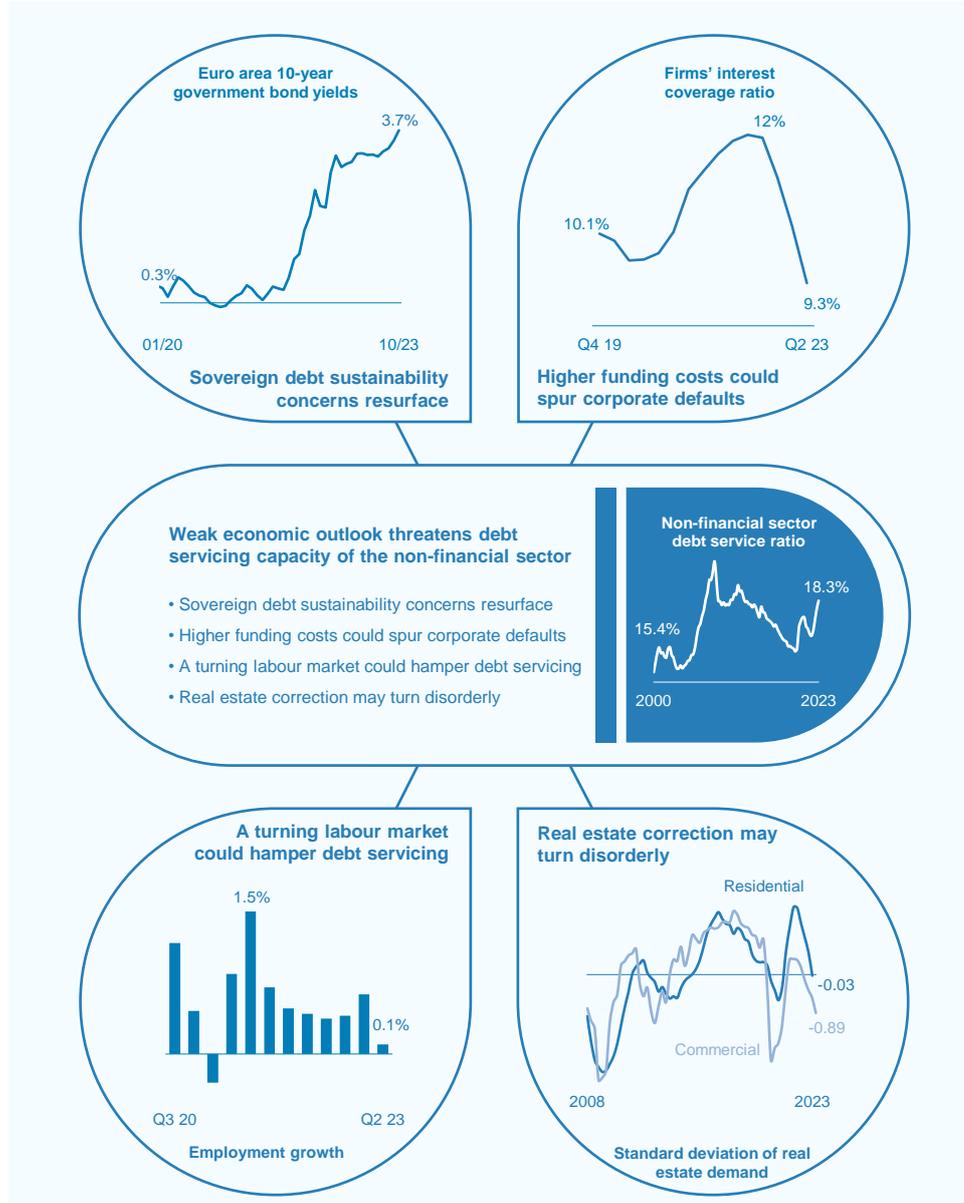
Despite greatly improved profitability and continued resilience across the sector, bank valuations have remained compressed. Among other things, this may be explained by the lingering structural problems across the industry (such as low cost-efficiency) and the high risk premia embedded in banks' cost of equity (**Box 5**). Low valuations may also reflect concerns about the sustainability of bank profits, given one-off factors such as the imposition of bank levies – or discussions in that direction – in a number of countries, as well as the headwinds associated with the prospect of worsening asset quality and higher funding costs going forward.

Macroprudential policies should help safeguard and strengthen resilience across the financial system

Safeguarding banking sector resilience remains key to navigating the turn of the financial cycle. Euro area macroprudential authorities have increased capital buffer requirements further in recent months, thereby bolstering banks' resilience. These actions have also strengthened the macroprudential policy space by expanding potentially releasable capital buffers. Macroprudential authorities should preserve these buffers to ensure that they remain available in case conditions in the banking sector deteriorate. They should also ensure that borrower-based measures remain in place as structural backstops to prevent lending standards deteriorating and to protect borrower quality. Beyond highlighting the importance of resilient banking systems, the lessons learnt from the stress in the US and Swiss banking markets in the spring of this year reaffirm the need to implement outstanding Basel III reforms and complete the banking union. Against this backdrop, recent initiatives to impose taxes on banks may have negative repercussions for financial stability, as they make it harder for banks to accumulate capital.

Structural vulnerabilities in different parts of the non-bank financial sector require a comprehensive policy response to increase resilience. Parts of the non-bank financial sector remain sensitive to adverse developments in macro-financial conditions that could place downward pressure on asset valuations, particularly in the case of riskier assets. Structural vulnerabilities arising from liquidity mismatches and leverage could amplify market-wide price corrections and aggravate liquidity stresses in the financial system. The large market footprint and interconnectedness of non-bank financial institutions make it all the more important to increase the sector's resilience by developing a comprehensive set of policy measures across non-bank entities and activities, taking a macroprudential perspective. This includes enhancing the liquidity preparedness of non-bank market participants to meet margin and collateral calls, tackling risks from non-bank leverage and mitigating liquidity mismatch in open-ended funds. International policy coordination will be key in this context to promote a level playing field and minimise the risk of cross-border arbitrage.

1 Macro-financial and credit environment



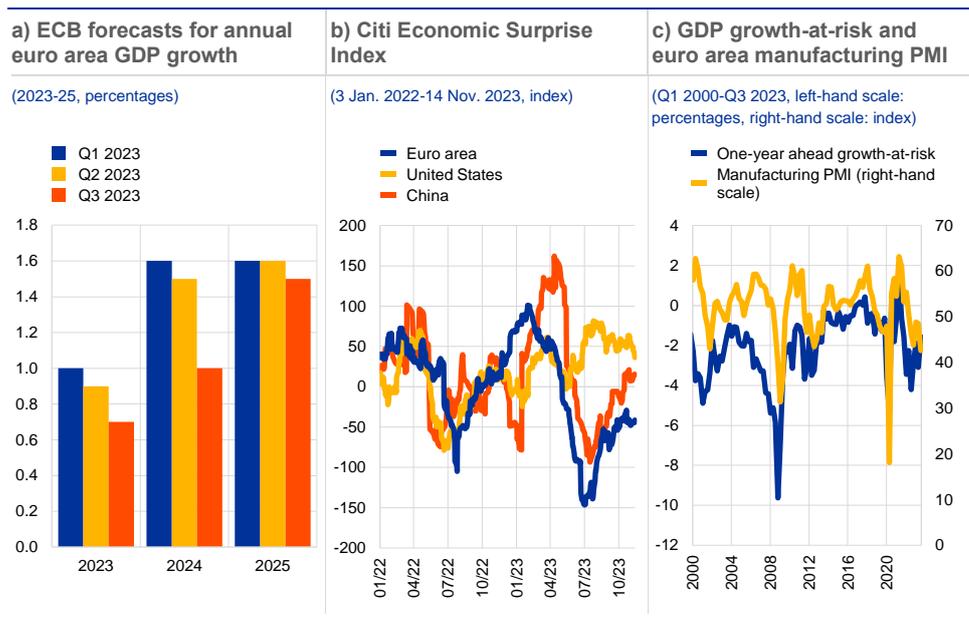
1.1 A recession remains a possible scenario as an already weak economic outlook deteriorates

Several downward revisions to forecasts and negative economic surprises confirm a weak economic outlook with substantial downside risks. The ECB/Eurosystem staff macroeconomic projections as well as other official and private sector forecasts were revised downwards for several quarters in a row, reflecting a worsened global economic environment, tighter financial conditions, lower aggregate demand and lower credit supply. Weak foreign demand and

receding fiscal support are weighing on activity, too. As of the third quarter of 2023, GDP growth is expected to come in at 0.7% in 2023 and 1.0% in 2024, the latter being a reduction of 60 basis points compared with six months earlier (**Chart 1.1**, panel a). While economic surprises have been to the upside in the United States in 2023, the news has been predominantly more negative than expected for the euro area and China (**Chart 1.1**, panel b). Even though forecasts indicate that the euro area economy might enjoy a soft landing, a recession also remains a likely scenario (see also **Chapter 2**). This risk is captured by the manufacturing Purchasing Managers' Index (PMI) – historically a reliable predictor of GDP growth – being in clearly contractionary territory (below 50 index points) as of the third quarter of 2023 (**Chart 1.1**, panel c). In addition, the one-year ahead GDP growth-at-risk estimate indicates that, with a probability of 5%, economic growth within the next 12 months may turn out lower than -1.6%, which would mean a more severe contraction. This suggests that there are downward risks to overall economic activity in the euro area, albeit varying from country to country.

Chart 1.1

Several rounds of downward revisions to forecasts confirm a weak economic outlook



Sources: ECB/Eurosystem staff macroeconomic projections, Bloomberg Finance L.P., Citigroup, S&P Global Market Intelligence, ECB and ECB calculations.

Notes: Panel a: includes GDP growth for Q1 and Q2 2023 as already reported at the time of publication. The respective forecasts are for the entirety of 2023 as per the respective ECB/Eurosystem staff macroeconomic projection rounds of Q1 through Q3 2023. Panel b: Citi Economic Surprise Index values above zero represent positive economic surprises in sum, while values below zero represent negative economic surprises. Panel c: growth-at-risk is the 5th percentile prediction of a quantile regression model estimated on a panel of euro area countries. Explanatory variables include GDP growth and indicators of cyclical systemic risk, financial stress, the debt service ratio and economic sentiment. See Lang, J.H., Rusnák, M. and Greiwe, M., "Medium-term growth-at-risk in the euro area", *Working Paper Series*, No 2808, ECB, 2023.

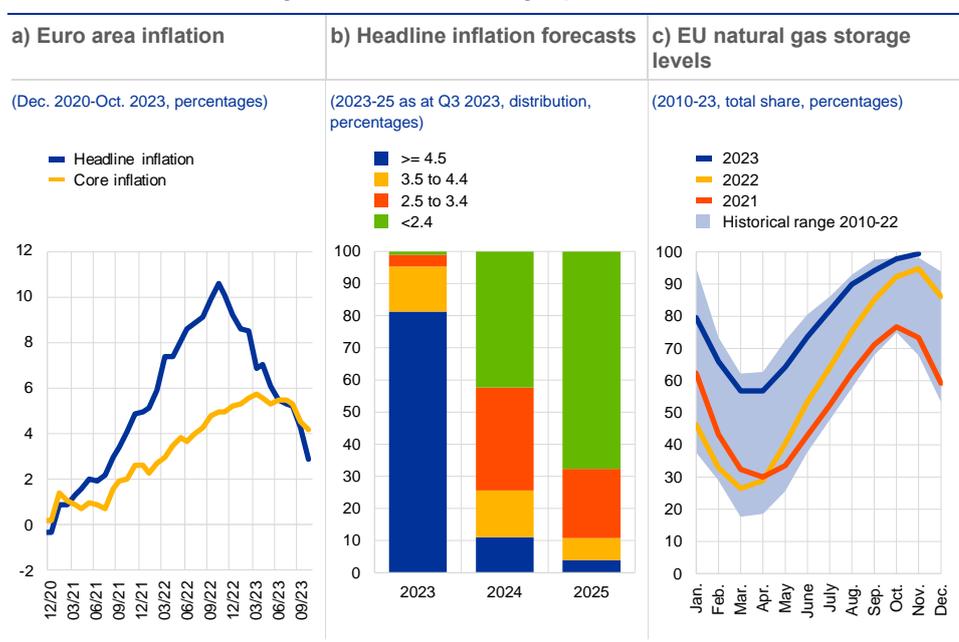
The risk of higher energy prices interrupting the ongoing decline of headline inflation cannot be ruled out.

Headline inflation in the euro area declined notably from over 10% year on year in October 2022 to 2.9% in October 2023. The dispersion of inflation across countries also narrowed markedly. However, core inflation remains persistently high and only started to decline in September 2023 (**Chart 1.2**, panel a). The majority of professional forecasters see annual headline inflation declining to below 3.4% in 2024 and below 2.4% in 2025 (**Chart 1.2**, panel

b).¹ Whether rising energy prices, especially for liquified natural gas, will affect inflation over the winter will largely depend on weather conditions, as well as on global economic and political developments. An interruption of liquified natural gas supplies from Russia or higher than expected demand from China could result in substantially higher prices, as energy price volatility remains elevated (**Chapter 2**). That said, the EU is entering the colder season well prepared, with natural gas storage facilities almost full (**Chart 1.2**, panel c). A continuation of the recent rise in oil prices or more notable increases due to a possible further escalation of the conflict in the Middle East may add to inflationary pressures as well as to downside risks to economic growth (**Overview**).

Chart 1.2

The decline in inflation could be challenged by rising energy prices in the event of a harsh winter or shifts in global economic and geopolitical risks



Sources: ECB, ECB Survey of Professional Forecasters and Bloomberg Finance L.P.
Notes: Panel a: the latest inflation data refer to October 2023. Panel b: the forecast distribution is as at Q3 2023. Panel c: the latest natural gas storage data are as at 14 November 2023.

Euro area growth prospects may be adversely affected by a further slowdown of the Chinese economy and geopolitical tensions. The ongoing crisis in the Chinese real estate sector is weighing on economic activity in China, resulting in lower demand for European export goods, with a negative knock-on effect on euro area growth. Even though direct euro area bank exposures to the Chinese real estate sector are limited, other transmission channels may allow for spillovers, should the situation deteriorate further (**Chapter 2**). Generally, there might be a further aggravation of geopolitical risk from the conflict in the Middle East, the presidential elections in the United States in 2024, Russia’s continuing unjustified war against Ukraine and ongoing tensions between the United States and China. On the back of a weak economy and stubbornly high core inflation, turbulence in

¹ For comparison, the [September 2023 ECB staff macroeconomic projections](#) forecast annual headline inflation of 3.2% in 2024 and 2.1% in 2025.

financial markets due to geopolitical tensions could easily exacerbate downward risks for economic growth and financial stability in the euro area. Currently, a further escalation of the conflict in the Middle East could induce instability through higher energy prices, with serious implications for inflation and potentially for monetary policy. Additionally, an escalation may also depress consumer sentiment and investor risk appetite, adversely impacting growth prospects in the euro area.

1.2 Sovereign vulnerabilities remain elevated due to higher refinancing costs and a weak macro-financial outlook

Stress in sovereign bond markets has generally receded, but risks remain elevated. Since the publication of the previous Financial Stability Review in May 2023, stress levels in sovereign bond markets have declined. Nevertheless, the dispersion across countries started to rise again at the end of September (**Chart 1.3**, panel a). As there are considerable differences across euro area countries and downside risks to fiscal positions, stress could increase again, especially if market participants perceive budget planning in some countries to be detrimental to longer-term debt sustainability. Overall, the euro area budget deficit is projected to decline over the coming years, accompanied by a tightening of the fiscal stance.² Such a tightening would help to ensure that fiscal policies are better aligned with the monetary policy response to inflation. While the expected phasing-out of government support measures introduced in response to the energy price shock and high inflation could help to achieve a tightening of the fiscal stance, governments might counteract this effect by introducing new stimulus measures in response to a stronger deterioration in economic activity, for example, or a renewed increase in energy prices. In addition, there are risks of delays in the implementation of the Next Generation EU programme, which may weigh on national sovereign budgets going forward, while heightened geopolitical tensions could require increases in defence spending.

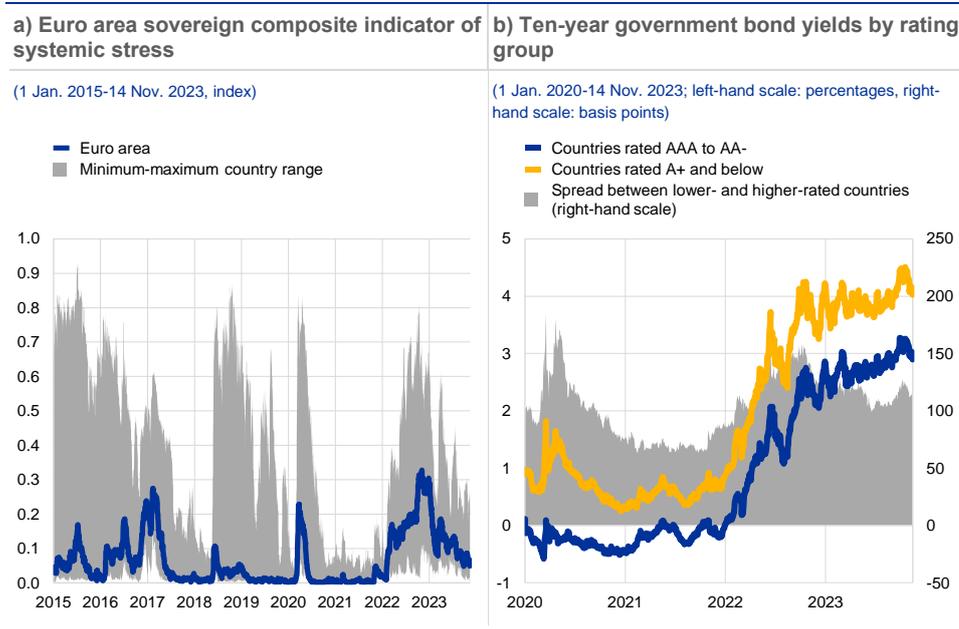
The ongoing negotiations on reforming EU fiscal rules are inducing significant uncertainty. As the general escape clause contained in the EU's Stability and Growth Pact will be deactivated by the end of 2023, reaching agreement is critical in order to anchor expectations for debt sustainability and sustainable, inclusive growth. Failure to swiftly agree on and put in place a credible, transparent and predictable fiscal framework could create uncertainty and unduly delay necessary fiscal adjustment and the impetus for reforms and investment.³ Such uncertainty would likely lead to further increases in government bond yields and spreads (**Chart 1.3**, panel b), especially for countries that may then fail to comply with the Stability and Growth Pact and face excessive deficit procedures.

² The September 2023 ECB staff macroeconomic projections forecast a decline in the euro area budget deficit to 3.2% of GDP in 2023 and 2.8% of GDP in 2024, followed by an increase to 2.9% of GDP in 2025. See [Economic Bulletin](#), Issue 6, ECB, September 2023.

³ See the [Opinion of the European Central Bank of 5 July 2023 on a proposal for economic governance reform in the Union](#) (CON/2023/20) (OJ C 290, 18.8.2023, p. 17).

Chart 1.3

Stress in sovereign bond markets has receded, but uncertainty remains high



Sources: ECB, Bloomberg Finance L.P., LSEG, S&P Global Market Intelligence, Moody's Analytics, Fitch Ratings and ECB calculations.

Notes: Panel a: the sovereign composite indicator of systemic stress is unit-free and lies within the interval (0, 1). The indicator is available for 11 euro area countries: Belgium, Germany, Ireland, Greece, Spain, France, Italy, the Netherlands, Austria, Portugal and Finland. See Garcia-de-Andoain, C. and Kremer, M., "Beyond spreads: measuring sovereign market stress in the euro area", *Economics Letters*, Vol. 159, 2017, pp. 153-156. Panel b: government bond yields are weighted by annual GDP as at 2022. Ratings refer to the average from Moody's, Standard & Poor's and Fitch and represents the ratings as at 14 November 2023.

The euro area sovereign debt-to-GDP ratio declined further but is expected to remain above pre-pandemic levels over the medium term. The euro area government debt-to-GDP ratio has benefited from a favourable interest rate-growth differential (the snowball effect) over recent quarters and is expected to fall to 89% in 2023, significantly below the peak seen during the pandemic. In the light of upward pressure from primary deficits and positive deficit-debt adjustments, as well as a narrowing of the snowball effect, the ratio is projected to stabilise at around 88% over the course of 2024 and 2025, above the pre-pandemic level of 84%.⁴ While the situation differs across euro area countries, debt levels generally remain elevated.

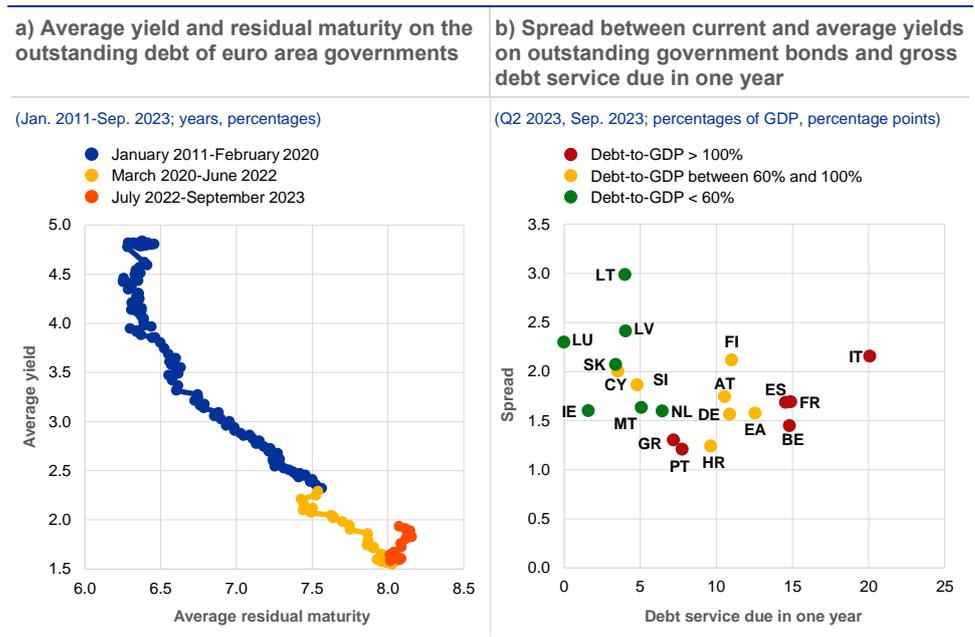
Sovereign debt service is still benefiting from the favourable financing conditions of the past but might face greater challenges in the future. Net debt issuance by euro area governments has been stable throughout 2023 – in line with previous years. With the Eurosystem reducing its footprint in sovereign bond markets, private sector actors like banks, non-bank financial institutions and foreign investors have stepped in to absorb fiscal issuance (**Box 1**). However, sentiment among such investors could change if fiscal policies in some euro area countries were perceived as detrimental to longer-term debt sustainability. During the pandemic, governments used favourable financing conditions to extend the maturity profile of their outstanding debt, helping to reduce refinancing risks going forward. While the currently higher interest rates feed slowly through to sovereign debt

⁴ See "ECB staff macroeconomic projections for the euro area, September 2023", published on the ECB's website on 14 September 2023.

stocks, governments have broadly maintained the same maturity profile (**Chart 1.4, panel a**). At the same time, yields in sovereign bond markets are around 1.5 percentage points above the average yield on debt portfolios, indicating significant potential for increases in the interest burden as maturing debt is rolled over (**Chart 1.4, panel b**). Countries with higher short-term refinancing needs are likely to see a faster increase in their interest burden, which may pose challenges going forward.

Chart 1.4

Sovereigns have extended their debt maturity, but higher interest rates will increase their interest burden going forward



Sources: ECB (GFS), LSEG, Bloomberg Finance L.P. and ECB calculations.

Notes: Panel b: the y-axis shows the difference between ten-year government bond yields and the average yield of the outstanding debt portfolio as at September 2023. Data for debt service due in one year refer to September 2023; data for the debt-to-GDP ratio refer to the second quarter of 2023.

Overall, risks to sovereign debt sustainability appear to be manageable in the short run, but medium-term challenges could add to financial stability risks.

While debt levels in the euro area have stabilised, medium- and longer-term challenges such as geopolitical risks, climate change and ageing populations are adding to sovereign vulnerabilities. These challenges underline the need for a robust EU framework for economic and fiscal policy coordination and surveillance. The outlook for sovereigns may deteriorate if financial conditions tighten further, which would increase governments' interest burdens, especially for sovereigns with high refinancing needs. In particular, debt sustainability concerns may arise going forward if governments do not pursue fiscally prudent paths or if highly indebted countries do not sufficiently reduce their debt ratios.

Box 1

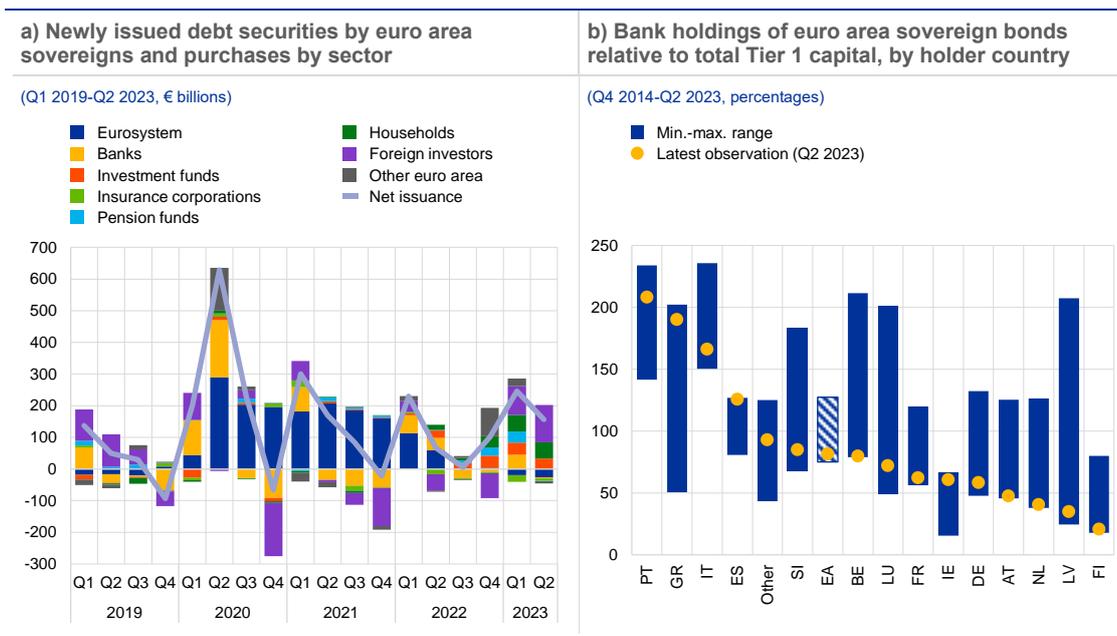
Sovereign bond markets and financial stability: examining the risk to absorption capacity

Prepared by Pablo Anaya Longaric, Maciej Grodzicki, Christoph Kaufmann, Allegra Pietsch, Pablo Serrano Ascandoni, Manuela Storz and Elisa Telesca

The smooth absorption of sovereign debt issuance by the financial sector is essential for financial stability. Sovereign bonds are widely used as high-quality liquid assets and their prices serve as benchmarks for the pricing of various financial contracts. This means that the capacity of investors to absorb additional issuance is key for the orderly functioning of sovereign bond markets. Market conditions may have been impacted by reduced demand for government bonds as net purchases of sovereign debt by the Eurosystem came to a halt at the end of June 2022.⁵ At the same time, the supply of government bonds is expected to remain high. Against this background, this box proposes a framework for assessing the potential challenges to financial stability related to the limits of the absorption capacities of different sectors active in sovereign bond markets.

Chart A

Positive net sovereign debt issuance has been absorbed smoothly, with banks' sovereign bond holdings mostly remaining at historical lows relative to their capital



Sources: ECB (SHS, CSDB, supervisory data) and ECB calculations.

Notes: Panel a: "Other euro area" includes all other euro area sectors. Panel b: based on a balanced sample of 96 euro area significant institutions at the highest level of consolidation. "Other" includes Estonia, Cyprus, Lithuania and Malta. Spanish data are partly distorted by a merger which took place between significant institutions in 2021.

Newly issued government debt has been absorbed smoothly so far in 2023, despite the absence of net central bank purchases. During the first half of the year, banks, investment funds, pension funds and households continued to purchase euro area sovereign bonds, while insurance corporations slightly reduced their exposures (Chart A, panel a). At the same time, foreign investors recommenced taking exposures towards euro area sovereign debt.⁶ While euro area banks have

⁵ The Eurosystem currently has a fully passive run-off of its public sector purchase programme (PSPP), while it intends to reinvest maturing bonds under the pandemic emergency purchase programme (PEPP) until at least 2024.

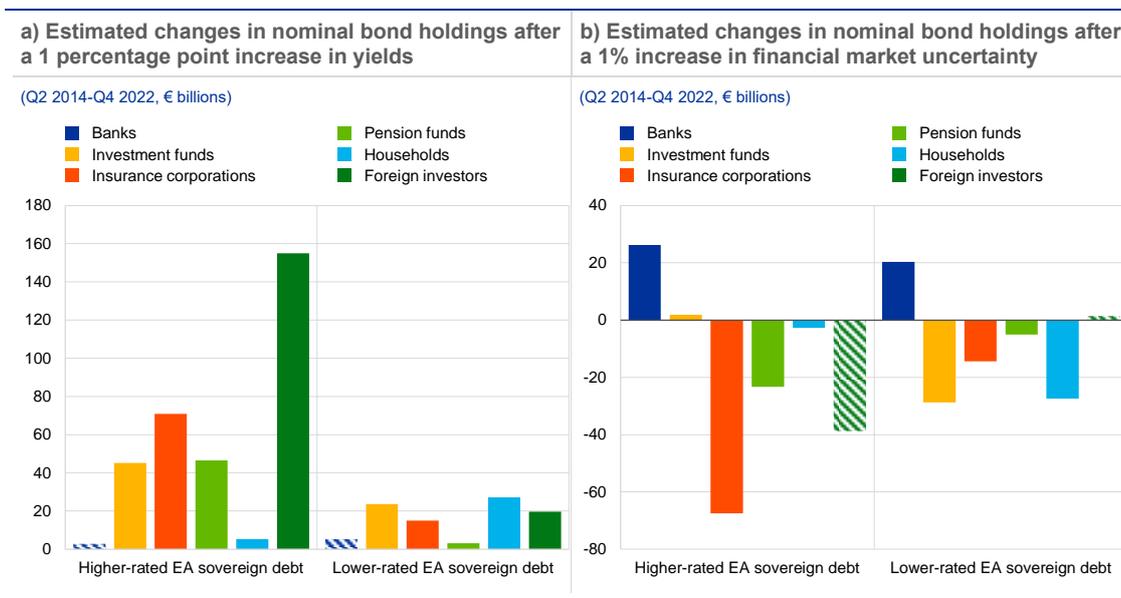
⁶ See the box entitled "Do global investment funds have a stabilising effect on euro area government bond markets?", *Financial Stability Review*, ECB, May 2023.

recently increased their sovereign debt holdings, overall exposures to euro area sovereigns relative to their regulatory capital remained, on average, at multi-year lows as of mid-2023 (Chart A, panel b).

Sovereign debt absorption patterns in 2023 have been in line with empirical evidence, which suggests that investors tend to increase their bond purchases when yields rise.⁷ Demand elasticities in respect of bond yields – which change inversely with prices – tend to be lower for lower-rated sovereign debt (Chart B, panel a). The analysis provides causal evidence that if sovereigns issue large amounts of debt, the absorption of such debt will take place at relatively higher yields. Higher yields may have played a key role in attracting foreign investors, who tend to be especially yield-sensitive, back to investing in higher-rated sovereign debt (Chart A, panel a). By contrast, households tend to show relatively high demand for the debt of lower-rated countries when yields on such debt increase and interest rates on deposits rise gradually.

Chart B

Rising euro area yields provide an incentive to absorb an increased net supply of sovereign bonds, while greater financial market uncertainty reduces absorption capacity for most financial sectors



Sources: ECB (SHS, CSDB) and ECB calculations.

Notes: Bars show estimated absolute changes in sectoral holdings due to a change in yields or in uncertainty. Estimates are obtained from separate regressions for each euro area sector and asset rating class where the dependent variable is the log of nominal bond holdings. Absolute changes are calculated from Q3 2022 levels. Shaded bars indicate statistically insignificant coefficients. "Lower-rated EA sovereign debt" refers to debt issued by euro area countries with a credit rating below AA- (Ireland, Greece, Spain, Italy, Cyprus and Portugal). The sample includes observations between Q2 2014 and Q4 2022. All regressions include a constant, security and holder area fixed effects, yield to maturity, US ten-year yields to proxy returns on alternative foreign assets and "financial market uncertainty", as measured by the VSTOXX volatility index. Yield to maturity is instrumented by high-frequency yield data on ECB Governing Council meeting dates taken from Altavilla, C. et al., "Measuring euro area monetary policy", *Journal of Monetary Economics*, Vol. 108, December 2019, pp. 162-179.

The absorption capacity of non-bank investors tends to decrease in times of elevated financial market uncertainty. Except for banks, all sectors tend to reduce their exposures to euro area sovereign debt when market volatility rises. Volatility often coincides with higher liquidity

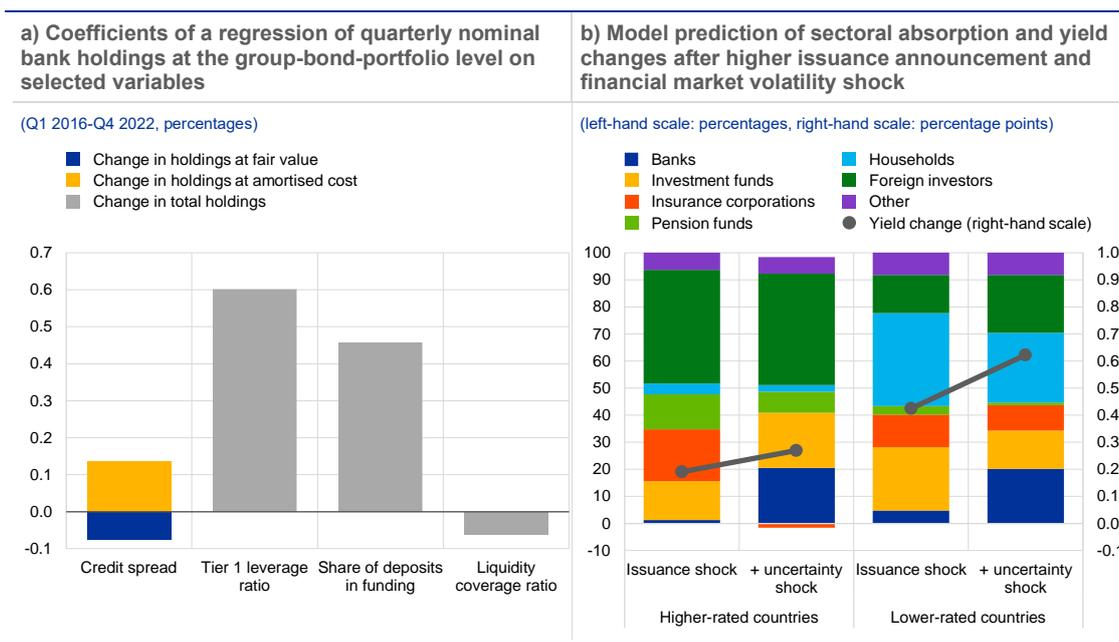
⁷ The framework used in this box is an econometric estimation of an asset demand system based on empirical euro area bond holdings data by sector between Q2 2014 and Q4 2022, akin to that in Kojien, R. et al., "Inspecting the mechanism of quantitative easing in the euro area", *Journal of Financial Economics*, Vol. 140, 2021, pp. 1-20. See also "The Eurosystem's asset purchase programme, risk-taking and portfolio rebalancing", *Financial Stability Review*, ECB, May 2019.

needs, such as those experienced due to investor outflows, and comparatively risk-averse sectors, such as insurers, may show a stronger reduction in sovereign bond holdings (**Chart B**, panel b).⁸

Accounting regimes and leverage requirements influence the capacity of banks to absorb sovereign debt. Unlike most institutional investors, banks can place sovereign bonds in their amortised-cost portfolios to lock in yields. As long as the credit risk of these bonds remains low, this accounting method reduces the volatility of banks' profits and regulatory capital. This allows banks to invest in sovereign bonds in periods of high market uncertainty, while their aggregate holdings do not seem to be sensitive to yield levels.⁹ However, holding government debt at historical values can create a gap between a bank's economic value and its book value, which could render it vulnerable to confidence shocks. Moreover, a low Tier 1 leverage ratio reflects a bank's weak financial health and limited balance sheet capacity, and is found to be linked to lower purchases (**Chart C**, panel a). Nonetheless, this constraint may have been less binding recently than in the past, given the low level of banks' sovereign bond holdings (**Chart A**, panel b). A high liquidity coverage ratio indicates that banks have limited need for liquid assets and is associated with lower net purchases of sovereign debt.

Chart C

Banks' absorption capacity depends on regulatory metrics, while they compensate for other financial investors in times of elevated market volatility



Sources: ECB (SHS, CSDB, supervisory data), Bloomberg Finance L.P. and ECB calculations.

Notes: Panel a: all coefficients are significant at (at least) the 5% level. The dependent variable is the logarithm of nominal amounts held at the group-bond-portfolio level by accounting treatment. Coefficients indicate the percentage change in nominal holdings in response to a one standard deviation increase in the explanatory variables. The credit spread is the bond-specific quarterly yield to maturity over the German government bond yield curve. The coefficient on credit spreads is estimated through an interaction between the accounting treatment and credit spreads. Control variables include an amortised-cost accounting dummy, the logarithm of banks' total assets and total government bond holdings, GDP growth and the ECB's deposit facility rate. Panel b: projection of sectoral absorption and expected yield changes using the demand functions estimated in Chart B (panels a and b). The scenario is a hypothetical announcement of additional government bond issuance equivalent to a 1.5% increase in debt outstanding in higher-rated (€90 billion) and lower-rated (€60 billion) countries. The uncertainty shock is proxied by a one standard deviation increase of the VSTOXX volatility index. Projections are calculated on the assumption that the government bond market clears: yields adjust such that total net issuance equals the sum of total purchases or sales of all sectors based on their estimated demand elasticities for given changes in volatility and foreign yields.

⁸ See Fache Rousová, L. and Giuzio, M., "Insurers' investment strategies: pro- or countercyclical?", *Working Paper Series*, No 2299, ECB, July 2019.

⁹ Banks tend to increase their share of holdings measured at amortised cost and reduce their share of holdings marked to market when sovereign spreads are high.

Higher government funding needs, especially in an environment of high market volatility, can imply rising yield levels and spreads. Simulations based on the framework presented in this box¹⁰ (**Chart B**) show that investors would be willing to absorb additional government bond issuance, equivalent to a 1.5% increase in outstanding debt in the euro area, at a higher yield (**Chart C**, panel b). They also indicate that the increase in yields would be greater in lower-rated countries than in higher-rated countries. Were such additional issuance to coincide with higher financial market volatility, equivalent to a one standard deviation increase of the VSTOXX volatility index, historical patterns suggest that banks would partially compensate for the reduced demand from other sectors. This would provide support to markets and ensure the ability of sovereigns to place the increased supply of debt. At the same time, it would further increase the close links between the banking system and sovereigns, which could reignite the negative feedback loop between these two sectors. Higher rates on government debt could, in turn, also tighten private sector financing conditions, especially in lower-rated countries. Spreads on lower-rated sovereign debt could rise further, exposing its holders to market risk effects. This box thus highlights the importance of interactions between fiscal policy and financial stability.

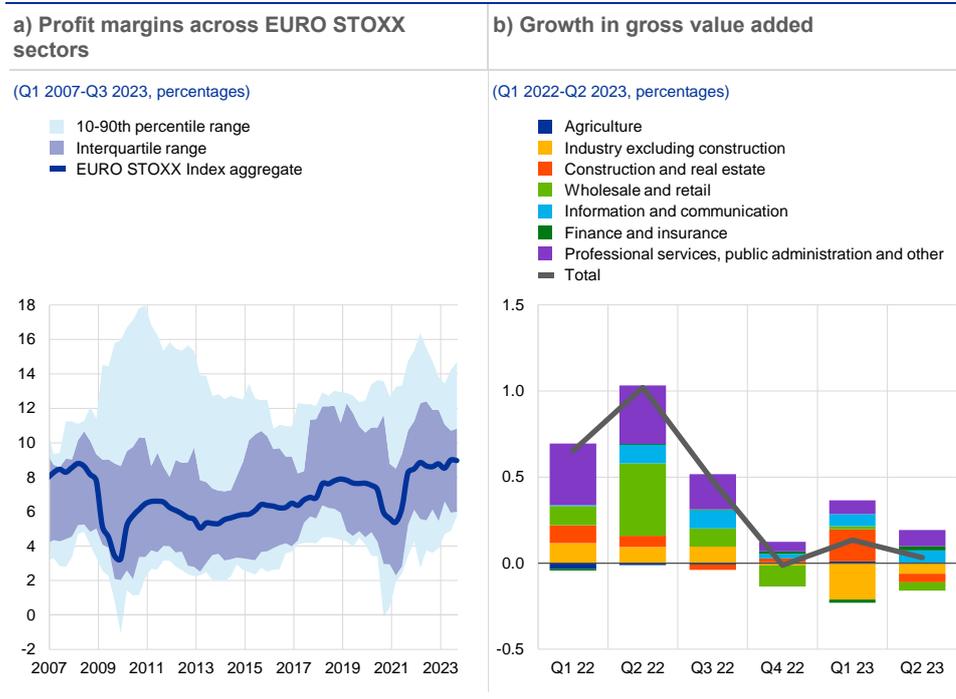
1.3 Tight financial conditions are starting to weigh on the debt servicing capacity of non-financial corporations

Euro area non-financial corporations (NFCs) entered the hiking cycle with resilient balance sheets, but activity is slowing in several sectors. A long period of ultra-low interest rates and a strong post-pandemic recovery helped the average corporate to build resilience. Euro area firms benefited from strong gross profits throughout the first half of 2023, reflecting continued rises in selling prices. This was also facilitated by firms maintaining their profit margins at stable levels (**Chart 1.5**, panel a). Growth has come to a halt across most sectors as the effects of the recovery have faded and the impact of tighter financial conditions has increased. So far, service-oriented sectors have not been as badly affected, but some industrial sectors are already contracting (**Chart 1.5**, panel b). Uncertainty around the future path of this slowdown persists. Downside risks could materialise, especially if inflation remains too high for too long and triggers a further tightening of financial conditions or if an external shock hits. This might take the form of renewed substantial rises in energy prices or supply bottlenecks, possibly driven by geopolitical tensions.

¹⁰ As elasticities are largely calibrated on the low-for-long environment, projections should not be seen as definitive as they may differ in times of lower excess liquidity.

Chart 1.5

Firms maintain profit margins, but growth is slowing



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

Notes: Panel a: the ranges in the chart cover the 17 non-financial sectors of the 20 sector indices that comprise the EURO STOXX Index. Panel b: growth in gross value added is shown as quarter-on-quarter changes in calendar-adjusted and seasonally adjusted gross value added.

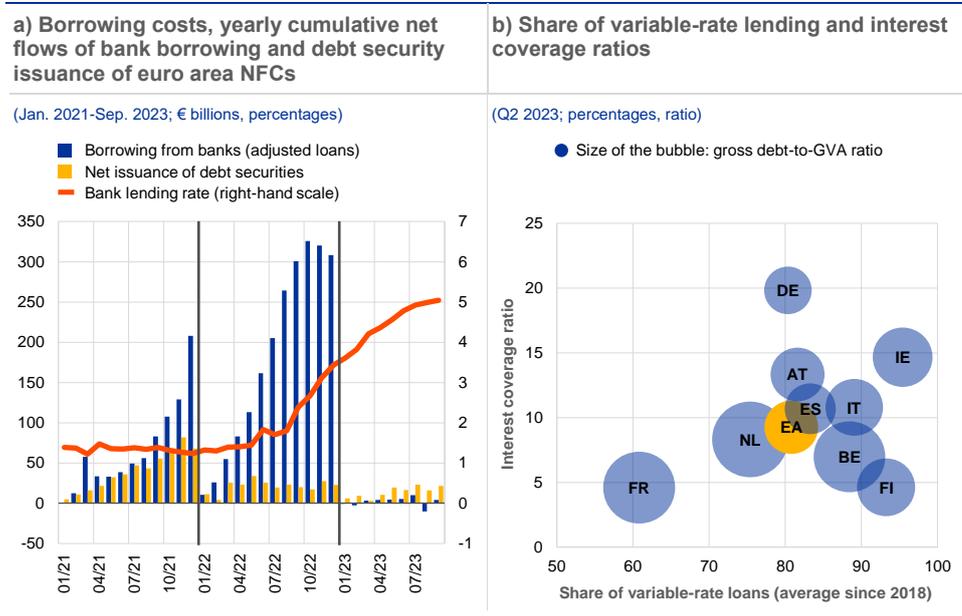
Firms have limited their borrowing in a climate of rising financing costs, causing leverage to decline.

The increases in corporates' financing costs over the past few months reflect the smooth transmission of monetary policy. The resulting tightening of credit standards by banks has been compounded by a drop in firms' demand for external financing and has led to a material decline in lending volumes. Since the beginning of 2023, net borrowing from banks and net issuance of debt securities has almost come to a halt (**Chart 1.6**, panel a). The lower demand for credit also mirrors the greater availability of internal sources to fund capital expenditures, such as ample cash buffers and solid retained earnings built up during the post-pandemic recovery. The decline in new borrowing has also allowed the corporate sector to further deleverage, reducing gross debt¹¹ to 131% of gross value added in the second quarter of 2023, down by 10 percentage points year on year and below pre-pandemic levels.

¹¹ For the definition of gross debt, see the notes to **Chart 1.6**, panel b.

Chart 1.6

Demand for bank loans stalls in a climate of rising interest rates and weakening debt service capacity



Sources: ECB (CSEC, BSI, MIR), Eurostat and ECB (QSA) and ECB calculations.
 Note: Panel a: flows of bank loans are adjusted for loan sales and securitisation (resulting in derecognition from the MFI statistical balance sheet) as well as for positions arising from notional cash pooling services provided by monetary financial institutions. Net issuance of debt securities refers to the difference in gross issues and redemptions of debt securities by euro area NFCs at face value. Panel b: the x-axis shows the average of monthly shares of variable-rate loans and loans with an interest rate fixation period of up to one year in total new lending between January 2018 and September 2023. The interest coverage ratio is calculated as the four-quarter moving sum of the gross operating surplus of NFCs divided by the four-quarter moving sum of interest before the financial intermediation services indirectly measured (FISIM) allocation payable by NFCs. Gross debt is unconsolidated and comprises the sum of loans granted to NFCs, debt securities issued by NFCs and insurance, pension and standardised guarantee schemes of NFCs minus loans granted by NFCs. GVA stands for gross value added.

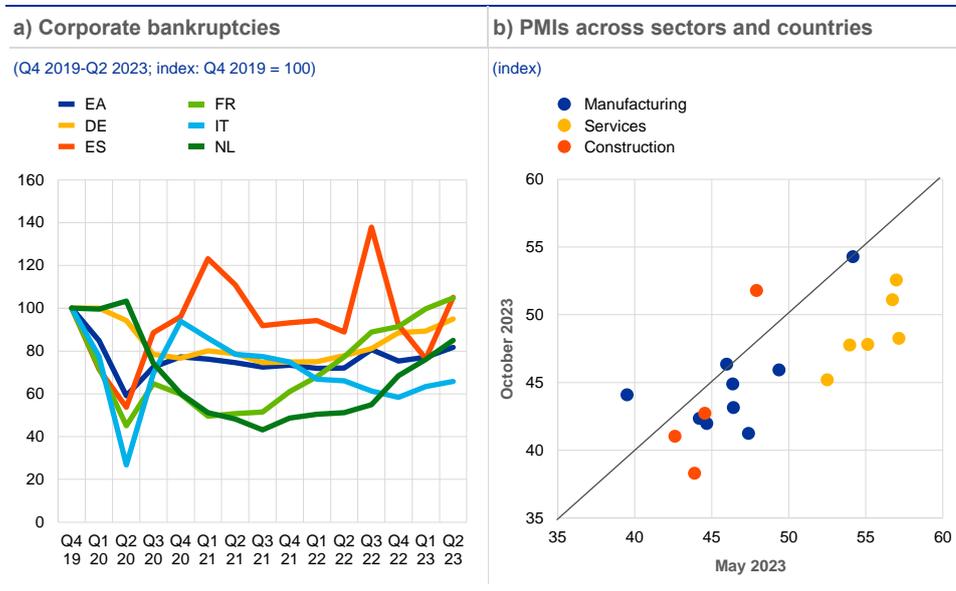
The debt servicing capacity of some firms may become a concern as higher interest rates feed through to corporate debt stocks. Prior to and during the pandemic, firms benefited from low interest rates, which helped to push interest coverage ratios up and default risks down. Because corporates generally have a larger share of adjustable-rate loans, they are affected by interest rate changes more quickly than other economic sectors. While the aggregate interest coverage ratio of euro area firms remained solid at 9.3 in the second quarter of 2023, higher interest expenses have already pushed it down by 2.7 percentage points compared with a year before. Interest expenses are expected to increase further with successive repricing of the loan stock. This may raise concerns over corporates' debt servicing capacity, especially where debt levels are high and interest coverage ratios are low (Chart 1.6, panel b).

Although generally still low, bankruptcies have started picking up, with some euro area countries seeing pre-pandemic levels surpassed. The more challenging macro-financial conditions, together with vulnerabilities built up over the pandemic, have led to an increase in insolvencies across countries (Chart 1.7, panel a). While this partly reflects the reduction of the insolvency backlog that accumulated during the pandemic, defaults are likely to rise further, with high-frequency indicators suggesting that the economic downturn is becoming more broad-based across countries and sectors (Chart 1.7, panel b). Default risk could particularly affect firms

that have not recovered from the strains inflicted by the pandemic and last year's energy price shock and could increase should energy prices take off again.

Chart 1.7

Bankruptcies are increasing as the outlook for economic growth deteriorates



Sources: Eurostat, INE, S&P Global Market Intelligence and ECB calculations.

Notes: Panel a: the bankruptcy index provided by Eurostat for Spain shows a sizeable pickup in Spanish bankruptcies, driven largely by sole proprietors, the removal of the bankruptcy moratorium in June 2022 and the amended Spanish Bankruptcy Law which entered into force on 26 September 2022. To ensure comparability with the indices for other countries, the chart shows Spanish bankruptcies obtained from INE that exclude natural persons. The euro area aggregate is calculated using the INE data for Spain. Panel b: points show euro area countries for which sectoral PMIs are available. For the manufacturing PMI, these comprise the euro area aggregate, Germany, Ireland, Greece, Spain, France, Italy, the Netherlands and Austria; for the services PMI, they comprise the euro area aggregate, Germany, Ireland, Spain, France and Italy; and for the construction PMI, they comprise the euro area aggregate, Germany, France and Italy. Dots below the 45-degree line signal a deterioration between the two points in time. Values below 50 signal a contraction of output, values above 50 an expansion.

Overall, corporate vulnerabilities have increased as financial conditions have tightened and the economic outlook has weakened.

There is considerable diversity across firms, despite them being resilient on average, as higher financing costs and a weakening macroeconomic outlook are now adding to the challenges they have faced over the past few years. The interest burden for corporates will likely increase further as debt has to be refinanced at higher rates once sources of internal funding have been depleted. In addition, some debt instruments, such as leveraged loans, are more sensitive to rate increases and might be particularly exposed should financial conditions tighten further. This means that the number of vulnerable firms that have difficulty servicing their debt is likely to increase. Accordingly, there could be more defaults going forward, with potential knock-on effects on bank balance sheets, non-bank investors in corporate debt (**Chapter 4**) and household employment prospects.

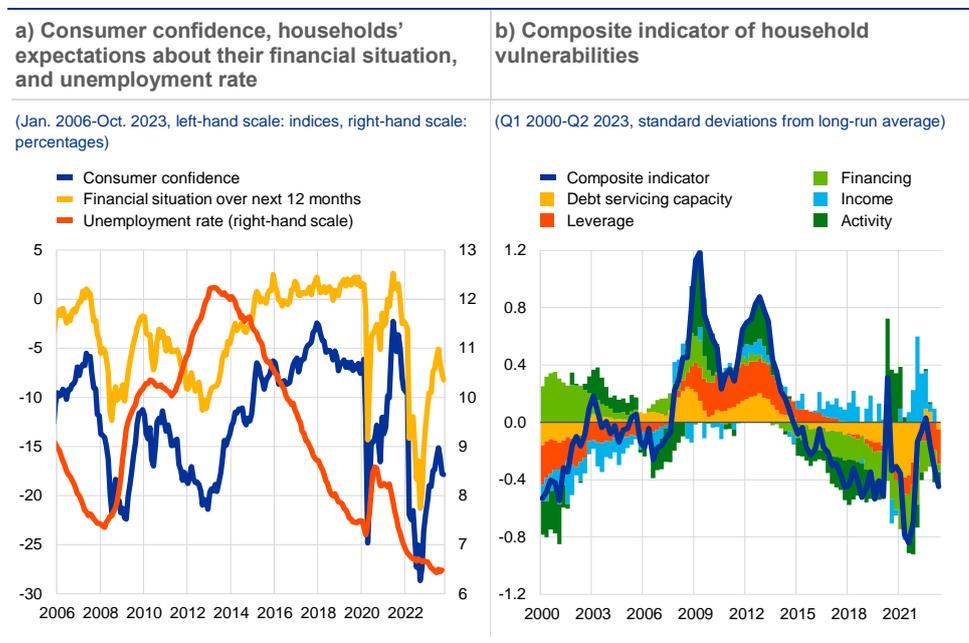
1.4 Households benefit from a strong labour market but face higher debt service costs

Euro area households continue to benefit from record levels of employment and, more recently, rising wages. Consumer confidence and households' self-

reported financial situations had been improving since the publication of the previous issue of the Financial Stability Review on the back of a very robust labour market and declining headline inflation. However, this improvement came to a halt in July 2023 before going into reverse and remaining markedly below pre-pandemic levels (**Chart 1.8**, panel a). After real compensation per employee suffered a substantial fall in 2022, negotiated wages have picked up significantly recently. While no concrete signs of the labour market turning have emerged as yet, the rate of change in the unemployment rate has flattened out in recent months and the number of people unemployed has slowly started to rise in some countries. The sound financial position of households overall is mirrored by the household vulnerability indicator, which stands below its long-run average (**Chart 1.8**, panel b).

Chart 1.8

Households benefit from a strong labour market, but prospects are subdued as initial signs of higher debt service costs emerge and the unemployment rate bottoms out



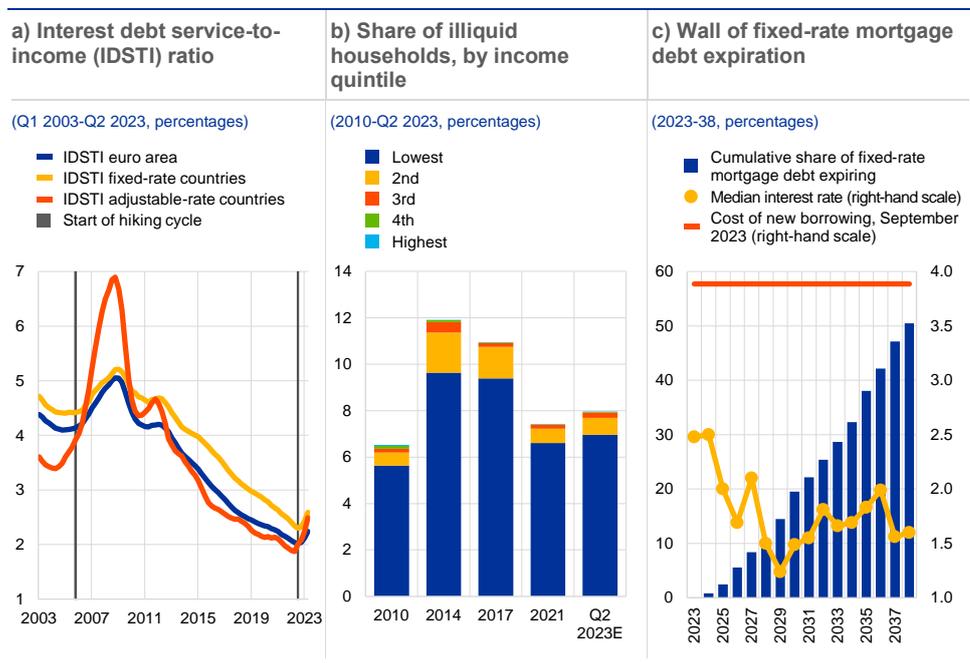
Sources: European Commission, Eurostat, ECB and ECB calculations.
 Notes: Panel a: the latest observation for the unemployment rate is for September 2023. Panel b: the composite indicator is based on a broad set of indicators along five dimensions: debt servicing capacity (measured by gross interest payments-to-income ratio, savings ratio and expectation of personal financial situation); leverage (gross debt-to-income and gross debt-to-total assets ratios); financing (bank lending rate, short-term debt-to-long-term debt ratio, quick ratio (defined as current financial assets/current liabilities) and credit impulse (defined as the change in new credit issued as a share of GDP)); income (real income growth and income-to-GDP ratio); and activity (labour participation rate and unemployment expectations). The indicators are standardised by transforming them into z-scores, i.e. they are converted into a common scale with a mean of zero and a standard deviation of one. Composite sub-indicators are calculated for each of the five dimensions by taking the simple arithmetic mean of the respective underlying z-scores of the individual indicators. Finally, the overall composite indicator is obtained by equally weighting the composite z-scores of the five sub-categories. Positive values indicate higher vulnerability, negative values lower vulnerability.

Household vulnerabilities are rising slowly due to deteriorating debt servicing capacity as higher policy rates feed through. The sharp decline in loan demand triggered by rising policy rates since 2022 has led to a drop in household leverage, reducing overall vulnerabilities. Similarly, the household vulnerability indicator's activity component reflecting the strong labour market is contributing to declining vulnerabilities. The income component is reverting to neutral territory, as real wages are catching up. However, the recent deterioration in households' debt servicing capacity is adding to aggregate vulnerabilities. The significant increase in the cost of

borrowing in the euro area has recently started to have an impact on mortgage debt service costs. Variable-rate mortgages and fixed-rate mortgages at the end of their rate fixation period are being repriced at interest rates that are much higher than they were a year ago or at origination. Worse debt servicing capacities are also reflected in the recent increase in the interest debt service-to-income (IDSTI) ratio for the euro area (Chart 1.9, panel a), in particular for countries where variable-rate mortgages predominate, while for most traditionally fixed-rate countries the ratio remained largely unchanged (Special Feature B).

Chart 1.9

Euro area household sector buttressed by sufficient cash flows and savings, but increase in debt service cost will weigh on households' financial situations



Sources: ECB (nowcasted Household Finance and Consumption Survey) and ECB calculations.

Notes: Panels b and c: the nowcasting methodology brings the most recent survey data from 2021 forward to Q2 2023 by micro-simulating the development of individual households' incomes, savings, expenditures and debt holdings according to aggregate macro-financial data. Structural shifts in aggregate employment and mortgage origination patterns are taken into account. A household is defined as illiquid when its income cash flow is negative after all expenses and its savings do not cover more than one month of total debt service.

Households remain solvent despite first signs of higher debt service costs on variable-rate loans, while fixed-rate loans could pose a problem down the line.

Micro-simulations using household survey data nowcasted to the first quarter of 2023 reveal that the share of households with a debt service-to-gross-income ratio of above 30%, which indicates elevated risk of default, increased from 12% to 14% between the first quarter of 2022 and the second quarter of 2023. In some countries with a share of variable-rate mortgages that is very high by historical standards, the increase has been even greater. At present, however, the micro-simulations do not show signs of a substantial increase in the share of illiquid households, as free cash flows – supported by the tight labour market – and savings buffers – supported by legacy excess savings from the pandemic – have not yet become impaired (Chart 1.9, panel b). During the period of ultra-low interest rates, households originated and refinanced large volumes of mortgages at very favourable conditions. That said,

estimates based on nowcasted survey data show that over 30% of the euro area's outstanding fixed-rate mortgage stock is expected to expire within the next ten years (**Chart 1.9**, panel c). These mortgages have median interest rates of between 1.5% and 2.0%, and debt service payments would have to be recalculated at market rates when the interest rate fixation expires. Depending on the future average cost of borrowing at the time, this repricing could result in a significant surge in debt service costs in countries where fixed-rate mortgages predominate. Since inflated house prices have driven up mortgage volumes substantially in several countries, even more affluent households may become financially stretched by increasing total debt service costs.¹²

Household debt service costs are expected to increase further, with associated risks for euro area financial stability; however, the most vulnerable households hold little debt. Lower-income households, which are benefiting in particular from strong labour markets, constitute by far the largest share of illiquid households. However, their debt share has been very stable over time and makes up only around 10% of euro area mortgage debt and 20% of consumer debt, effectively limiting banks' exposure. Going forward, higher debt service costs from variable-rate loans (over the short to medium term) and from fixed-rate mortgages (over the medium to long term) pose an increasing threat to households' financial health and hence to the stability of the banking system in the euro area. Strong labour markets and sufficient savings are currently preventing higher debt service costs from leading to more defaults. That said, debt service costs are expected to increase further, and the September 2023 ECB staff macroeconomic projections already predict a slight increase in the unemployment rate to 6.7% in 2024. A significant deterioration of labour market conditions may put even middle-income households at risk, however.

1.5 Euro area residential and commercial real estate markets are experiencing a downturn

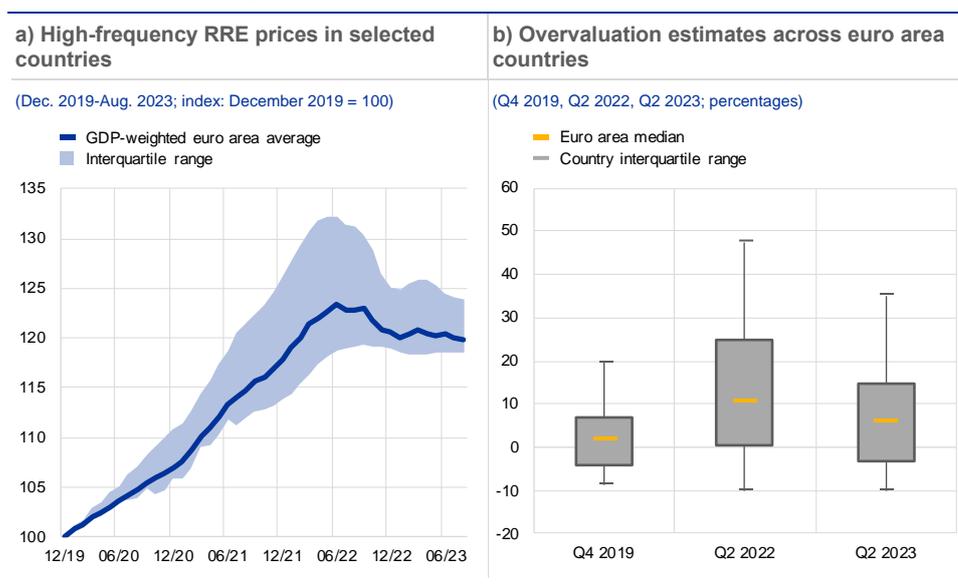
Euro area residential real estate (RRE) prices exhibited a year-on-year decline in the second quarter of 2023. The steep increase in borrowing costs since the beginning of the tightening cycle has had a negative impact on the demand for mortgages, leading to a sharp drop in new lending. The general level of interest rates, the reduction in consumer confidence and deteriorating housing market prospects are the main drivers behind the dwindling demand for housing loans. In line with falling new lending, euro area RRE price growth declined from 9.2% in the second quarter of 2022 to -1.7% in the second quarter of 2023. Model-based evidence suggests that monetary policy tightening is the main factor putting downward pressure on house prices, followed by changes in household preferences and tighter bank credit standards (**Special Feature B**). Although euro area RRE price dynamics only recently turned negative, prices had already started declining in some euro area countries in the second half of 2022. High-frequency data suggest that the pace of the decline in RRE prices has slowed over recent months (**Chart**

¹² Households can also renegotiate the schedule of principal payments and extend the duration of a mortgage.

1.10, panel a), indicating a price correction that has been orderly so far.¹³ Euro area rental prices, on the other hand, are rising at a record pace – in September 2023 they were up 2.7% year on year.

Chart 1.10

RRE prices are declining at a slower pace, but valuations still seem stretched in several countries, suggesting that further price falls are likely



Sources: ECB, Europace, Eurostat, Immobiliare.it, Meilleursagents.com, Confidencial Imobiliário, Arco Real Estate, Národná banka Slovenska, Statistics Finland, Irish Central Statistics Office and Statistics Netherlands.

Notes: Panel a: the chart includes monthly data up to August 2023 for the following countries: Germany, Finland, France, Ireland, Italy, Latvia, Portugal and the Netherlands. For Slovakia, data are quarterly and up to June 2023. An average listing price index is used for Italy, while a hedonic price index based on transaction prices is used for all the other countries. Panel b: the chart shows deviations from the long-term average of the house price-to-income ratio, which constitute an indication of potential overvaluation in domestic housing markets. The long-term average is calculated from Q1 1996 to the respective end quarter. The average of two measures (inverted demand econometric model and house price-to-income ratio) was employed in previous editions of the Financial Stability Review, but the inverted demand model might underestimate overvaluation in a period of high inflation due to its use of real interest rates. Accordingly, the house price-to-income ratio is being employed as the benchmark overvaluation measure in the current edition of the Financial Stability Review.

RRE valuations are still above pre-pandemic levels in several euro area countries, suggesting that vulnerabilities remain elevated.

RRE prices grew at a fast pace during the coronavirus (COVID-19) pandemic, rising significantly quicker than household incomes, which, in turn, pushed up estimated valuations of housing prices. These remain significantly above pre-pandemic levels, despite the fall in RRE prices witnessed thus far in some euro area countries (Chart 1.10, panel b).¹⁴ Higher interest rates are likely to result in further downward pressure on house prices as they weigh on demand for new loans, while the debt servicing capacity of households with outstanding mortgages could deteriorate (Section 1.4). This is especially the case in countries where valuations are stretched, debt levels are elevated, or household mortgage debt is largely composed of variable-rate loans. Indeed, banks still expect the demand for housing loans to decline in the fourth quarter of 2023, but at a slower pace than in the previous five quarters. Together

¹³ Price growth has even turned positive again in some countries in recent months.

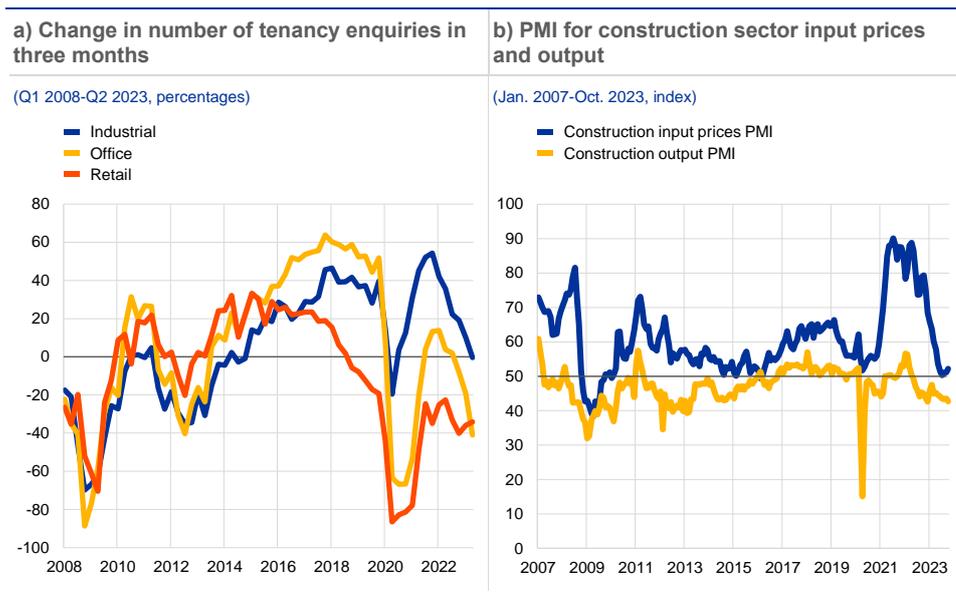
¹⁴ The growth in nominal wages could also contribute to lower housing valuation estimates going forward, particularly if households continue to demand higher wages to compensate for inflation.

with supply-side shortages and high construction prices, this might contain the fall in RRE prices in the near term.

The outlook for commercial real estate (CRE) firms has continued to deteriorate in a context of falling tenant demand and negative credit rating actions. Transaction activity in CRE markets remains subdued (-47% in the first half of 2023 compared with the first half of 2022), although this may change in the coming quarters as the future path of interest rates becomes clearer. Any increase in market activity will aid price discovery but may result in significant declines in transaction prices as the market prices in a year of monetary policy tightening. The effects of this tightening are amplified by falling demand for CRE assets in the wake of the pandemic, with demand for office space dropping significantly over the course of 2023 (**Chart 1.11**, panel a). This dual challenge has driven significant credit rating activity for real estate firms over recent months. For example, S&P has downgraded 22% of European real estate firms since 2022 and a further 26% are on negative outlook. Looking at the combined actions of all credit rating agencies, market analysts estimate that €6 billion of bonds issued by European real estate firms were downgraded to high yield between May and August this year and that a further €10 billion in bonds remain vulnerable. Conditions are particularly challenging for property developers, who face falling sales prices, contracting order books and rising input costs, although price pressure from input materials has reduced in recent months (**Chart 1.11**, panel b). These factors resulted in a number of smaller German developers filing for bankruptcy in September. Construction sector PMIs have deteriorated in recent months, although they remain far above the lows seen during the pandemic and the global financial crisis (**Chart 1.11**, panel b).

Chart 1.11

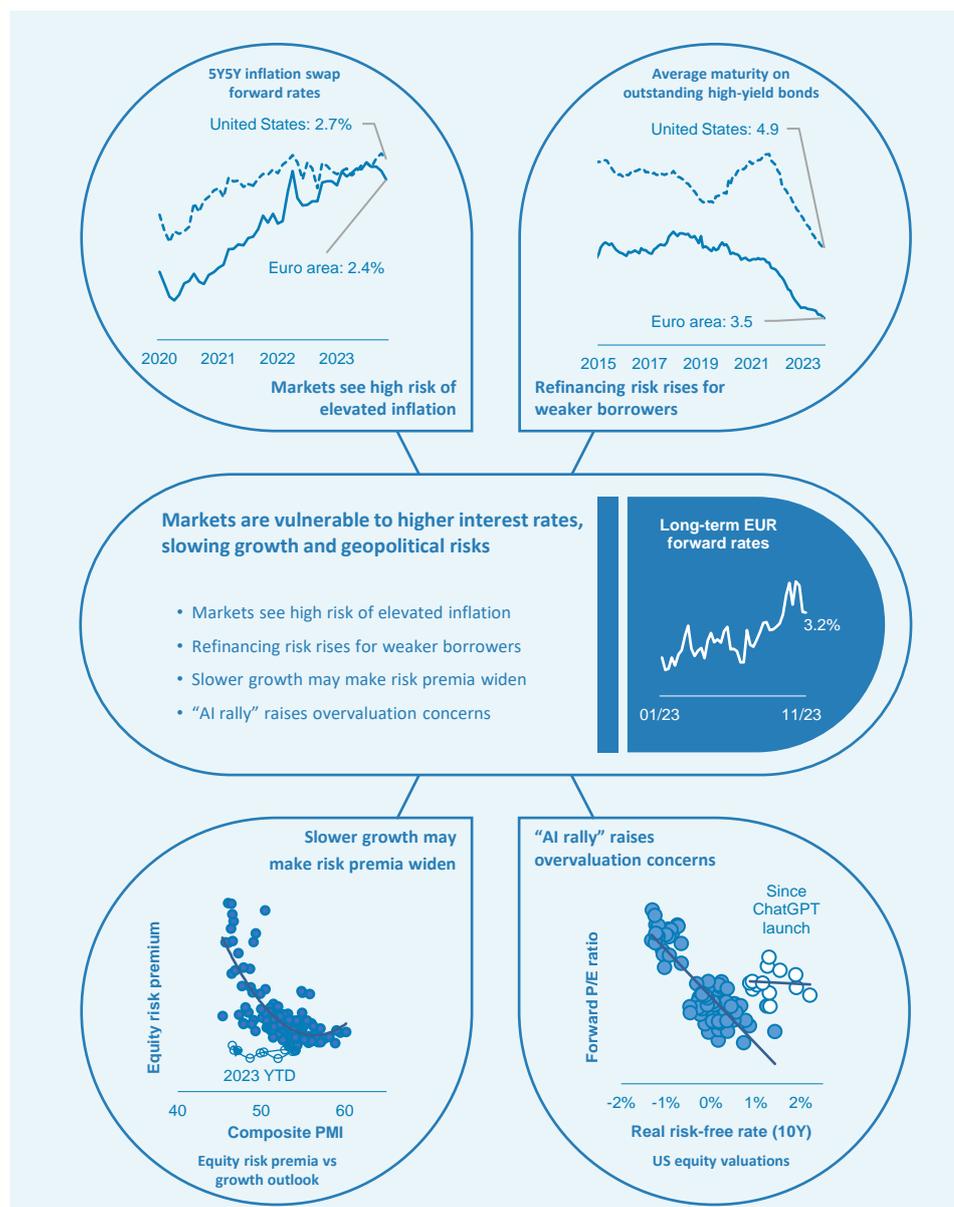
The outlook for CRE markets continues to deteriorate, with landlords facing falling demand and developers under additional pressure from input costs



Sources: RICS, ECB calculations and S&P Global Market Intelligence.
 Notes: Panel b: a value above 50 denotes an increase and a value below 50 denotes a decrease (in confidence or prices). PMI stands for Purchasing Managers' Index.

The implications of the ongoing real estate correction for financial stability critically depend on the extent to which tighter financial and credit conditions reduce real estate demand and affordability. The downward adjustment in RRE prices has so far taken place in an orderly manner. However, risks remain tilted to the downside, especially in those countries where debt levels are elevated and properties might be overvalued. The commercial segment has seen a steeper downturn, and the combination of rising financing costs and falling rental incomes could pose repayment capacity challenges. Despite negative credit rating actions, so far there is limited evidence of credit supply restrictions, fire sales or a widespread deterioration in credit quality among CRE firms. Banks' aggregate exposures are substantially smaller for CRE than for RRE and are unlikely to be large enough at the euro area level to cause a systemic crisis alone. Nevertheless, a scenario where real estate firms suffer very large losses is likely to coincide with stress in other sectors. In this way, CRE market outcomes have the potential to act as a significant amplifying factor in an adverse scenario, increasing the likelihood of systemically relevant losses accruing in the banking system (**Special Feature B**). While macroprudential policy should focus on maintaining the resilience of the banking sector at the current juncture, current levels of banking sector profitability may provide an opportunity for further targeted increases of macroprudential buffers in some countries while avoiding procyclical effects (**Chapter 5**).

2 Financial markets



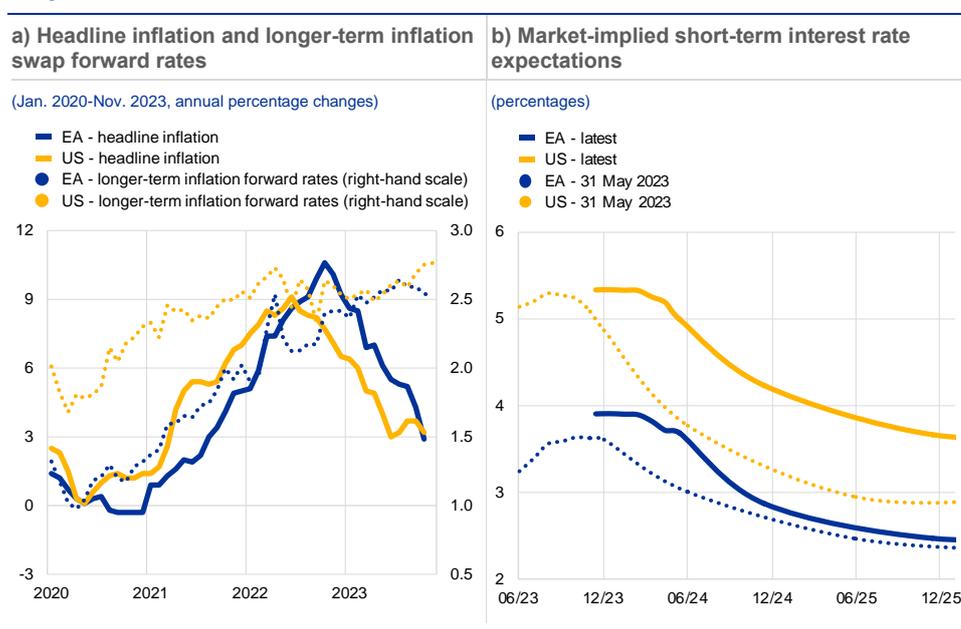
2.1 Markets adjust to an environment of higher rates

Market participants' view that there is a heightened risk of persistent inflation has led them to revise their expectations for interest rates to remain elevated for a longer period of time. Falling inflation (Chart 2.1, panel a) has encouraged major central banks to moderate the pace of policy rate hikes. In addition, the prospect of nearing the end of the rate-hiking cycle lowered the implied volatility in risk-free interest rate markets and supported investor sentiment until August. At the same time, however, longer-term inflation swap forward rates have stayed elevated

(Chart 2.1, panel a), as resilient labour markets, the energy transition, climate change and heightened geopolitical tensions may contribute to greater inflation persistence and economic uncertainty.¹⁵ Consequently, market participants have also adjusted their expectations regarding the future path of short-term interest rates and have priced them as remaining at elevated levels for an extended period of time (Chart 2.1, panel b). Over September and October a rapid increase in long-term government bond yields in line with this trend, as well as on the back of rising term premia, put renewed pressure on asset valuations. However, the market correction proved to be short-lived, as investor confidence benefited from a downside surprise in inflation.

Chart 2.1

Investor expectations of inflation persistence have led them to price in higher-for-longer rates



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

Notes: The latest observations are for 14 November 2023. Panel a: longer-term inflation swap forward rates refer to 5Y5Y swaps on HICP (euro area) and CPI (United States). Panel b: risk-neutral market expectations for one-month rates based on the €STR OIS and the USD SOFR OIS forward curves.

A period of higher interest rates may bring long-term benefits for the stability of the financial system, but it could also temporarily increase market volatility.

The era of ultra-low interest rates was associated with an accumulation of financial stability risks.¹⁶ In financial markets, these risks were linked primarily to search-for-yield behaviour, resulting in increased leverage and exposure to risky assets and causing a build-up of market and credit risks that in some cases may have exceeded risk-bearing capacities.¹⁷ As a result, the transition to a higher interest rate environment has triggered a reversal which is visible in de-risking trends as safer

¹⁵ See, for example, “[Policymaking in an age of shifts and breaks](#)”, speech by Christine Lagarde at the annual Economic Policy Symposium “Structural Shifts in the Global Economy”, Jackson Hole, 25 August 2023.

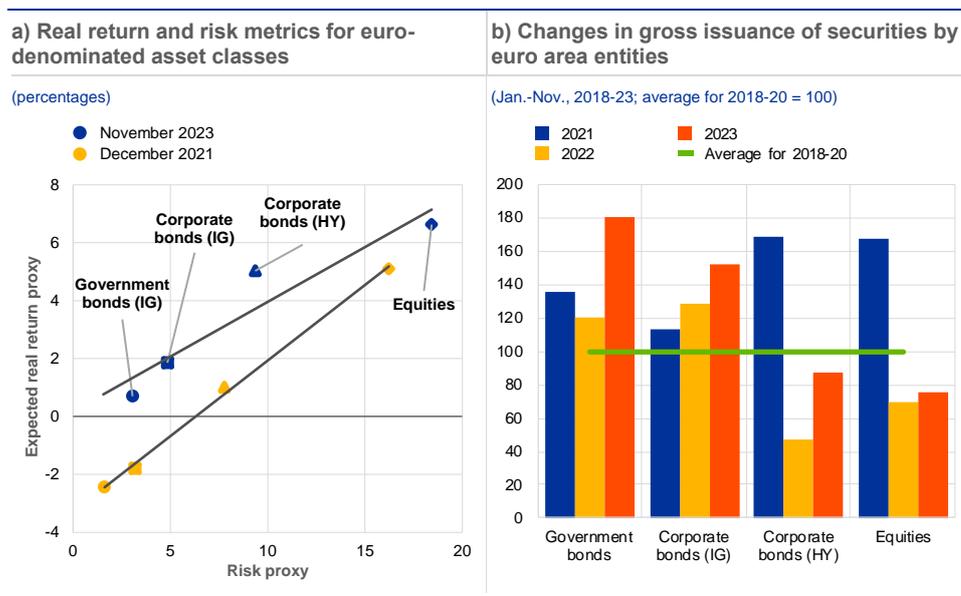
¹⁶ See, for example, “[Macprudential policy issues arising from low interest rates and structural changes in the EU financial system](#)”, ESRB, November 2016.

¹⁷ See, for example, Hermans, L., Kostka, T. and Vassallo, D., “[Asset allocation and risk taking under different interest rate regimes](#)”, *Working Paper Series*, No 2803, ECB, March 2023.

assets have become increasingly appealing to investors (**Chart 2.2**, panel a). Net flows into investment funds exposed to riskier asset classes have also been substantially lower (**Chapter 4**). The crowding out of riskier assets has so far mostly been evident in primary market volumes, with the gross issuance of euro area high-yield bonds and equities declining considerably during the normalisation of monetary policy (**Chart 2.2**, panel b). In the secondary market, the rise in real risk-free rates has induced a correction in equity prices, albeit of limited extent to date. Such resilience may be attributed partly to reduced supply from new issuance, on top of the robust demand stemming from the soft-landing expectations or from investors who see equities as a better inflation hedge than fixed income securities. Going forward, compressed risk premia leave global equity markets vulnerable to disorderly repricing if risk sentiment deteriorates. Such correction could be exacerbated by heightened leverage in the equity options market (**Box 2**).

Chart 2.2

The transition to a higher interest rate environment has reduced the issuance of riskier assets



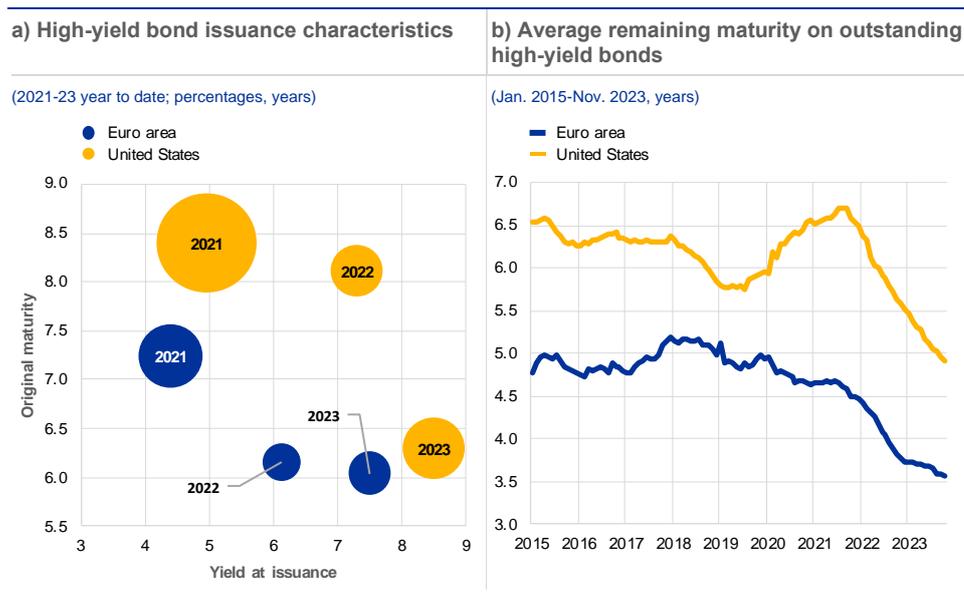
Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: The latest observations are for 14 November 2023. IG stands for investment grade; HY stands for high yield. Panel a: calculated on the basis of Bloomberg euro-denominated total return bond indices for three- to five-year maturities and on the EURO STOXX Index. Expected real returns are proxied by the weighted average yield to maturity adjusted by inflation swap rates on the euro area HICP matching index average maturity (for debt indices) and by the five-year cyclically adjusted price-to-earnings (CAPE) yield (for the equity index). Risk is proxied by the rolling five-year annualised volatility of monthly returns. Fitted lines are linear functions. Panel b: rating groups are based on the average rating assigned to a given issuer.

The impact of policy tightening on riskier borrowers may be greater in the medium term. Lower-rated corporate borrowers issued a record amount of debt shortly before the onset of the tightening cycle (**Chart 2.2**, panel b). This may have enabled them to reduce issuance in 2022 and 2023 to some degree, which shielded them from the immediate effects of higher risk-free rates and wider spreads on their funding costs. Some firms which still opted for market-based funding have issued new bonds but with shorter maturities, potentially aiming to lower the risk premia demanded by investors or hoping that monetary policy would ease faster than currently anticipated (**Chart 2.3**, panel a). These two trends have recently caused the average maturity of outstanding high-yield debt to fall to historical lows (**Chart**

2.3, panel b). While such debt management strategies could prove beneficial for borrowers if tight monetary policy is short-lived, they might increase rollover risks, especially in a higher-for-longer environment. In particular, shorter debt maturities leave lower-rated firms more exposed to future market conditions. If a delay in the impact of policy tightening on funding costs coincides with an already slowing economy, this could lead to a further rapid decline in interest coverage ratios (Chapter 1) and cause a disorderly price correction in the high-yield bond market.

Chart 2.3

High-yield issuers are increasingly exposed to refinancing risk



Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: The latest observations are for 14 November 2023. Panel a: bubble size is scaled to reflect the notional amount of debt issued. Average characteristics are weighted by the amount issued. The calculation of average original maturity excludes perpetual bonds. Panel b: average maturity for the ICE BofA Euro High Yield Index (euro area) and the ICE BofA US High Yield Index (United States).

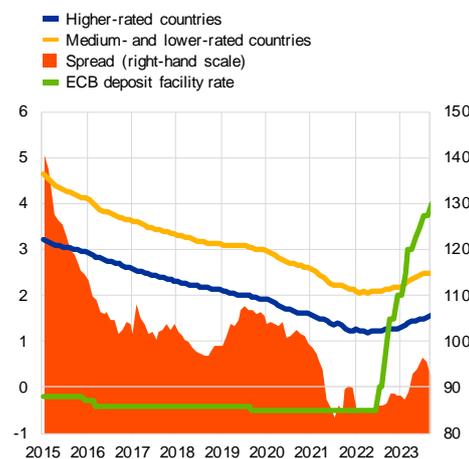
Vulnerabilities are also persisting in sovereign bond markets due to the continued rise in risk-free rates and subdued economic growth. The period of ultra-low interest rates led to a gradual decline in the cost of public debt and reduced disparities in funding costs between euro area countries despite rating differences (Chart 2.4, panel a). The reversal of this trend since summer 2022 has been only gradual so far. It could, however, gain momentum, particularly as more vulnerable countries are confronted by substantial rollover needs in the near term (Chapter 1). At present it would appear that sovereign spreads are increasingly reflecting differences in country ratings and the outlook for these ratings, with more euro area sovereign debt at risk of a downgrade than an upgrade (Chart 2.4, panel b). Going forward, some euro area countries may experience significant spread widening if they are unable to consolidate their fiscal positions, although this may prove challenging given the ongoing economic slowdown. At the same time, the flexibility in the ECB’s pandemic emergency purchase programme reinvestments and the ECB’s Transmission Protection Instrument could mitigate unwarranted disorderly sovereign debt market dynamics that could pose a serious threat to the transmission of monetary policy across the euro area, if the programme conditions are fulfilled.

Chart 2.4

Higher interest rates might strengthen market discipline of fiscal policies

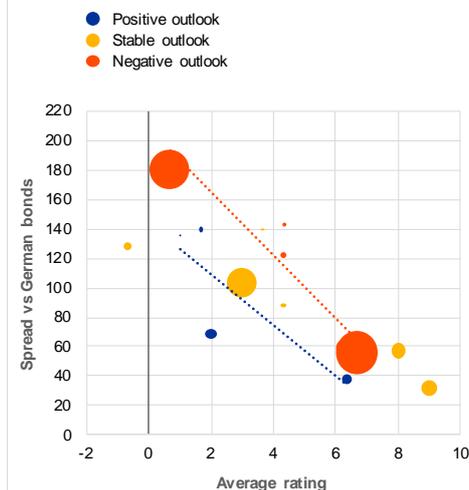
a) Sovereign financing costs, by rating, and ECB deposit facility rate

(Jan. 2015–Sep. 2023; left-hand scale: percentages, right-hand scale: basis points)



b) Spreads for euro area sovereigns, by average rating and rating outlook

(14 November 2023; notches above investment-grade threshold, basis points)



Sources: Bloomberg Finance L.P., ECB (CSDB), Fitch Ratings, Moody's Analytics, S&P Global Market Intelligence and ECB calculations.

Notes: Panel a: average yield at issuance for outstanding sovereign debt. "Medium and lower-rated countries" are defined here as those having at least one credit rating below Aa3 (Moody's) or AA- (Fitch and S&P). Other euro area countries are considered to be higher rated. The spread shows the difference in average yield at issuance for the two groups indicated in the chart. Panel b: the highest possible rating (AAA/Aaa) equals 9. The fitted lines are linear functions for countries with positive (blue) and negative (red) outlooks. Average rating from Fitch, Moody's and S&P. Bubble size is scaled to reflect the notional amount of debt outstanding as at the end of September 2023.

Disruptions in the supply of energy commodities could push inflation up again and contribute to market volatility.

The euro area has seen wide swings in the price of natural gas over the last two years and there is still considerable uncertainty surrounding future prices. Europe's heavy reliance on liquified natural gas has rendered natural gas prices highly vulnerable to potential supply disruptions. Implied volatility metrics also indicate that risks are tilted to the upside. In addition, oil prices have risen since July 2023 on the back of concerns about reduced supply. Volatility in energy commodity prices might also rapidly increase in response to growing geopolitical tensions. A renewed energy price shock, triggered by geopolitical tensions in the Middle East for example, could lead to more persistent inflation, induce an adjustment in market-based interest rate expectations and further weaken economic growth. This could potentially lead to renewed market corrections.

Box 2

The risks from hidden leverage in short-term equity options

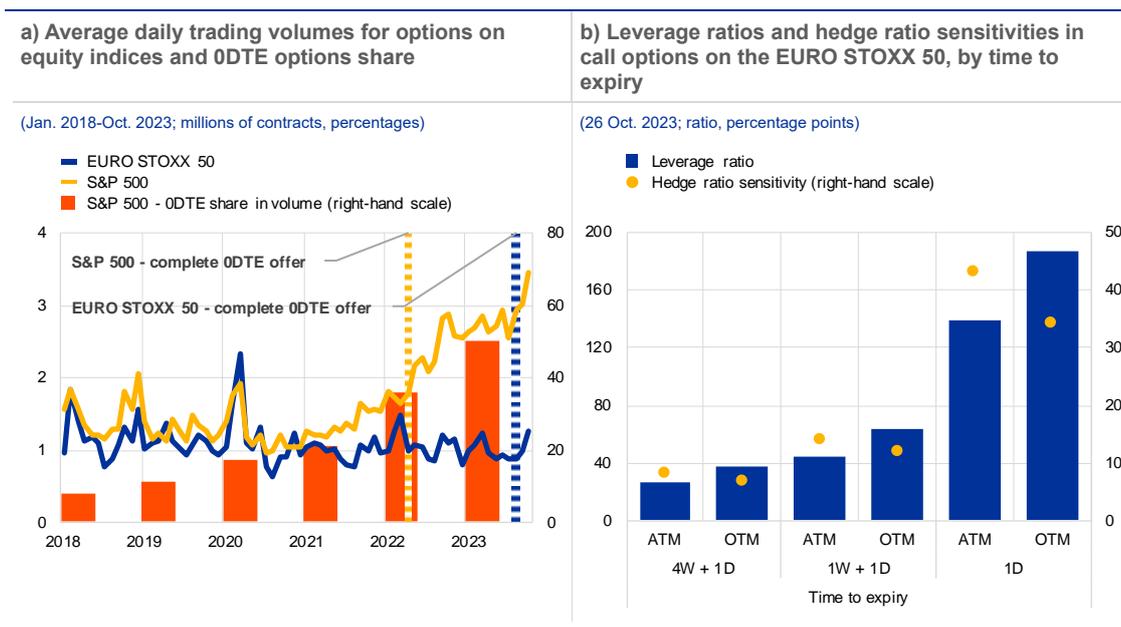
Prepared by Andrzej Sowiński

Option trading volumes in the euro area equity market could increase significantly in the coming quarters in response to the broader offer of such instruments. In the United States, there has been growing interest in trading S&P 500 options on the day of their expiry (commonly referred to as "0 days to expiry" or "ODTE"). In response, the Cboe Exchange has expanded the

offer of these options by adding expiration dates to include every business day.¹⁸ Since then, trading volumes for options on the S&P 500 have soared (**Chart A**, panel a). Recently they reached an all-time high, with 0DTE options accounting for more than 50% of total option volumes for this index. In anticipation of similar investor interest in trading 0DTE options in the euro area equity market, on 28 August 2023 EUREX expanded the offer of weekly options on the EURO STOXX 50 to also cover every business day.

Chart A

Trading activity and leverage in the euro area equity option market might rise after EUREX expanded the offer of options on the EURO STOXX 50 to cover every business day



Sources: Bloomberg Finance L.P., Cboe Global Markets and ECB calculations.

Notes: Panel a: the latest observations are for 26 October 2023. "Complete 0DTE offer" marks the date from which options start to expire on each business day. Data on 0DTE share in S&P 500 option volume traded in 2023 show a year-to-date share at the end of August.* Panel b: the option leverage ratio (i.e. the option lambda parameter, or how much leverage market participants are employing while engaging in these trades) is calculated as the value of the delta-equivalent position (i.e. the effective exposure in the underlying index) over the option price. Hedge ratio sensitivity (i.e. the option gamma parameter) is calculated as the sensitivity of the option delta parameter (i.e. how much an option price changes when the underlying equity index changes) to the level of the underlying index. A higher gamma implies higher volatility in option prices. At-the-money (ATM) and out-of-the-money (OTM) options represent options closest to 50% and 25% delta respectively.

*) See "Volatility Insights: Evaluating the Market Impact of SPX 0DTE Options", Cboe, 8 September 2023.

Trading in 0DTE options is more cost efficient for market participants. A broader range of expiries gives market participants more flexibility, for instance if they want to hedge against or speculate on the immediate market impact of a specific macroeconomic data publication or policy decision. Since the timing of such events is known in advance, investors can open their positions on the same day, paying less in premia for the relevant 0DTE options than they would otherwise have done for longer-dated contracts. This feature makes them particularly attractive during periods of heightened economic uncertainty.

Some characteristics of 0DTE options might, however, increase procyclicality in the equity market. The smaller premia paid for options with a shorter time to expiry mean the effective leverage embedded in these contracts is much higher (**Chart A**, panel b). This can magnify their impact on the underlying stock market because of the way exposures are managed by option sellers. Some traders only hedge their position after breaching a certain loss threshold. Others,

¹⁸ Before 2022, contracts expired on Mondays, Wednesdays and Fridays. Tuesday and Thursday expiries were added on 18 April and 11 May 2022 respectively.

such as market-makers (typically large banks or investment firms), tend to hedge their short positions swiftly, either by buying other options or trading the underlying securities, depending on the market situation. As the effective exposure stemming from options is sensitive to changes in the underlying index, the quantity of securities that must be bought or sold (the hedge ratio is determined by the option delta) also changes over the life of a contract. Sensitivity to changes is much higher for out-of-the-money options with a shorter time to expiry (**Chart A**, panel b). This means that the sellers of such 0DTE options might need to trade the underlying securities in a way which is very dynamic and in line with the short-term trend. In other words, they need to buy more and more when prices go up and sell more and more when prices go down. As a result, these transactions might fuel short-term price movements and amplify intraday volatility spirals.

The potential for 0DTE options to affect the underlying equity market depends heavily on investors' positioning. Option sellers hedge their positions at a portfolio level, and the hedging transactions of individual market participants might offset each other. This means that the aggregate market impact of these trades depends on the current structure of option exposures. If investors open similar positions in call and put options to a comparable degree, the initial impact on the underlying index might be negligible. Nevertheless, hedging trades might still affect short-term price developments over the life of these contracts. This effect is larger if market participants exploit higher leverage by choosing options with shorter maturities (**Chart B**, panel a) and out-of-the-money options (**Chart B**, panel b). If, on the other hand, the market positioning becomes more one-sided – meaning participants invest more in put (call) options – even the immediate market impact can become material (**Chart B**, panel c), and the potential for further impact in line with short-term price trends is skewed to the downside (upside).

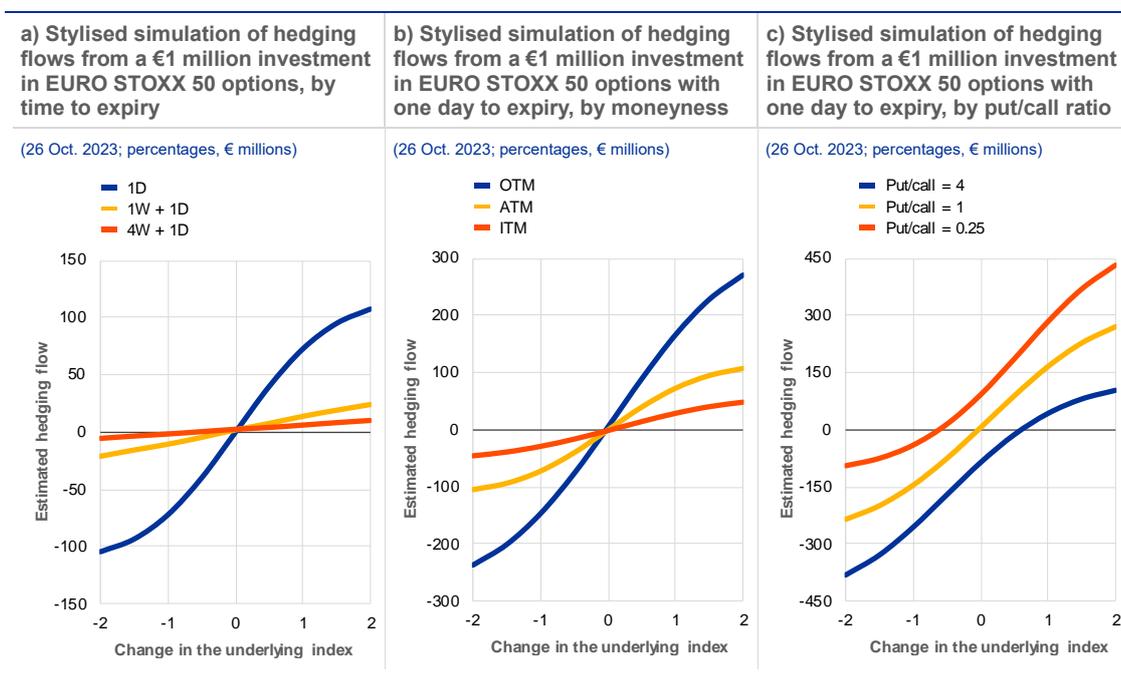
A build-up of exposures in 0DTE options might fuel disorderly market moves. Greater sensitivity of shorter-dated options to changes in the price of the underlying index might constitute a structural vulnerability. The potential impact of 0DTE options grows with the size of exposures in these instruments relative to the size of the underlying equity market. Such an impact might remain muted until a large, abrupt swing in investor sentiment occurs, when markets typically become one-sided. Option sellers might then be forced to rapidly trade underlying securities in line with the short-term price trend. The expected deterioration in market liquidity conditions could also add to an adverse volatility spiral. In addition, some market participants – such as retail investors – might exploit this vulnerability by triggering or feeding a volatility spike through 0DTE options with the highest effective leverage.¹⁹ Although the number of such investors in this market segment remains small, their share is growing rapidly.²⁰

¹⁹ For more information on the potential role of retail investors in inducing forced equity trades (e.g. short squeeze), see, for example, Anand, A. and Pathak, J., “[The role of Reddit in the GameStop short squeeze](#)”, *Economics Letters*, Vol. 211, February 2022, and Vasileiou, E., “[Does the short squeeze lead to market abnormality and antileverage effect? Evidence from the Gamestop case](#)”, *Journal of Economic Studies*, Vol. 49, No 8, October 2022.

²⁰ See the box entitled “[The Fast-Growing Interest in Retailers' Trading in the Zero-Day Options Market: Is It a Hidden Risk?](#)”, *Global Financial Stability Report*, International Monetary Fund, April 2023.

Chart B

The potential impact of options on the underlying equity market depends on various factors



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

Notes: Out-of-the-money (OTM), at-the-money (ATM) and in-the-money (ITM) options represent options closest to 75%, 50% and 25% delta respectively. "Estimated hedging flow" shows the values of the underlying securities that must be traded by option sellers to delta-hedge the option exposure. Other option parameters and characteristics (e.g. implied volatility) are assumed constant in the analysis. Panel a: investment amount assumed in the scenario is split equally between put and call ATM options. Panel b: investment amount assumed in the scenario is split equally between put and call options with one day to expiry. Panel c: investment amount assumed in the scenario is split between put and call OTM options with one day to expiry, in line with indicated put/call ratio.

Risks for the euro area from 0DTE options also stem from the high level of integration with global equity markets. Although it is yet to be seen if interest in trading EURO STOXX 50 options on the day of their expiry will grow rapidly, the euro area equity market might experience a disorderly correction if risks associated with 0DTE options were to materialise in the United States. The correlation between the two markets tends to rise during stress events, so adverse spillover effects could be expected. In addition, a rapid deterioration of market sentiment abroad might interplay with vulnerabilities in the EURO STOXX 50 option market. Further monitoring of trading patterns in 0DTE options globally is therefore warranted.

2.2 Investors may be underestimating the risk of a slowdown in economic growth

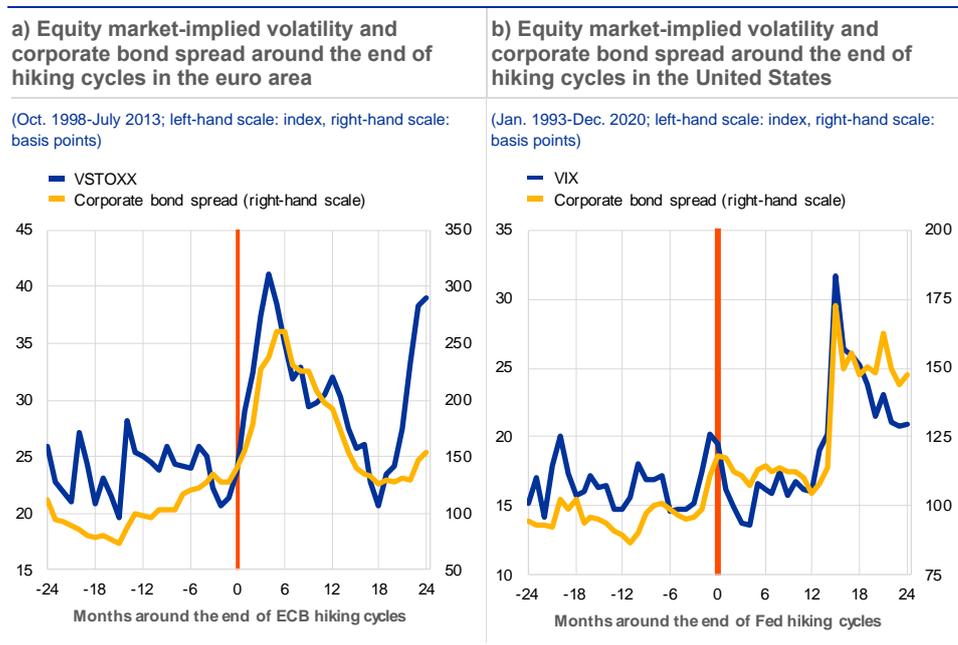
Elevated economic uncertainty could also lead to a surge in market volatility.

Various shocks – such as credit events – can occur unexpectedly, while vulnerabilities tend to become more pronounced towards the end of a tightening cycle. Currently, the low levels shown by market-based risk indicators suggest that the baseline expectation among investors is that the economy will experience a soft landing, meaning that inflation will decline towards central bank targets without an

accompanying recession.²¹ Nevertheless, the historical evidence indicates that a benign scenario of this type is difficult (although not impossible) to achieve in practice, especially given the magnitude of rate increases in a short period of time.²² This underscores the fact that there are material risks surrounding current market pricing. In both the euro area (**Chart 2.5**, panel a) and the United States (**Chart 2.5**, panel b), market volatility and risk premia have tended to increase after a hiking cycle has concluded, albeit with different time lags. The potential underestimation of risk by market participants could therefore lead to a disorderly correction if there are any negative economic surprises or if market sentiment turns.

Chart 2.5

Economic uncertainty might lead to a spike in market volatility after rate hikes end



Sources: Bloomberg Finance L.P. and ECB calculations.
 Notes: While the sample is limited and not every increase in the risk indicators was directly associated with monetary policy, a tighter policy stance might have impacted the scale of market volatility. Panel a: average values observed over the previous three hiking cycles. Option-adjusted spreads for ICE BofA Euro Corporate index. Panel b: average values observed over the previous four hiking cycles. Option-adjusted spreads for the Bloomberg US Corporate Bond index.

The equity risk premium may be excessively compressed in the light of the weak macroeconomic outlook for the euro area. As the effects of monetary policy tightening transmit throughout the economy, a notable deterioration in growth prospects for the euro area is evident in economic forecasts and several leading indicators of economic activity (**Chapter 1**). Historically, the prospect of economic contraction has typically led to a substantial widening of risk premia as market participants demand higher compensation for taking risks in an environment in which corporate profits are expected to decline and default rates are expected to increase. In the past, this relationship has shown greater sensitivity for riskier assets. In recent months, however, risk premia in the euro area corporate bond market (**Chart 2.6**,

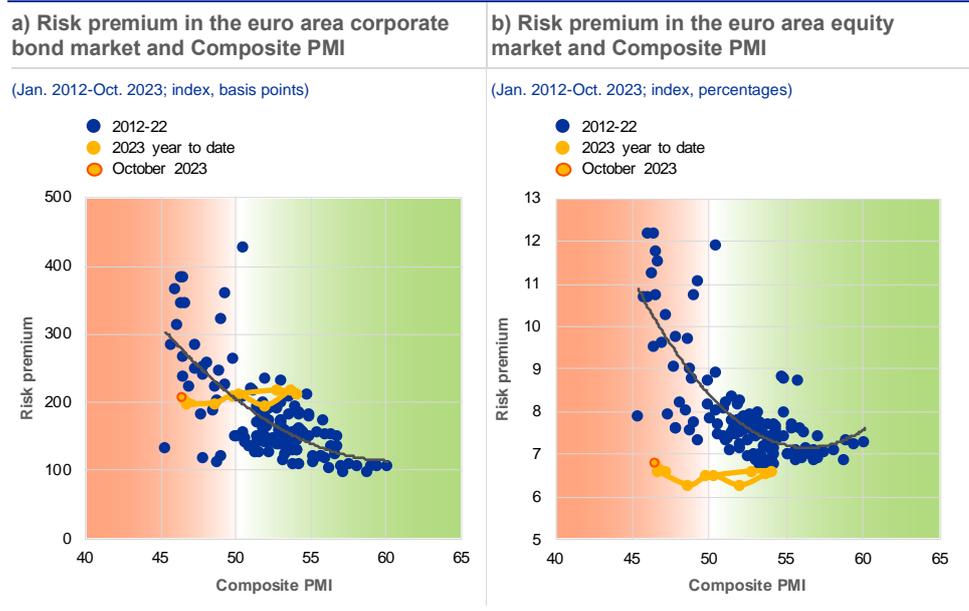
²¹ Recently yield curve inversion has remained one of the few market indicators pointing to a large risk of recession. For further information, see the box entitled “[The inversion of the yield curve and its information content in the euro area and the United States](#)”, *Economic Bulletin*, Issue 7, ECB, 2023.

²² See, for example, Blinder, A.S., “[Landings, Soft and Hard: The Federal Reserve, 1965-2022](#)”, *Journal of Economic Perspectives*, Vol. 37, No 1, Winter 2023, pp. 101-120.

panel a) and equity market ([Chart 2.6](#), panel b) have remained largely unchanged, despite a substantial decline in the composite Purchasing Managers' Index (PMI) and its indications of economic contraction. Furthermore, although the level of risk premia in the corporate bond market still appears to be fairly well aligned with historical patterns, it is significantly compressed in the equity market. This will render equities vulnerable to abrupt repricing if the adverse effect of the economic slowdown on corporate profitability is greater than currently anticipated by investors.

Chart 2.6

The response of risk premia to the worsening growth outlook has so far been limited



Sources: Bloomberg Finance L.P., S&P Global Market Intelligence and ECB calculations.
 Notes: Composite PMI below 50 indicates economic contraction (red area) while above 50 indicates economic expansion (green area). The fitted lines are quadratic functions and exclude the first three months of pandemic-related lockdown (March-May 2020) as outliers. Panel a: credit risk premia are calculated as the option-adjusted spread for BBB-rated corporate bonds with a residual maturity of five to seven years. Panel b: equity risk premia are calculated as the five-year CAPE yield for the EURO STOXX less the five-year real (inflation-swap-adjusted) German government bond yield.

China's economic slowdown may also act as a drag on growth in the euro area and may adversely affect market sentiment.

The reopening of the Chinese economy offered only temporary relief from concerns surrounding the local real estate market. Credit spreads for bonds issued by property developers spiked again to severely distressed levels as an increasing number of them found it difficult to meet their debt obligations ([Chart 2.7](#), panel a). Furthermore, Chinese banks have seen their valuations plummet to historic lows, given that they hold vast majority of debt exposure to property developers. The substantial contribution made by the real estate sector to China's GDP²³ means that a downturn in the property market, coupled with subdued consumer confidence, could significantly impede overall economic growth in the country for an extended period. This risk would become even more pronounced if credit losses incurred by exposed banks led to a severe tightening of lending standards or, worse, a financial crisis also involving domestic shadow bank trusts. Although euro area entities have limited direct securities

²³ According to some studies, the contribution of the broad real estate sector to China's GDP is estimated at almost 30%; see Rogoff, K. and Yang, Y., "Has China's Housing Production Peaked?", *China & World Economy*, Vol. 29, Issue 1, 2021, pp. 1-31.

exposure to Chinese companies, potential spillover effects could emerge due to China’s prominent role in the global economy. Macroeconomic shocks in China could therefore have a material impact on global financial markets.²⁴ While the correlations between the Chinese equity market and markets in advanced economies weakened when inflation surged around the world, they have rebounded over the course of 2023 (Chart 2.7, panel b). For this reason, further negative surprises in China may have adverse effects on financial conditions in the euro area as well.

Chart 2.7

Vulnerabilities in China could spill over to advanced economies



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

Notes: The latest observations are for 14 November 2023. Panel a: option-adjusted spreads for the ICE 1-5 Year USD China Senior Real Estate Corporate Constrained Index and the ICE BofA Asian Dollar High Yield Corporate China Issuers Index. Panel b: rolling 12-month correlation for monthly returns on EURO STOXX (euro area), S&P 500 (United States) and MSCI China (China).

2.3 Rapid adoption of artificial intelligence might also have financial stability implications

Progress in developing artificial intelligence has sparked euphoria among investors.

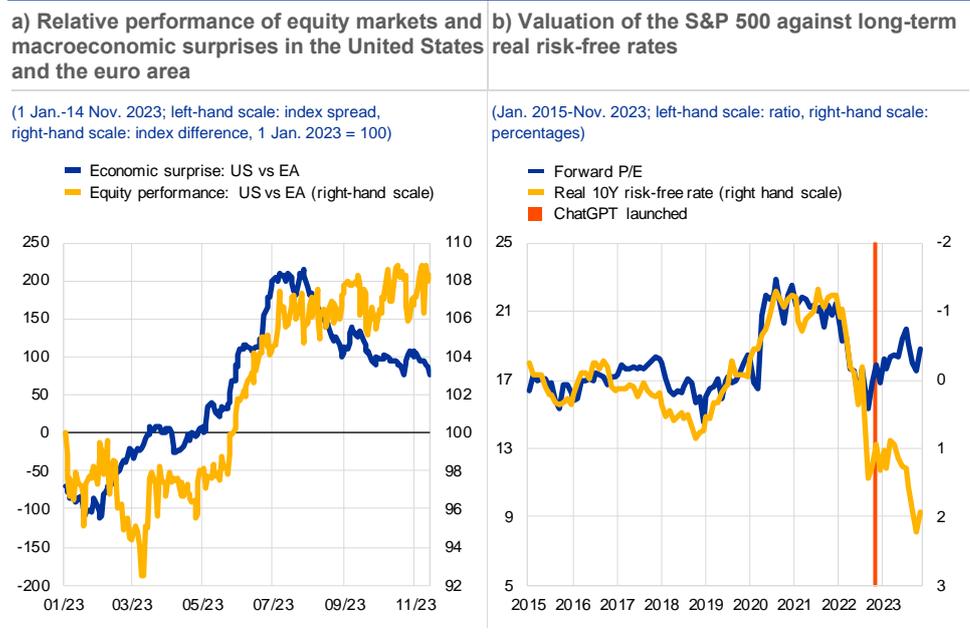
Since May, the equity market in the United States has strongly outperformed that of the euro area, partly due to more positive macroeconomic surprises (Chart 2.8, panel a). However, robust economic data in the United States have also led investors to expect policy rates to remain higher for longer (Chart 2.1, panel b), contributing to the substantial increase in long-term nominal and real risk-free rates. While the surge in these rates played a major role in the market correction in 2022, valuations of US companies have increased in 2023 despite the continued rise in real rates (Chart 2.8, panel b). This market rebound has been concentrated in the technology sector. As the shares of such high-growth companies are considered

²⁴ See, for example, the box entitled “The impact of Chinese macro risk shocks on global financial markets”, *Financial Stability Review*, ECB, May 2022.

to be long-duration assets, their prices should be particularly sensitive to interest rate levels. Nevertheless, progress in adopting artificial intelligence (AI) has pushed equity valuations higher on the back of investors' optimism about future earnings in companies judged likely to benefit from these new technologies.

Chart 2.8

Stronger economic outlook and AI advances have led US equity valuations higher



Sources: Bloomberg Finance L.P. and ECB calculations.
 Notes: Panel a: "Economic surprise" shows the difference between the Citi Economic Surprise Index for the United States and for the euro area. "Equity performance" shows the normalised ratio of S&P 500 (United States) and EURO STOXX (euro area). Panel b: the latest observations are for 2 November 2023. Price to one-year blended-forward earnings and ten-year real (inflation-swap-adjusted) government bond yield.

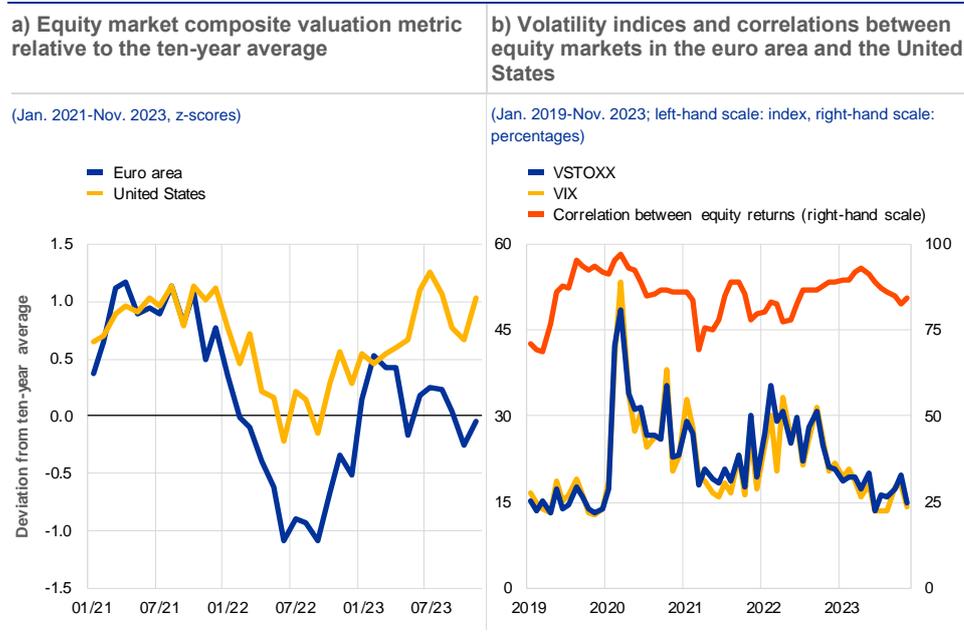
Potential overvaluation in the US equity market could have repercussions for financial markets in the euro area. Numerous equity valuation metrics in the United States reached decade-high levels during the summer, prompting concerns of overvaluation (Chart 2.9, panel a) or even an AI-related asset price bubble.²⁵ By contrast, euro area equity valuation indicators did not increase to such levels (Chart 2.9, panel a), partly because of the much smaller share of technology companies. Financial stability risks for the euro area from their potential overvaluation therefore relate mostly to spillovers from the United States. The deep integration of the two equity markets is evidenced by the very high correlation of returns, which typically becomes even stronger during periods of stress (Chart 2.9, panel b).²⁶ Apart from real-economy linkages, these strong correlations might also stem from the level of similarity between the portfolios of global investors, which could have increased partly on account of the digitalisation of financial services (Box 3) and the growing share of passive investing. A disorderly correction in the US equity market could therefore affect euro area entities via large direct exposures, which amounted to €2.6

²⁵ Since June 2023 an AI/tech bubble has been consistently flagged by respondents to the Bank of America Global Fund Manager Survey as one of the biggest tail risks.
²⁶ See, for example, the box entitled "Risk of spillovers from US equity market corrections to euro area markets and financial conditions", *Financial Stability Review*, ECB, May 2021.

trillion in the second quarter of 2023²⁷, and via the transmission of negative sentiment to euro area markets.

Chart 2.9

Potential overvaluation in the US equity market also poses a risk for euro area markets



Sources: Bloomberg Finance L.P. and ECB calculations.
 Notes: The latest observations are for 14 November 2023. Panel a: average z-scores of the following valuation metrics for EURO STOXX (euro area) and the S&P 500 (United States): price-to-book ratio, price-to-forward (twelve-month) earnings ratio, price-to-long-term (ten-year) inflation-adjusted earnings ratio, price/earnings-to-growth ratio (growth rate calculated as the average of annualised five-year historical earnings growth and annualised two-year blended-forward earnings growth) and inverse risk premia proxied by five-year CAPE yield less five-year real (inflation-swap-adjusted) government bond yield (German for the euro area). Panel b: VSTOXX and VIX are implied volatility indices based on options on the EURO STOXX 50 and on the S&P 500 respectively. Rolling 12-month correlation for monthly returns for EURO STOXX 50 and the S&P 500.

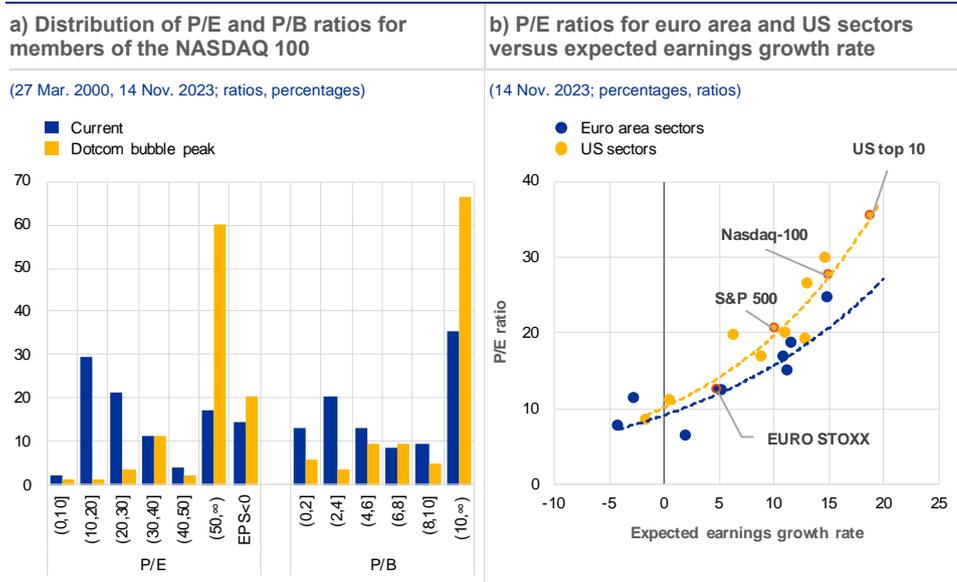
The risk of technology-led asset price overvaluation warrants a thorough financial stability assessment. Concerns over a potential AI-related asset price bubble have prompted comparisons with the dotcom bubble. Research indicates that the dotcom crash did not have wider macroeconomic consequences.²⁸ However, the companies around which bubble-type concerns are arising today are substantially larger in size.²⁹ At the same time, the distribution of the most common equity valuation metrics was much more extreme at the peak of the dotcom bubble than is currently the case (Chart 2.10, panel a). Nevertheless, continuous monitoring is warranted, as systemic risk builds up when valuations are still increasing.³⁰ Given the fact that credit-fuelled bubbles are often seen as more detrimental for financial stability, it is also crucial to assess how various forms of leverage and the associated

²⁷ Additional exposures might also stem from investments through financial intermediaries domiciled outside the euro area or via derivatives.
²⁸ See, for example, Brunnermeier, M., Rother, S. and Schnabel, I., “Asset Price Bubbles and Systemic Risk”, *The Review of Financial Studies*, Vol. 33, Issue 9, September 2020, pp. 4272-4317.
²⁹ During the dotcom bubble, the market capitalisation of companies from the Nasdaq-100 (which comprises the largest innovative non-financial corporations) relative to companies from the broader S&P 500 index grew over two years from 9.6% to 32.2% at the market peak. On 23 September 2023 the ratio stood at 48.1%.
³⁰ Chen, G., Chen, L., Liu, Y. and Qu, Y., “Stock price bubbles, leverage and systemic risk”, *International Review of Economics and Finance*, Vol. 74, July 2021, pp. 404-417.

risk of illiquidity spirals could affect financial institutions and broader financial markets.

Chart 2.10

Valuation metrics are below the extreme levels seen in the past but sensitivity to growth assumptions leaves the US equity market vulnerable to sudden repricing



Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: The latest observations are for 14 November 2023. P/E stands for price-to-earnings; P/B stands for price-to-book. Panel a: share of total number of companies for which data on P/E and P/B ratios were available. Panel b: P/E ratios estimated for 2023. Annualised estimated earnings growth rate for the next two calendar years (2024 and 2025). The fitted lines are exponential functions based on values for EURO STOXX (euro area) and S&P 500 (United States) subindices for the following sectors: banks, consumer discretionary, consumer staples, energy, health care, industrials, technology and utilities. "US top 10" is based on the average values for the ten largest listed US companies, weighted by market capitalisation.

The anticipation of high earnings growth related to AI adoption might lead to increased price volatility and the risk of a disorderly market correction. During the course of 2023, earnings expectations have increased substantially for companies expected to benefit most from AI adoption. Such expectations might be justified if AI significantly enhances productivity. At the same time, though, the non-linear correlation between valuation metrics and earnings growth expectations (**Chart 2.10**, panel b) leaves the largest US companies vulnerable to sudden repricing. Elevated uncertainty surrounding the ultimate impact of AI could therefore also contribute to high volatility in the equity market, irrespective of whether the "AI rally" displays asset price bubble dynamics or not.

The widespread adoption of AI, while offering many benefits, may also introduce new risks to market functioning. Market participants in the euro area are increasingly using AI in investment strategies, risk management, compliance, data analysis and post-trade processes.³¹ However, there are concerns around the potential manipulative use of AI, such as the ability to influence market sentiment through social media.³² The relevance of this risk transmission channel was

³¹ See, for example, "Artificial intelligence in EU securities markets", *ESMA TRV Risk Analysis*, ESMA, 1 February 2023.

³² See "ESMA Report on Trends, Risks and Vulnerabilities", *TRV Risk Monitor*, No 2, ESMA, 31 August 2023.

underscored in March 2023 when social media activity likely accelerated the failure of Silicon Valley Bank (**Box 3**).³³ In addition, the proliferation of similar AI models in portfolio management could exacerbate herding behaviour and increase market procyclicality.³⁴

Box 3

Financial stability considerations arising from the digitalisation of financial services

Prepared by Katharina Cera, Allegra Pietsch and Andrzej Sowiński

The digitalisation of financial services brings a variety of benefits but could also amplify and accelerate the materialisation of financial stability risks. The surge in retail investors participating directly in equity markets during the pandemic was associated with increased access to capital markets via trading apps (**Chart A**, panel a). This trend has certainly brought some benefits, for example by broadening risk sharing and lowering transaction costs. Nonetheless, authorities' attention was drawn to episodes of extreme volatility in the prices of "meme" stocks³⁵ in the first half of 2021, which had been induced by individual investors coordinating trades through social media.³⁶ Furthermore, the banking sector stress in the United States in March 2023 reignited concerns around the impact of digitalisation on financial stability, as the interaction of increased online banking (**Chart A**, panel b) and social media may accelerate the pace of bank runs.

The increased popularity of retail trading via apps, while bringing some benefits, could result in more procyclicality in financial markets. Digitalisation has made it easier for retail investors to trade in financial instruments not only by speeding up the opening of an investment account or the submission of trading orders, but also by providing widespread access to investment ideas published on social media. Making financial markets accessible to a broader range of investors is beneficial, as it enables risk sharing across the economy, provides more equal opportunities to gain financial returns and can help to deepen financial markets. At the same time, it can raise concerns about investor protection and market functioning. The new market participants are typically younger and less financially literate, and have a greater risk appetite, which has major implications for their trading behaviour.³⁷ These investors might trade more frequently based on emotions or other non-fundamental factors. Such activity can be accentuated by trading platforms' "social trading" functionality, which allows users to copy other investors' trades automatically. Increased herding could, in turn, undermine the orderly functioning of financial markets by making asset price bubbles or disorderly corrections more likely. Moreover, the design of trading apps and their marketing campaigns have led to a "gamification of trading", which might have attracted risk-seeking individuals during the pandemic.³⁸ Furthermore, excessive use of leverage via margin debt

³³ See, for example, "[Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank](#)", Board of Governors of the Federal Reserve System, 28 April 2023.

³⁴ See, for example, "[Isaac Newton to AI](#)", remarks by Gary Gensler, SEC Chair, before the National Press Club, Washington, 17 July 2023.

³⁵ Stocks that became popular among retail investors via social media.

³⁶ See the box entitled "[Retail Investors, Social Media, and Equity Trading](#)", *Financial Stability Report*, Board of Governors of the Federal Reserve System, November 2021, pp. 18-21.

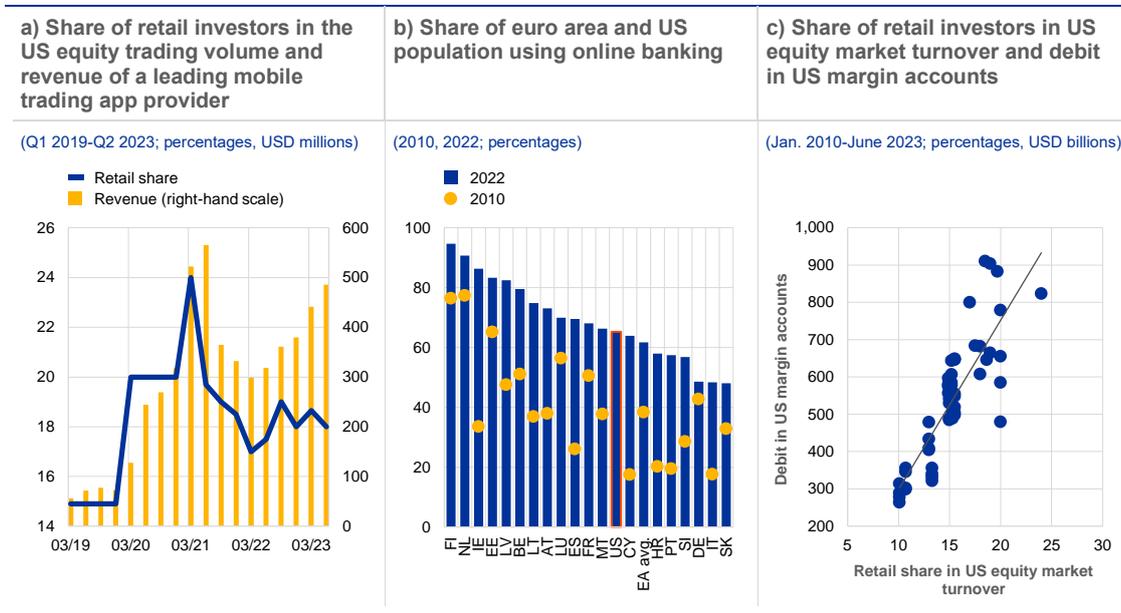
³⁷ See "[Final Report – On the European Commission mandate on certain aspects relating to retail investor protection](#)", ESMA, 29 April 2022.

³⁸ See, for example, Chiah, M. and Zhong, A., "[Trading from home: The impact of COVID-19 on trading volume around the world](#)", *Finance Research Letters*, Vol. 37, November 2020, or Chiah, M., Tian, X. and Zhong, A., "[Lockdown and retail trading in the equity market](#)", *Journal of Behavioral and Experimental Finance*, Vol. 33, March 2022.

(Chart A, panel c) or embedded in derivatives contracts such as 0 days to expiry (0DTE) options could potentially amplify market movements in tail events.³⁹

Chart A

Digitalisation is progressing in both traditional banking and investment services



Sources: Bloomberg Finance L.P., Eurostat, FINRA, World Bank and ECB calculations.

Notes: Panel a: revenue of an app provider refers to the revenue of Robinhood. Retail share refers to the share of retail investors in US equity market turnover. Panel b: "EA avg." is the average of all countries shown weighted by population in 2010 and 2022. US data are only available for 2022. Structural breaks in the series mean that the change between 2010 and 2022 may be underestimated for Germany, Latvia and Luxembourg and overestimated for Estonia and Ireland. Panel c: the debit balance in a margin account is the amount of money a customer owes their broker for funds they have borrowed to purchase securities.

Social media allows information to spread faster but can also trigger or amplify shocks.

Social media has the potential to help retail investors make more informed and more timely decisions⁴⁰, and to enable those bank depositors that are not protected by deposit insurance schemes to better understand financial risks. At the same time, it may foster herd behaviour while feeding rumours and disinformation, which could raise financial stability concerns. During the GameStop episode in 2021, retail investors coordinated on social media to buy the company's heavily shorted stocks, resulting in some institutional investors facing a short squeeze which had a significant impact on market volatility (Chart B, panel a).⁴¹ The US bank tensions in March 2023 raised concerns that negative sentiment on social media platforms could adversely affect banks'

³⁹ See the box entitled "The Fast-Growing Interest in Retailers' Trading in the Zero-Day Options Market: Is It a Hidden Risk?", *Global Financial Stability Report*, International Monetary Fund, 11 April 2023, pp. 50-51.

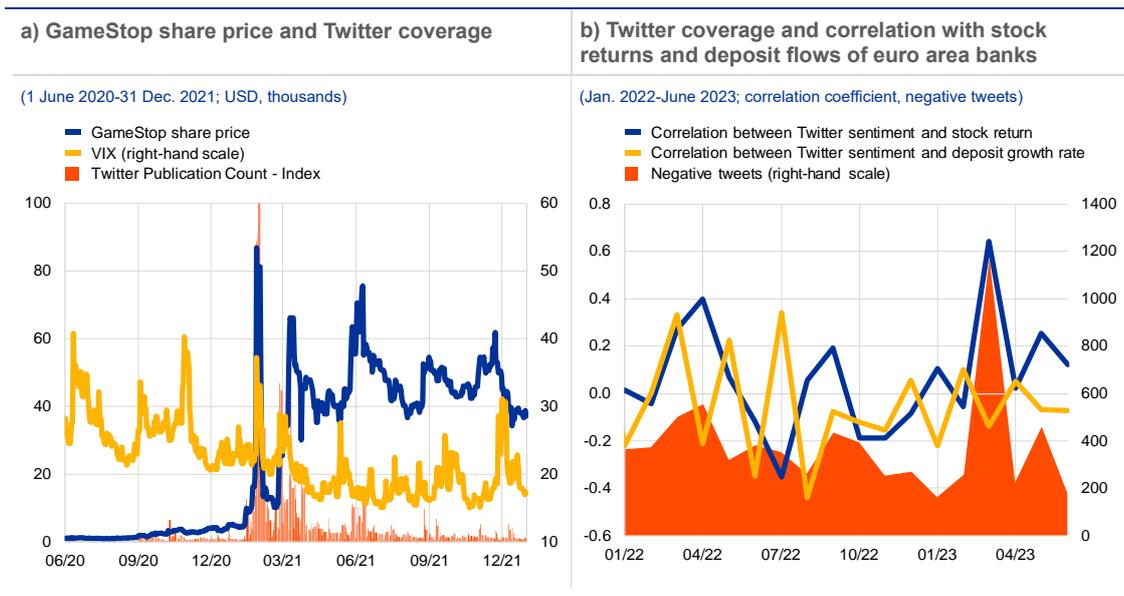
⁴⁰ See Farrell, M., Green, T.C., Jame, R. and Markov, S., "The democratization of investment research and the informativeness of retail investor trading", *Journal of Financial Economics*, Vol. 145, Issue 2, Part B, August 2022.

⁴¹ See, for example, Anand, A. and Pathak, J., "The role of Reddit in the GameStop short squeeze", *Economics Letters*, Vol. 211, Issue C, February 2022, or Vasileiou, E., "Does the short squeeze lead to market abnormality and antileverage effect? Evidence from the GameStop case", *Journal of Economic Studies*, Vol. 49, No 8, October 2022.

stock prices or fuel deposit outflows, as was likely the case with Silicon Valley Bank.⁴² For euro area banks, the correlation between sentiment on X, previously known as Twitter, and stock returns reached an all-time high of 64% in March 2023 (Chart B, panel b), though the nature of this relationship requires further investigation. At the same time, negative social media coverage was not associated with systematic deposit shifts between individual euro area banks during the March tensions. These events should not, however, be seen as a decisive test, given the lack of fundamental concerns about euro area banks at the time.

Chart B

Financial stability impact of social media tends to increase rapidly during periods of stress



Sources: Bloomberg Finance L.P., ECB (BSI) and ECB calculations.
 Notes: Panel a: the "Twitter Publication Count - Index" was established by scaling the publication count time series, capturing the number of tweets on a specific topic or security by a predefined list of selected influential accounts, by its maximum observation over the period shown. Panel b: based on a sample of 23 euro area listed significant institutions in the EURO STOXX Banks index. Deposit flows are monthly percentage changes of household and non-financial corporate deposits at the bank. Twitter sentiment data are normalised between 1 and -1 and indicate the average sentiment of tweets posted on individual banks. Stock returns are monthly price returns. Correlation is expressed as the monthly correlation coefficient for the cross-sectional data of bank-level Twitter sentiment and deposit movements or stock returns. "Negative tweets" captures the number of original negative tweets by a predefined list of selected influential accounts. Tweets are classified as "negative" from a long position investor perspective by Bloomberg's supervised learning algorithm.

The digitalisation of financial services may have broader policy-relevant implications for financial markets and banks. More retail investors are participating in financial markets thanks to digitalisation. Sometimes this might lead to excessive risk taking and undermine market integrity. In particular, additional monitoring of how leverage is used in financial products and extra scrutiny in market abuse supervision are both warranted. The case of Silicon Valley Bank represents the most prominent bank run of the digital era. Few depositors queued up outside a branch – instead they used bank apps and phone calls to access their money within minutes.⁴³ Accordingly, regulators and supervisors should consider the issue of how digitalisation could accelerate the pace of deposit

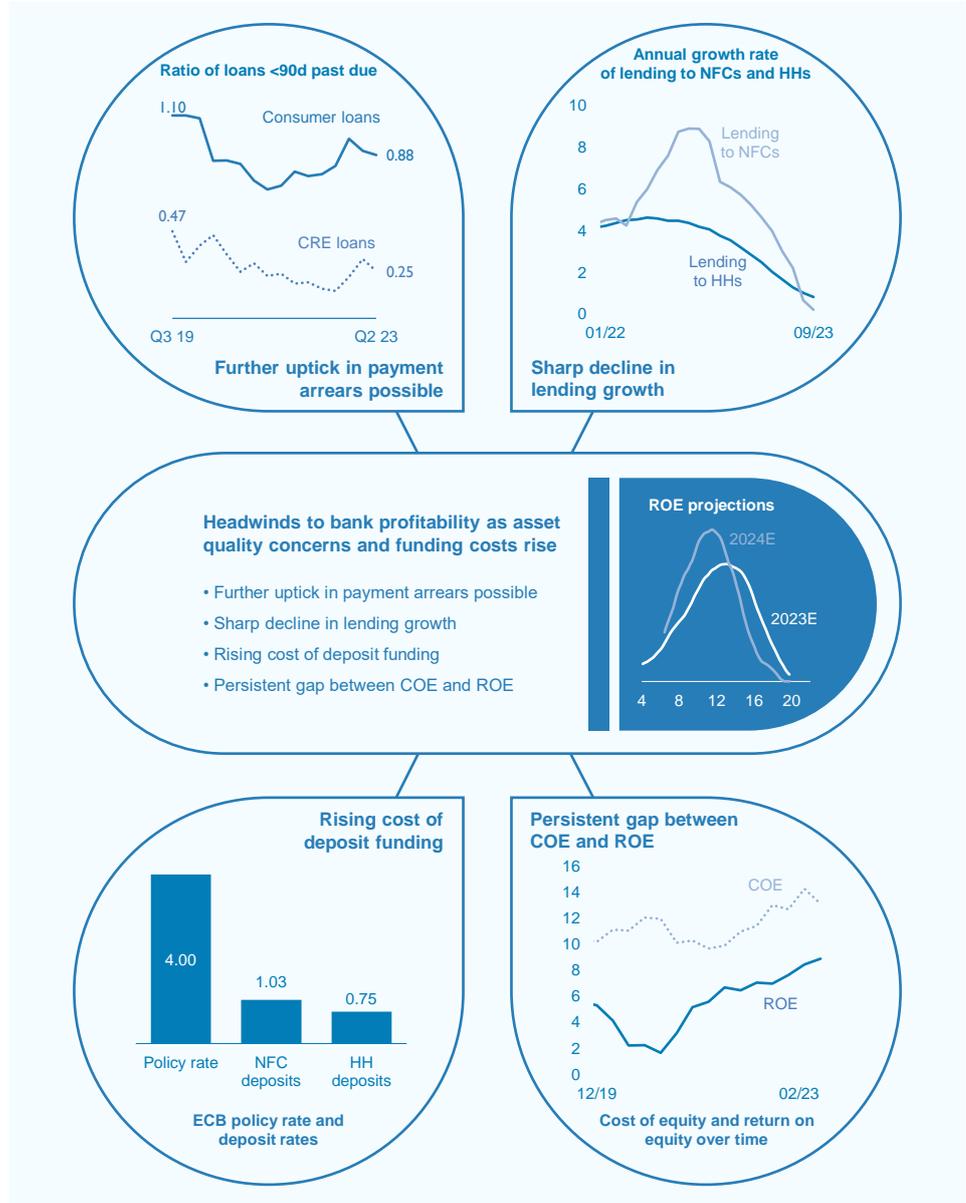
⁴² Communication via social media likely accelerated the failure of Silicon Valley Bank which faced fundamental issues due to the materialisation of unrealised losses. A highly concentrated depositor base with a large share of uninsured deposits may have made it particularly vulnerable to coordinated deposit outflows. See "Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank", Board of Governors of the Federal Reserve System, 28 April 2023. See also Cookson, J.A., Fox, C., Gil-Bazo, J., Imbet, J.F. and Schiller, C., "Social Media as a Bank Run Catalyst", *Université Paris-Dauphine Research Paper*, No 4422754, 13 July 2023.

⁴³ In contrast to physical branches, online banking services are available 24/7 except during periods of scheduled maintenance.

withdrawals in a structural way during periods of stress.⁴⁴ This could encourage the collection of deposit data at a higher frequency. Finally, how social media activities relate to financial stability concerns and how the analysis of such activities can be used to monitor risks requires further investigation.

⁴⁴ See McCaul, E., "[Mind the gap: we need better oversight of crypto activities](#)", blog post, ECB, April 2023, and Bindseil, U. and Senner, R., "[Destabilisation of Bank Deposits Across Destinations – Assessment and Policy Implications](#)", SSRN, 15 September 2023.

3 Euro area banking sector



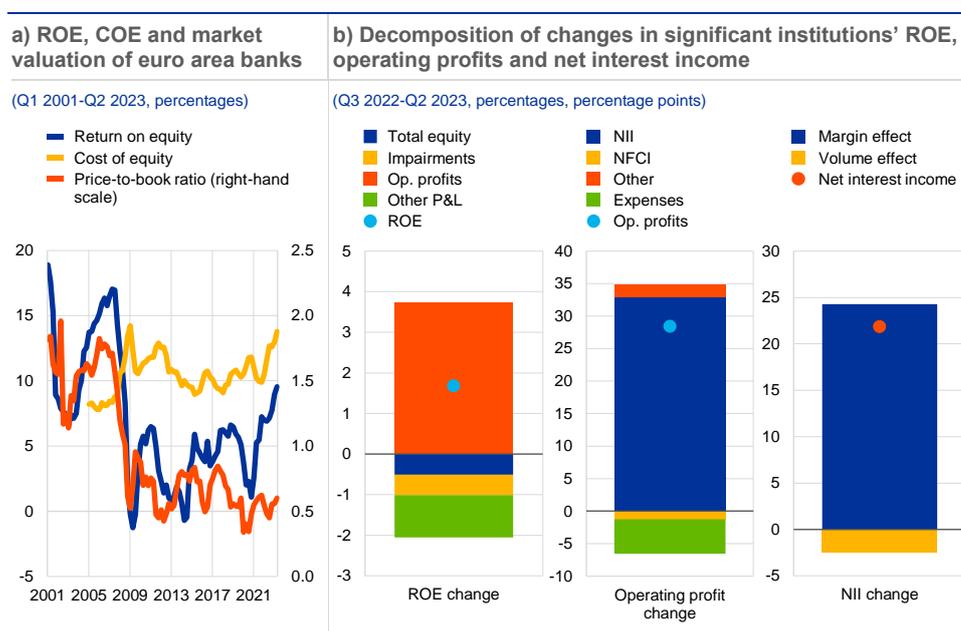
3.1 Profitability at multi-year heights, but headwinds grow

The widening of interest margins has continued to boost the profitability of euro area banks to record levels. The four-quarter trailing return on equity (ROE) of euro area significant institutions has gone on rising in 2023 and reached 8.9% in

the second quarter, a level last seen 15 years ago (Chart 3.1, panel a).⁴⁵ The improvements in ROE seen since the end of 2022 have been driven mostly by higher net interest income (NII) (Chart 3.1, panel b). While higher lending volumes were the main driver of NII growth in the first quarter, margin expansion was the key factor behind improved NII levels in the second quarter. In some countries, such as France and Germany, other operating profits relating to trading activities accounted for the bulk of the changes in ROE. Third quarter earnings releases of listed banks suggest that the profitability of euro area banks remained almost unchanged.

Chart 3.1

Bank profitability has reached levels last seen 15 years ago, on the back of rising net interest income



Sources: Bloomberg Finance L.P., ECB (supervisory data) and ECB calculations.

Notes: Panel a: ROE and price-to-book ratio are calculated on the basis of a balanced sample of 19 euro area banks. COE stands for cost of equity. Altavilla et al.* estimate the COE of euro area banks as an average across ten different models (five implied COE models and five factor models), which are estimated for individual listed euro area banks and then weighted by market capitalisation. Panel b: based on a balanced sample of 81 euro area significant institutions. NFCI stands for net fee and commission income. *Altavilla, C., Bochmann, P., De Ryck, J., Dumitru, A., Grodzicki, M., Kick, H., Melo Fernandes, C., Mosthaf, J., O'Donnell, C. and Palligkinis, S., "Measuring the cost of equity of euro area banks", *Occasional Paper Series*, No 254, ECB, 2021.

Differences in pass-through of policy rates explain most of the dispersion of interest margins across euro area countries.

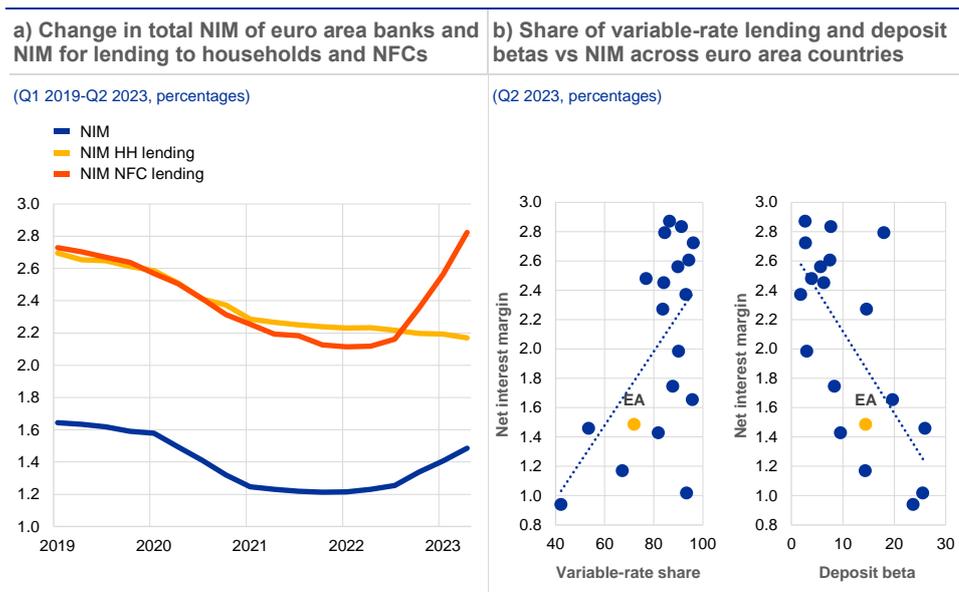
Interest margins have taken different paths across loan segments and euro area countries since the start of the hiking cycle last year. While total net interest margins (NIMs) have remained below pre-pandemic levels for the euro area overall, the NIM for corporate lending climbed to new heights as loans to non-financial corporations (NFCs) are granted predominantly at variable rates. By contrast, aggregate NIMs for lending to households continued to decline for the euro area, which illustrates the implications for bank profitability of mortgage lending at fixed interest rates during the period of

⁴⁵ The Financial Stability Review uses the four-quarter average of stock variables, while flow variables are annualised using trailing four-quarter sums. In addition, a balanced sample of banks is used to avoid composition effects, which might result in figures that differ from those in the published Supervisory Banking Statistics. The ROE in the text refers to a balanced sample of 81 banks using supervisory data, while Chart 3.1, panel a) shows the ROE based on Bloomberg data to capture a longer sample.

ultra-low interest rates (**Chart 3.2**, panel a). Indeed, the share of variable-rate lending and the sensitivity of deposit rates to ECB policy rates (the “deposit beta”) are two major factors explaining the margin differences across euro area countries (**Chart 3.2**, panel b).

Chart 3.2

Margin expansion was driven largely by corporate lending, and the share of variable-rate lending and deposit betas explain NIM dispersion across countries



Sources: ECB (supervisory data, BSI, MIR) and ECB calculations.

Notes: Based on a balanced sample of 81 euro area significant institutions. Panel a: all measures of NIM shown refer to the outstanding stock. The NIM for households (HH) and non-financial corporations (NFCs) refers to banks' lending activities. Panel b: deposit betas capture the percentage pass-through of the increase in the ECB's deposit facility rate to new business deposit rates since the start of the hiking cycle in July 2022.

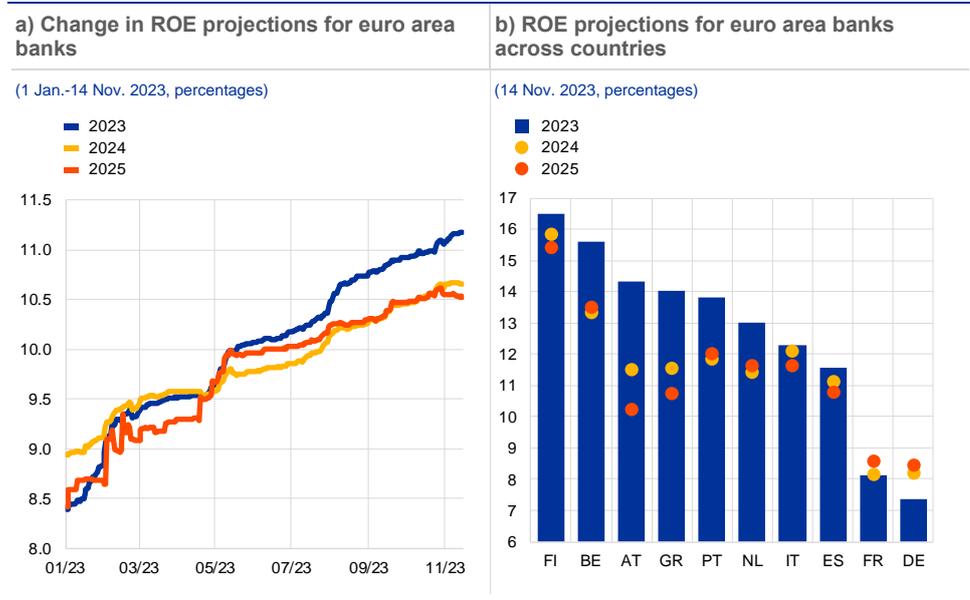
Looking forward, downside risks are growing for banks on the back of asset quality concerns, muted lending dynamics and rising funding costs.

While banks have so far largely benefited from higher interest rates, going forward their profits are likely to be constrained by three factors. First, the combination of higher living costs, higher debt service costs and a deteriorating macroeconomic environment could eventually have an adverse impact on bank asset quality. Second, higher lending rates, lower loan demand and tighter credit standards have led to a substantial drop in lending volumes, which will weigh on bank profitability. Finally, compared with past hiking cycles, the pass-through of rate hikes to depositors has been more limited for overnight deposits, partly due to the ample level of excess liquidity in the system and the abundance of overnight deposits without regulatory value for banks. Banks' currently strong profitability is likely to come under pressure as their funding costs catch up with the interest rates paid on new business and their funding composition continues to shift towards more expensive sources. Indeed, market analysts expect ROE to decline slightly by 2024 (**Chart 3.3**, panel a); moreover, these expectations may be skewed to the upside as they are founded on benign projections of asset quality. Profitability is projected to decline in most countries going forward. At the same time, ROE is expected to improve in some countries, especially those with a higher share of fixed-rate lending

where loan repricing takes place more gradually and which have already seen a larger pass-through of rate hikes to depositors (**Chart 3.3**, panel b).

Chart 3.3

Profitability projections for the next two years are below those for 2023, reflecting headwinds related to asset quality concerns, muted lending and rising funding costs



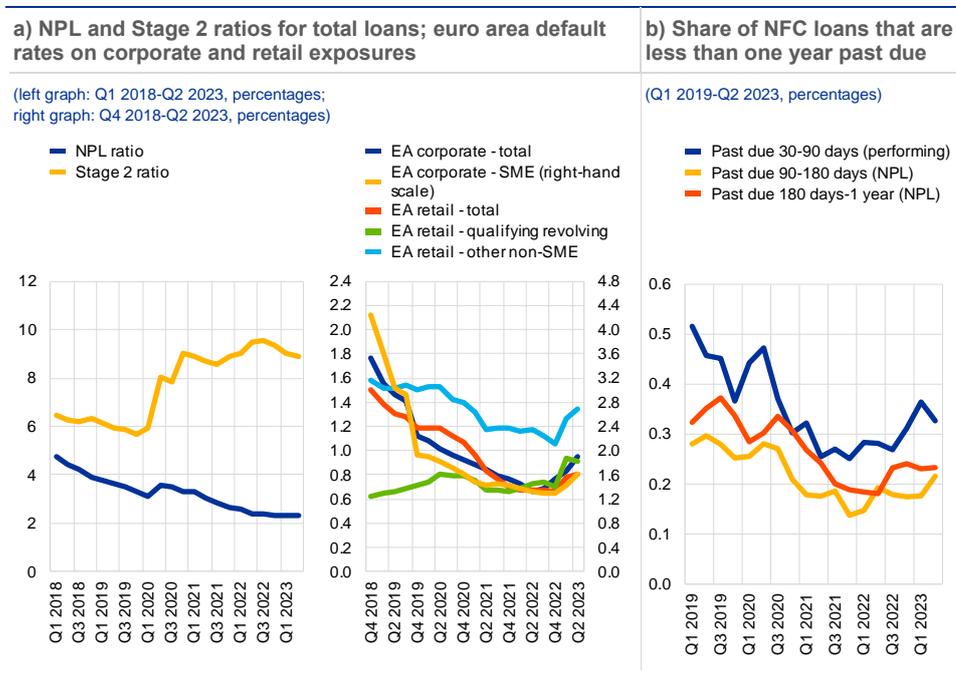
Sources: LSEG and ECB calculations.
Note: Based on market analyst projections of ROE for a sample of 29 listed euro area banks.

3.2 Early signs of asset quality deterioration from historical lows

The asset quality of euro area banks remains robust, but default rates and payment arrears are showing early signs of stress. Banks' aggregate non-performing loan (NPL) ratio, a lagging indicator of asset quality, remained close to historical lows in the second quarter of 2023, while the Stage 2 ratio has declined slightly from recent elevated levels (**Chart 3.4**, panel a, left graph). At the same time, default rates on both corporate and retail exposures have started to increase (**Chart 3.4**, panel a, right graph), and the share of loans which are less than 90 days past due but still performing has also picked up and stands above the historically low levels seen in 2022. This increase may translate into more NPLs in the coming quarters, as new NPL formation typically lags any rise in early payment arrears (**Chart 3.4**, panel b).

Chart 3.4

NPL ratio remains stable, while default rates and payment arrears increase from low levels



Source: ECB (supervisory data).

Notes: Panel a, left graph: based on a balanced sample of 81 euro area significant institutions; right graph: IRB-reporting significant institutions. Four-quarter trailing figures. Euro area exposures only. Panel b: full sample of significant institutions.

After a long period of improving asset quality, early signs of strain are now evident across loan portfolios.

A breakdown by firm size reveals some divergence in asset quality as NPL ratios on loans to smaller firms⁴⁶ increased over the last two quarters, while NPL ratios decreased slightly on loans to firms with relatively higher total assets (top 5% of firms by total assets) (Chart 3.5, panel a, left graph). This development is in line with the typically stronger sensitivity of small firms to economic activity. Gross NPL inflows for loans to the commercial real estate (CRE) sector^{47,48} increased more in the second quarter of 2023 than offsetting NPL outflows (Chart 3.5, panel a, right graph). Given the recent substantial increase in interest rates, mortgages in countries with high shares of variable rates were more likely to become non-performing (Chart 3.5, panel b, left graph). Similarly, consumer loans saw their first couple of quarters of net NPL inflows after a long period of outflows (Chart 3.5, panel b, right graph). Countries with predominantly variable rates would be likely to see a more pronounced deterioration in asset quality going forward if the labour market were to weaken notably, adding to the squeeze on households due to rising mortgage debt service costs and a higher cost of living (Special Feature B).

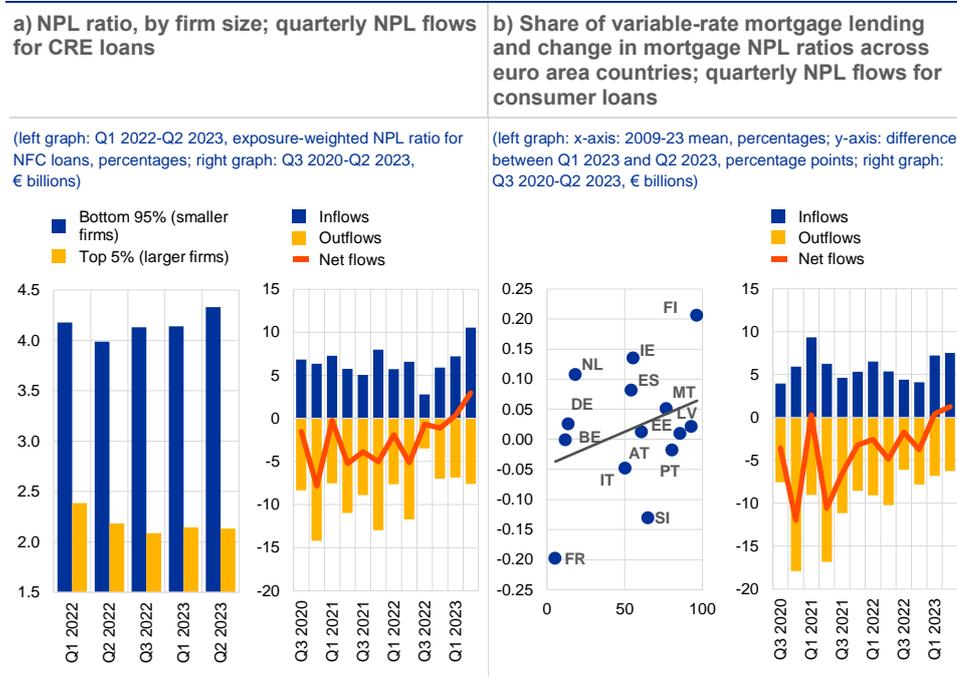
⁴⁶ Smaller firms are defined as the bottom 95% of firms by total assets. Loans to this group of firms represent 25% of corporate exposures.

⁴⁷ The share of CRE loans in total loans varies widely across banks, however, with an interquartile range of between 4.8% and 16.2%.

⁴⁸ For loans other than those held for sale and trading.

Chart 3.5

Recent increase in mortgage NPL ratios predominantly in variable-rate countries; slight rise in CRE and consumer loans with recent NPL net inflows and NPL ratio of smaller firms up slightly



Sources: ECB (AnaCredit, MIR, RIAD, supervisory data), BvD Electronic Publishing GmbH – a Moody’s Analytics company and ECB calculations.

Notes: Panel a, left graph: only significant institutions supervised by the ECB. Total assets are taken from Orbis as at December 2021. The top 5% firms in terms of total assets are responsible for, on average, 75% of the outstanding amount of loans. Panels a and b, right graphs: full sample of significant institutions. Excludes loans held for sale. Panel b, left graph: the mean from 2009 to 2022 serves as a proxy for the share of variable-rate mortgages in the outstanding stock of loans in a given country. Fixed-rate mortgages are defined as new mortgages with fixed rates and maturities of more than one year/all new mortgages at a monthly frequency. The change in the mortgage NPL ratio is aggregated at the lender country level and covers the full sample of significant institutions. The data for Greece, Cyprus and Luxembourg are not shown in the graph due to the relatively large absolute changes in their respective mortgage NPL ratios. Their addition would not materially change the relationship shown when accounting for the size of the respective mortgage loan portfolios. Some national authorities have country-specific data on fixation periods of the stocks, but differences between the national data and the approximation based on flows are not substantial in most cases. Some differences can be seen, however, for Italy.

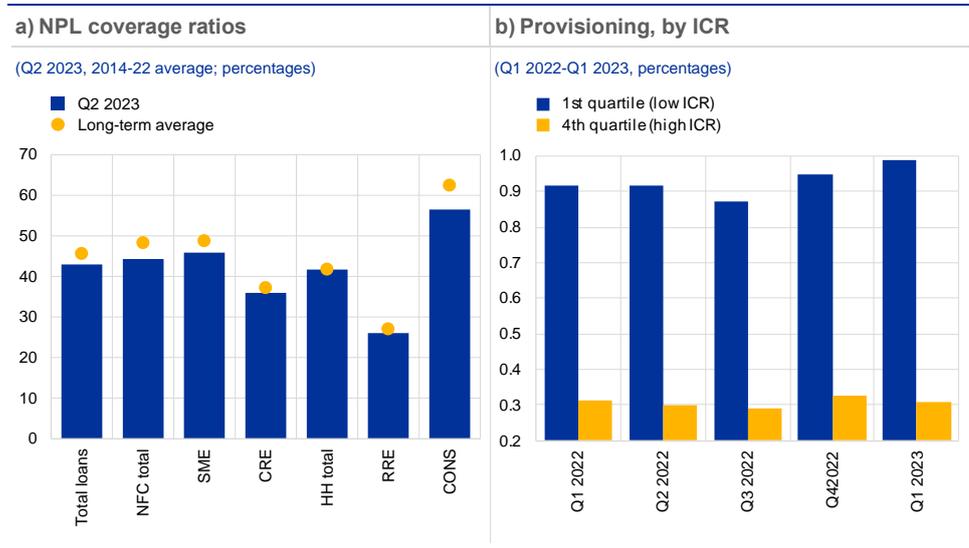
Banks may face higher provisioning needs, reflecting the vulnerability of borrowers to higher interest rates.

The NPL coverage ratios of most loan portfolios have fallen compared with longer-term averages, in particular for consumer loans (Chart 3.6, panel a). The decline for collateralised loans may be explained at least in part by the fact that asset prices still stand above pre-pandemic levels, but with real estate collateral becoming increasingly illiquid and property prices falling, there is a risk that banks may be slow in adjusting their expected recoveries to reality, thereby potentially understating provisions. Banks recently increased provisions on loans to firms with lower interest coverage ratios (ICRs), meaning they are less able to repay their debt out of their recurring cash flows (Chart 3.6, panel b). This stands in contrast with the slight decline in provisions for high-ICR firms while remaining consistent with the notion that banks are anticipating stress for firms which are especially vulnerable to the recent rise in interest rates. The flipside of this is higher bank profitability for the time being. Nonetheless, a longer period of high interest rates is likely to lead to higher provisions, which in turn will be a drag on profitability further down the line. On the one hand, the difference in provisioning is

reassuring because banks appear to be aware of the risk. On the other hand, it shows their exposure to this risk.

Chart 3.6

NPL coverage ratios remain below long-term averages, and banks are provisioning more for firms vulnerable to interest rate increases (low ICR)



Source: ECB (supervisory data).

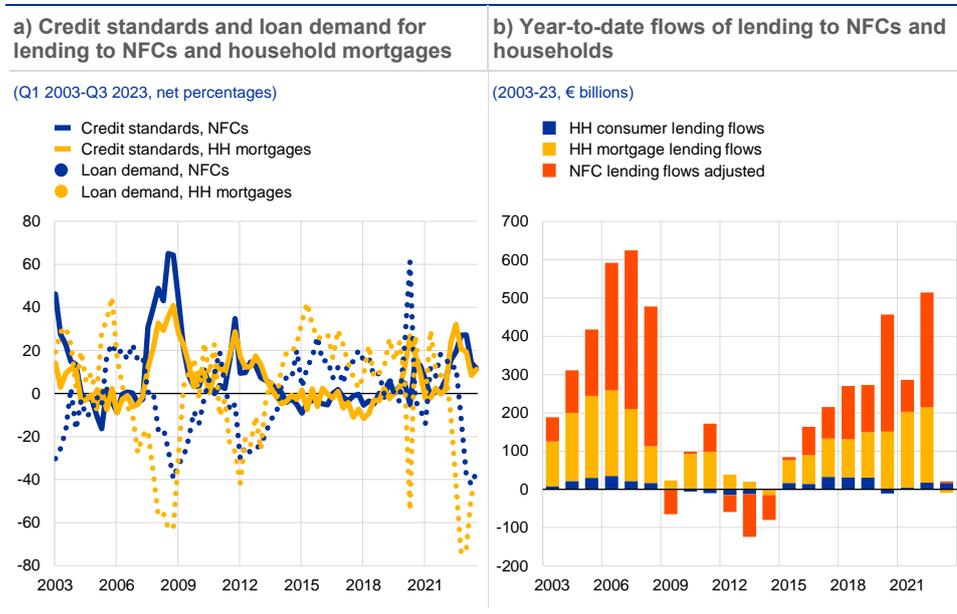
Notes: Full sample of significant institutions. Panel a: CONS stands for consumer loans. Panel b: provisions as a share of exposures for all non-defaulted NFC loans.

Lending dynamics have weakened substantially, which will weigh on bank profitability going forward.

The monetary policy tightening that started last year prompted banks to tighten their credit standards to historically elevated levels. In addition, higher interest rates, coupled with a more uncertain economic outlook, have contributed to a substantial decline in loan demand (Chart 3.7, panel a). As a consequence, cumulative year-to-date net lending flows to the non-financial private sector have been stagnant, in stark contrast with the loan book expansion seen over the previous seven years (Chart 3.7, panel b). While banks' lending margins have expanded on the back of higher rates, the muted lending dynamics represent a headwind for bank profitability going forward.

Chart 3.7

Credit standards have tightened and loan demand has declined to historical lows, while year-to-date lending flows are the lowest since 2015



Sources: ECB (BLS, BSI) and ECB calculations.
 Notes: Panel a: for credit standards, net percentages are defined as the difference between the sum of the shares of banks responding "tightened considerably" and "tightened somewhat" and the sum of the percentages of banks responding "eased somewhat" and "eased considerably" in the ECB's bank lending survey. Net percentages for the questions on demand for loans are defined as the difference between the sum of the shares of banks responding "increased considerably" and "increased somewhat" and the sum of the shares of banks responding "decreased somewhat" and "decreased considerably".

3.3 Rising funding costs as bonds reprice and deposit betas adjust

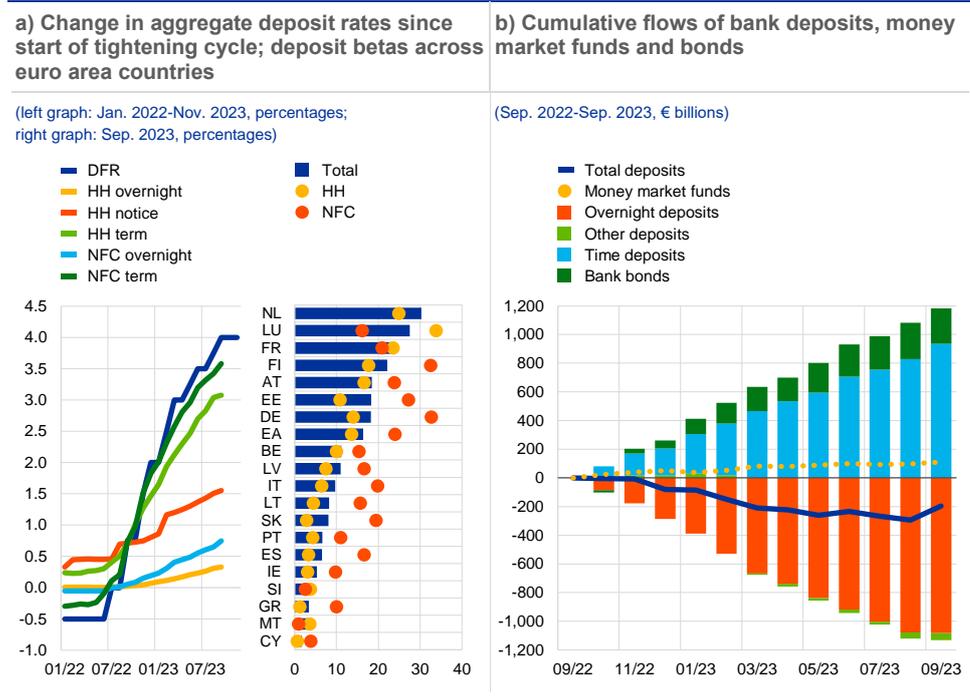
The pass-through of policy rates to depositors by euro area banks remains limited for overnight deposits, leading to a shift towards term deposits.

The pass-through of policy rates to bank depositors has not substantially changed since the publication of the previous Financial Stability Review and remains sizeable only for term deposits (Chart 3.8, panel a, left graph). After years of low rates, banks' deposit books have been skewed towards overnight deposits. But while overnight deposits are constantly repriced at the prevailing rates, banks have been reluctant to increase these overnight rates more substantially. At 0.3% and 0.7% respectively, interest rates on overnight deposits from households and from NFCs, which account for the largest share of outstanding deposit volumes in both segments, correspond only to a pass-through rate of 7% and 18% of the change in policy rates since summer last year. These deposit betas are low compared with past hiking cycles, making it likely that a more substantial rise in deposit rates will weigh on interest margins, and hence bank profitability, going forward. There is a substantial dispersion of deposit betas across not only different types of deposit and counterparty but also euro area countries, which is to some extent driven by regulation as well as by competition among banks (Chart 3.8, panel a, right graph). The differences in remuneration between deposit types has led to a gradual shift from overnight to term deposits since the start of the hiking cycle, in line with

historical regularities, and funds have remained largely within the banking sector (Chart 3.8, panel b). The fact that deposit outflows have been higher than inflows into money market funds in absolute terms could be related to higher consumption and working capital costs in a context of higher inflation. Concerns about deposit outflows have also been mentioned in the discussions surrounding the introduction of a digital euro. Specific design features such as a cap on individual holdings would prevent such unintended consequences (Box 4).

Chart 3.8

Depositors are slowly shifting from overnight accounts to better-remunerated term deposits



Sources: ECB (BSI, MIR) and ECB calculations.

Notes: Panel a: deposit betas capture the percentage pass-through of the increase in the ECB's deposit facility rate (DFR) to new business deposit rates since the start of the hiking cycle in July 2022. All three deposit types – overnight, notice and term deposits – are taken into account in the right graph. Panel b: bank deposits consist of deposits placed with the monetary financial institution (MFI) sector by euro area residents excluding MFIs, central governments and financial vehicle corporations involved in securitisation activity. Their flows have been adjusted for the operational incident in TARGET2, which inflated the September 2022 other financial institutions deposits before then being reversed in October and November 2022. Bank bonds are those held by euro area residents excluding MFIs and central governments.

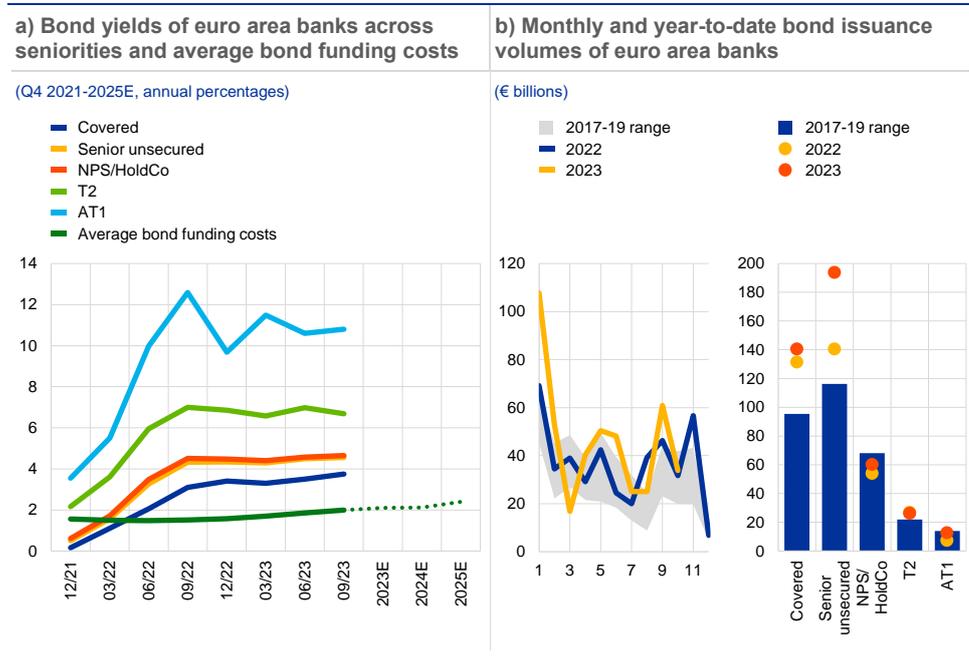
Bond issuance volumes have been very strong this year, in particular for senior instruments, despite elevated funding costs.

The yields on euro area bank bonds have stabilised at elevated levels since late spring (Chart 3.9, panel a). As a sizeable share of bank bonds matures over the next few years, the large increase in bond yields since the end of 2021 will continue to translate into higher bond funding costs for banks. A repricing of maturing bonds at current secondary market yields would cause banks' bond funding costs to rise to 2.1% at the end of 2023 and 2.4% at the end of 2025. Apart from March, when bond issuance stalled due to the tensions in the Swiss and US banking sectors, 2023 has seen issuance volumes well above the range observed prior to the pandemic (Chart 3.9, panel b, left graph). At €432 billion, year-to-date issuance volumes are around 37% above the average observed between 2017 and 2019. Issuance of covered and senior

unsecured bonds has been particularly strong in 2023, while that of senior bail-inable bonds has remained below pre-pandemic averages (Chart 3.9, panel b, right graph). The market for Additional Tier 1 securities has reopened gradually as spreads narrowed from the levels observed immediately after the March tensions. Banks have also shortened bond maturities quite substantially in response to higher interest rates. While the aggregate maturity of outstanding senior bonds for euro area banks is around ten years, senior bonds issued in 2023 only have an average maturity of around six years.

Chart 3.9

Bond yields have remained broadly unchanged at elevated levels, while issuance activity is strong, especially for covered and senior unsecured instruments



Sources: S&P Dow Jones Indices LLC and/or its affiliates, Dealogic and ECB calculations.

Notes: Panel a: the funding cost scenario (indicated by the dotted line) assumes that maturing bonds are refinanced at a yield to maturity observed in the secondary market in September. All funding costs are volume weighted (covered, senior unsecured, NPS/HoldCo and T2 bonds are included, being the main seniorities maturing in 2023). AT1 stands for Additional Tier 1 securities; T2 stands for Tier 2 securities; NPS/HoldCo stands for senior non-preferred securities.

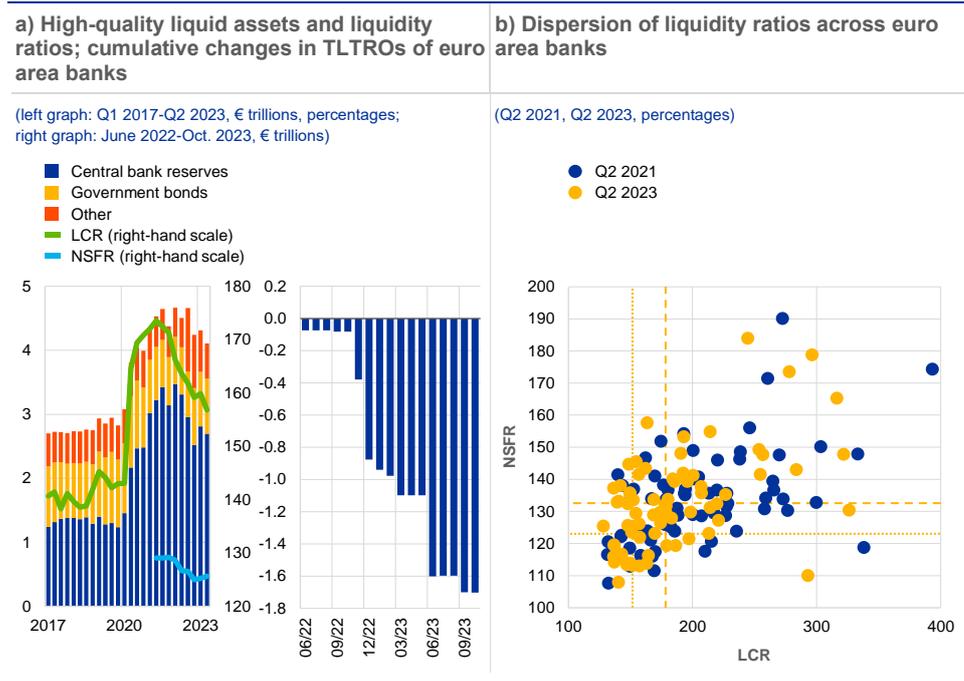
Liquidity buffers remain well above regulatory requirements, despite declining upon repayment of central bank funding.

Aggregate liquidity ratios of euro area banks continued their expected decline in line with the gradual repayment of the targeted longer-term refinancing operations (TLTRO) and the associated, albeit smaller, reduction in central bank reserves. Central bank reserves were also affected by autonomous factors, with a significant amount of non-monetary policy deposits moving away from the Eurosystem into the market. The aggregate liquidity coverage ratio (LCR) fell from a peak of 174% in the second quarter of 2021 to 157% in the second quarter of 2023, while the net stable funding ratio (NSFR) – which captures the medium-term resilience of bank funding – has increased slightly during the past six months to 125% (Chart 3.10, panel a). In terms of the breakdown of high-quality liquid assets, the share of central bank reserves has declined alongside TLTRO repayments but remains the largest single element, at around two-thirds of the total. The aggregate picture masks substantial differences at the individual bank level.

While the vast majority of significant institutions have liquidity ratios well above their regulatory requirements, there are some banks with LCR and NSFR levels that indicate lower resilience to funding stress. Large banks tend to operate with smaller liquidity buffers, which is evident from the fact that the 25th percentile for both liquidity ratios is close to the euro area aggregate (**Chart 3.10**, panel b).

Chart 3.10

Despite gradual TLTRO repayments, liquidity ratios are substantially above regulatory thresholds overall, but some banks have smaller liquidity buffers



Sources: ECB (supervisory data, ILM) and ECB calculations.
Notes: Based on a balanced sample of 81 euro area significant institutions. Panel b: the dashed and the dotted yellow lines represent the median and the 25th percentile for the cross-sectional distribution of the LCR and NSFR in Q2 2023 respectively.

Box 4

A digital euro: gauging the financial stability implications

Prepared by Claudia Lambert, Cosimo Pancaro and Antonella Pellicani

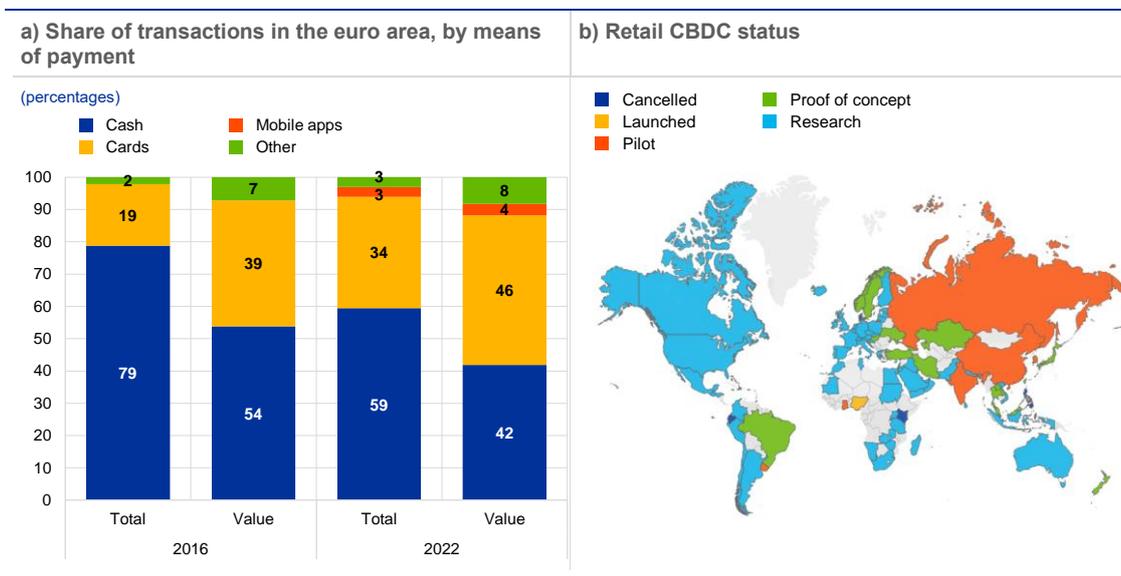
Central banks around the world have stepped up their efforts to explore and develop their own digital currencies (known as CBDCs),⁴⁹ an electronic equivalent to cash. New technologies in retail payments (e.g. mobile payments, digital wallets and the potential future deployment of crypto-asset payments) and changes in people's payment habits have fuelled the interest of central banks in CBDCs. In the euro area, for example, the share of transactions for which cash was used as a means of payment declined from 79% to 59% between 2016 and 2022. At the same time, the coronavirus (COVID-19) pandemic, among other things, has accelerated the shift towards online shopping and digital payments (**Chart A**, panel a). In response, central banks

⁴⁹ A CBDC is a digital form of central bank money that would be available to the general public as a complement to banknotes and coins. The ECB is currently working with the euro area national central banks to investigate whether to introduce a CBDC in the euro area. For more information, see the [digital euro page](#) on the ECB's website.

are investigating the benefits and risks of CBDCs in complementing banknotes and coins, offering an additional means of payment in an increasingly digitalised economy (**Chart A**, panel b).

Chart A

The role of cash as a means of payment has been declining in the euro area over the last few years, while CBDC-related projects around the world are thriving



Sources: Panel a: ECB (SPACE). Panel b: cbdctracker.org.

Notes: Panel a: "Other" includes bank cheques, credit transfers, loyalty points, vouchers and gift cards, and other payment instruments. Percentages may not add up to 100% due to rounding. Panel b: retail CBDC refers to digital central bank money offered to the general public, while wholesale CBDC refers to the settlement of interbank transfers and related wholesale transactions in central bank reserves. The map shows the status of retail CBDC initiatives as of 1 September 2023.

In the euro area, the introduction of a CBDC ("digital euro") could offer several financial stability benefits by providing an alternative to new forms of private digital money and spurring innovation. Recent years have seen a significant increase in the number of non-European big-techs⁵⁰ active in the European payments landscape as well as a proliferation of crypto-assets and stablecoins.⁵¹ A digital euro would help to preserve the role of public money as the anchor for the monetary system in the digital age and protect monetary sovereignty. The introduction of a digital euro could also stimulate innovation,⁵² which may benefit banks and non-bank entities, and promote a more competitive, efficient and resilient financial system (**Chart B**, panel a).

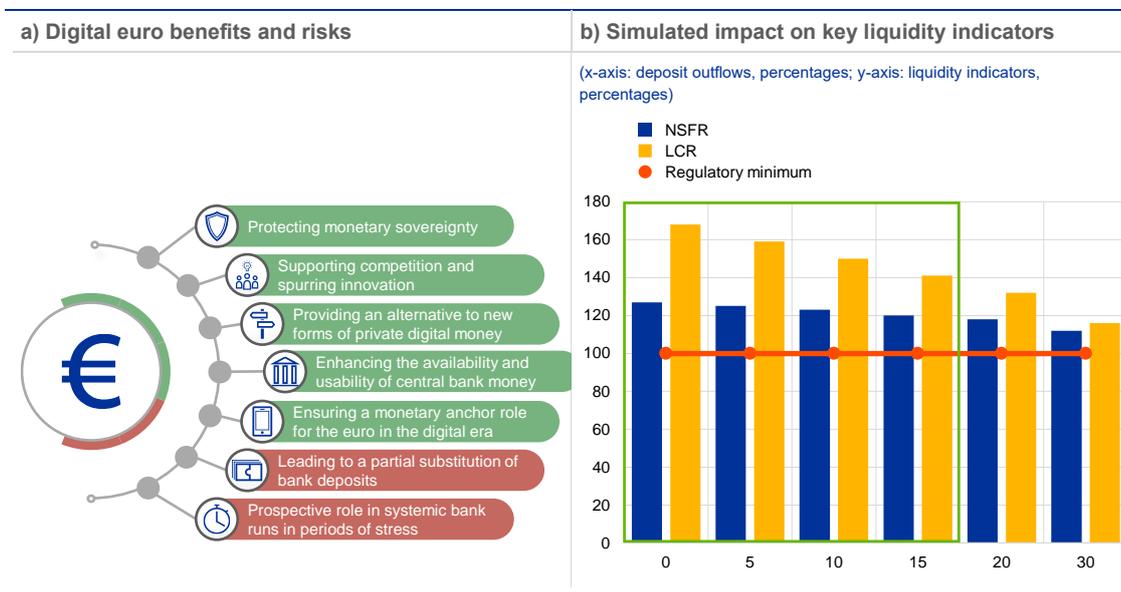
⁵⁰ See, for example, Beck, T. et al., "Will video kill the radio star? Digitalisation and the future of banking", *Reports of the Advisory Scientific Committee*, No 12, ESRB, 2022.

⁵¹ See, for example, the article entitled "Stablecoins' role in crypto an beyond: functions, risks and policy", *Macprudential Bulletin*, ECB, July 2022, and the box entitled "The expanding uses and functions of stablecoins", *Financial Stability Review*, ECB, November 2021.

⁵² For example, a CBDC has the potential to streamline payment processes and reduce transaction costs. Moreover, a CBDC could potentially enhance cross-border transactions by simplifying the settlement process.

Chart B

A digital euro could offer financial stability benefits but, if not properly designed, could also prompt financial stability risks



Sources: Panel b: ECB (supervisory data) and ECB calculations.

Notes: Panel b: simulated impact on key liquidity indicators in a scenario in which banks are willing to draw down their entire voluntary liquidity buffers up to the regulatory minimum (100% for the NSFR and the LCR) to meet the demand for digital euro. The simulation is based on Q1 2023 data. The liquidity indicators represent averages across 111 significant institutions, weighted by total assets. The 0% deposit outflow scenario represents the liquidity metrics in the absence of a digital euro. The other scenarios show how the conversion of household overnight deposits into digital euro, ranging between 5% and 30%, impacts the liquidity metrics: the blue and yellow bars. The green box indicates the range and upper bound of potential levels of household overnight deposit outflows in the event of a €3,000 holding limit per person.

At the same time, a CBDC, if not properly designed, could prompt financial stability risks

and affect the structure and scale of bank intermediation. The introduction of a CBDC could lead to changes in the demand for bank deposits – typically a stable and relatively inexpensive form of bank funding – which would be partially substituted. The extent of bank deposit substitution would depend on the relative attractiveness of the digital euro and could, depending on the magnitude, have adverse consequences for banks’ liquidity, profitability and overall resilience. This, in turn, could affect the provision of a wide range of intermediation and financial services by the banking sector.⁵³

In the absence of adequate holding limits, the materialisation of high deposit outflows could

heighten liquidity risk for significant institutions. An analysis based on a constrained balance sheet optimisation model⁵⁴ suggests that liquidity risk for significant institutions might only become significant if 20% of the stock of overnight deposits were withdrawn from the banking system.⁵⁵ For key liquidity metrics such as the net stable funding ratio (NSFR) and the liquidity coverage ratio

⁵³ The theoretical literature on the impact of introducing a CBDC leads to different conclusions, depending on the theoretical framework employed. For a review of the literature, see Ahnert, T. et al., “The economics of central bank digital currency”, *Working Paper Series*, No 2713, ECB, 2022.

⁵⁴ A bank’s reaction to CBDC demand (deposit outflows) is simulated using a constrained balance sheet optimisation model in which a bank is expected to maximise profits, subject to some constraints. A bank sequentially (i) draws down its own reserves (until reserves-depleted or NSFR/LCR-constrained), (ii) obtains market funding (until liquidity or collateral-constrained), and (iii) obtains additional reserves from the central bank. For an overview of the model, see Meller, B. and Soons, O., “Know your (holding) limits: CBDC, financial stability and central bank reliance”, *Occasional Paper Series*, No 326, ECB, 2023.

⁵⁵ The results presented hinge on the level of reserves available in the system. All things being equal, a lower level of reserves would imply that banks would have to rely more on the interbank market or central bank funding to accommodate the same level of deposit outflows.

(LCR), the current level of voluntary buffers that significant institutions hold above the regulatory minimum would progressively decrease as deposit outflows became larger (**Chart B**, panel b).

However, the envisaged design of a digital euro would address financial stability concerns by applying adequate holding limits.⁵⁶ The cap on individual holdings would set an upper bound for the amount of digital euro in circulation and prevent the materialisation of high deposit outflows.⁵⁷ Recent studies show that setting a digital euro holding limit of €3,000 per person, as suggested by Bindseil and Panetta⁵⁸, would be effective in containing the impact on banks' liquidity risks and funding structures. With such a limit in place, outflows of household overnight deposits from the euro area banking sector could only occur (up to a maximum of 15%) in the following highly unlikely circumstances: (i) if all euro area citizens adopted the digital euro simultaneously, and (ii) they all shifted bank deposits to the digital euro at the upper bound of the holding limit instantaneously and then held these on a continuous basis. However, the actual level of the individual holding limit would be calibrated closer to the possible introduction of a digital euro to reflect the economic conditions prevailing at that time.

Looking more broadly, recent experience has shown that digitalisation generally has the potential to speed up systemic bank runs in periods of stress in the absence of the necessary safeguards. An important lesson from the March 2023 events in the US banking sector was that bank runs can occur more swiftly in the digital era irrespective of any CBDC. That said, the introduction of a digital euro would not heighten the risk of idiosyncratic bank runs. A flight to safety towards a CBDC⁵⁹ or another commercial bank deemed safer would depend on customers' risk appetites and preferences. To prevent a CBDC increasing the latent risk of systemic bank runs during periods of stress, however, all currently applicable financial stability, central bank and bank risk management limits and tools should remain in place should a digital euro be introduced.

3.4 Improved solvency and rising capital distributions

Solvency ratios have risen in 2023, supported by higher bank profitability and bank de-risking, with increased appetite for capital distributions. After declining in 2022, the aggregate Common Equity Tier 1 (CET1) ratio of euro area banks rose in the first half of 2023 to 15.3%, which is well above the aggregate maximum distributable amount (MDA) trigger of 11.1% (**Chart 3.11**, panel a). The increase of around 30 basis points was driven mainly by higher retained earnings on the back of improved bank profitability and declining average risk weights, reflecting a de-risking of banks' portfolios. At the same time, rising total assets in the first quarter made a

⁵⁶ See "A stocktake on the digital euro: Summary report on the investigation phase and outlook on the next phase", ECB, 2023.

⁵⁷ Business users would have a zero holding limit, meaning that they would not be able to accumulate holdings of digital euro, but they would be able to make specific types of payments. Similarly, governments and public authorities would be able to conduct transactions in digital euro without holding any digital euros in their wallets.

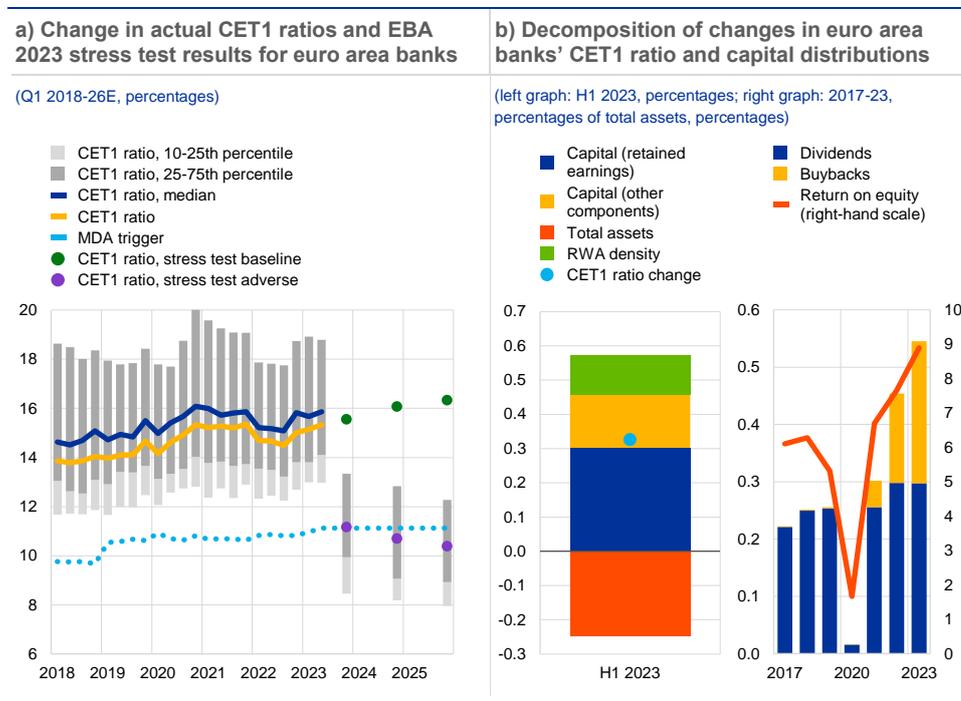
⁵⁸ See Bindseil, U. and Panetta, F., "Central bank digital currency remuneration in a world with low or negative nominal interest rates", *VoxEU*, Centre for Economic Policy Research, 5 October 2020.

⁵⁹ This is not expected to occur thanks to the lines of defence currently in place, including effective banking regulation and supervision, deposit insurance and the central bank's role as lender of last resort.

negative contribution (**Chart 3.11**, panel b, left graph).⁶⁰ The results of the European Banking Authority (EBA) stress test⁶¹, which were published at the end of July, show that euro area banks remain resilient overall, even under an adverse scenario which combines a severe EU and global recession, rising interest rates and higher credit spreads (**Chart 3.11**, panel a). The substantial recent improvement in bank profitability, the associated rise in banks' management buffers and the high cost of equity have increased the appetite for capital distributions, which have been rising over the last two years (**Chart 3.11**, panel b, right graph).

Chart 3.11

Solvency of euro area banks has risen on the back of stronger profits, leading to an increasing appetite for capital distributions in the form of dividends and share buybacks



Sources: Bloomberg Finance L.P., ECB (supervisory data) and ECB calculations.

Notes: Panel a: based on a balanced sample of 81 euro area significant institutions. Panel b: the left graph is based on a balanced sample of 81 euro area significant institutions. The right graph is based on a balanced sample of 47 listed euro area banks.

Information on dividends and share buybacks represent the payments as announced in each of the years. The year of announcement is usually also the year in which payments are made. Amounts represent the annual value of dividend payments and share buybacks scaled by the average total assets of all banks in the sample over the sample period. ROE for 2023 is a projection by market analysts.

Global cyberattacks targeting financial institutions have continued to rise in

2023. After reaching a new peak in 2022, the number of global cyberattacks detected across all economic sectors in the first five months of 2023 was broadly the same as last year. The number of attacks recorded in the financial sector globally this year is, however, about 30% higher than a year ago, highlighting just how serious the threat is. Accordingly, financial institutions need to ensure that they have

⁶⁰ There was also a positive contribution from sources of other comprehensive income, reflecting unrealised gains due to the introduction of IFRS 17 and the associated reclassification of banks' financial assets under their insurance business, and also realised gains from banks' portfolios of assets measured at fair value.

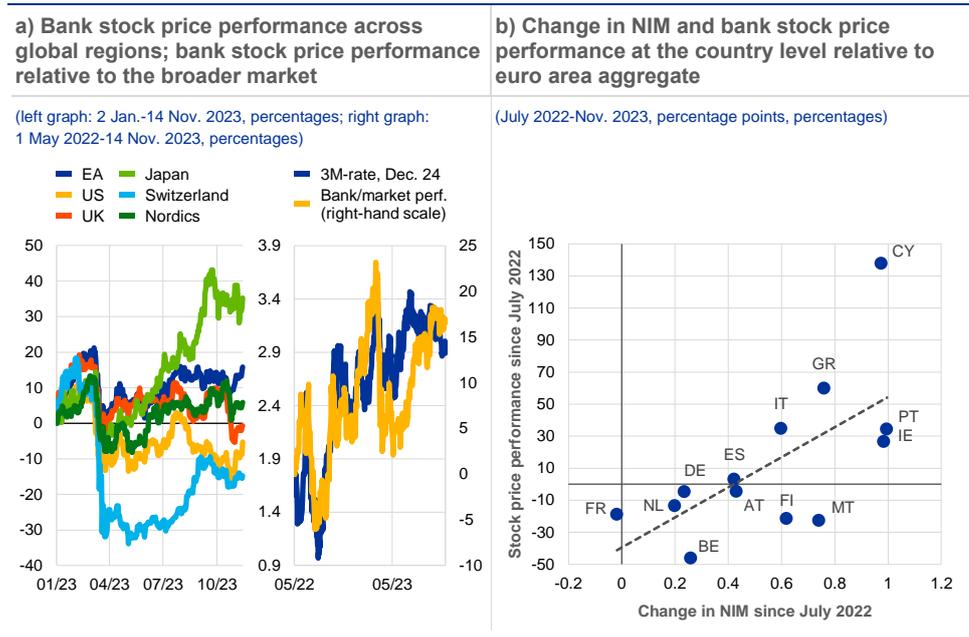
⁶¹ See the July 2023 release of the EBA's [EU-wide stress test](#).

in place an adequate level of cyber resilience for their own protection as well as for that of the entire financial ecosystem.

While market valuations of euro area banks have not recovered fully since the March turmoil, they have been outperforming the broader market in the year to date on the back of higher interest rates. Compared with their peers in other regions, notably Switzerland and the United States, euro area banks have seen their equity prices perform well this year (**Chart 3.12**, panel a, left graph). Euro area bank equities have gained 16% since the banking turmoil in March and are up 15% in the year to date. This is slightly above the broader market trend, driven partly by better than expected earnings results. The performance of bank stocks relative to the market continues to be driven strongly by interest rate expectations, as banks are perceived to be one of the main beneficiaries of policy rates remaining higher for longer (**Chart 3.12**, panel a, right graph). The rate sensitivity of their profitability is also reflected in bank stock prices performing differently across country lines, with outperformance evident in countries with larger increases in NIMs (**Chart 3.12**, panel b).

Chart 3.12

Bank stock prices have recovered since the March turmoil and the outperformance of the banking sector and across countries is being driven by rate sensitivity



Sources: Bloomberg Finance L.P., ECB and ECB calculations.
 Notes: Panel a: the sample consists of 71 global listed banks. Share prices across regions are weighted by banks' total assets.

The difference between banks' cost of equity (COE) and their ROE has not narrowed, with different factors at play, notably macroeconomic uncertainty and cost-inefficiencies. Indeed, the COE, an estimate of market participants' compensation for investing into banks' equity, rose alongside the ROE, as higher interest rates more than offset a narrowing in the equity risk premium. Since cross-sectional differences in the COE can be partly attributed to bank fundamentals, lingering structural issues like cost-inefficiencies might explain why bank valuations

have not picked up, as investors might have doubts about the sustainability of the recent rise in bank profitability (**Box 5**).

Box 5

Euro area bank fundamentals, valuations and cost of equity

Prepared by Paul Bochmann, Maciej Grodzicki, Heinrich Kick, Benjamin Klaus and Cosimo Pancaro

Euro area bank earnings have reached multi-year highs, while bank equity valuations have not substantially exceeded pre-pandemic levels. Between March 2022 and the end of the year, the share prices of euro area banks increased by 18% from the lows they reached after the start of Russia's unjustified war against Ukraine, as earnings expectations recovered from the initial shock. The negative impact of higher risk-free rates on the net present value of future dividends paid by banks was broadly offset by reduced uncertainty about the prospects of the sector, as measured by the equity risk premium (**Chart A**, panel a). However, the equity risk premium widened abruptly in March 2023 during the banking tensions in the United States and Switzerland and continued to widen even when the tensions had abated. Taken together with increasing bank profitability, this pattern indicates increased uncertainty about the long-run sustainability of bank earnings. Bank equity risk premia have continued to weigh on valuations since the spring tensions. The aim of this box is to shed light on the cost of equity (COE) and market valuations in the banking sector and to reach a better understanding of the role of bank fundamentals in this context.⁶²

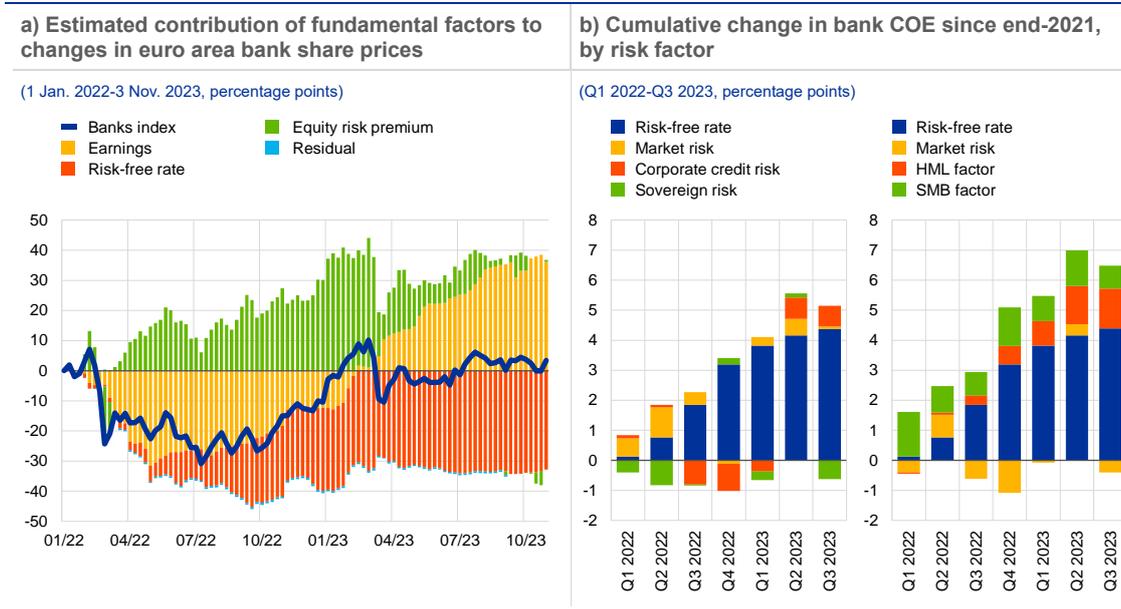
Banks' exposure to corporate credit risk and the perception of their stocks as value stocks have contributed to the stagnant valuations of the banking sector in 2023. Factor models of time-varying COE make it easier to understand the drivers of change in banks' equity risk premia. These models confirm that a large part of the overall increase in the COE can be attributed to the mechanical effects of higher risk-free rates. However, they also reveal concerns about banks' exposure to credit risk, which have depressed bank valuations since the end of 2022 (**Chart A**, panel b). Bank valuations have also come under pressure due to their exposure to a factor capturing risks associated with value stocks. While banks are attractive because of the steady dividend income they do not offer any growth opportunities.⁶³

⁶² Banks' market valuations are driven by changes in their return on equity and COE, among other things. If the price-to-book ratio – defined as a bank's market capitalisation divided by the accounting value of its equity – is higher (lower) than 1, this means that its return on equity is higher (lower) than its COE. All else equal, a higher COE implies a lower valuation.

⁶³ This can be inferred from the increased positive contribution of the Fama-French HML factor, which represents the excess returns on value stocks compared with growth stocks.

Chart A

Bank valuations face headwinds from greater uncertainty, higher risk-free rates and credit risk



Sources: LSEG, Kenneth French's data library and ECB calculations.

Notes: Panel a: based on a dividend discount model using COE, which includes a risk-free rate and an equity risk premium, as a discount factor. For details, see Fuller and Hsia*. A lower equity risk premium implies a positive contribution to share prices. Panel b: COE is not directly observable. The chart presents a decomposition of its estimates based on two orthogonalised factor models: one based on market factors and the other on Fama-French factors; see Altavilla et al.** The risk-free rate is the one-year overnight index swap rate. The market risk factor is the return on a market equity portfolio. Corporate credit and sovereign risks are captured using returns on indices covering BBB-rated corporate bonds and lower-rated euro area sovereign bonds. The HML factor represents the difference between returns on value stocks and growth stocks. The SMB factor represents the difference between returns on small cap equities and large cap equities. Factor models employ time-varying beta estimates but static risk premia. The contributions of individual factors represent quarterly averages of weekly data. HML stands for high minus low; SMB stands for small minus big.

*) Fuller, R. and Hsia, C., "A simplified common stock valuation model", *Financial Analysts Journal*, No 40, 1984, pp. 49-56.

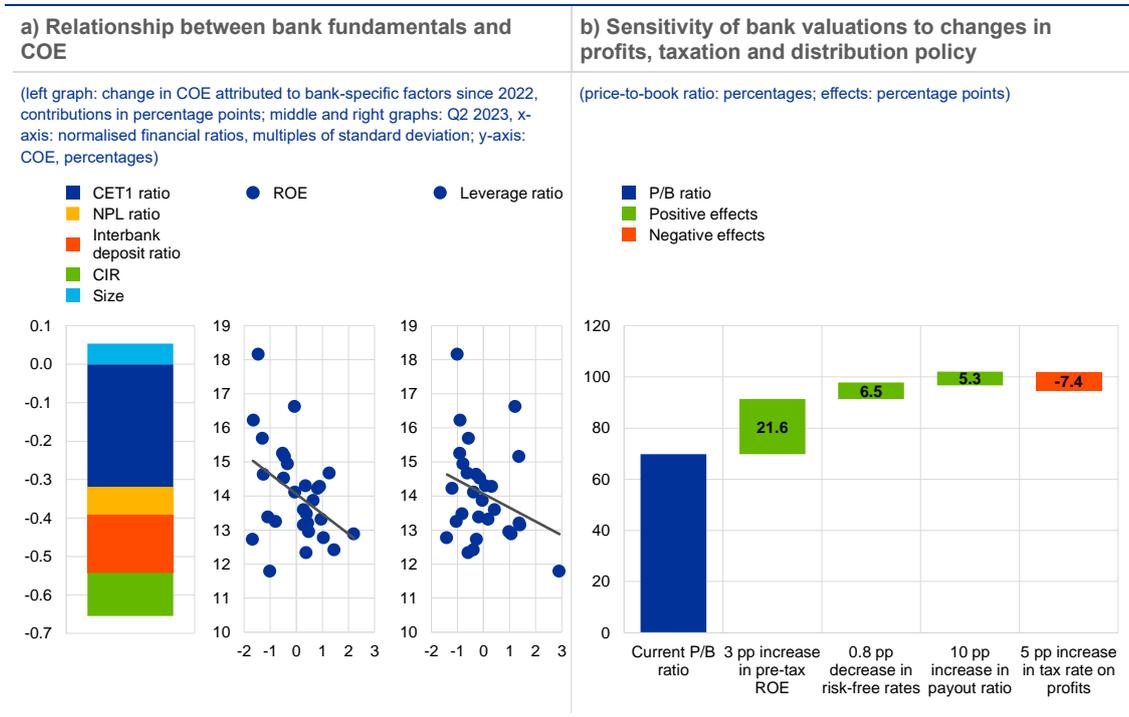
**) Altavilla, C., Bochmann, P., De Ryck, J., Dumitru, A., Grodzicki, M., Kick, H., Melo Fernandes, C., Mosthaf, J., O'Donnell, C. and Palligkinis, S., "Measuring the cost of equity of euro area banks", *Occasional Paper Series*, No 254, ECB, 2021.

Stagnant bank valuations cannot be fully explained by the fundamentals but may also be due to heightened uncertainty about shareholder access to returns earned by banks. There is empirical evidence that a lower COE is associated with lower leverage, better cost-efficiency and better asset quality.⁶⁴ Based on a cross-section of listed euro area banks, these patterns continue to hold. Improving fundamentals are estimated to have reduced the COE by about 0.6 percentage points in 2022 (Chart B, panel a). A sensitivity analysis of the bank price-to-book ratio shows that other factors beyond profitability and capital, such as distribution policies and taxation of profits, can have a large impact on bank valuations. As banks have limited growth opportunities to earn returns commensurate with their COE, distributing a higher share of profits to investors leads to improved valuations. Conversely, the risk of the dividend income stream being taxed affects valuations more strongly relative to growth stocks, which reinvest cash flows internally and are expected to return them to investors in the more distant future (Chart B, panel b).

⁶⁴ See, for example, Altavilla, C., Bochmann, P., De Ryck, J., Dumitru, A., Grodzicki, M., Kick, H., Melo Fernandes, C., Mosthaf, J., O'Donnell, C. and Palligkinis, S., "Measuring the cost of equity of euro area banks", *Occasional Paper Series*, No 254, ECB, 2021; the special feature entitled "Common equity capital, banks' riskiness and required return on equity", *Financial Stability Review*, ECB, December 2011; and Bogdanova, B., Fender, I. and Takáts, E., "The ABCs of bank PBRs", *BIS Quarterly Review*, Bank for International Settlements, March 2018.

Chart B

Fundamentals, distribution policies and taxation affect the attractiveness of bank stocks to investors



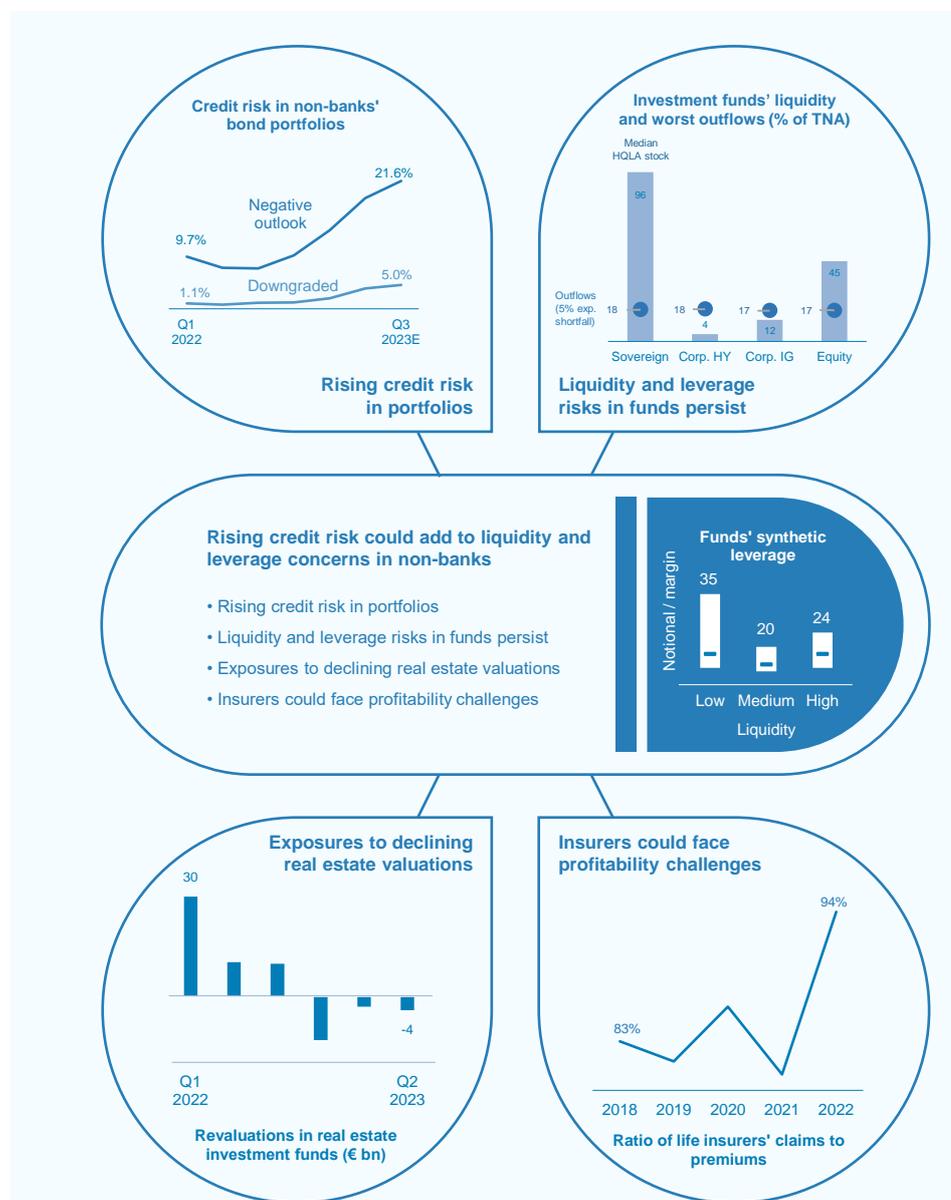
Sources: ECB (supervisory data) and ECB calculations.

Notes: Panel a: left graph based on Altavilla et al.* using a regression approach to explain changes in COE with bank-specific fundamental factors. This approach is complementary to the factor model analysis presented in Chart A, panel b. CIR stands for cost/income ratio. Interbank deposit ratio is calculated as the ratio of interbank deposits to total assets and is used as a proxy for reliance on unstable funding. Middle and right graphs: bank fundamental variables are standardised to facilitate comparability. Bank-level COE based on Altavilla et al.* Panel b: sensitivities are estimated using a dividend discount model for a representative euro area bank assumed to earn a return on equity of 15% (before tax), pay a 25% tax rate and distribute 50% of net profits after tax and Additional Tier 1 coupons to investors. Assumed changes to these parameters correspond to about one-fifth of the observed input parameters.

*) Altavilla, C. et al., "Measuring the cost of equity of euro area banks", *Occasional Paper Series*, No 254, ECB, 2021.

Weak bank stock valuations and a high COE increase the cost of lending to the real economy and make it harder for banks to raise capital. Uncertainty about the outlook for bank profits and asset quality, coupled with concerns about the sustainability of dividend payouts following announcements of higher bank taxes, is contributing to the stagnant valuations and persistently high equity risk premia observed in the euro area banking sector. In the long run, this may adversely affect financial stability as banks which are valued by investors at a discount will likely find it more challenging to raise new equity when needed. As capital required to support lending is remunerated by lending rates, weak valuations translate directly into stricter terms and conditions for finance to the real economy.

4 Non-bank financial sector



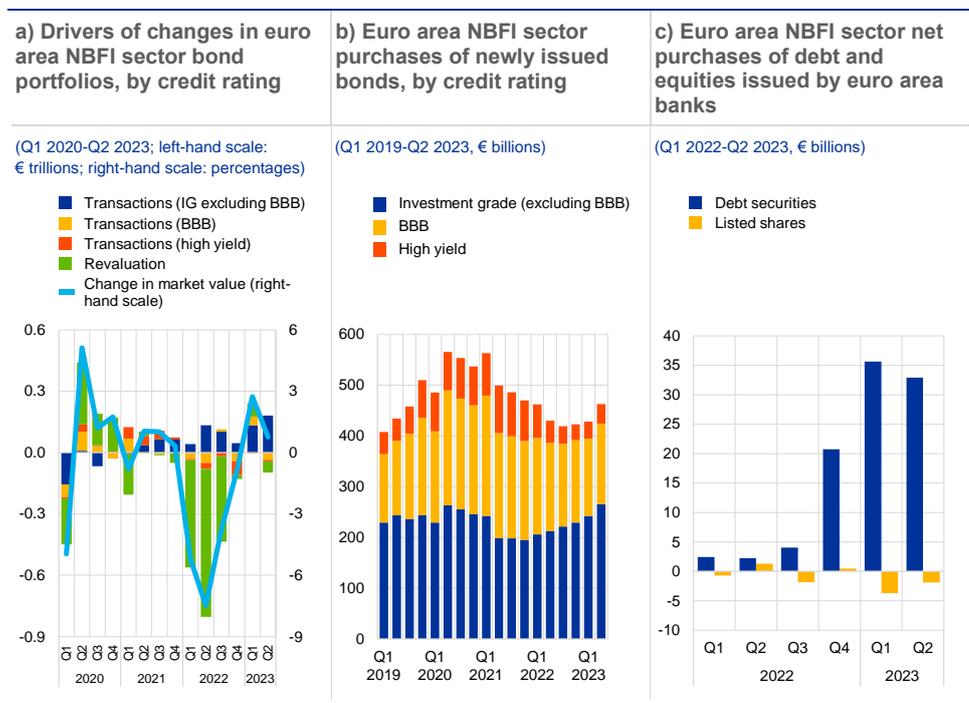
4.1 Non-banks have proved resilient recently but may face challenges ahead as structural vulnerabilities persist

Investment activity in the non-bank financial intermediation (NBFi) sector has picked up again in 2023, supporting debt issuance by sovereigns and corporates. Despite the uncertain macroeconomic environment (**Chapter 1**) and challenging financial market conditions (**Chapter 2**), investment funds (IFs) and insurance corporations and pension funds (ICPFs) have proved resilient recently and remain very active in primary debt markets. The sector continued to rebalance its

investment portfolios towards comparatively safer assets in the first half of 2023. The total value of bond portfolios, which was significantly affected by revaluation losses in 2022, has increased once again. This has been driven by rising active (re)investment in mostly higher-rated debt securities (Chart 4.1, panel a). As of mid-2023, cumulative purchases in the highest-rated bonds over one year have been close to the record levels seen during the post-pandemic recovery (Chart 4.1, panel b). The NBFi sector has also increased its investments in bank bonds, although demand for bank equities has remained muted since the banking sector turmoil in March of this year (Chart 4.1, panel c). Overall, this highlights the sector’s ongoing important role in financing banks (Chapter 3), non-financial corporations and sovereigns (Box 1).

Chart 4.1

The NBFi sector has continued to rebalance portfolios, including by further increasing its purchases of bank debt and higher-rated bonds in primary debt markets



Sources: ECB (SHS, CSDB), S&P Global Market Intelligence, Moody’s Analytics, Fitch Ratings, DBSR Morningstar and ECB calculations.

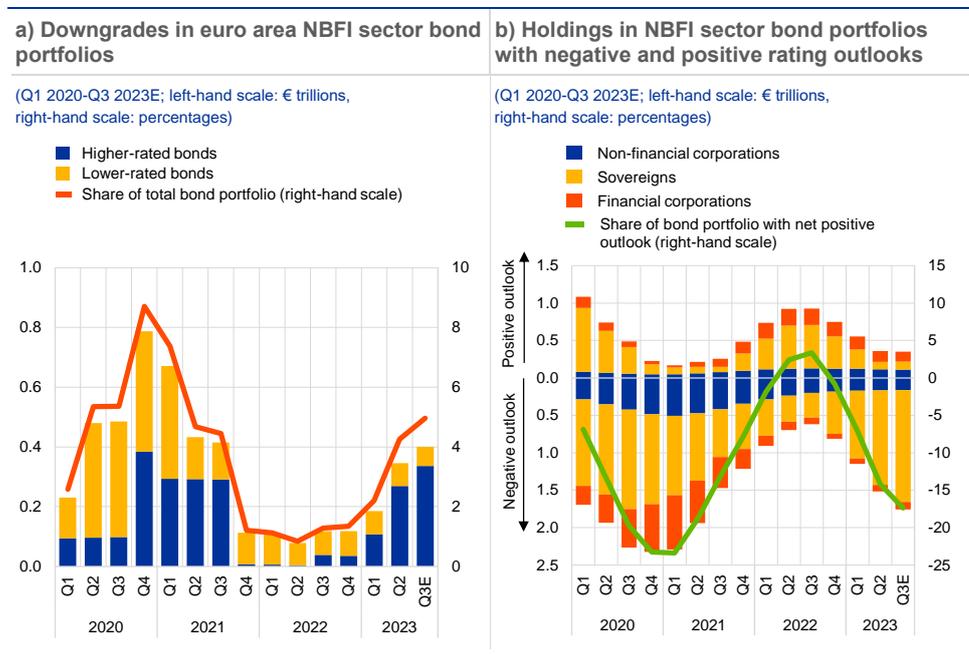
Notes: All amounts at market value. Panel a: IG stands for investment grade. Panel b: purchases of long-term bonds issued in the same quarter, accumulated over the past four quarters to account for seasonality.

Against a backdrop of macroeconomic uncertainty and tighter financial conditions, the NBFi sector remains vulnerable to rising credit risks. Over the past year, NBFi sector bond portfolios have seen an increase in rating downgrades, with amounts rising above pre-pandemic levels (Chart 4.2, panel a). Downgrades in this context have mostly been concentrated among higher-rated issuers. At the same time, the credit outlook has deteriorated for several issuers, given the continuing high level of macroeconomic uncertainty, persistent inflation and tighter financial conditions. As a result, and despite rebalancing towards comparatively safer assets, the NBFi sector is now exposed to higher levels of holdings that have been given a

negative credit outlook – these could be downgraded in the near future, implying possible revaluation losses (Chart 4.2, panel b). The increase in holdings at risk of rating downgrades has been concentrated primarily among sovereign issuers. This reflects both the forthcoming substantial refinancing needs of several governments (Chapter 1, Box 1) and the high share of sovereign bonds in non-banks' portfolios. Rising credit risk may cause losses for riskier IFs and weigh on ICPF profitability, increasing the risk of redemptions and policy lapses⁶⁵ respectively, while also reducing the financial intermediation capacity of the NBFi sector (Sections 4.2 and 4.3).

Chart 4.2

A weaker macroeconomic outlook and tighter financial conditions have increased credit risk in NBFi sector portfolios



Sources: ECB (SHS, CSDB), S&P Global Market Intelligence, Moody's Analytics, Fitch Ratings, DBSR Morningstar and ECB calculations.

Notes: All amounts are four quarter moving averages at market value. Values for Q3 2023 are estimated by applying observed rating and outlook action in Q3 on the latest available holdings data referring to Q2 2023. Panel a: higher-rated bonds are defined as those with a worst issuer rating of AA- or higher. Panel b: total value of bonds from issuers that have been given a positive or negative credit outlook by at least one rating agency, excluding holdings with no or contradictory outlooks. The share of a bond portfolio with net positive outlook is given by the sum of positive less negative outlook holdings divided by total bond portfolio holdings.

A deterioration in the macroeconomic outlook or wider adverse shocks could trigger sudden liquidity needs in the NBFi sector. Given that liquidity buffers in the NBFi sector remain very low, sudden investment fund outflows, large margin calls or lapsing insurance policies could lead to forced asset sales, which would amplify downward pressures in financial markets. Pursuing policies aimed at strengthening the liquidity and liquidity preparedness of the NBFi sector from a macroprudential perspective therefore remains of great importance in safeguarding financial stability across the sector and the wider financial system (Chapter 5, Box 6).

⁶⁵ A policy lapse occurs when a policyholder stops paying the policy premium, in which case the benefits and coverage provided under the policy are terminated.

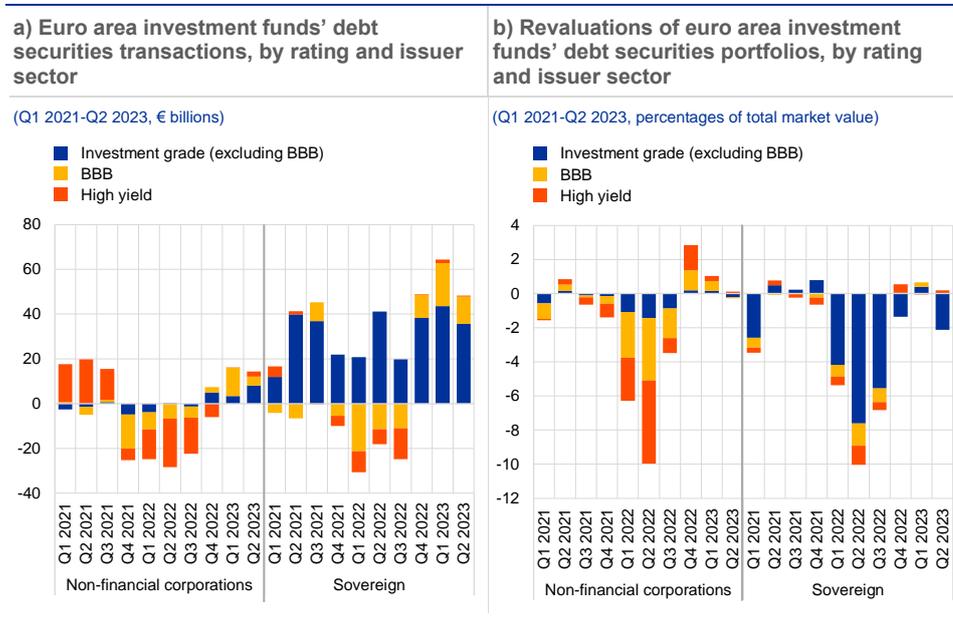
4.2 Risks related to liquidity and leverage point to structural vulnerabilities in investment funds

Euro area investment funds continue to shift their bond portfolios towards higher-rated debt, but the uncertain macroeconomic outlook could trigger renewed revaluation losses. Compared with 2022, investments in the first two quarters of 2023 were more strongly focused on purchases of investment-grade sovereign and corporate bonds, while sales of high-yield debt securities ceased (**Chart 4.3**, panel a). However, investment-grade sovereign bonds were particularly sensitive to revaluation losses during 2022 (**Chart 4.3**, panel b). While more limited in 2023 to date, losses could potentially be triggered by the uncertain macroeconomic outlook (**Overview**, **Chart 5**, panel b).

Fund flows mirror the shift observed in funds' debt securities portfolios. Inflows into euro area-domiciled sovereign and investment-grade corporate bond funds are increasing, as safe assets are performing well in the current environment. This aligns with the shift observed in the fund sector's bond portfolios. At the same time, there have been significant net outflows from equity funds invested in the financial sector since the episode of banking stress in March of this year (**Chart 4.4**, panel b).

Chart 4.3

Investment funds continue to shift to safer bonds, mitigating financial stability concerns, but revaluations of their debt securities portfolios might still pose challenges



Sources: ECB (CSDB, SHS), S&P Global Market Intelligence, Moody's Analytics, Fitch Ratings, DBSR Morningstar and ECB calculations.
 Note: The analysis excludes unrated bond holdings.

Decreasing net inflows into real estate investment funds (REIFs) might amplify negative effects on the real estate cycle. In recent quarters, REIFs have experienced decreasing net inflows – and even net outflows in some jurisdictions –

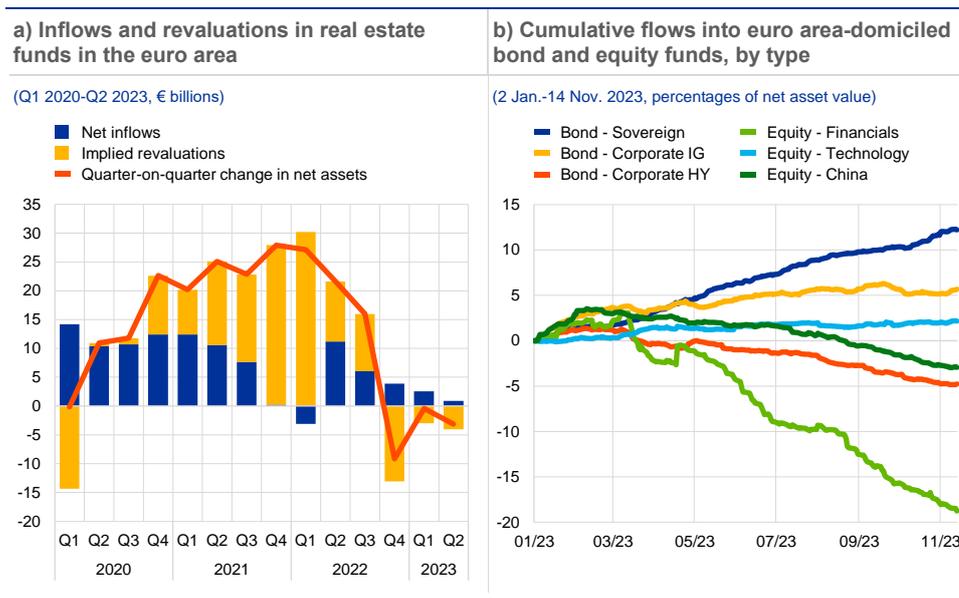
and revaluation losses (Chart 4.4, panel a) in a context of monetary policy tightening, a turning real estate cycle and higher bond yields, all of which have contributed to making these funds less attractive for investors. Given the importance of REIFs for the real estate market, instability in this segment is especially concerning as it could amplify risks to the real estate sector.⁶⁶

Financial stability concerns about stress in the Chinese real estate market spilling over to the euro area investment fund sector are currently limited.

Net inflows into funds investing in Chinese equities began to slowly decrease at the start of the year, before turning into outflows as of the end of August 2023 (Chart 4.4, panel b). This dynamic reflects the real estate stress affecting the Chinese economy (Chapter 2). That said, in September 2023 China-focused investment funds accounted for less than 1% of the total net asset value of euro area-domiciled equity funds.⁶⁷ The limited and decreasing relevance of such funds is mitigating financial stability concerns about direct spillovers from Chinese market stress to the euro area investment fund sector. At the same time, a slowdown in China might have repercussions for the investment fund sector through its macroeconomic effects on the euro area economy or via adverse sentiment effects in financial markets.

Chart 4.4

Fund flows reflect the current macroeconomic environment



Sources: ECB (IVF), EPFR Global and ECB calculations.

Notes: Panel a: implied revaluations are calculated as the difference between the quarter-on-quarter change in net asset value minus net inflows. Panel b: IG stands for investment grade; HY stands for high yield.

Despite the ongoing de-risking process, the euro area investment fund sector remains vulnerable to liquidity risks.

Cash buffers in equity and bond funds remain low in a context of tightening financial conditions, although they proved to be adequate for the level of aggregate net outflows that these funds experienced during

⁶⁶ See also the box entitled “Institutional investors and house price growth”, *Financial Stability Review*, ECB, May 2023, and the article entitled “The growing role of investment funds in euro area real estate markets: risks and policy considerations”, *Macprudential Bulletin*, Issue 20, ECB, April 2023.

⁶⁷ Data from EPFR Global.

relatively volatile market conditions in 2022 ([Chart 4.5](#), panel a). Aggregate statistics do not, however, sufficiently capture liquidity risk or how associated structural vulnerabilities have evolved. These dimensions can be better assessed by looking at fund-level data and their distribution. Focusing on open-ended bond funds, their liquidity resilience to severe redemptions appears to have deteriorated compared with before the pandemic ([Box 6, Chart B](#), panel a). In an adverse scenario, inadequate liquidity buffers could lead investment funds to engage in procyclical selling behaviour, potentially amplifying market corrections.

Structural vulnerabilities in euro area investment funds may also be caused by leverage. This could be financial leverage through unsecured and secured borrowing, such as via repurchase agreements (repos) and other securities financing transactions, or synthetic leverage through derivative exposures. Excessive leverage can amplify stress and propagate shocks from the investment fund sector to the wider financial system, potentially leading to systemic issues. The distribution of investment funds' financial leverage from repo borrowing⁶⁸ shows that this type of leverage is low on average, but pockets of highly leveraged funds could be a source of financial stability concerns ([Chart 4.5](#), panel b). The distribution of synthetic leverage tells a different story, however. One way to measure the leverage embedded in derivatives portfolios is by calculating the ratio of the portfolio's gross notional value (GNV) to the initial margin (IM) posted.⁶⁹ The data collected from a sample of investment funds' equity derivatives portfolios show that the synthetic leverage stemming from these positions can be significant ([Chart 4.5](#), panel c).⁷⁰

The combination of leverage, low liquidity buffers and high credit risk is a significant financial stability concern which underscores the need to strengthen the resilience of investment funds from a macroprudential perspective. As (synthetic) leverage can amplify shocks, especially when combined with liquidity and credit risk, it is important to consider these three aspects together.⁷¹ Some of the funds with low liquidity buffers and risky asset portfolios might also be exposed to derivatives portfolios with a high level of synthetic leverage embedded,⁷² making them especially vulnerable ([Chart 4.5](#), panel c). Together with the other vulnerabilities discussed in this section, these risks highlight the need to strengthen the resilience of the investment fund sector from a macroprudential perspective ([Chapter 5](#)).

⁶⁸ This leverage is measured as the ratio of total repo borrowing (median over the quarter) to the net asset value of the fund.

⁶⁹ See also the box entitled "[Synthetic leverage and margining in non-bank financial institutions](#)", *Financial Stability Review*, ECB, May 2022, and Avalos, F. and Sushko, V., "[Margin leverage and vulnerabilities in US Treasury futures](#)", *BIS Quarterly Review*, BIS, September 2023.

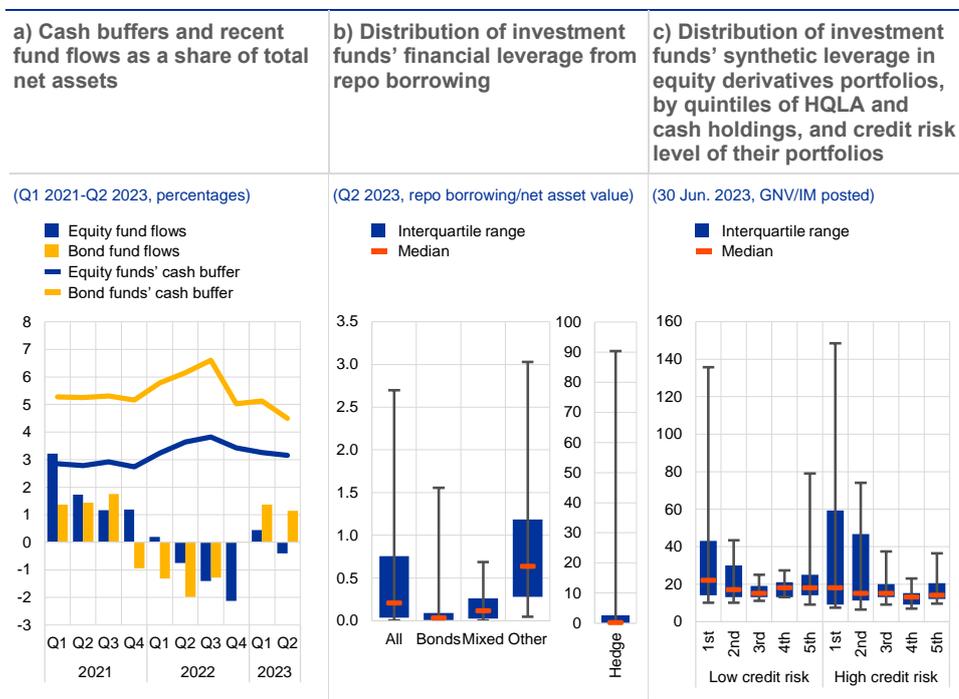
⁷⁰ The ratio "GNV/IM posted" is a measure of synthetic leverage at activity level and not entity level. This means that it cannot be directly compared with the measure used to calculate the financial leverage stemming from repo borrowing, as the former is an activity-based measure and the latter an entity-based measure.

⁷¹ See also the box entitled "[Non-banks' liquidity preparedness and leverage: insights and policy implications from recent stress events](#)", *Financial Stability Review*, ECB, May 2023.

⁷² A high level of synthetic leverage embedded in a derivatives portfolio does not necessarily imply that the overall level of synthetic leverage in the fund is high. The latter depends on the characteristics of the fund's balance sheet.

Chart 4.5

The euro area investment fund sector is vulnerable to risks from leverage and low liquidity buffers



Sources: ECB (IVF, EMIR, SFTDS), EMIR sector enrichment based on Lenoci and Letizia*, LSEG Lipper IM and ECB calculations. Notes: Panel b: the leverage ratio is calculated as the median of the total repo borrowing during the quarter divided by the net asset value of the fund. Box plot whiskers represent the 5th and 95th percentiles of the distribution. Panel c: HQLA stands for high-quality liquid assets. The analysis only includes portfolios of centrally cleared equity derivatives. As at 30 June 2023, these portfolios accounted for 8% of the total centrally cleared derivative portfolio. The GNV/IM posted ratio is a measure of synthetic leverage at the portfolio level and as such does not capture the total synthetic leverage of an individual fund. For confidentiality reasons, box plot whiskers represent the 10th and 90th percentiles of the distribution where each observation consists of the aggregation of three funds. Liquidity buffers are expressed as the share of cash and HQLA in the total net assets of a fund. Part of these buffers might already be pledged as collateral for initial margins. The quintiles are ordered from lowest liquidity buffers to highest (i.e. the first quintile contains the lowest 20% of the liquidity buffer distribution). The credit risk of a fund is defined as the average credit risk of the fund's portfolio. The credit risk score goes from 0 (lowest) to 10 (highest). The low credit risk sample includes all those funds whose portfolios have an average credit score below 3. *) See Lenoci, F.D. and Letizia, E., "Classifying Counterparty Sector in EMIR Data", in Consoli, S., Reforgiato Recupero, D. and Saisana, M. (eds.), *Data Science for Economics and Finance*, Springer, Cham, 2021.

4.3 Insurers remain resilient, but rising economic uncertainty could challenge profitability

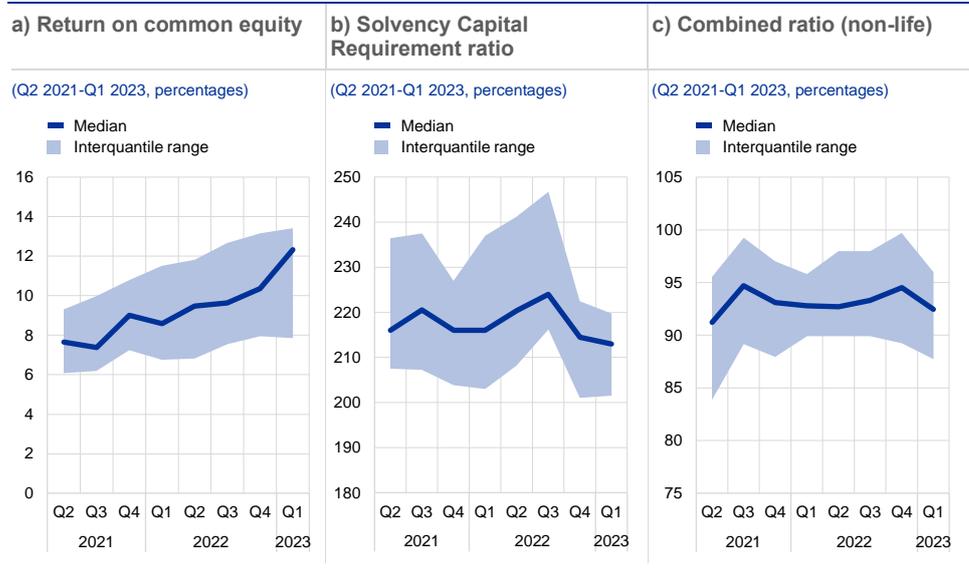
Euro area insurers remain resilient overall, with strong profitability and solvency positions. Insurers continued to perform well in the first quarter of 2023. The aggregate profitability of large insurance groups – as measured by return on equity – continued to increase (Chart 4.6, panel a). Solvency Capital Requirement (SCR) ratios also remained well above the regulatory minimum of 100%, despite a recent decline (Chart 4.6, panel b).⁷³ Furthermore, a falling combined ratio (defined as claim-related losses plus expenses divided by net premiums earned) in the first quarter of 2023 points to improved underwriting profitability for large non-life insurers, following the negative impact of inflation in 2022 (Chart 4.6, panel c).

⁷³ Note that where insurers employ transitional measures, the reported SCR ratio does not account for potential unrealised losses in their asset portfolios. For further discussion, see the "Report on Long-Term Guarantee Measures and Equity Risk 2020", EIOPA, December 2020.

Looking ahead, slower economic growth could pose profitability challenges for non-life (re)insurers, as this could result in falling demand for new policies or rising numbers of policy lapses.

Chart 4.6

Insurers' profitability and solvency remain strong in aggregate



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

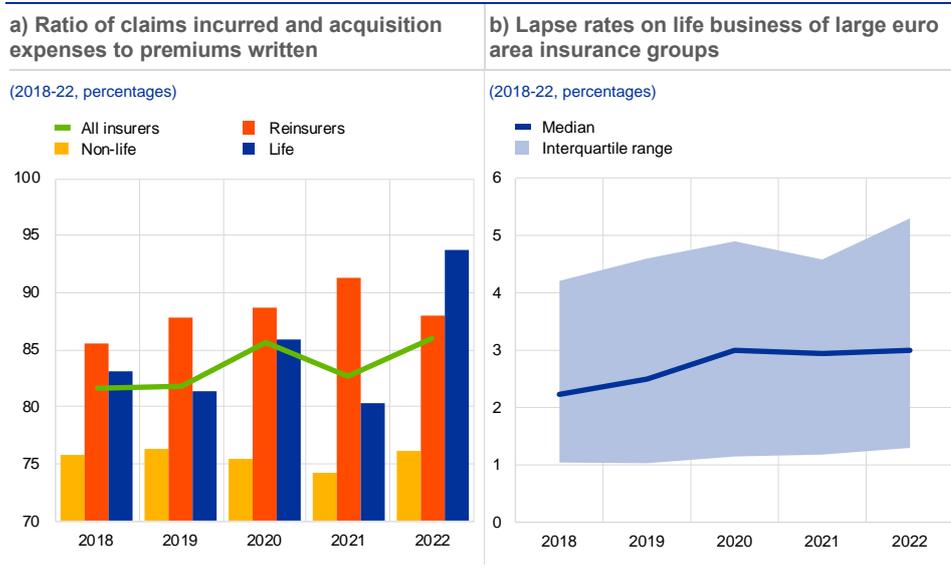
Notes: Data are based on a sample of large euro area insurers offering life and non-life products. The combined ratio is a common measure of non-life insurance profitability.

Life insurers may also face challenges from declining underwriting

profitability. While aggregate profitability (i.e. profitability from both investment and underwriting activities) continues to increase for the insurance sector as a whole, life insurers faced declining underwriting profitability in 2022 (as measured by the ratio of claims incurred plus acquisition expenses to premiums written) (Chart 4.7, panel a). This was primarily driven by falling real household incomes, which reduced demand for new life insurance policies, while policy lapses also increased marginally (Chart 4.7, panel b). Profitability may remain a concern going forward, as slower growth could further weigh on demand for new policies and increase lapse rates. In addition, early redemptions of traditional savings products by policyholders may also pose a challenge for some life insurers, as higher interest rates could provide an incentive to reinvest in new contracts or alternative assets offering higher returns.

Chart 4.7

Euro area life insurers face challenges from falling profitability



Sources: ECB (ICO, LIG) and ECB calculations.

Note: Panel a: the chart shows observations for Q4 of each year for all insurance groups.

Higher interest rates may increase the resilience of insurers and pension funds in the medium term, but it is important for them to strengthen their liquidity preparedness to meet margin calls.

The recent gradual increase in interest rates is beneficial for insurance corporations and pension funds (ICPFs), given their negative duration gaps.⁷⁴ It has also contributed to greater demand for higher-quality bonds from ICPFs in recent quarters (Chart 4.8, panel a). This may help to lower credit risk for ICPFs, though some exposures to vulnerable corporates remain (Section 4.1). Similarly, higher yields can alleviate concerns regarding the absorption of future sovereign bond issuance (Box 1). At the same time, any sharp increase in sovereign bond yields or a spike in financial market volatility could expose those ICPFs which use interest rate derivatives to large margin calls. Recent stress events, such as the March 2020 market turmoil and the UK gilt market episode, demonstrate how liquidity pressures faced by ICPFs can propagate stress across the wider financial system. This underscores how important it is for ICPFs to strengthen their liquidity preparedness to meet margin calls (Chapter 5).

In the near term, higher interest rates may result in revaluation losses on exposures to assets and sectors, such as real estate, which are sensitive to interest rates.

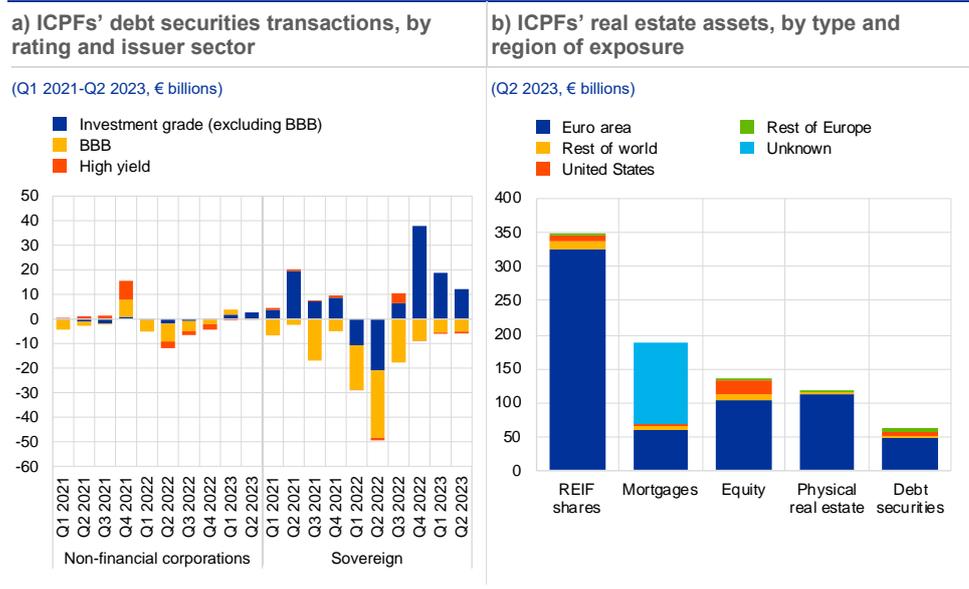
During the period of ultra-low interest rates that prevailed until last year, ICPFs significantly increased their holdings of less liquid assets, especially real estate. ICPFs generally have indirect exposure to real estate, mainly in the form of shares in euro area real estate investment funds (REIFs) (Chart 4.8, panel b). A decrease in incentives to search for yield could lead to a rebalancing of portfolios away from commercial real estate (CRE). Moreover, CRE prices have fallen recently as financial conditions have tightened (Chapter 1) and they remain at risk of further

⁷⁴ The duration gap refers to the difference between the duration of assets and liabilities. When the duration of assets is larger (smaller) than that of liabilities, the insurer has a positive (negative) duration gap. Insurers typically have a negative duration gap, whereas banks have a positive duration gap.

correction, which could result in losses for ICPFs. Price corrections could also increase redemption pressures for REIFs, which could potentially lead to forced sales (Section 4.2) and hence losses for their investors, including ICPFs. Equally, the potential for losses could incentivise ICPFs to rebalance their portfolios away from CRE, including by means of redemptions from REIFs. In turn, this could contribute to potential liquidity pressures for REIFs. The ongoing correction in CRE markets and financial system interconnectedness warrant continued monitoring.

Chart 4.8

Higher interest rates continue to see ICPFs shift to safer assets, but could result in losses on real estate exposures



Sources: ECB (SHS, CSDB), S&P Global Market Intelligence, Moody's Analytics, Fitch Ratings, DBSR Morningstar, EIOPA and ECB calculations.

Notes: Panel a: the chart shows net purchases of securities broken down by rating and issuer sector. Panel b: the chart is based on aggregate asset exposure statistics published by EIOPA. Data on pension funds reflect occupational pension schemes only. "Unknown" refers to mortgage exposures where the region of lending is unavailable in EIOPA data. "Equity" refers to holdings of real estate-related corporations. "Physical real estate" includes exposures to residential and commercial properties (excluding those for own use).

Over the longer term, insurers will continue to face several fundamental challenges, including climate change. Estimated global insured losses of USD 124 billion made 2022 one of the costliest years ever in terms of natural catastrophes.⁷⁵ In Europe, three series of events alone – droughts in France, Storms Dudley, Eunice and Franklin in February 2022, and Storms Petra and Qiara in June 2022 – generated direct economic losses of USD 17 billion and insured losses of USD 10 billion.⁷⁶ The rising frequency of major natural catastrophes due to climate change and the growing magnitude of associated losses have also pushed up insurance prices. This adds to profitability challenges faced by non-life insurers and might widen protection gaps (the proportion of economic losses not covered by insurance), which may adversely affect the macroeconomic situation and financial

⁷⁵ See Banerjee, C., Bever, L., Corti, T., Finucane, J. and Lechner, R., "A perfect storm: Natural catastrophes and inflation in 2022", Swiss Re Institute, March 2023.

⁷⁶ See "Gallagher Re Natural Catastrophe Report of 2022", Gallagher Re, January 2023.

stability. This highlights the importance of taking policy action to reduce the climate insurance protection gap.⁷⁷

Box 6

Assessing liquidity vulnerabilities in open-ended bond funds: a fund-level redemption coverage ratio approach

Prepared by Pierce Daly, Elisa Telesca and Christian Weistroffer

Recent changes in the macroeconomic and financial landscape have underscored the need to reassess how liquidity vulnerabilities have evolved for euro area open-ended bond funds.

The higher interest rate environment may have implications for open-ended investment funds exposed to interest rate-sensitive assets and sectors, such as high-yield corporate debt. This, together with recent episodes of liquidity stress in the fund sector (such as that seen in March 2020), highlights the need to re-examine the resilience of bond funds to liquidity shocks. Based on a newly constructed, granular dataset of funds' portfolio holdings and flows,⁷⁸ this box explores how funds' resilience has evolved since the coronavirus (COVID-19) pandemic and resulting market turmoil. It considers the share of high-quality liquid assets (HQLA) in fund portfolio assets as well as funds' redemption coverage ratio (RCR), calculated by dividing the value of available HQLA stock by net outflows experienced in a severe but plausible scenario lasting 30 days.⁷⁹

Overall reduced HQLA levels for bond funds would suggest that they have greater liquidity mismatch, which would increase vulnerabilities should the sector face severe outflows.

Despite ongoing de-risking by the sector, the median share of HQLA holdings has generally fallen across the sample since the end of 2019, reflecting revaluations of underlying assets⁸⁰ and suggesting that overall liquidity risk in the sector is higher than it was before the pandemic (**Chart A**, panel a). In particular and by definition, relatively less liquid Level 2 assets represent the bulk of the liquidity stock of investment-grade corporate bond funds. This exposes such funds to potentially higher liquidity risk, as the underlying market liquidity for these assets is prone to fall during stressed periods (**Chart A**, panel b). Moreover, although the aggregate net assets of bond funds in the sample have decreased,⁸¹ the overall sectoral market footprint has remained broadly stable over time and is relatively high in certain market segments.⁸² Any procyclical sell-off of less liquid assets during stressed periods could thus have an adverse impact on underlying markets.

⁷⁷ See "Policy options to reduce the climate insurance protection gap", *Discussion Paper*, ECB-EIOPA, April 2023.

⁷⁸ The dataset combines fund-level holdings and flows from Lipper and security-level data from the ECB's Centralised Securities Database (CSDB) for a sample (around 35%) of euro-area domiciled bond funds.

⁷⁹ The RCR builds on the [Basel Liquidity Coverage Ratio requirements](#), according to which assets are considered HQLA if they can be easily and immediately converted into cash with little or no loss of value. See also Bouveret, A., "Liquidity Stress Tests for Investment Funds: A Practical Guide", *IMF Working Papers*, No 2017/226, IMF, 2017; Metadger, N. and Moloney K., "Liquidity analysis of Bond and Money Market Funds", *Economic Letter Series*, Vol. 2017, No 10, Central Bank of Ireland, 2017; and "Stress simulation for investment funds", *ESMA Economic Report*, ESMA, 2019.

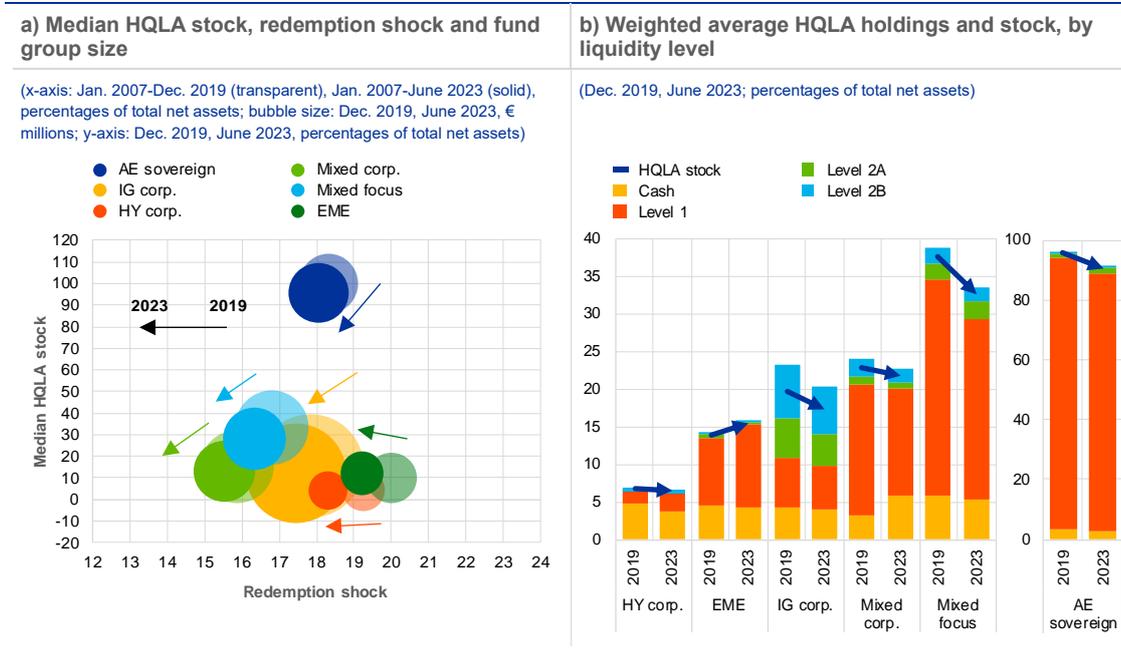
⁸⁰ Euro area investment funds have been increasing purchases of investment-grade sovereign and corporate bonds, while the latter have also suffered negative revaluations (see Chapter 4 in this issue of the Financial Stability Review).

⁸¹ The sample's aggregate net assets decreased by 10%, in line with the 8% fall for euro area bond funds between Q4 2019 and Q2 2023 reported under ECB Investment Funds Balance Sheet Statistics (IVF).

⁸² For example, the market share of euro area investment funds in euro area corporate bonds remained stable at 24% between Q4 2019 and Q2 2023, and that of euro area high yield corporate bonds at 40%, reported under ECB Securities Issues Statistics (CSEC) and Securities Holdings Statistics (SHS).

Chart A

Euro area bond funds' liquid asset holdings have declined, increasing exposure to potentially higher liquidity risk



Sources: LSEG Lipper IM, ECB (CSDB) and ECB calculations.

Notes: Panel a: redemption shocks (plotted on x-axis) are calculated, for each fund type, as the 5% expected shortfall of the distribution of monthly net flows experienced by funds between January 2007 and December 2019 (transparent bubbles) and January 2007 and June 2023 (solid bubbles) – in line with the methodology applied by ESMA*. The expected shortfall averages net flows below the 5th percentile of the distribution. The size of the fund groups in millions of euro for December 2019 (transparent bubbles) and June 2023 (solid bubbles). Panel b: HQLA holdings and stock are weighted by funds' total net assets. Arrows connect the weighted average HQLA stock per sub-group in Q1 2019 and Q2 2023. Funds' holdings are classified at the security-level according to the [Basel Liquidity Coverage Ratio requirements for HQLA](#). HQLA Level 1 assets include cash, cash equivalents and qualifying government bonds; Level 2A and 2B include less liquid assets such as qualifying covered bonds, corporate bonds, asset-backed securities and stocks. The HQLA stock is then calculated by applying no haircut to cash and Level 1 assets, 15% to Level 2A assets and 40% to Level 2B assets. Both panels: funds are categorised into six sub-groups based on their portfolio holdings, i.e. when 60% or more of their total net assets are invested in the corresponding asset category. "AE sovereign" includes government bonds issued by advanced economies in accordance with the [IMF country classification](#); for "Mixed corp.", HY and IG corporate bonds collectively meet the 60% threshold; "Mixed focus" includes the remainder of funds not reaching the 60% threshold. AE stands for advanced economies; IG stands for investment grade; HY stands for high yield; EME stands for emerging market economies. *) See ESMA, "Stress simulation for investment funds", *ESMA Economic Report*, 2019.

The redemption coverage of bond funds in a severe outflow scenario has generally deteriorated since 2019.

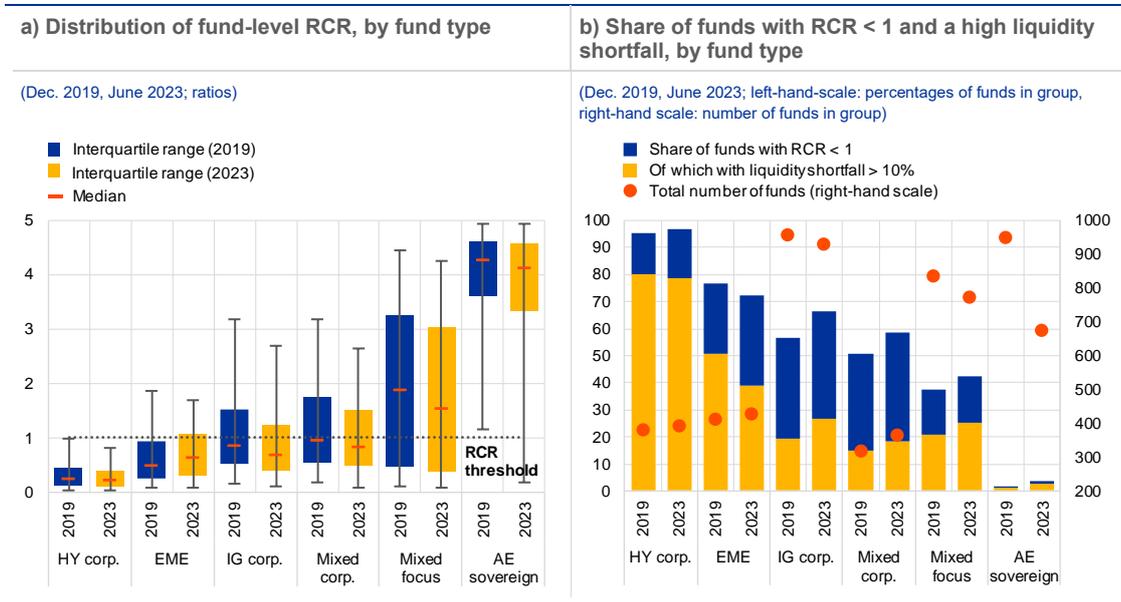
The RCR results suggest that funds in the sample are generally less resilient to redemption shocks now than they were four years ago. In particular, a large share of corporate and emerging-market bond funds would not have sufficient liquid assets to cover potentially large redemptions over a one-month period⁸³ (Chart B, panel a). This is because such funds invest in less liquid markets and have historically suffered higher outflows than the other sub-groups. While the share of entities with an RCR of below one has generally increased, the number of funds with a liquidity shortfall⁸⁴ – defined as net outflows minus liquid assets – has decreased overall. However, shortfall levels remain quite high (i.e. more than 10% of total net assets) for a considerable share of funds in each group (Chart B, panel b). This is with the sole exception of investment-grade corporate bond funds, for which an increase in funds with a high liquidity shortfall suggests an even larger uptick in vulnerabilities than for the other groups.

⁸³ Assuming funds first sold liquid asset to meet outflows.

⁸⁴ For funds with a RCR of less than 1, a larger liquidity shortfall implies that the fund would need to sell more illiquid assets to cover severe redemptions.

Chart B

Corporate and emerging-market bond funds show signs of material liquidity mismatch amid a sector-wide deterioration in resilience to severe redemptions



Sources: LSEG Lipper IM, ECB (CSDB) and ECB calculations.

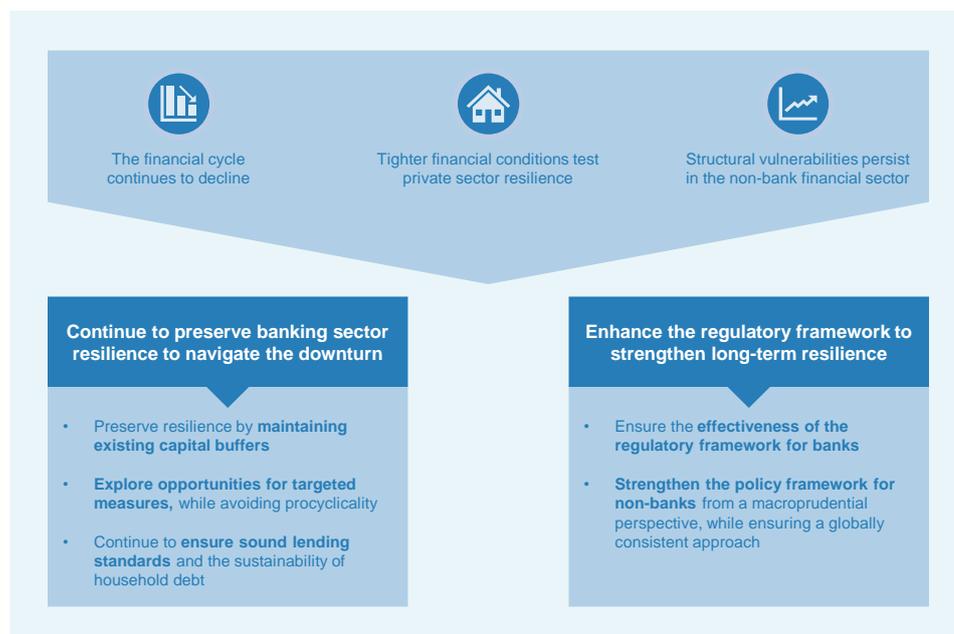
Notes: Panel a: the RCR is the ratio between the fund-level HQLA stock and the calculated group-level redemption shock, both expressed as a percentage of total net assets. Two shocks are applied for 2019 and 2023 respectively, the calibration of which is described in the notes to Chart A, panel a. The box plots display the distribution per fund group of the resulting fund-level RCRs in December 2019 and June 2023. Panel b: liquidity shortfall is defined as the redemption shock (net outflows) minus HQLA stock. The bars display the share of funds, in each fund category, with an RCR < 1 and a liquidity shortfall > 10% of total net assets.

Heightened liquidity vulnerabilities indicate that large-scale redemptions could lead to stress within the bond fund sector, with negative repercussions for the underlying markets.

The RCR results are relevant in the current market environment where negative surprises concerning the credit and growth outlook could trigger large redemptions. This, in turn, increases the potential for forced asset sales, increasing the likelihood that stressed funds could amplify negative movements in underlying market prices and liquidity. Consequently, the results also highlight the need to better align asset liquidity with fund redemption terms, in line with the Financial Stability Board recommendations that seek to address structural liquidity mismatch in open-ended investment funds.⁸⁵

⁸⁵ See “Addressing Structural Vulnerabilities from Liquidity Mismatch in Open-Ended Funds – Revisions to the FSB’s 2017 Policy Recommendations: Consultation report”, FSB, 2023.

5 Macprudential policy issues



5.1 Continue to preserve banking sector resilience to navigate the downturn

In recent months, the euro area macroprudential authorities have continued to strengthen bank resilience by further increasing macroprudential capital buffers. Macroprudential actions have been facilitated by banks' strong profitability and comfortable capital headroom, which have prevented any procyclical effects (**Chart 5.1**, panel a) in a context of lower credit demand and heightened aversion to risk on the part of banks.⁸⁶ Specifically, macroprudential authorities have increasingly activated countercyclical capital buffers (CCyB), either to address vulnerabilities linked to the build-up of credit risk or to increase macroprudential space in the form of releasable capital buffers. Since the publication of the May 2023 Financial Stability Review, five jurisdictions have either introduced or further tightened the CCyB, bringing the total number of countries with a positive CCyB rate in place to 13 (**Chart 5.1**, panel b). Thanks to the more active use of this instrument, the weighted average CCyB rate in the banking union rose from 0.23% at the onset of the pandemic to 0.58% in the second quarter of 2023.⁸⁷ Since the pandemic, several countries have also introduced sectoral capital buffers to address

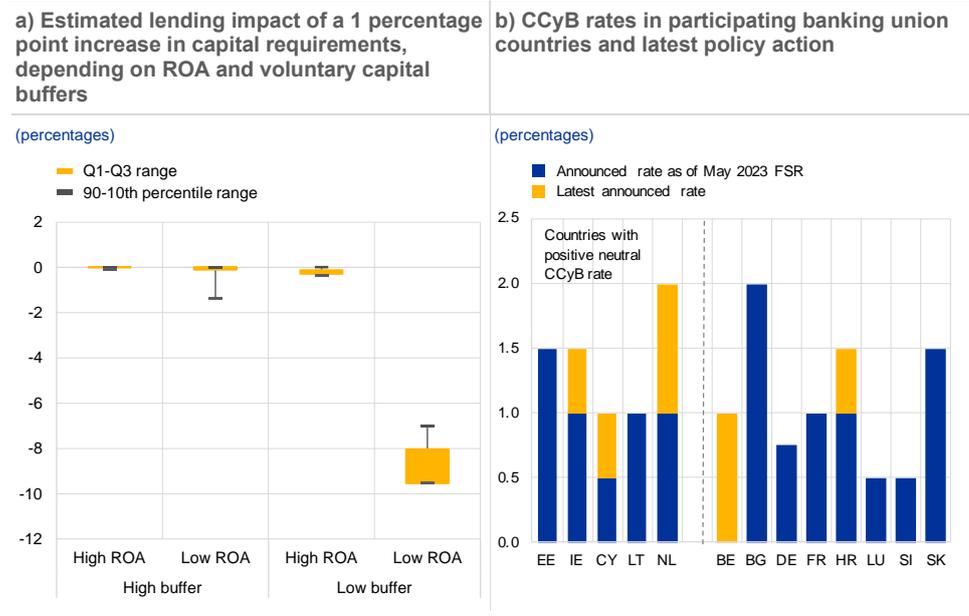
⁸⁶ As reported in the October 2023 euro area bank lending survey; see the ECB [press release](#) of 24 October 2023.

⁸⁷ For further discussion, see the article entitled "A positive neutral rate for the countercyclical capital buffer – state of play in the banking union", *Macroprudential Bulletin*, Issue 21, ECB, April 2023.

vulnerabilities in specific sectors such as the residential real estate and corporate sectors.⁸⁸

Chart 5.1

Macroprudential actions have further fostered resilience and increased macroprudential space, while avoiding procyclical effects on lending



Sources: Notifications from national authorities, Eurostat, ECB and ECB calculations.
 Notes: Panel a: interquartile range and 90-10th percentile range of the simulated impact on lending of a 1 percentage point increase in capital requirements based on the model in Lang and Menno*. The following category definitions apply: high ROA > 0.5; medium ROA [0.25, 0.5]; low ROA < 0.1; high voluntary capital buffer: greater than median; low voluntary capital buffer: lower than median. ROA stands for return on assets. Panel b: announced rates for the CCyB as notified to the ECB by national authorities. The announced rate is already effective in Bulgaria, Germany, Lithuania, Luxembourg and Slovakia, while in other countries it will become effective by the end of 2023 (Estonia and Slovenia) or 2024 (Belgium, Ireland, France, Croatia, Cyprus and the Netherlands), one year after the announcement date.*
 *) Lang, J.H. and Menno, D., "The state-dependent impact of changes in bank capital requirements", Working Paper Series, No 2828, ECB, July 2023.

Macroprudential authorities should preserve macroprudential buffers to ensure that they remain available should conditions deteriorate in the banking sector.

The turning of the financial cycle increases the risk that existing vulnerabilities – such as high private sector indebtedness and residential real estate price overvaluation – could lead to a disorderly unravelling. Furthermore, the full impact of tighter financial conditions and weak economic growth on the private sector has yet to be felt. So far there has been no sign of widespread losses, bank profitability is at a historical high, and dividend payouts have increased (Chapter 3). Existing capital buffers should therefore be maintained to preserve available macroprudential space and should only be used if widespread losses (or the expectation of such losses) were to materialise. The availability of releasable capital buffers helps to preserve trust in the banking system during the current challenging period and mitigates the risk that banks might unduly constrain the credit supply if distress were to occur. Furthermore, current levels of banking sector profitability may provide an opportunity for some countries to implement additional targeted increases

⁸⁸ Seven countries have introduced sectoral capital buffer requirements to address risks in the residential real estate sector (Belgium, Germany, Lithuania, Slovenia, Malta and Portugal) and the corporate sector (France).

of macroprudential buffers, which would strengthen macroprudential space. Finally, borrower-based measures should remain in place and continue to act as structural backstops to ensure that lending standards do not deteriorate and that borrowers' debt remains sustainable. While meeting that objective, the flexibility embedded in the design of borrower-based measures in many countries could help to avoid excessive mortgage supply constraints and preserve credit accessibility for specific segments of borrowers.

Recent initiatives imposing extraordinary taxes on credit institutions in some countries may have negative implications for financial stability. In the current macro-financial environment, it is extremely important to ensure that credit institutions maintain – or where necessary build on – a sound capital base so that they can continue to fulfil their role as credit intermediaries in the economy. In recent opinions on the subject⁸⁹, the ECB has highlighted the potential for bank levies to make it harder for banks to build up additional macroprudential capital buffers, which would have negative repercussions on bank resilience and the lending supply should broader distress materialise. Finally, the heterogeneous nature of such extraordinary taxes and the possibility of double taxation for credit institutions operating through branches in different jurisdictions may lead to fragmentation in the European financial system.

Ensure the effectiveness of the regulatory framework for banks

The Basel Committee on Banking Supervision (BCBS) conducted an important stocktake of lessons learnt from the tensions in the US and Swiss banking sectors earlier this year, reaffirming that implementing Basel III remains a priority. A first key finding relates to the crucial role of sound risk management practices and internal governance by banks as a first line of defence. In addition, the BCBS highlighted the importance of strengthening supervisory effectiveness. Moreover, the BCBS has initiated targeted analyses to assess whether specific features of the Basel framework, such as liquidity risk and interest rate risk in the banking book, performed as intended during the March turmoil and will assess the need to explore policy options over the medium term. Notwithstanding the fact that the EU banking sector proved resilient during the turmoil, these lessons learnt and further analyses will offer important insights into potential improvements.

The banking union has made considerable progress in reducing the complexities associated with the failure of systemically important banks active in multiple countries in the banking union. This progress was recognised at the global level in the methodology used to set capital buffers for global systemically important banks (G-SIBs). However, the framework used by the ECB to assess buffers set by national authorities for other systemically important institutions (O-SIIs) continues to treat all cross-jurisdictional activities within the banking union as being

⁸⁹ See the Opinion of the European Central Bank of 2 November 2022 on the imposition of temporary levies on certain credit institutions ([CON/2022/36](#)), the Opinion of the European Central Bank of 4 April 2023 on the imposition of a temporary solidarity contribution ([CON/2023/9](#)) and the Opinion of the European Central Bank of 12 September 2023 on the imposition of an extraordinary tax on credit institutions ([CON/2023/26](#)).

equally concerning, from a financial stability perspective, as exposures outside the banking union. The existence of single supervision and resolution mechanisms substantially reduces the frictions which affect the supervision and resolution of internationally active banks, although differences remain as some elements of the banking union are yet to be completed. The ECB is therefore carrying out the technical work required to explore different options for recognising the banking union in its O-SII framework.

5.2 Enhancing the policy framework for non-bank financial intermediation

Parts of the non-bank financial intermediation (NBFI) sector exhibit significant vulnerabilities, highlighting the need to strengthen the resilience of the sector from a macroprudential perspective. Vulnerabilities may arise from liquidity mismatch or leverage across a range of non-bank financial institutions.⁹⁰ These vulnerabilities have crystallised during several periods of stress in recent years, notably the March 2020 market turmoil, the failure of Archegos Capital Management in 2021 and the UK government bond (gilt) market stress in 2022. In some cases, extraordinary policy responses from central banks were needed to stabilise markets and limit contagion to the wider financial system.⁹¹ Given the increasingly important role played by the NBFI sector in financing the real economy and its interconnections with the banking system,⁹² it is important to tackle the sector's vulnerabilities to enhance financial stability and support monetary policy in fulfilling its objectives.

A comprehensive set of policy measures should be developed to address vulnerabilities in the NBFI sector holistically. Such an approach would consider interdependencies across different parts of the financial sector as well as interactions between policies, such as those between approaches to tackle liquidity risk and leverage in the NBFI sector. In this context, it is important to recognise the heterogeneous nature of the non-bank financial sector. Different business models and balance sheet structures require that the policy measures will be tailored to specific entity types and their business models. It is also essential to ensure that the economic benefits of any new policy measures exceed their economic costs (e.g. through calibration).

The policy approach should take existing frameworks into account and be rooted in strong international coordination. A macroprudential approach to the NBFI sector should ideally include repurposing existing tools (i.e. by embedding

⁹⁰ This section focuses on investment funds, money market funds, insurers and pension funds.

⁹¹ See the ECB blog posts by Luis de Guindos and Isabel Schnabel entitled "[The ECB's commercial paper purchases: A targeted response to the economic disturbances caused by COVID-19](#)", 3 April 2020, and "[Improving funding conditions for the real economy during the COVID-19 crisis: the ECB's collateral easing measures](#)", 22 April 2020. For the Bank of England's response to the UK gilt market stress in 2022, see "[Bank of England announces gilt market operation](#)", news release, Bank of England, 28 September 2022.

⁹² See the box entitled "[Measuring market-based and non-bank financing of non-financial corporations in the euro area](#)", *Financial Integration and Structure in the Euro Area*, ECB, April 2022, and the special feature entitled "[Key linkages between banks and the non-bank financial sector](#)", *Financial Stability Review*, ECB, May 2023.

macroprudential perspectives) and consider developing additional macroprudential policies as well as assessing the role of the authorities in implementing them.⁹³ In addition, the availability and use of granular data and metrics to assess vulnerabilities should be enhanced, including by better information sharing across jurisdictions. Given the pronounced cross-border dimension of NBFIs activities, international policy coordination via the Financial Stability Board (FSB) will be an important way to promote a level playing field and minimise the risk of cross-border arbitrage.

The structural vulnerabilities related to liquidity and leverage and their interaction mean it is vital to enhance the resilience of the NBFIs sector from several angles. The remainder of this section focuses on policies aimed at (i) enhancing liquidity preparedness to meet large margin and collateral calls in derivatives and repo markets, (ii) containing leverage-related risks in the NBFIs sector, and (iii) tackling liquidity mismatch in open-ended funds. Money market fund reforms are discussed briefly at the end of the section.

Inadequate liquidity preparedness to meet margin and collateral calls can precipitate adverse feedback dynamics and amplify market-wide stress. Market participants may be forced to sell assets in periods of market stress, which can depress asset prices further and, in turn, accelerate margin calls, potentially transforming individual liquidity stress into a system-wide issue. This was the case in September 2022, when a sudden increase in gilt yields led to UK pension funds facing large margin calls on their interest rate derivative positions, prompting them to sell long-dated government bonds in thin underlying markets.⁹⁴ Similarly, the large margin calls faced by EU insurance corporations and pension funds in March 2020 triggered significant outflows from money market funds, which amplified the stress across the wider financial system.⁹⁵

It is therefore important to enhance the preparedness of NBFIs sector entities to cope with liquidity needs stemming from large margin and collateral calls. Strengthening the governance and liquidity risk management of a broad range of non-bank entities, including investment funds, insurance corporations and pension funds, is the most direct way to enhance liquidity preparedness. The table below summarises promising policy options. These include enhancing contingency planning and governance, using liquidity stress testing and ensuring that there are appropriate levels of liquidity buffers and that liquidity sources are diversified.

Policies should consider the trade-off between enhancing resilience to liquidity stress and wider economic costs and be calibrated in a way that ensures benefits outweigh costs. In addition, liquidity preparedness should be proportional to liquidity risk and should reflect the size of potential margin calls and

⁹³ The current FSB policy agenda focuses largely on repurposing existing policy tools. At a later stage, the FSB will assess whether there is a need to develop additional tools for use by the authorities.

⁹⁴ See the box entitled “Non-banks’ liquidity preparedness and leverage: insights and policy implications from recent stress events”, *Financial Stability Review*, ECB, May 2023.

⁹⁵ See the box entitled “Lessons learned from initial margin calls during the March 2020 market turmoil”, *Financial Stability Review*, ECB, November 2021, and Ghio, M., Rousová, L., Salakhova, D. and Villegas Bauer, G., “Derivative margin calls: a new driver of MMF flows”, *Working Paper Series*, No 2800, ECB, March 2023.

the interplay with leverage. In this respect, liquidity stress testing and contingency planning may be useful when calibrating the appropriate level of liquidity buffers and the diversification of liquidity sources.

Policy options for enhancing non-banks’ preparedness to meet margin and collateral calls

Policy option	Description	Justification
Contingency planning and governance	NBFI sector entities should be required to have effective contingency planning and governance practices in place to manage liquidity risks stemming from margin or collateral calls. Specifically, they should have clear action plans for different adverse scenarios and an effective governance structure for managing such calls. To the extent possible, the plans should reflect a system-wide perspective, for example, by taking into account the resilience of common sources of liquidity during periods of market-wide stress.	Progress in this area would allow NBFI sector entities to better assess and manage their liquidity risks from margin and collateral calls. This could include enhancing collateral management practices and access to credit lines. It would also enable authorities to check whether the contingency plans are appropriate and to calibrate concrete liquidity measures accordingly. For larger institutions, the approach should be relatively less costly to implement. However, developing and maintaining the contingency plans would be relatively more expensive for smaller entities, highlighting the importance of proportionality.
Liquidity stress testing	NBFI sector entities should be subject to appropriate stress tests to assess liquidity risk from margin and collateral calls under adverse scenarios. Guidelines, best practices, and recommendations should be developed for such stress tests. The authorities should have a clear mandate to follow up on the stress test results and demand action from supervised entities.	By gauging the resulting entity-level and system-wide liquidity needs, authorities and entities would be better placed to assess the ability to meet margin and collateral calls in periods of stress. Running stress tests should also enhance the available data at entity level, operate as a disciplining device and help strengthen entities’ risk management functions and contingency planning. In addition, the results could be used in the calibration of other policy measures such as the appropriate level of liquidity buffers and the diversification of liquidity sources. Stress testing can be resource-intensive, so it is important to consider proportionality when establishing any stress testing approach.
Higher levels of liquidity	NBFI sector entities should hold sufficient levels of high-quality liquid assets or cash buffers. Adequate levels may be higher than is currently the case.	Ensuring that NBFI sector entities hold a sufficient level of liquid assets would directly enhance their ability to meet large margin and collateral calls, thereby enhancing system-wide resilience. While there are also costs associated with holding high-quality liquid assets and cash (e.g. costs arising from foregone revenues as well as the potential for greater market-wide scarcity of high-quality collateral), these should be weighed against the benefits of the increased resilience of individual NBFI sector entities and the wider financial system. The calibration of any policy measures in this area should ensure that benefits outweigh costs.
Diversification of liquidity sources	NBFI sector entities should diversify their liquidity sources, both across and within asset classes, and should avoid concentration in any particular type of collateral. On the funding side, entities should avoid excessive counterparty concentration for credit and repo lines.	NBFI sector entities often rely on the same sources of liquidity and might not internalise the extent to which their individual actions could exacerbate systemic stress. Requiring liquidity source diversification should enhance the resilience of entities in response to widespread liquidity shocks, for example, by reducing dependence on the liquidity of particular assets under stress, and enhancing the availability of funding more broadly.

While enhancing liquidity preparedness is mainly the responsibility of market participants, complementary measures related to margining practices and the resilience of liquidity provision should be considered. To that end, it would be useful to enhance transparency and reduce procyclicality in margin and collateral calls. For example, recent stress episodes have highlighted the need for greater transparency in the margin models of central counterparties and clearing members. This could entail gathering more information about how margin models work (e.g. information on discretionary add-ons/multipliers) and using better data and tools (e.g. margin simulators). In addition, enhancing collateral transformation services and

improving the resilience of repo and cash bond markets could be beneficial for the liquidity preparedness of NBFIs sector entities.

Both entity-based and activity-based measures should be used to address the risks related to NBFIs sector leverage. Entity-based measures, such as rules that restrict leverage for certain NBFIs sector entities, should be complemented by measures affecting certain activities (such as derivative or repo transactions) used to generate leverage. Given the complexities involved in the use of leverage in an interconnected financial system, the policy response should also take a holistic perspective which takes into account interactions with policies targeting liquidity risk. For instance, leverage limits could reduce the size of margin calls faced by non-bank financial institutions. At the same time, enhanced liquidity risk management would mitigate the need for forced asset sales, something which could have particularly strong amplifying effects for highly leveraged financial intermediaries.

A globally consistent approach for measuring risks stemming from both financial and synthetic leverage would make it possible to monitor such risks more effectively.⁹⁶ For this purpose, it is important to continue to develop globally consistent metrics and improve data quality and coverage as well as cross-jurisdictional information sharing. This will make it easier to assess leverage-related risks across NBFIs sector entities, activities and jurisdictions.⁹⁷

One key aspect of policy would be to consider leverage restrictions for different types of NBFIs sector entity. This could include setting concrete leverage limits and/or using discretionary restrictions for types of entity with similar risk exposures.⁹⁸ Calibrating such limits would require an assessment of appropriate levels of leverage for NBFIs sector entities – this should take into account the specific business models of different entities, the economic benefits of such leverage and the level of leverage-induced externalities that the financial system could withstand. Stress testing could be informative in this case. It is also important to ensure that any regulatory requirements are not circumvented and that the authorities can address any arbitrage promptly should it occur.

Enhancing prudential rules on haircuts and margins for securities financing (including repos) and derivative transactions should also be part of the approach to address NBFIs sector leverage. Since not all NBFIs sector entities would be subject to direct leverage constraints, a higher initial margin during periods of low market volatility would operate as a backstop limiting both the amount of leverage created through derivative exposures (synthetic leverage) and margin

⁹⁶ Financial leverage implies an on-balance-sheet exposure from the borrowing of funds. By contrast, synthetic leverage is usually obtained via derivative exposures and requires daily mark-to-market margining, which would expose entities to liquidity risk in the event of significant adverse price movements.

⁹⁷ This work should complement the previous done work by the International Organization of Securities Commissions (IOSCO) on investment funds. See “[Recommendations for a Framework Assessing Leverage in Investment Funds](#)”, *Final Report*, No 18/2019, IOSCO, December 2019.

⁹⁸ For instance, funds under the UCITS Directive are subject to different approaches to limit leverage, depending on the complexity of their investment strategy. Under Article 25 of the AIFM Directive, competent authorities can impose leverage limits on alternative investment funds to ensure the stability and integrity of the financial system. See also [ESMA Guidelines on Article 25 of Directive 2011/61/EU](#), 23 June 2021.

procyclicality. With regard to securities financing transactions, it is important to swiftly implement the FSB minimum haircut framework in European law. At the same time, the rules on haircuts and margins could have potentially adverse consequences for the cost of hedging for end users, highlighting the need to carefully balance benefits and costs.

Finally, as part of a holistic approach it is important to consider how prime brokers and dealer banks facilitate NBFi leverage in accordance with their risk management practices and regulation. This is another important complementary aspect to consider with regard to mitigating the build-up of leverage in the NBFi sector globally, especially for entities that are not subject to regulatory leverage constraints.

A key policy objective concerning liquidity mismatch in open-ended funds (OEFs) is to better align fund redemption terms with the liquidity of portfolio assets. The FSB has recently published proposals in support of this objective.⁹⁹ In particular, the daily creation and redemption of fund shares would remain appropriate for funds that invest mainly in assets that are liquid under both normal and stressed market conditions (e.g. certain listed equities or government bonds). For funds invested in assets that are relatively less liquid during normal periods, but which could become illiquid under stress, such as corporate bond funds, daily redemptions may be appropriate if the asset manager can demonstrate to the authorities that higher standards of liquidity management are being met. However, the asset manager should consider longer notice periods or a lower redemption frequency to reduce liquidity mismatch vulnerability if the costs of selling assets cannot be passed on to redeeming investors by anti-dilution tools. Finally, it would not be appropriate for OEFs holding a significant share of assets (such as real estate assets) that are illiquid even under normal market conditions to offer daily liquidity to investors. National regulators and authorities supervising property funds in the EU have devised a range of policy measures to limit the liquidity mismatch in such funds.¹⁰⁰

Enhancing the availability and use of anti-dilution liquidity management tools should form part of the policy response to vulnerabilities in the OEF sector.¹⁰¹

In particular, OEFs should be able to pass on to redeeming investors both the explicit and the implicit costs of selling assets under both normal and stressed market conditions to reduce first-mover advantages and disincentivise procyclical investor redemptions. This could be achieved by employing price-based anti-dilution tools such as swing pricing or anti-dilution levies, especially for funds invested in less

⁹⁹ See “[Addressing Structural Vulnerabilities from Liquidity Mismatch in Open-Ended Funds – Revisions to the FSB’s 2017 Policy Recommendations: Consultation report](#)”, FSB, July 2023.

¹⁰⁰ For a more detailed discussion, see the article entitled “[The growing role of investment funds in euro area real estate markets: risks and policy considerations](#)”, *Macprudential Bulletin*, No 20, ECB, April 2023.

¹⁰¹ Under the revised AIFMD and UCITS Directive, if adopted, fund managers should have at least two appropriate liquidity management tools in place, which could include suspension of redemptions, redemption gates, notice periods, redemption fees, swing pricing, dual pricing, anti-dilution levies, redemptions in kind or side pockets.

liquid assets.¹⁰² However, price-based liquidity management tools could be difficult to use in stressed market conditions when liquidity has dried up and price information could be missing or distorted. Therefore, to ensure that withdrawals do not cause liquidity strains under such conditions, redemption terms should be commensurate with asset liquidity. In particular, as discussed above, longer notice periods might be warranted for funds investing in less liquid assets, and higher liquidity buffers might be needed for funds offering daily redemptions.

Money market fund (MMF) reforms in the EU should be pursued as a matter of priority, in line with the international policy proposals. Following the March 2020 market turmoil, proposals to enhance the resilience of MMFs without unduly curtailing their economic function were developed at both the international and the European levels. The proposals focused on removing regulatory threshold effects, strengthening MMF liquidity requirements and improving the availability and usability of liquidity management tools.¹⁰³ In the EU, however, reform of MMFs has seen limited progress to date. While MMFs will be required to have at least two liquidity management tools, as is the case for other funds, no legal reforms have as yet been proposed to the dedicated EU Money Market Fund Regulation.¹⁰⁴ In the United States, the authorities have adopted significant MMF reforms, such as raising liquidity requirements to 25% and 50% of a fund's total assets for daily and weekly liquid assets respectively.¹⁰⁵ As the United States and other jurisdictions are progressing with legal reforms, updating the EU's MMF framework should be pursued as a matter of priority.

¹⁰² The aim of such tools is to impose the cost of redemptions on redeeming investors, thereby ensuring that the remaining investors do not have to bear the cost. This can be achieved by adjusting the price at which investors buy and sell shares in the fund, for example, or by imposing a redemption fee.

¹⁰³ At the international level, see [“Policy Proposals to Enhance Money Market Fund Resilience – Final report”](#), *Final Report*, FSB, October 2021. At the European level, see [“Eurosystem contribution to the European Securities and Markets Authority \(ESMA\) consultation on the framework for EU money market funds”](#), ECB, June 2021; [“Recommendation of the European Systemic Risk Board of 2 December 2021 on reform of money market funds”](#), ESRB, January 2022; and [“ESMA opinion on the review of the Money Market Fund Regulation”](#), *Final Report*, ESMA, February 2022.

¹⁰⁴ See [“Report from the Commission to the European Parliament and the Council on the adequacy of Regulation \(EU\) 2017/1131 of the European Parliament and of the Council on money market funds from a prudential and economic point of view”](#), European Commission, July 2023.

¹⁰⁵ On 12 July the US Securities and Exchange Commission (SEC) adopted [amendments to certain rules that govern MMFs](#).

5.3 Other ongoing policy initiatives that support euro area financial stability

Topic	Recent initiatives
Banking package	Implementation of the latest banking package in the EU, including the final Basel III elements, is currently under way. The ECB has published its views on the banking package reforms and welcomes the agreement reached by the EU co-legislators on 27 June 2023. This will make it possible to finalise the legal process in time to meet the target date for initial application (1 January 2025). The EU implementation is in line with the overall objectives of the Basel III framework and will apply to all EU banks. The reforms will further bolster the resilience of the banking system, especially by increasing the capital needed for credit, operational and market risks.
Crisis management and deposit insurance	<p>Improving the toolkit used to address the failures of smaller and mid-sized banks is at the centre of the European Commission's proposed reform of the crisis management and deposit insurance framework. The aim of the reforms is to mitigate risks to financial stability, improve the protection of depositors and avert the use of public funds in banking crises by extending the availability of effective crisis management options such as transfer tools to a broader set of banks. Loss absorption by shareholders and creditors will remain the first line of defence in a bank failure.</p> <p>The ECB strongly welcomed the proposal in its opinion. While outside the scope of the Commission's proposal, the ECB noted that a number of further actions are still warranted to strengthen the resilience of the European bank crisis management framework: (i) the introduction of a European deposit insurance scheme, which would buttress depositor confidence, even in a systemic crisis; (ii) the establishment of a common backstop to the Single Resolution Fund, which would bolster the firepower available to support bank resolutions in the banking union; and (iii) the introduction of a European backstop for liquidity in resolution, which is essential to ensure market confidence in a bank during and after its resolution.</p>
Crypto-assets	<p>The regulation of crypto-asset activities is advancing at both European and international levels. In the EU, the Markets in Crypto-assets Regulation entered into force in June 2023, containing provisions applicable to stablecoins (e-money tokens and asset-referenced tokens as defined by the regulation) from June 2024 and to other crypto-assets and the provision of crypto-asset services from December 2024. In the meantime, the European Banking Authority and the European Markets and Securities Authority are consulting on a first set of technical standards to implement the regulation.</p> <p>At the international level, the Financial Stability Board (FSB) has published a Global Regulatory Framework for Crypto-asset Activities providing high level recommendations for regulating crypto-asset activities and markets and global stablecoin arrangements. Implementing these recommendations across FSB jurisdictions and beyond will be key to promoting consistency and international cooperation in these areas. Furthermore, the IMF-FSB synthesis paper represents an important step forward in the implementation process as it brings together regulatory and macro-financial considerations related to crypto-assets. It also outlines the next steps international organisations and standard-setting bodies will take to implement crypto-asset policy frameworks aimed at addressing macroeconomic and financial stability risks.</p>
Digital euro	<p>On 28 June 2023 the European Commission published its Single Currency Package, comprising a legislative proposal for the establishment of the digital euro and a legislative proposal on the legal tender of euro cash. The ECB warmly welcomed the proposal settling the legal framework for a possible digital euro that would be widely usable and largely available in the digital economy and would complement euro banknotes and coins. The legal foundation of the digital form of the euro would also ensure that central bank money would continue to contribute significantly to a resilient, efficient and well-functioning payment system. The ECB received the consultation requests from the Council of the European Union and the European Parliament in September and will publish its opinion within three months. The legislative act is expected to be adopted by the end of 2024 at the earliest.</p> <p>The two-year investigation phase for the digital euro project concluded in October 2023 when the ECB's Governing Council decided to launch the next phase of the programme, the preparation phase.¹⁰⁶ However, the issuance of a digital euro would require a separate Governing Council decision and would be taken only after the legislative act has been adopted.</p>
Capital markets union	On 24 May 2023 the European Commission published a proposal for a retail investment strategy as part of its 2020 Capital Markets Union Action Plan. The aim of the proposal is to enable retail investors to make well-informed financial decisions by ensuring that information is provided in a more standardised format, by increasing the transparency and comparability of cost structures and by addressing potential conflicts of interests (e.g. by not allowing inducements for "execution-only" sales or by protecting retail investors from misleading marketing campaigns). A further aim of the Commission's proposal is to implement measures which could reduce administrative burdens and improve the accessibility of products and services. In addition, the proposal brings forward measures aimed at enhancing supervisory cooperation to ensure consistent implementation throughout the EU.

¹⁰⁶ See also "Eurosysteem proceeds to next phase of digital euro project", press release, ECB, 18 October 2023.

Special features

A Assessing risks from euro area banks' maturity transformation

Prepared by Lara Coulier, Sándor Gardó, Benjamin Klaus, Francesca Lenoci, Cosimo Pancaro and Alessio Reghezza

This special feature builds on the concept of maturity gap as a metric of banks' maturity mismatch to shed light on how banks' engagement in maturity transformation differs across euro area countries and bank types. Banks can mitigate the interest rate risk stemming from their maturity mismatch by using derivatives for hedging purposes. Euro area banks increased their positions in interest rate derivatives over the last two years in anticipation of the start of monetary policy normalisation. Significant institutions rely more than cooperative and savings banks on interest rate derivatives and have a more diversified positioning. The extent of banks' maturity mismatch determines the sensitivity of their net interest income to changes in interest rates and the slope of the yield curve. This special feature provides empirical evidence that the more banks engage in maturity transformation the more their net interest margin benefits from a steepening of the yield curve, boosting bank profits. This effect might dissipate going forward, especially for banks in countries where variable-rate lending predominates.

Introduction

Engaging in maturity transformation exposes banks to interest rate risk: the potential negative impact on their earnings or capital that could arise from adverse changes in interest rates.¹⁰⁷ The failure of Silicon Valley Bank in the United States in March 2023 illustrates the possible challenges banks can face following a swift and material rise in interest rates. This is especially the case when compounded by weak risk management practices and business models that feature a high share of long-term assets and rely largely on uninsured deposits.

This special feature builds on the maturity gap, a metric of banks' maturity mismatch, to explore the role of maturity transformation for banks. It first examines how banks' maturity gaps change over time and across bank types before going on to discuss the role that interest rate derivatives can play in mitigating the interest rate risk stemming from maturity mismatch. Finally, it investigates the implications of the maturity gap for banks' net interest margins (NIMs).

¹⁰⁷ Changes in interest rates affect banks' interest-sensitive income and expenses and, over time, their profitability. Changes also have an immediate impact on the value of a bank's assets and liabilities through changes in the present value and the timing of future cash flows. The bank's economic value of equity is also affected accordingly. While banks' aggregate profitability benefits from rising interest rates and a steepening yield curve, their economic value of equity is likely to be negatively affected.

Maturity transformation and interest rate risk

Banks' engagement in maturity transformation can be measured by the maturity gap. The maturity gap captures the difference between the repricing period for bank assets and bank liabilities. Due to data availability constraints, in this special feature the maturity gap is approximated by the difference between the weighted average repricing period for loans to the non-financial private sector and the weighted average repricing period for deposits from the non-financial private sector, based on new business volumes.¹⁰⁸ A positive maturity gap indicates that loan repricing occurs over a longer timespan than deposit repricing. This measure makes it possible to analyse the relations between banks' balance sheet structures and interest rate developments, and the implications for profitability.

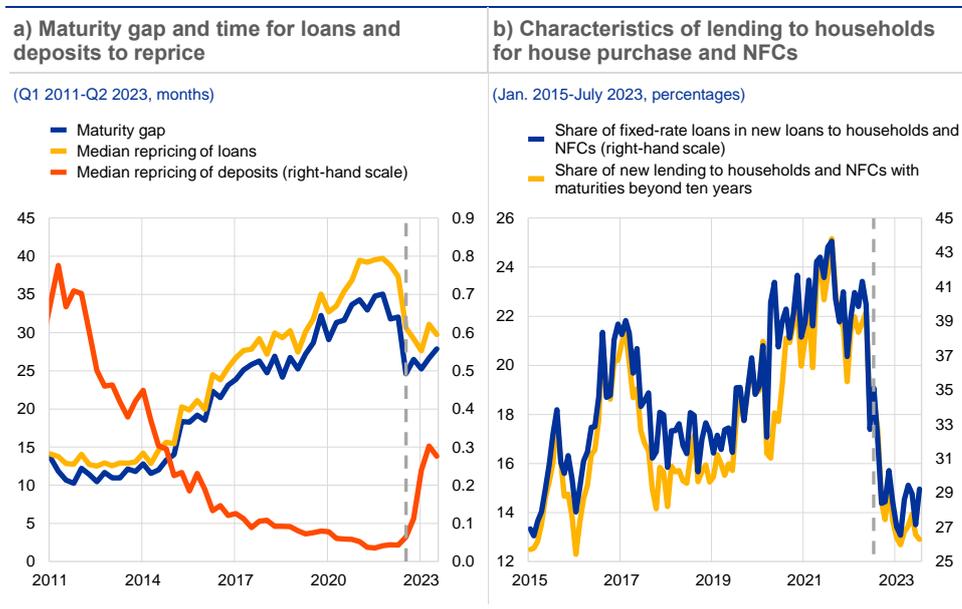
The aggregate maturity gap of euro area banks has decreased during the recent rate-hiking cycle. During the period of ultra-low interest rates which ran from 2014 to 2021, the average time for loans to reprice increased gradually (**Chart A.1**, panel a) as the share of fixed-rate lending rose (**Chart A.1**, panel b). Banks had an incentive to earn the larger term premium associated with longer maturities to partially offset margin compression and the related drop in profitability. Also, customers preferred to borrow at fixed rates with a view to locking in very low rates for a longer period. At the same time, there was a decline in the average time for deposits to reprice on account of the shift from term deposits to overnight deposits.¹⁰⁹ As a result, the average maturity gap rose to about 35 months as at the end of the last quarter of 2021 (**Chart A.1**, panel a). This trend then reversed as expectations of monetary policy tightening began to materialise. The decrease in the maturity gap was driven by a reduction in loan repricing time, caused by a drop in the share of fixed-rate lending, as well as an increase in deposit repricing time. The latter was caused by a shift from overnight deposits to term deposits on the back of the higher remuneration provided by the latter when rates are rising.

¹⁰⁸ The definition of maturity gap follows the approach used by Altavilla, C., Boucinha, M. and Peydró, J.-L., "Monetary policy and bank profitability in a low interest rate environment", *Economic Policy*, Vol. 33, Issue 96, 2018, pp. 531-586. One caveat is that the data used to calculate the maturity gap provide information on the contractual time to reprice and do not account for behavioural assumptions. This is especially relevant for the calculation of the effective time for mortgages and overnight deposits to reprice as contractual repricing does not account for loan prepayments and/or the fact that the behavioural repricing of overnight deposits is longer than the contractual repricing. Similar measures, covering banks' full balance sheets, are used by English, W., Van den Heuvel, S. and Zakrajšek, E., "Interest rate risk and bank equity valuations", *Journal of Monetary Economics*, Vol. 98, Issue C, 2018, pp. 80-97, and Drechsler, I., Savov, A. and Schnabl, P., "Banking on Deposits: Maturity Transformation without Interest Rate Risk", *Journal of Finance*, Vol. 76, Issue 3, 2021, pp. 1091-1143.

¹⁰⁹ For more details, see the box entitled "[Euro area bank deposit costs in a rising interest rate environment](#)", *Financial Stability Review*, ECB, May 2023.

Chart A.1

The growing share of variable-rate assets and term deposits has led to a decrease in the maturity gaps of euro area banks since the start of the hiking cycle in mid-2022



Sources: ECB (iMIR, MIR) and ECB calculations.

Notes: The dashed grey lines mark the start of the hiking cycle in July 2022. Panel a: based on an unbalanced sample of 330 monetary financial institutions (MFIs, consolidated). The lines represent the median in each quarter. Panel b: loans include new lending for house purchase (households) and new loans other than revolving loans and overdrafts, convenience and credit card debt extended to non-financial corporations (NFCs).

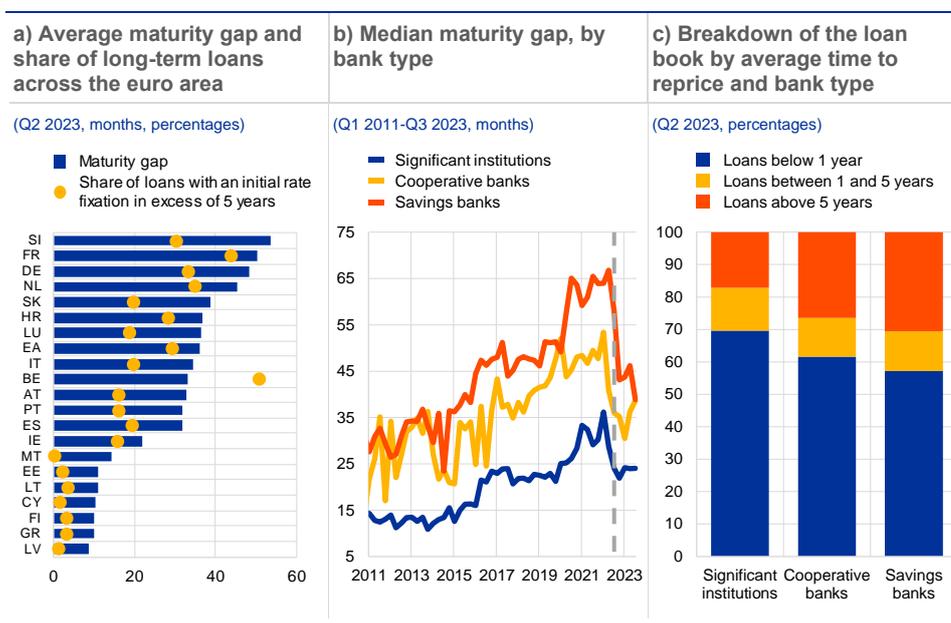
Banks' maturity gaps differ across countries and bank types due to differences in interest rate fixation conventions and business model characteristics.

In terms of their maturity gaps, banks domiciled in euro area countries can be clustered into three groups: around ten months, about 30 months and above 40 months (Chart A.2, panel a). The gap is higher in countries where banks have a larger share of long-term, fixed-rate loans. Typically, long-term loans originated at a fixed rate have a higher duration and are therefore more sensitive to interest rate risk. When it comes to bank types, cooperative banks and savings banks are more active in maturity transformation (Chart A.2, panel b), given their focus on traditional banking activities with a greater share of long-term loans to households and NFCs (Chart A.2, panel c).¹¹⁰ By contrast, significant institutions' more diversified business models have a narrower maturity gap (Chart A.2, panel b), mainly because they carry a lower share of long-term loans on their balance sheets.

¹¹⁰ Cooperative and savings banks are defined based on the field specialisation provided by BvD Electronic Publishing GmbH – a Moody's Analytics company and are validated at the country level using data from the European Association of Co-operative Banks and the European Savings and Retail Banking Group. Significant institutions reflect the list of euro area banks supervised by the ECB and are reclassified as either cooperative banks or savings banks if BvD Electronic Publishing GmbH – a Moody's Analytics company considers their business model to be attributable to these specialisations. Banks' balance sheets are captured at the highest level of consolidation, where available. This sample of banks consists of 81 significant institutions, 1,403 cooperative banks and 407 savings banks, covering €19 trillion, €8 trillion, and €2.6 trillion of total assets at year-end 2022 respectively. However, data on time for loans and deposits to reprice are more limited. iMIR covers only 55 significant institutions, 23 cooperative banks and 21 savings banks, representing 85%, 44% and 34% of the starting sample in terms of total assets respectively. 67 significant institutions, 395 cooperative banks and 341 savings banks report under EMIR and they account for 97%, 90% and 93% of the starting sample in terms of total assets respectively.

Chart A.2

Banks' maturity gaps vary across euro area countries and banks' business models



Sources: ECB (iMIR), BvD Electronic Publishing GmbH – a Moody's Analytics company and ECB calculations.
Notes: Panel a: based on an unbalanced sample of 251 MFIs (consolidated). Panel b: the dashed grey line marks the start of the hiking cycle in July 2022. Panels b and c: based on an unbalanced sample of 103 MFIs at the highest level of consolidation.

Use of derivatives to manage interest rate risk

Banks can manage their interest rate risk either by changing the composition of their balance sheets or by actively using derivatives for hedging purposes.

The first approach, known as natural hedging, involves aligning the interest rate sensitivity of assets and liabilities. In this way, banks' cash flows generated from asset exposures offset those stemming from their liabilities along the repricing schedule. Alternatively, banks can use derivatives contracts linked to interest rate fluctuations to reduce the duration gap between assets and liabilities without altering their balance sheet structures. This means that banks actively trade in the interest rate derivatives market to manage their interest rate risk.¹¹¹

Euro area banks have increased their positions in interest rate derivatives over the last two years. The gross notional traded on EURIBOR interest rate swaps (IRS) and forward rate agreements (FRA) by euro area counterparties rose significantly between September 2021 and June 2023.¹¹² The bulk of this increase took place after the ECB announced the end of net purchases under its pandemic emergency purchase programme but before the actual start of the hiking cycle.¹¹³

¹¹¹ See the boxes entitled "Interest rate risk exposures and hedging of euro area banks' banking books", *Financial Stability Review*, ECB, May 2022, and "Euro area interest rate swaps market and risk-sharing across sectors", *Financial Stability Review*, ECB, November 2022.

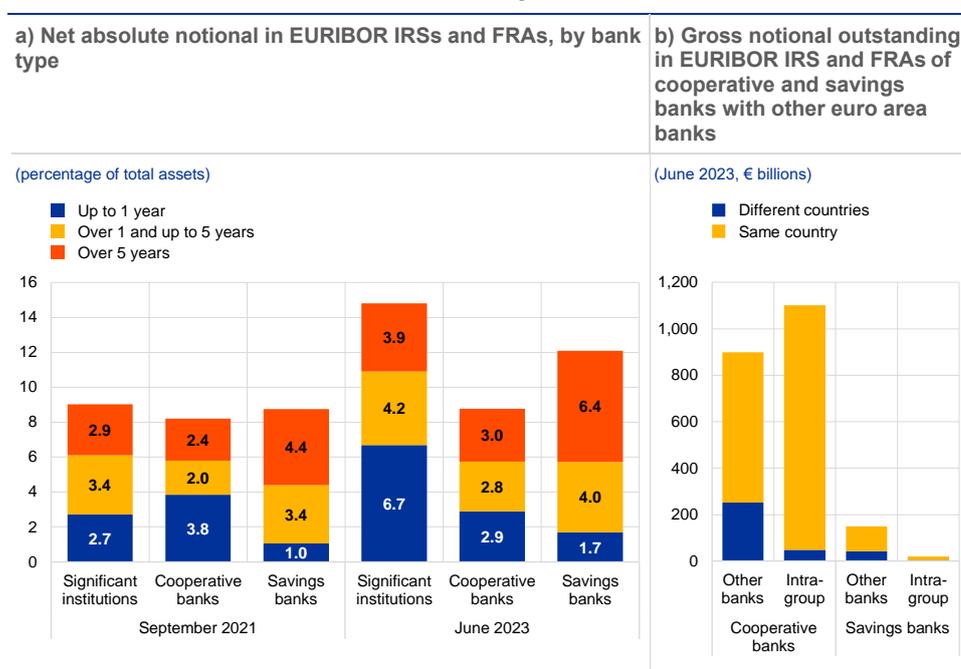
¹¹² EURIBOR IRSs and FRAs are the most traded and liquid derivatives used to manage interest rate risk for euro-denominated exposures. Together they accounted for around three-quarters of the gross notional derivatives outstanding in the euro area as at mid-2023.

¹¹³ Longer-term market rates had already started rising in this period as expectations for future interest rate hikes began to strengthen.

This might reflect the positioning on interest rate derivatives adopted by banks and other informed investors in anticipation of the start of monetary policy normalisation. Significant institutions and savings banks increased their interest rate derivatives positions substantially during this period, although their greater reliance on derivatives was not sufficient to compensate for the material increase in interest rate risk (**Box A**). The overall positioning of cooperative banks remained broadly unchanged, but their mix of instruments shifted towards interest rate derivatives with longer maturities (**Chart A.3**, panel a). Similarly, savings banks tend to trade derivatives contracts with longer maturities, reflecting their greater maturity transformation.

Chart A.3

Banks' net exposures to interest rate derivatives have increased, and cooperatives have shifted their instrument mix towards longer maturities since rate hikes started



Sources: BvD Electronic Publishing GmbH – a Moody's Analytics company, ECB (iMIR, EMIR, RIAD) and ECB calculations.
 Notes: Panel a: at the end of each period, the absolute value of contracts netted at the counterparty and the maturity level is divided by the total assets of banks belonging to each specialisation group. The net absolute notional is defined as the absolute value of the difference between buying and selling positions on EURIBOR IRs and FRAs, irrespective of whether counterparties are active in EURIBOR IRs and FRAs, in each of the maturity buckets "Up to 1 year", "Over 1 and up to 5 years" and "Over 5 years". Panel b: "Intragroup" refers to interest rate derivatives positions among banks identified at solo level and belonging to the same group.

Significant institutions tend to rely on interest rate derivatives to a larger extent than cooperative and savings banks. Their somewhat greater reliance on interest rate derivatives may be linked to their ability to leverage more sophisticated risk management frameworks.¹¹⁴ Cooperative and savings banks affiliated with central cooperative or savings banks (CCBs) frequently enter the derivatives market indirectly by trading with their parent, which often nets positions across subsidiaries to hedge the resulting bundled trades (**Chart A.3**, panel b). The benefits arising from

¹¹⁴ See Esposito, L., Nobili, A. and Ropele, T., "The management of interest rate risk during the crisis: Evidence from Italian banks", *Journal of Banking & Finance*, Vol. 59, Issue C, 2015, pp. 486-504, and Purnanandam, A., "Interest rate derivatives at commercial banks: An empirical investigation", *Journal of Monetary Economics*, Vol. 54, Issue 6, 2007, pp. 1769-1808.

exploiting offsetting positions might, however, leave the CCB with some interest rate risk if the hedge is not perfect.

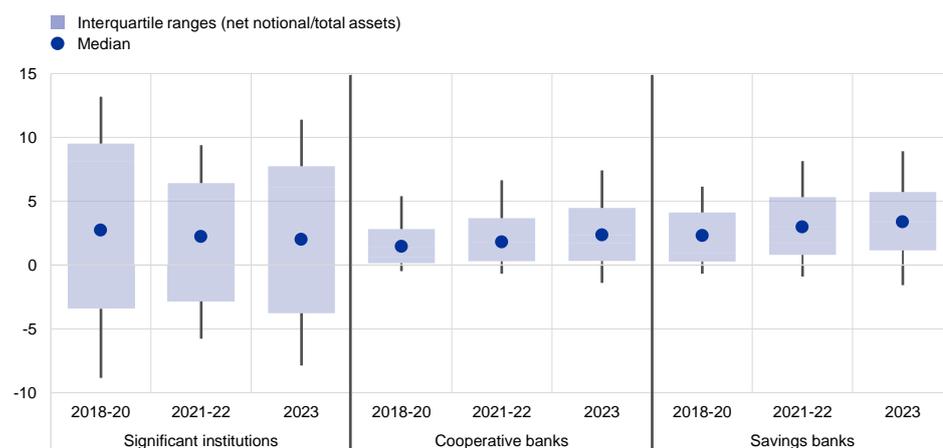
The use of interest rate derivatives differs by bank type, with large banks' positionings being more mixed. The net directional positioning in interest rate derivatives differs more among significant institutions than among cooperative banks and savings banks (**Chart A.4**).¹¹⁵ The positioning of significant institutions, as either net buyers or net sellers, might reflect the diversity of their duration gaps.¹¹⁶ In addition, some large banks could also be active in this market with the aim of speculating on interest rate movements or acting as market-makers or clearing members. Cooperative and savings banks mostly enter the interest rate derivatives market as net buyers of EURIBOR IRSs and FRAs.¹¹⁷ Only a few such banks are net sellers, and the extent of net sales is limited to less than 2% of their total assets (**Chart A.4**). This suggests that these banks, along with their wider maturity gap, use interest rate derivatives mostly for hedging purposes.

Chart A.4

Significant institutions exhibit more diverse interest rate derivatives positions

Distribution of net notional outstanding on EURIBOR IRSs and FRAs over total assets

(Q4 2018-Q3 2023, percentages)



Sources: BvD Electronic Publishing GmbH – a Moody's Analytics company, ECB (iMIR, EMIR) and ECB calculations.

Notes: See notes to Chart A.3. For the number of banks included in each specialisation group, see footnote 110. Bars show the interquartile ranges while whiskers are winsorised at the 10th and 90th percentiles. Positive (negative) values indicate net buyers (sellers), i.e. notional values on pay-fix receive-float positions are larger (smaller) than pay-float receive-fix positions.

Impact of maturity transformation on bank net interest margins

Bank profitability generally benefits from rising interest rates. In the current context of rising interest rates, euro area banks' net interest margins increased from

¹¹⁵ The directional positioning in interest rate derivatives is proxied by the ratio of net notional on EURIBOR IRSs and FRAs to banks' total assets.

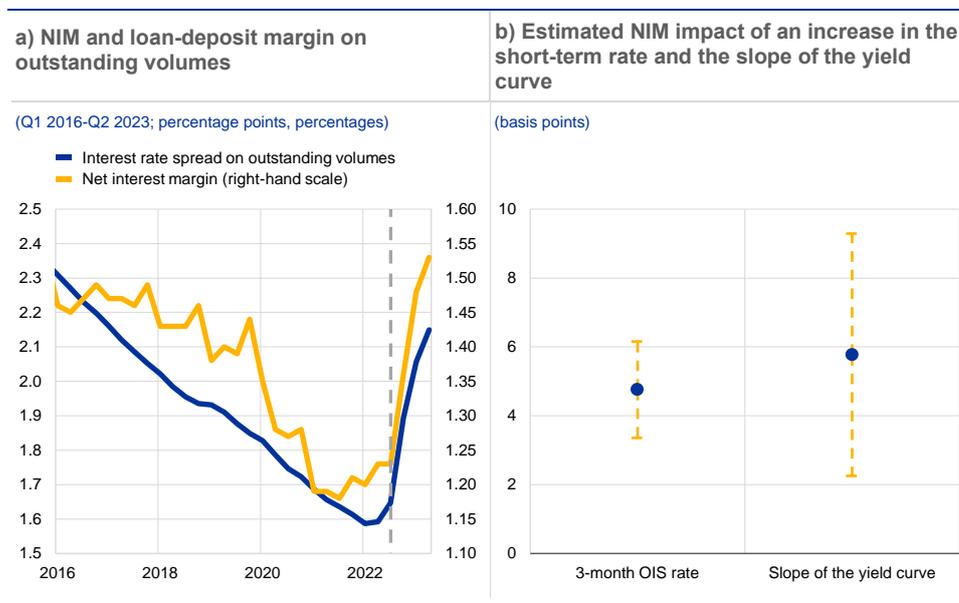
¹¹⁶ Banks with a positive duration gap can hedge their exposures by taking positions in IRSs as net buyers, while banks with a negative duration gap can hedge their exposures by acting as net sellers. On average, banks are net buyers while insurance companies and pension funds are net sellers. Market-makers are the main counterparty of banks.

¹¹⁷ Banks, which are net buyers, have long positions and their cash flow results from paying the fixed-rate EURIBOR and receiving the floating-rate EURIBOR.

their recent minimum of 1.2% in the third quarter of 2021 to 1.5% in the second quarter of 2023, benefiting from the widening of the loan-deposit margin (Chart A.5, panel a). Indeed, changes in the level of interest rates and the slope of the yield curve can affect banks' net interest margins. An increase in interest rates may improve banks' NIMs in line with the "retail deposits endowment effect", according to which overnight deposit rates are priced at a markdown on market rates and tend to be sticky upwards.¹¹⁸ Since retail deposits represent the largest component of bank liabilities, an increase in interest rates results in improved NIMs as assets reprice or mature faster than liabilities. A change in the shape of the yield curve could also affect banks' NIMs. Since banks engage in maturity transformation, a steepening of the yield curve may provide more of a boost to longer-term yields than to short-term yields, raising the rate on interest-earning assets more than the cost of liabilities.

Chart A.5

Higher short-term interest rates and a steeper yield curve have, on average, a positive impact on euro area banks' margins



Sources: BvD Electronic Publishing GmbH – a Moody's Analytics company, LSEG, ECB (iMIR, supervisory data) and ECB calculations.

Notes: Panel a: the dashed grey line marks the start of the hiking cycle in July 2022. The net interest margin is defined as net interest income divided by total earning assets. The interest rate spread (loan-deposit margin) is calculated as the difference between the weighted average rate on outstanding loans to non-financial corporations (NFCs) and households and the weighted average rate on outstanding deposits from NFCs and households using the outstanding amounts as weights. Panel b: the blue dots represent the point estimates, while the dashed yellow lines show the 90% confidence bands. The sample period runs from Q4 2014 to Q2 2023. The slope is calculated as the difference between the yields on government bonds with a residual maturity of ten years and two years. The regressions control for a wide range of bank-specific characteristics such as the logarithm of total assets, the CET1 ratio, the ratio of liquid assets to total assets, the cost/income ratio, the ratio of risk-weighted assets to total assets, the ratio of loans to total assets, the ratio of deposits to total assets and macro-level controls such as annual GDP growth and inflation. The regressions are saturated with bank fixed effects and standard errors are clustered at the bank level. The regressions are estimated on a balanced sample of 122 significant institutions and less significant institutions. The estimated impact represents the effect of a 1 percentage point increase in the three-month OIS rate and a 1 percentage point increase in the country-specific slope of the yield curve.

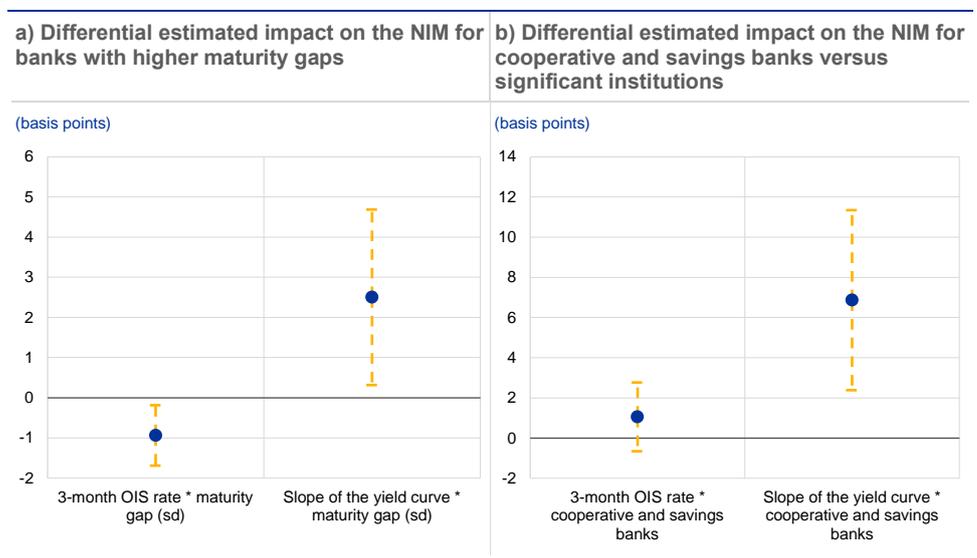
The empirical evidence confirms that an increase in short-term rates and a steepening of the yield curve support bank margins. Bank-level estimations,

¹¹⁸ See Albertazzi, U. and Gambacorta, L., "Bank profitability and the business cycle", *Journal of Financial Stability*, Vol. 5, 2009, pp. 393-409; Alessandri, P. and Nelson, B.N., "Simple banking: Profitability and the yield curve", *Journal of Money, Credit and Banking*, Vol. 47, 2015, pp. 143-175; Borio, C., Gambacorta, L. and Hofmann, B., "The influence of monetary policy on bank profitability", *International Finance*, Vol. 20, 2017, pp. 48-63; and English, W.B., Van den Heuvel, S.J. and Zakrajšek, E., "Interest rate risk and bank equity valuation", *Journal of Monetary Economics*, Vol. 98, 2018, pp. 80-97.

regressing the NIM on the level of the short-term rate and the slope of the yield curve while controlling for a large set of bank- and country-specific characteristics, confirm the empirical evidence in the literature. At impact there is a positive and statistically significant relationship between NIM and both the level of the short-term rate and the slope of the yield curve (**Chart A.5**, panel b). More specifically, the estimated coefficients suggest that a 1 percentage point increase in the three-month overnight index swap (OIS) rate increases the NIM by 4.8 basis points, while a 1 percentage point increase in the slope of the yield curve has a positive impact of 5.8 basis points.¹¹⁹ The estimated coefficients do not capture longer-term effects, which could differ from the results at impact once the liability repricing catches up and credit risk may arise.

Chart A.6

The impact of higher short-term interest rates and a steeper yield curve on bank margins varies with the extent of maturity transformation and across bank types



Sources: BvD Electronic Publishing GmbH – a Moody's Analytics company, LSEG, ECB (iMIR, supervisory data) and ECB calculations.

Notes: The blue dots represent the point estimates, while the dashed yellow lines show the 90% confidence bands. For details on the sample period and included variables, see notes under Chart A.5. The regressions are saturated with bank and time fixed effects and standard errors are clustered at the bank level. Panel a: regressions are estimated on a balanced sample of 122 significant institutions and less significant institutions. The estimated impact represents the differential effect of a 1 percentage point increase in the three-month OIS rate and a 1 percentage point increase in the country-specific slope of the yield curve for a bank with a maturity gap that is one standard deviation above the sample average. Panel b: regressions are estimated on a balanced sample of 48 significant institutions and 42 cooperative and savings banks. The estimated impact represents the differential effect of a 1 percentage point increase in the three-month OIS rate and a 1 percentage point increase in the country-specific slope of the yield curve for cooperative and savings banks compared with significant institutions.

Banks with a wider maturity gap benefit less from a change in short-term rates and more from a steepening of the yield curve.

The empirical evidence also shows that a higher maturity gap has a significantly negative impact on the relationship between the NIM and the short-term rate (**Chart A.6**, panel a). A bank with a maturity gap that is one standard deviation above the sample average exhibits an increase in its NIM that is 1 basis point smaller in response to a 1 percentage

¹¹⁹ This result is confirmed by several studies, including Samuelson, P.A., "The effect of interest rate increases on the banking system", *American Economic Review*, Vol. 35, 1945, pp.16-27; English, W.B., "Interest rate risk and bank net interest margins", *BIS Quarterly Review*, BIS, December 2002; and Claessens, S., Coleman, N.C. and Donnelly, M., "'Low-for-long' interest rates and banks' interest margins and profitability: Cross-country evidence", *Journal of Financial Intermediation*, Vol. 35, 2017, pp. 1-16.

point increase in the short-term rate.¹²⁰ This is consistent with the view that banks with a larger mismatch between the repricing schedules of their assets and their liabilities will benefit less from parallel shifts in interest rates. This is because, all else equal, their liabilities reprice faster than banks with a narrower mismatch, leading to a smaller increase in margins. By contrast, a higher maturity gap has a positive and statistically significant impact on the relationship between the NIM and the slope of the yield curve (**Chart A.6**, panel a). A bank with a maturity gap that is one standard deviation above the sample average exhibits an increase in its NIM that is 2.5 basis points stronger in response to a 1 percentage point steepening of the yield curve compared with a bank with a maturity gap at the sample average. Indeed, banks engaging in maturity transformation benefit more from a steepening of the yield curve which, by raising long-term yields more than short-term yields, induces a greater increase in interest-earning assets than interest-bearing liabilities for these banks.

The margins of cooperative and savings banks gain more from a steepening of the yield curve than significant institutions' margins. As cooperative and savings banks engage more in maturity transformation than significant institutions (**Chart A.2**, panels b and c), the NIMs of these banks benefit more from a steepening of the yield curve (**Chart A.6**, panel b). More specifically, the NIMs of savings and cooperative banks increase by 6.9 basis points more than the NIMs of significant institutions in response to a 1 percentage point increase in the slope of the yield curve. The effect of an increase in the short-term rate is not found to be significantly different for the various types of banks.

Conclusions

The extent to which bank margins benefit from higher interest rates depends on the maturity mismatch between their assets and their liabilities. The maturity gap, a measure of maturity mismatch, started to decline at the end of 2021. The maturity gap differs across euro area countries and bank types, depending on country-level interest rate fixation conventions and bank business model characteristics. Cooperative and savings banks appear to have a larger maturity gap than significant institutions owing to their more diversified business models.

Banks with longer asset duration managed to sustain margins better during the period of ultra-low interest rates but may experience only a delayed positive impact from higher rates. Euro area banks' NIMs were compressed for several years during the period of ultra-low interest rates when banks sustained their profitability by extending loans with longer maturities and collecting the term premium. Customers, for their part, took the opportunity to lock in historically low interest rates over an extended period. However, the loans granted at that time with long interest rate fixation periods offer limited potential for benefiting from higher rates, as such assets are repriced at a slower pace. At the same time, higher interest rates make the funding of legacy long-term, fixed-rate assets increasingly

¹²⁰ On average, the maturity gap in the sample is 40 months while the standard deviation is 31 months.

challenging. As such, while rising interest rates impact banks' margins positively overall, the profitability of significant institutions, which are characterised by a higher share of variable-rate lending, has benefited more from the recent fast increase in interest rates.

Banks have started to adjust their balance sheets and hedging practices as expectations of monetary policy tightening begin to materialise. With the start of monetary policy normalisation, banks have in aggregate increased their reliance on interest rate derivatives. Less sophisticated banks, such as cooperative and savings banks, have larger maturity gaps but do not use interest rate derivatives as much as their larger peers do. Significant institutions are more varied in their interest rate derivatives positionings, possibly reflecting more diverse duration gaps, their role as clearing members or market-makers, or speculative behaviour. Significant institutions and savings banks have significantly increased their interest rate derivatives positioning since September 2021. The overall positioning of cooperative banks has remained largely unchanged, but their mix of instruments has shifted towards interest rate derivatives with longer maturities.

Box A

How is the banking sector coping with increased interest rate risk?

Prepared by Marcel Bräutigam, Rasmus Pank Roulund, Gernot Stania, and Nina Stizi

Uncertainty over the future path of interest rates exposes banks to interest rate risk. The usual maturity mismatch between bank assets and liabilities means that banks are exposed to interest rate risk. Banks can mitigate this risk by using interest rate swaps and other interest rate derivatives. As the extent to which banks hedge interest rate risk is a key determinant of the resilience of credit intermediation to shocks in the yield curve, their interest rate risk management matters for financial stability.

This box uses supervisory and market data to examine how effectively banks use interest rate derivatives to mitigate interest rate risk. The impact of changes in the yield curve on the economic capital of a bank can be measured as the change in the bank's economic value of equity (EVE) – defined as the net present value of future expected cash flows. Quarterly supervisory data¹²¹ can be used to infer bank-level sensitivities¹²² of EVE to yield curve shocks. Building an EVE risk distribution at the level of individual banks also requires a probability distribution of future changes to the yield curve. This can be constructed from two types of market data that are available on a daily basis: the EUR yield curve and the corresponding implied swaption volatilities for the different tenors of the curve. After aggregation across banks, the standard deviation of the resulting EVE risk distribution is used as a measure of system-level interest rate risk.

Compared with 2021, the effectiveness with which banks hedge interest rate risk has declined as the risk level has increased. Leveraging a breakdown of the data provided by the ECB's Short Term Exercise (STE) into derivative and non-derivative positions makes it possible to calculate the hypothetical interest rate risk while excluding derivatives and the portion of interest

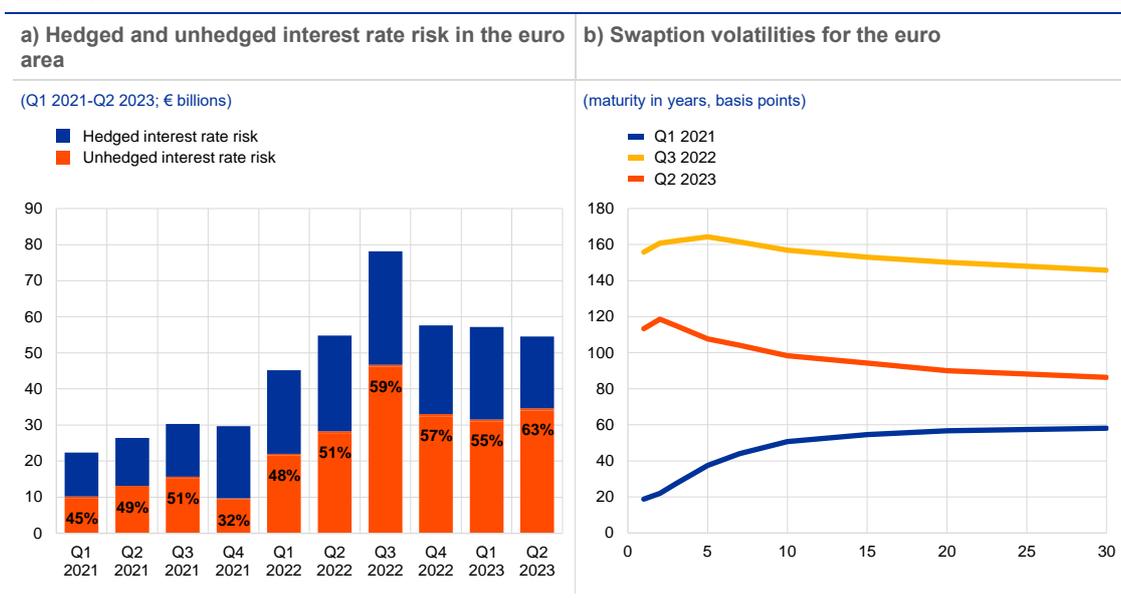
¹²¹ These data are part of the STE conducted by the ECB for the purposes of the Supervisory Review and Evaluation Process (SREP).

¹²² The sensitivity contribution of non-maturity deposits is based on banks' internal models subject to STE reporting instructions.

rate risk hedged by derivatives. Elevated uncertainty regarding the path of interest rates reflected by swaption volatilities, together with longer bank asset maturities, drove the exposure of euro area banks to interest rate risk to a peak in the third quarter of 2022 (**Chart A**, panel a). Swaption volatilities have increased significantly across all tenors of the yield curve since 2021 (**Chart A**, panel b). At the same time, the duration of banks' non-derivative banking book positions has increased by about 35%. In line with earlier findings, derivatives have a mitigating effect (i.e. the hedged portion is positive).¹²³ However, this mitigating effect has not been sufficient to counterbalance the two drivers of increased interest rate risk (**Chart A**, panel a).

Chart A

Interest rate risk and swaption volatilities have increased markedly since 2021, while banks' hedging effectiveness has declined



Sources: ECB (supervisory data), Bloomberg Finance L.P. and ECB calculations.

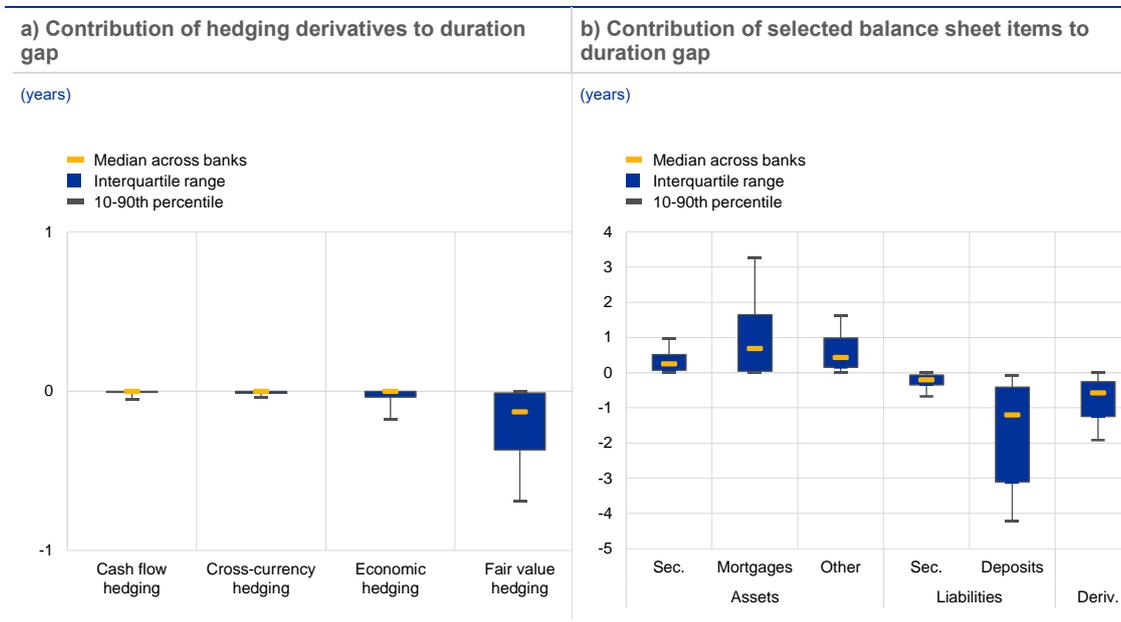
Notes: Panel a: the change in interest rate risk is calculated on the basis of the euro-denominated banking book positions of a panel of 89 banks. Each bank reports a repricing ladder for its assets, liabilities and derivatives. This is a breakdown by the earliest time at which the interest rate of a given position might be reset. Percentages inside bars indicate remaining risk, i.e. the share of interest rate risk not mitigated with interest rate derivatives. Panel b: volatilities implied by prices of swaptions with an expiry in one year for the period 2021-23.

Banks' hedging has served first and foremost to avoid profit and loss swings due to fair value accounting rather than to mitigate interest rate risk in the banking book (IRRBB) more effectively. Under the International Financial Reporting Standards, interest rate changes only have an immediate impact on income or capital for positions carried at fair value. Banks can use fair value hedges to offset corresponding revaluation impacts, which has been the strategy for hedging interest rate risk adopted by euro area banks (**Chart B**, panel a). The banking book consists of positions held at fair value and positions held at amortised cost: the latter include mortgages and contribute more to IRRBB (**Chart B**, panel b), but have generally not been hedged with derivatives (**Chart B**, panel a).

¹²³ See the box entitled "Interest rate risk exposures and hedging of euro area banks' banking books", *Financial Stability Review*, ECB, May 2022.

Chart B

In the euro area, positions carried at amortised cost that contribute more to IRRBB than fair value positions have generally not been hedged with derivatives



Sources: EBA and ECB calculations.

Notes: Panel a: the chart shows the impact of hedging instruments on the overall duration gap. Panel b: the chart shows the impact of selected balance sheet items on the overall duration gap. The impact is determined by excluding the item and comparing it with the full duration gap. The boxes represent the 25-75th interquartile range, the whiskers denote the 10-90th percentile, and the yellow line denotes the median. "Sec." stands for securities; "Deriv." stands for derivatives.

The interest rate risk of euro area banks remains elevated and is only partly hedged. Despite subsiding slightly since its peak in the third quarter of 2022, interest rate risk remains elevated. In addition, less than half of the exposure has been effectively hedged. Adverse changes to the yield curve could therefore reduce the economic capital of the banking sector, particularly if these shocks were to persist.

B Real estate markets in an environment of high financing costs

Prepared by Ellen Ryan, Barbara Jarmulska, Giorgia De Nora, Adele Fontana, Aoife Horan, Jan Hannes Lang, Marco Lo Duca, Claudiu Moldovan and Marek Rusnák

Tighter financing conditions have reduced the affordability of and demand for real estate assets, putting downward pressure on prices. They have also increased the debt service costs faced by existing borrowers, with more-indebted borrowers in countries with widespread variable-rate lending being the most affected. Robust labour markets have thus far supported household balance sheets, thereby mitigating credit risk in banks' relatively large residential real estate exposures. Commercial real estate firms, by contrast, have faced more severe challenges in a context of rising financing costs and declining profitability. While banks have smaller exposures to commercial real estate markets, losses in this segment could act as an amplifying factor in the event of a wider shock.

Introduction

Imbalances in real estate markets can cause financial crises, as has been seen several times in the past. The 2008 global financial crisis is the most prominent example of the financial and macroeconomic instability caused by credit-fuelled real estate boom-bust cycles. The importance of real estate markets for financial stability stems from the strong link between the real estate sector and significant parts of the economy, including the banking sector.¹²⁴

Real estate markets in the euro area have received closer attention due to their dynamism in recent years.¹²⁵ This dynamism has been the result of both cyclical forces and structural changes such as the shift to e-commerce and hybrid working, leading to the accumulation of significant vulnerabilities in euro area real estate markets.¹²⁶ Residential real estate (RRE) and commercial real estate (CRE) entered a downturn in mid-2022, in the case of RRE after a decade-long boom (**Chart B.1**, panel a) and in the case of CRE after a brief post-pandemic recovery (**Chart B.1**, panel b). These developments call for an assessment of the conditions and channels which could lead to risk materialisation and broader financial instability in an environment of high interest rates.

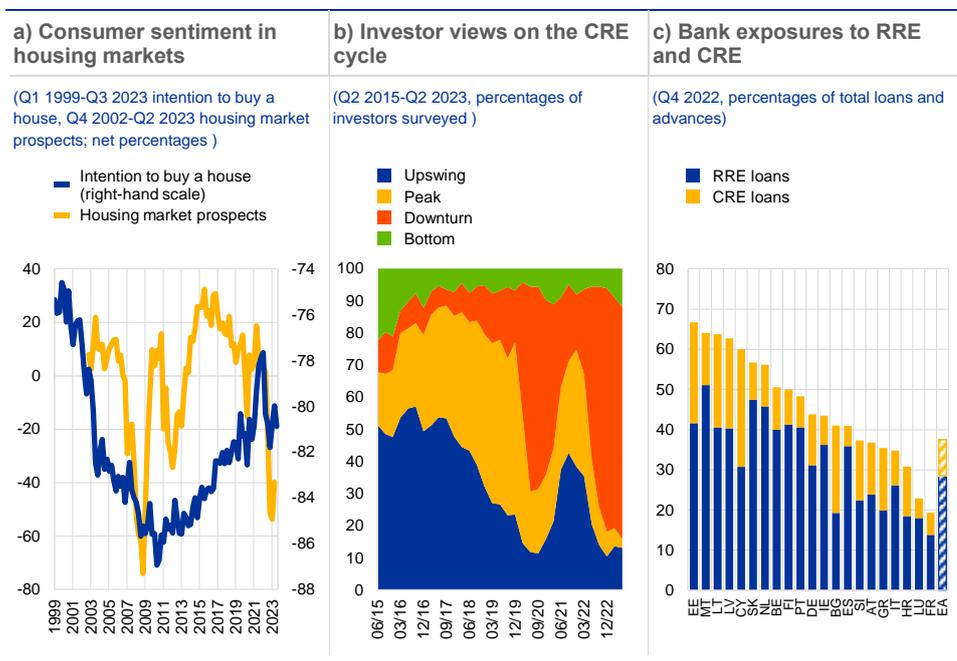
¹²⁴ See the article entitled “[Real estate markets, financial stability and macroprudential policy](#)”, *Macprudential Bulletin*, No 19, ECB, 2022.

¹²⁵ See the section entitled “[Vulnerable real estate markets are turning](#)”, *Financial Stability Review*, ECB, May 2023.

¹²⁶ Those vulnerabilities relate in particular to real estate price overvaluation and accumulated indebtedness collateralised by real estate, or by real estate firms.

Chart B.1

As RRE and CRE markets enter a downturn, losses could materialise in the financial system



Sources: Panel a: ECB (BLS, European Commission). Panel b: RICS, ECB and ECB calculations. Panel c: ECB (supervisory data).
Notes: Panel a: the ECB's bank lending survey (BLS) shows what net percentage of banks report that housing market prospects contribute to an increase (+) or a decrease (-) in mortgage loan demand. A negative reading therefore implies many banks reporting that the current housing market prospects are putting a drag on loan demand. Hence, an indirect connection between the BLS results and housing market prospects can be inferred.

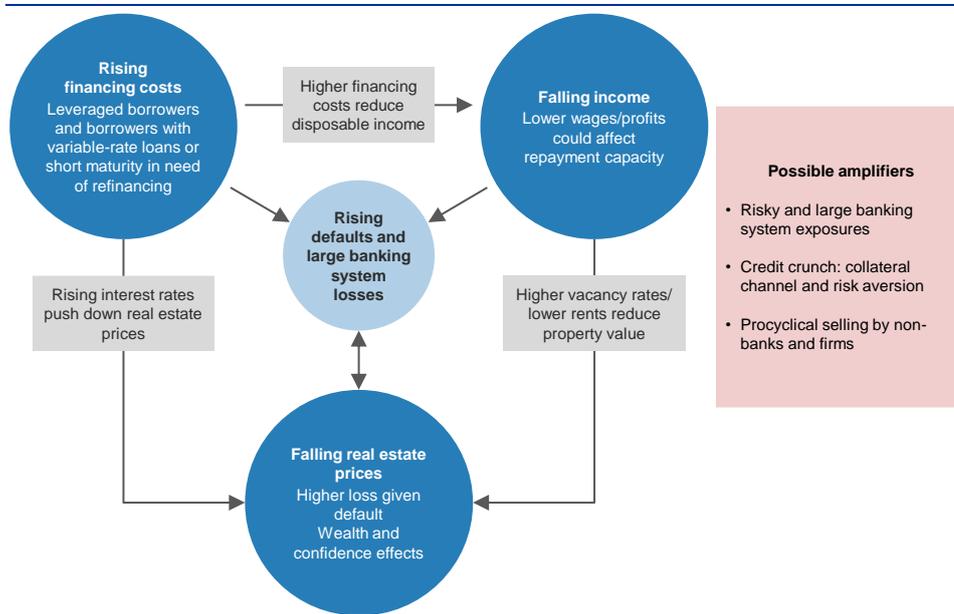
Real estate price corrections and borrowers' impaired debt servicing capacity related to high financing costs could lead to bank losses (Figure B.1).

Rising interest rates reduce the affordability of and demand for real estate assets. This pushes down real estate prices and exposes banks to losses where real estate assets are used as collateral – by increasing banks' losses given default (LGDs).¹²⁷ At the same time, rising interest rates push up financing costs via higher debt service costs, and this increases the probability of default (PD), particularly where borrowers face income challenges. Bank losses can be significant and widespread when LGDs and PDs increase in tandem, which has systemic implications. This special feature discusses first how price and collateral channels affect LGDs and then how the cost of borrowing and income impact PDs.

¹²⁷ Indirectly, a fall in house prices can also have negative implications for household consumption via wealth effects or confidence and can reduce access to credit for firms that use real estate as collateral (see, for example, Horan, A., Jarmulska, B. and Ryan, E., "Asset prices, collateral and bank lending: the case of Covid-19 and real estate", Working Paper Series, No 2823, ECB, 2023).

Figure B.1

A combination of rising financing costs, falling real estate prices and negative income shocks for households and real estate firms could lead to banking sector losses



While the current environment places greater pressure on banks’ CRE exposures, these exposures are less systemically important than their RRE portfolios.

Both CRE and RRE markets are in a downturn and existing borrowers are faced with higher debt service costs amid high interest rates. While mortgage borrowers’ debt servicing capacity is currently supported by robust labour markets, CRE borrowers face declining profitability. This exposes CRE portfolios to a higher likelihood of facing debt servicing challenges. Banks’ RRE exposures are large, with residential mortgages accounting in aggregate for almost 30% of euro area banks’ total loans. By contrast, banks have around 10% of loans exposed to CRE (Chart B.1, panel c).^{128,129} While the relatively limited size of bank CRE portfolios implies that they are unlikely on their own to lead to a systemic crisis, they could play a significant amplifying role in the event of broader market stress.

¹²⁸ This figure uses exposures collateralised by CRE as a simple proxy for banks’ exposures to CRE. In some cases, this approach will also capture loans with a purpose other than CRE, but which use CRE collateral, and may also miss some CRE-purposed loans which use non-CRE collateral. However, this simple approach allows for a clear comparison with RRE portfolios. For more detail on types of exposure to CRE among euro area banks, see the article entitled “Commercial real estate and financial stability – new insights from the euro area credit register”, *Macprudential Bulletin*, No 19, ECB, 2022.

¹²⁹ We examine RRE and CRE markets separately as they have different characteristics, participants and past dynamics. For example, there is a historical tendency for CRE exposures to be substantially riskier than RRE exposures due to their more volatile asset market and typically riskier lending practices. Indeed, CRE lending typically has higher LGDs and PDs than RRE markets. Market participants also differ, with RRE markets typically consisting of (domestic) households and banks while CRE markets include firms and a range of (international) non-banks (see the article entitled “Real estate markets, financial stability and macroprudential policy”, *Macprudential Bulletin*, No 19, ECB, 2022). CRE lending is also often characterised by riskier lending practices than RRE, with wider use of non-recourse lending, bullet lending and complex lending structures.

Sizing up the potential for losses: price and collateral channels

Higher financing costs after a long RRE boom are putting cyclical downward pressure on overvalued house prices.

A standard asset-pricing model can be used to link equilibrium real estate prices to the discounted value of the cash flow that a property could provide if rented out. As the discount factor enters the denominator of the price equation, the relationship between property prices and interest rates is negative.¹³⁰ Following the global financial crisis, accommodative monetary policy and the easing of mortgage conditions by banks, together with a shift in households' preference to hold real estate assets during the pandemic, seem to have been the most important drivers of protracted and robust increases in house prices (**Chart B.2**, panel a). These factors all contributed to increasingly stretched house price valuations in the euro area.¹³¹ By contrast, positive contributions from monetary policy and banks' financing conditions have dissipated since the start of 2022. Tighter financing conditions have resulted in higher debt service costs for borrowers and tighter credit standards on mortgages,¹³² making it more expensive and more difficult for prospective borrowers to obtain financing, which in turn has put downward pressure on house prices. As a reflection of this, the extent of downside risks to RRE prices as measured by the ECB's RRE price-at-risk model has increased abruptly, although it remains at much less severe levels than those seen during the global financial crisis (**Chart B.2**, panel b).

Unlike cyclical developments, structural and supply-related factors continue to support prices in housing markets.

In recent years, housing completions in the euro area have remained below their average level since the start of monetary union,¹³³ indicating a possible accumulated structural gap between housing demand and housing supply.¹³⁴ In addition, rising construction costs due to supply shortages and high input costs are exerting upward pressure on house prices.¹³⁵ These factors are currently mitigating downside risks to house prices. Over the medium term, however, exposure to both physical and transition climate risk could lead to lower

¹³⁰ Indeed, there is a vast empirical literature confirming that higher interest rates tend to put downward pressure on house prices, all else being equal (see Dieckelmann, D., Hempell, H.S., Jarmulska, B., Lang, J.H. and Rusnák, M., “House prices and ultra-low interest rates: exploring the non-linear nexus”, *Working Paper Series*, No 2789, ECB, 2023).

¹³¹ See the section entitled “Vulnerable real estate markets are turning”, *Financial Stability Review*, ECB, May 2023. Euro area house price overvaluation estimate stood at 18% in Q2 2022 and at 9% in Q2 2023.

¹³² See the [Euro area bank lending survey Q3 2023](#), ECB, 2023.

¹³³ For discussions on the supply of housing in the euro area, see the article entitled “The state of the housing market in the euro area”, *Economic Bulletin*, Issue 7, ECB, 2018, and Frayne, C., Szczypińska, A., Vašíček, B. and Zeugner, S., “Housing Market Developments in the Euro Area: Focus on Housing Affordability”, *European Economy Discussion Paper 171*, European Commission, 2022.

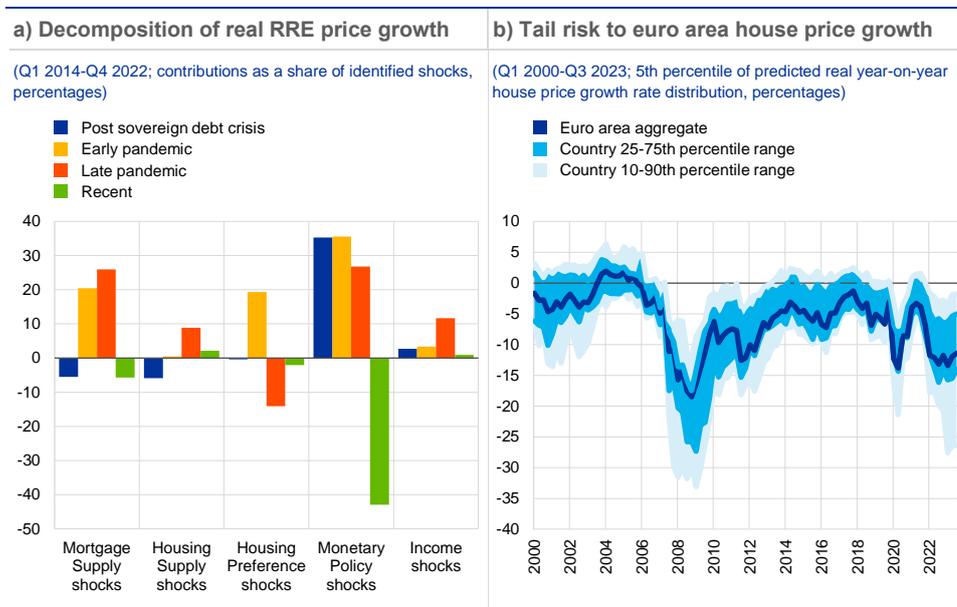
¹³⁴ Demand for housing is determined by many factors, notably including the affordability of housing and the number of households. The total number of households in the European Union rose by 10.3% from 2009 to 2022, increasing demand in the long term. See also Eurostat's [Household composition statistics](#), accessed on 28 September 2023.

¹³⁵ Construction producer prices for new residential buildings increased by 12% in the EU in 2022. See also Eurostat's [Construction producer price and construction cost indices overview](#), accessed on 28 September 2023.

valuations for properties in certain locations and housing units with lower energy efficiency.¹³⁶

Chart B.2

Cyclical factors are putting downward pressure on house prices, while structural and supply-related factors are continuing to support prices, at least in the near term



Sources: ECB and ECB calculations.

Notes: Panel a: results from a vector autoregression model including real RRE prices, real lending for house purchases, the nominal lending rate on new loans for house purchases, the nominal shadow rate, real residential investments, and real disposable income. We use quarterly series for the euro area aggregate covering the period from Q1 2000 to Q4 2022. The fundamental drivers (structural shocks) are identified using a combination of zero and sign restrictions, with restrictions being based on relevant empirical literature.* "Post sovereign debt crisis" refers to Q1 2014-Q4 2019; "Early pandemic" refers to Q1-Q4 2020; "Late pandemic" refers to Q1 2021-Q1 2022; "Recent" refers to Q1 2022-Q1 2023. Panel b: results from an RRE price-at-risk model based on a panel quantile regression on a sample of 19 euro area countries. The RRE price-at-risk is defined as the 5th percentile of the predicted RRE price growth; this provides an indication of how severe an RRE price decline could be in extreme cases. Explanatory variables: lag of real house price growth, overvaluation (average of deviation of house price/income ratio from long-term average and econometric model), systemic risk indicator, consumer confidence indicator, financial market conditions indicator capturing stock price growth and volatility, government bond spread, slope of yield curve, euro area non-financial corporate bond spread, and an interaction between overvaluation and a financial conditions index.

*) Jarociński, M. and Smets, F., "House Prices and the Stance of Monetary Policy", *Review*, Federal Reserve Bank of St. Louis, 2008; Calza, A., Monacelli, T. and Stracca, L., "Housing Finance and Monetary Policy", *Journal of the European Economic Association*, Vol. 11, 2013; and Nocera, A. and Roma, M., "House prices and monetary policy in the euro area: evidence from structural VARs", *Working Paper Series*, No 2073, ECB, 2017.

The post-pandemic recovery in CRE markets reversed sharply as interest rates started to increase (Chart B.1, panel b).

Credit registry data for the euro area indicate that average rates on new loans for the purchase of CRE assets have increased by 2.6 percentage points since interest rates started moving upward.¹³⁷

Rising interest rates and overall uncertainty, combined with the inherent illiquidity of CRE markets, resulted in a sharp 47% drop in the number of transactions conducted

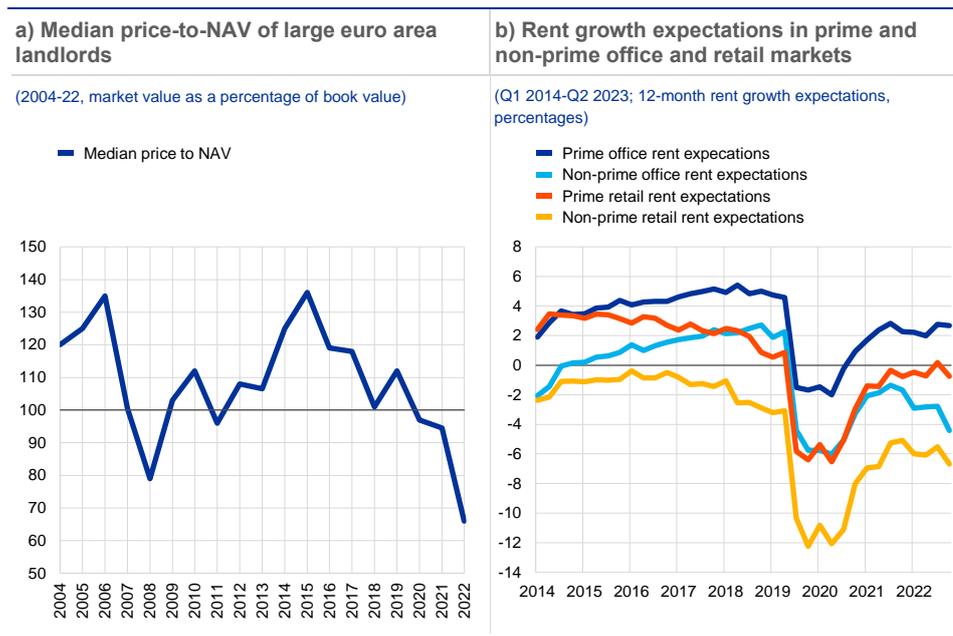
¹³⁶ For the impact of physical risk on house prices, see, for example, Gourevitch, J.D., Kousky, C., Liao, Y., Nolte, C., Pollack, A.B., Porter, J.R. and Weill, J.A., "Unpriced climate risk and the potential consequences of overvaluation in US housing markets", *Nature Climate Change*, Vol. 13, pp. 250-257, 2023, and Benetton, M., Emiliozzi, S., Guglielminetti, E., Loberto M. and Mistretta, A., "Do house prices reflect climate change adaptation? Evidence from the city on the water", *Occasional Papers*, No 735, Banca d'Italia, 2022; for the impact of transition risk on house prices, see Ferentinos, K., Gibberd, A. and Guin, B., "Climate policy and transition risk in the housing market", *Staff Working Papers*, No 918, Bank of England, 2021.

¹³⁷ A comparison of average interest rates on real estate purchase-purposed loans to non-financial corporations from June 2022 to June 2023, weighted by exposure size. These dynamics are largely in line with wider data on new lending to non-financial corporations, which suggests they do not yet include a rising CRE-specific risk-aversion component.

in euro area CRE markets over the first half of 2023 compared with the first half of 2022. This has inhibited price discovery, which is hampering the assessment of actual market dynamics. The performance of real estate firms in equity markets, which are more liquid, suggests substantial price declines, with the euro area's largest listed landlords trading at a discount of over 30% to net asset value (NAV), their largest discount since 2008 (**Chart B.3**, panel a).¹³⁸

Chart B.3

The adverse effects of rising interest rates on CRE valuations are compounded by illiquidity and structural changes resulting in lower demand for certain types of assets



Sources: Panel a: LSEG and ECB calculations. Panel b: RICS and ECB calculations.
Notes: Panel a: calculations are based on a sample of listed euro area CRE companies. The number of firms in the sample increases over time, with 100-150 firms in 2004 rising to 260 firms in 2023. Panel b: based on survey data.

Structural challenges and climate change concerns are aggravating downside risks in certain segments of the CRE market. Cash flow prospects, as illustrated by expected rental growth, in both the office and retail sectors remain substantially below pre-pandemic levels (**Chart B.3**, panel b). This likely reflects the fact that behavioural changes following the pandemic (i.e. hybrid working and increased use of e-commerce) have permanently reduced demand in these segments. Moreover, the difference between prime and non-prime assets in terms of rental growth expectations has also widened in recent quarters, with the outlook for the non-prime market being particularly negative (**Chart B.3**, panel b). For the office segment, this partly reflects demand for higher-quality space as firms downsize their total office usage. However, climate change concerns have also been a major driver of this shift. Market participants are indicating that demand is increasingly concentrated in the market for high-quality buildings with good energy ratings. In addition, lower-

¹³⁸ Limited ability to raise rents has also reduced the capacity of CRE to act as an inflation hedge in the way it might have done in previous inflationary periods, particularly at the levels of inflation experienced since early 2022. Indeed, this dynamic has been reflected in real estate firms' equity valuations, which initially responded well to rising inflation and interest rate expectations but – once the extent of inflationary pressures and the potential interest rate response had become clearer – significantly underperformed wider equity markets.

quality buildings face rising retrofitting costs, which exacerbate downward pressure on prices. Thus, while the price outlook for the market as a whole is negative, outcomes may be particularly severe in non-prime markets.

Debt servicing capacity and scope for borrower distress

Debt servicing capacity – a central factor driving PDs – is determined by a borrower’s leverage, income prospects and exposure to higher interest rates.

Borrowers with variable-rate loans are typically most exposed to rising interest rates as their loans reprice in line with market rates. Among fixed-rate borrowers, short maturity lending that needs to be rolled over and loans with short interest rate fixation periods also create exposure to higher rates. Risks are amplified when borrowers are highly leveraged, which can be measured by metrics such as the loan-to-income (LTI) ratio. Crucially, financial stability may be at risk if and where borrowers’ incomes are not sufficient to meet these higher financing costs, pushing up loan PDs at a time when LGDs are also rising.

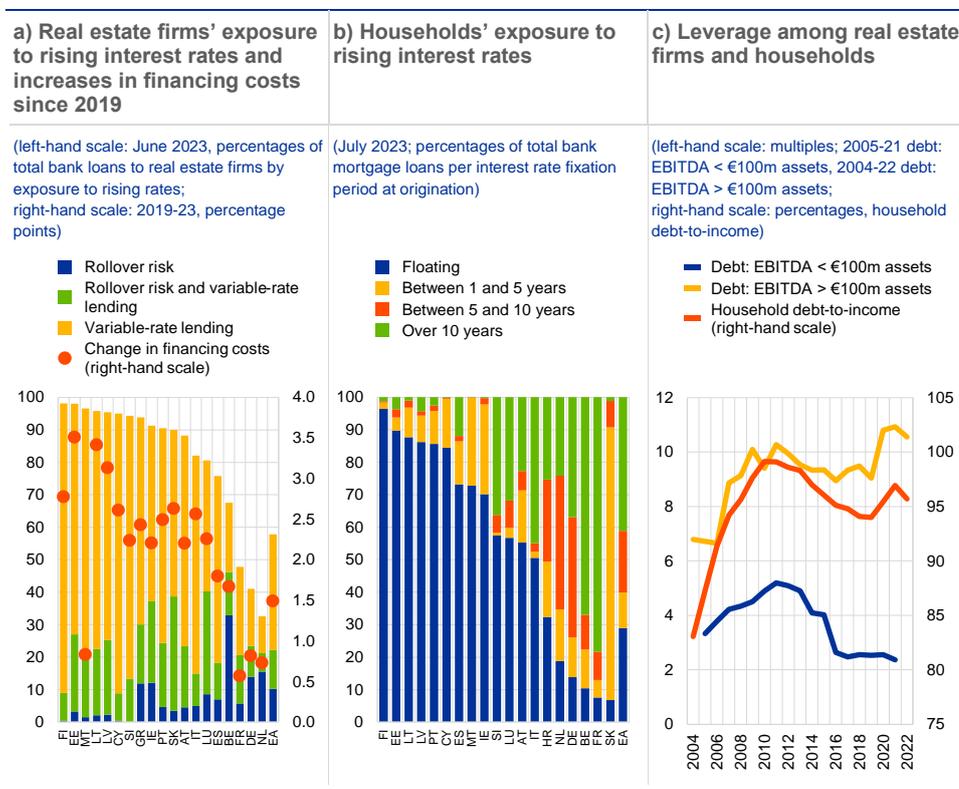
Firms and households in some euro area countries are particularly exposed to rising interest rates, given their extensive use of variable-rate lending.

While the interest rates on new loans have direct implications for real estate prices, it is the cost of servicing the existing stock of loans that affects debt servicing capacity. The use of fixed- and variable-rate lending differs significantly across euro area countries. Fixed-rate lending makes up the bulk of outstanding bank loans in Germany, France and the Netherlands while variable-rate lending dominates in Finland and the Baltic states (**Chart B.4**, panels a and b). This, combined with a varying degree of reliance on short-term loans which need to be rolled over, creates substantial cross-country differences in exposure to rising interest rates. According to credit registry data, the average financing costs on the stock of loans borrowed by real estate firms in Germany and the Netherlands have increased by about 0.75 percentage points since 2019 and in Finland by as much as 2.75 percentage points (**Chart B.4**, panel a).¹³⁹ This implies that in some euro area countries borrowers tend to bear the burden of rising interest rates, while for lenders interest income increases with financing costs when interest rates rise. Of course, from a wider financial stability perspective, the widespread use of fixed-rate lending may entail interest rate risk for the banks, when the interest margin turns negative due to rising interest rates on liabilities.

¹³⁹ While variable-rate lending dominates structurally in some countries, there has been an overall trend towards fixed-rate mortgage lending over the last two decades. This trend has seen the share of new loans with variable rates in the euro area falling from around 50% to around 15% between 2003-05 and 2020-22, leading to a shift of some of the risk of rising interest rates from households to banks. The shares of variable-rate lending increased again since the end of 2022, reaching 20% in September 2023. This might reflect the preference of borrowers not to lock in higher interest rates for a longer period and their expectation that interest rates will, on average, be lower over the entire life of the loan. However, the volume of credit for house purchase has fallen substantially since the interest rate hikes started (see the section entitled “[Vulnerable real estate markets are turning](#)”, *Financial Stability Review*, May 2023), so new lending amounts to a limited share of the stock of mortgage loans on banks’ balance sheets.

Chart B.4

Highly leveraged borrowers with variable-rate lending are most exposed to rising interest rates



Sources: Panel a: ECB (AnaCredit) and ECB calculations. Panel b: ECB and ECB calculations. Panel c: LSEG (firms > €100m assets), BvD Electronic Publishing GmbH – a Moody's Analytics company (firms < €100m assets), Eurostat and ECB (QSA, household debt-to-income) and ECB calculations.

Notes: Panel a: a loan is defined as exposed to rollover risk if it matures within the next two years. Panel b: approximation of information for mortgage stocks using interest rate fixation periods at origination of cumulative mortgage flows since data availability starts or for the period equalling the average mortgage loan maturity when this period is shorter than data availability. Some national authorities have country-specific data on fixation periods of the mortgage stocks, but differences between the national data and the approximation based on flows are not substantial in most cases. Some differences can be seen, however, for Ireland (see Figure 1 in Byrne et al.*), Italy, Slovenia or Luxembourg, for example. Greece excluded due to data quality issues.

*) Byrne, D., McCann, F. and Gaffney, E., "The interest rate exposure of mortgaged Irish households", *Financial Stability Notes*, Vol. 2023, No 2, Central Bank of Ireland, 2023.

The impact of higher interest rates is amplified by leverage, which among households and larger real estate firms is close to or above pre-GFC levels.

The ratio of household debt to income increased between 2020 and 2022 – the late phase of the housing market boom (Chart B.4, panel c).¹⁴⁰ A similar pattern is visible for the debt/earnings ratio of large real estate firms. This metric may deteriorate further as these firms' earnings decline and CRE prices are revalued downwards. Indeed, the first signs of such a dynamic are already visible for the largest firms' debt/earnings ratios at the end of the review period. This could pose a challenge for highly leveraged firms that need to roll over existing debt and that face notably higher financing costs or even reduced access to credit. Indeed, between February 2022 and March 2023, Moody's Analytics carried out negative ratings actions on 40% of European real estate firms and cited deteriorating debt/asset

¹⁴⁰ For a discussion on lending standards for new lending, where loan-to-income ratios have been also increasing until 2022, see the article entitled "Evolution of mortgage lending standards at the turn of the housing market cycle", *Macprudential Bulletin*, No 22, ECB, 2023.

ratios – an alternative leverage measure – in 70% of these.^{141,142} Where this dynamic requires firms to collectively deleverage, it could create a negative feedback loop between access to financing and CRE prices.

For households, while rising debt service costs may challenge debt servicing capacity, strong labour markets are mitigating default risk on mortgages.

A microsimulation analysis assessing debt servicing capacity indicates that rising interest rates have pushed loan service-to-income (LSTI) ratios on variable-rate loans up by 8.0 percentage points on average since 2021. Half of existing highly leveraged borrowers with long maturity loans at origination could see their LSTI ratios increase by more than 15.0 percentage points, while for 10% of them the increase could exceed 25.7 percentage points (**Chart B.5**, panel a).¹⁴³ In addition to debt service costs, the income of a given borrower is an important determinant of default risk (**Chart B.5**, panel b), implying that a scenario featuring a substantial weakening of the labour market would be a source of concern from a financial stability perspective.^{144,145}

By contrast, real estate firms are vulnerable to losses in the current environment, with consequences for the resilience of banks' loan books.

Loans to landlords account for around two-thirds of banks' exposures to real estate firms, while structurally lower demand for CRE assets reduces landlords' capacity to raise rents. Developers and landlords alike face rising costs from inflationary pressures and capital expenditures associated with higher energy efficiency requirements. Developers are under further pressure from falling sales prices and contracting order books. This implies that profits for real estate firms may in fact fall in the coming years rather than keep pace with rapidly rising financing costs, posing challenges to debt servicing capacity. Indeed, a deterioration in firms' fixed charge ratios was the most commonly cited factor in Moody's recent rating downgrades.¹⁴⁶ As for bank loans to real estate firms, the recent rise in financing costs may cause the share of loans extended to loss-making firms to double to as much as 26%. If tighter financing conditions persisted for two years and firms were required to roll over all maturing loans, this number would increase to 30%. Finally, 53% of loans in the sample would

¹⁴¹ Rating actions included both changes in outlook and changes in ratings. See "Corporate credit quality will deteriorate with rising rates, falling property values", Moody's, 7 February 2023.

¹⁴² For a discussion of collateral and earning constraints in corporate borrowing, see Horan, A., Jarmulska, B. and Ryan, E., "Asset prices, collateral and bank lending: the case of Covid-19 and real estate", *Working Paper Series*, No 2823, ECB, 2023, and Lian, C. and Ma, Y., "Anatomy of Corporate Borrowing Constraints", *The Quarterly Journal of Economics*, Vol. 136, Issue 1, February 2021, pp. 229-291.

¹⁴³ Based on data on securitised mortgage loans for countries where variable-rate lending prevails (Ireland, Spain, Italy and Portugal, available from [European DataWarehouse \(EDW\)](#)). In the microsimulation, highly leveraged borrowers are those with an LTI exceeding seven while "long maturity" means longer than 30 years. Overall, around 30% of loans in the euro area are granted at variable rates (**Chart B.4**, panel b).

¹⁴⁴ The euro area unemployment rate stood at a historical low of 6.4% in August 2023 and is projected to increase to 6.7% in 2024. For more details, see the [ECB staff macroeconomic projections for the euro area, September 2023](#).

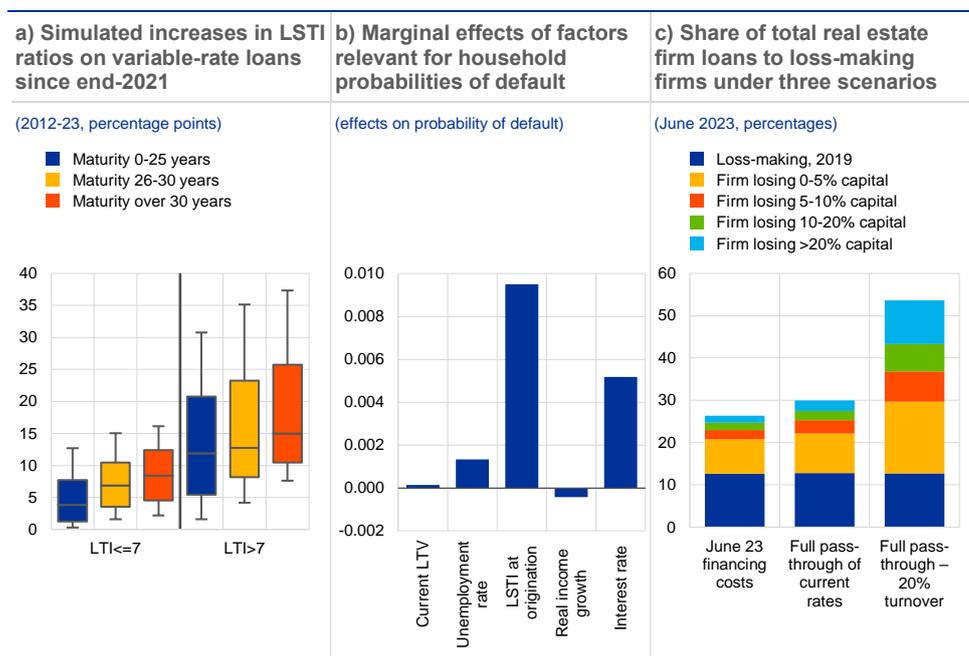
¹⁴⁵ Household default risk may also be mitigated in some countries by support measures for household borrowers that are already in place or being designed. Whether or not a borrower defaults will also depend on accumulated savings. Even in the absence of defaults, however, higher debt service ratios caused by higher interest rates could have significant negative macroeconomic implications due to decreased consumption.

¹⁴⁶ See "Real estate – Europe: Corporate credit quality will deteriorate with rising rates, falling property values", Moody's, 7 February 2023.

be to loss-making firms if firms simultaneously experienced a 20% drop in turnover. In some cases, losses are substantial – for 17% of loans, annual losses exceed 10% of the firm’s total capital (Chart B.5, panel c).¹⁴⁷ These results suggest there are substantial vulnerabilities in this loan book, particularly when considering that it is expected that both higher financing costs and reduced profitability will persist for a number of years. Indeed, business models established on the basis of pre-pandemic profitability and low-for-long interest rates may become unviable over the medium term.

Chart B.5

Higher debt service costs may have credit risk implications for variable-rate loans and for real estate firms with weak profitability



Sources: Panels a and b: EDW and ECB calculations. Panel c: BvD Electronic Publishing GmbH – a Moody’s Analytics company, ECB (AnaCredit) and ECB calculations.

Notes: Panels a and b: only variable-rate loans are shown in countries available in EDW (Ireland, Spain, Italy and Portugal). Panel a: loans originated in 2012-21; loans expiring before 2023 dropped. The chart shows simulated increases in LSTI ratios between 2021 and 2023. LSTI ratios in 2023 are calculated on the basis of the household cost of borrowing (MIR) in August 2023 plus 25 basis points interest rate hike in September. Boxes based on 10th, 50th and 90th percentiles, whiskers on 1st and 99th percentiles. The total is weighted by GDP. Further details on the methodology underlying this analysis can be found in the article entitled “Gauging the sensitivity of loan-service-to-income (LSTI) ratios to increases in interest rates”, *Macprudential Bulletin*, Issue 19, ECB, October 2022. Panel b: the chart shows average marginal effects of relevant right-hand-side variables included in the logistic regression of one-year-ahead probabilities of default of mortgage loans. Further details can be found in the article entitled “The analytical toolkit for the assessment of residential real estate vulnerabilities”, *Macprudential Bulletin*, Issue 19, ECB, October 2022. Panel c: based on a sample of 115,000 firms for which profitability data are available in the BvD dataset, accounting for approximately 25% of loans in AnaCredit to real estate firms. Firms’ losses categorised by size relative to firm capital. Sample coverage across countries varies, with countries where variable-rate lending is prevalent generally having higher coverage than those which typically use fixed-rate lending. Firm profitability, including the estimated impact of changes in financing costs, is calculated as 2019 net income (excluding the effects of depreciation/amortisation) – (change in borrower average cost of financing) *total debt. This is normalised by firm capital, which includes all equity and reserves. Under a full pass-through scenario, (1) the further 50 basis points of monetary tightening which has occurred since June 2023 is incorporated in all variable-rate loans; (2) all loans expiring within two years are rolled over at the new rates; and (3) all fixed-rate loans with rate resets scheduled in the next two years are updated to the new rates, where new rates are calculated as original interest rate + change in long-term government bond yields since original loan inception. A 20% decline in turnover is uniformly applied to all firms to account for the various profitability headwinds facing the real estate sector discussed in the main text. AnaCredit data are as at June 2023.

¹⁴⁷ This analysis is based on a sample of 115,000 euro area real estate firms. For further details on the analysis, see the notes to Chart B.5.

Conclusions

While mitigating factors are supporting banks' large mortgage portfolios for now, banks' smaller CRE exposures appear to be more vulnerable. Despite falling real estate prices and rising financing costs in both RRE and CRE markets, robust labour markets are currently helping to mitigate credit risk in mortgage portfolios. However, any substantial weakening of the labour market would pose significant risks to the RRE portfolios. By contrast, the weak profitability outlook is creating greater downside risks in banks' CRE portfolios. Aggregate CRE exposures are substantially smaller than for RRE and are unlikely by themselves to be large enough to cause a systemic crisis at the euro area level. Nevertheless, a scenario where real estate firms suffer very large losses would likely coincide with stress in other sectors. In this way, CRE market outcomes have the potential to significantly amplify an adverse scenario, increasing the likelihood of systemically relevant losses being incurred in the banking system. Moreover, a negative outcome of this type would also drive large losses in other parts of the financial system which are significantly exposed to CRE, such as investment funds and insurers.

Macroprudential policy measures might also help to reinforce resilience, especially for RRE. Almost all euro area countries have implemented macroprudential measures to address RRE vulnerabilities, but policy action targeting CRE has been much more contained. Many countries increased macroprudential capital buffers or implemented borrower-based measures in response to increasing RRE vulnerabilities after the pandemic subsided. By mid-2023, 15 of the 20 euro area countries had put borrower-based measures in place, ten had implemented targeted capital-based measures (sectoral systemic risk buffers or measures to increase risk weights), and several had increased broad countercyclical capital buffers (among others) in response to the high level of accumulated RRE vulnerabilities.¹⁴⁸ By contrast, very few measures in euro area countries target CRE vulnerabilities, as the complexity of CRE markets and the high number of diverse players make a policy response more difficult to design.¹⁴⁹ While the range of tools applicable at the level of banks is, in principle, identical to that of the RRE toolkit, measures available to investment funds or insurance corporations are scarce. In addition, data gaps are more substantial than they are for RRE and hinder risk assessment. All in all, a comprehensive policy response for CRE markets would require multiple measures to be implemented to target all exposed actors and avoid leakages and would need to take particular care to avoid procyclicality. Regardless of whether targeted RRE or CRE measures are in place in each country, however, the internal processes of banks and non-banks should ensure that their provisioning practices and capital properly reflect the level of accumulated vulnerabilities.

¹⁴⁸ See "[Vulnerabilities in the residential real estate sectors of the EEA countries](#)", ESRB, 2022, the [ESRB's overview of national macroprudential measures](#) and the [list of macroprudential measures in euro area countries notified to the ECB](#).

¹⁴⁹ See "[Vulnerabilities in the EEA commercial real estate sector](#)", ESRB, 2023.

Acknowledgements

The Financial Stability Review assesses the sources of risks to and vulnerabilities in the euro area financial system based on regular surveillance activities, analysis and findings from discussions with market participants and academic researchers.

The preparation of the Review was coordinated by the ECB's Directorate General Macroeprudential Policy and Financial Stability. The Review has benefited from input, comments and suggestions from other business areas across the ECB. Comments from members of the ESCB Financial Stability Committee are gratefully acknowledged.

The Review was endorsed by the ECB's Governing Council on 15 November 2023.

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Editorial, multimedia and production assistance was provided by Maria Canelli, Marina Decker, Paula González Escribano, Anna Heckler, Peter Nicholson and Verena Reith.

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PDF ISSN 1830-2025, QB-XU-23-002-EN-N
HTML ISSN 1830-2025, QB-XU-23-002-EN-Q