EUROPEAN CENTRAL BANK

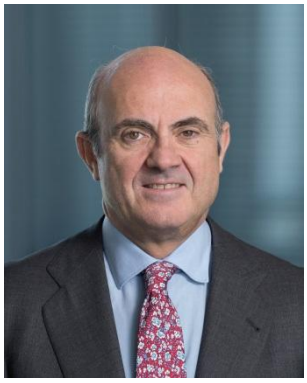
EUROSYSTEM

Financial Stability Review

May 2026

Contents

Foreword



At the turn of the year 2025-26, economic growth surprised on the upside while financial market sentiment remained strong despite high uncertainty. The war in the Middle East is now putting this resilience to the test. The conflict has disrupted the global supply of energy and other commodities, dented growth prospects, pushed energy prices up and, by extension, raised inflation. While the full impact of the war is unclear at this stage, the repercussions for the global economy and financial stability are becoming graver the longer it lasts. Also, cybersecurity risks and hybrid threats to critical infrastructure are rising in this complex geopolitical environment.

Financial market adjustments have been pervasive but, nevertheless, orderly so far. Despite initial declines, financial asset prices still look stretched by historical standards, all the more so when current geoeconomic stress and uncertainty are taken into account. This leaves markets vulnerable to sharp repricing, and non-bank financial institutions could amplify financial market swings if they were to occur. Unforeseen redemptions during drawdowns and margin calls in the context of surging volatility could challenge non-banks in general and open-ended corporate bond funds in particular, given their low liquidity buffers. While not a systemic concern for the euro area, private markets warrant close monitoring in light of the potential for a spillover of stresses from US markets.

On the positive side, euro area banks have benefited from a decade-long improvement in capital and liquidity buffers and, more recently, stronger profitability. That said, several risks lie ahead. While euro area banks have only limited direct exposure to the Middle East, potential second-round effects of the war could be material and affect banks' exposures to energy-intensive and trade-reliant sectors. Cost-of-living pressure could also weaken households and thus the asset quality of consumer credit and mortgage portfolios. Calls to cushion vulnerable households and firms from the fallout from the war, on top of higher spending needs for defence, could strain public finances further in some highly indebted euro area countries.

This edition of the ECB's Financial Stability Review also includes four special features. The first explores financial stability sentiment using advanced AI tools. The second examines the divergence between rising corporate insolvencies and low NPL ratios in the euro area. The third assesses the effects of macroprudential policies on household credit and house prices, and the fourth analyses the implications of stress in global private credit markets for euro area financial stability.

The Financial Stability Review is 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. It is intended to promote 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 vulnerabilities remain elevated as geoeconomic shock unfolds

1 Prolonged geopolitical tensions and lingering fiscal challenges could test financial market sentiment and expose sovereign vulnerabilities

- Further escalating and/or prolonged geopolitical tensions could stress global energy markets, with marked implications for growth, inflation and interest rates.
- Equity and corporate bond market valuations fell after the outbreak of the Middle East war but remain high by historical standards and at risk of sharp repricing.
- Fiscal capacity to cushion the impact of the war on households' and firms' expenses might be limited by stretched public finances in some countries.
- Fiscal slippage or adverse spillovers from fiscal shocks in other major advanced economies could lead to a global repricing of sovereign risk.
- Investor concerns about AI disruption or disappointment could further strain market segments with exposures to AI-related assets, notably private markets.

2 Vulnerabilities among non-banks, including those active in private markets, could amplify stress in financial markets and increase the risk of cross-sector spillovers

- Investment funds have weathered market turmoil relatively well but may face outflows in a context of heightened geoeconomic uncertainty.
- Further stress in opaque and interconnected private markets may trigger adverse confidence effects and spillovers to public markets.
- High valuations and concentration in financial markets continue to represent vulnerabilities for non-bank portfolios.
- Declining cash holdings and significant liquidity mismatch in some types of open-ended investment funds make funds vulnerable to redemption shocks.
- Pockets of elevated financial and synthetic leverage in some entities, notably hedge funds, may exacerbate the risk of financial contagion.

3 Banking sector resilience has strengthened overall, but credit, liquidity and funding vulnerabilities might unravel given exposure to non-banks and energy and trade-sensitive corporates

- The ability of euro area banks to absorb future shocks is supported by robust earnings momentum and ample capital and liquidity buffers.
- Rising financial sector linkages could cause stress in the non-bank financial intermediation sector to spill over to euro area banks, especially via funding.
- While euro area banks' direct Middle East exposure is limited, second-round effects could be material as the shock propagates through the real economy.
- Banks with high exposure to trade, energy and interest rate-sensitive industries could face worsening asset quality in the event of prolonged geoeconomic stress.
- A cost-of-living shock, weaker than expected growth outturns and deteriorating labour market conditions could erode some households' debt servicing capacity.

Other cross-cutting and structural risks

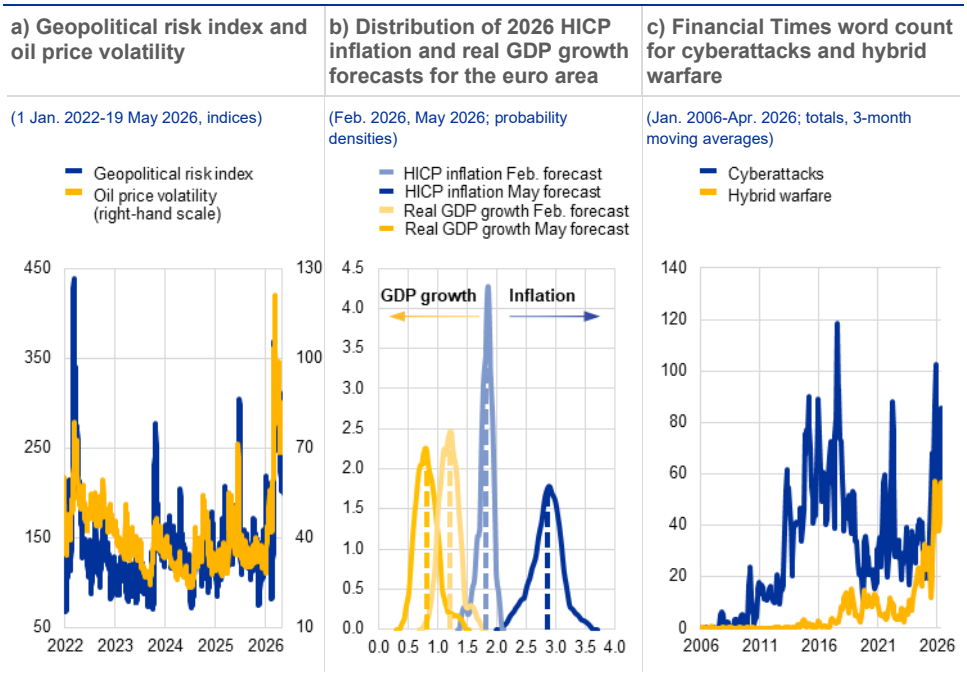
- Cybersecurity weaknesses and hybrid threats against critical infrastructure in an increasingly complex geopolitical landscape
- The rise of artificial intelligence, especially newly emerging frontier models, and quantum computing, which provide both opportunities and risks of destabilisation along the innovation path
- Risks stemming from global regulatory fragmentation and deregulation
- Risks associated with ageing populations
- Climate-related risks on the way to a low-carbon economy

Euro area financial stability outlook challenged by the materialisation of acute geopolitical risks

The unexpected outbreak of war in the Middle East has unleashed an adverse supply shock, with highly uncertain outcomes in the medium term. The global financial system and real economy had been remarkably resilient going into 2026, despite a series of uncertainty shocks. These included questions over Greenland's sovereignty, the US military intervention in Venezuela, market concerns over central bank independence and renewed trade policy uncertainty after the Supreme Court's decision to overturn US "reciprocal" tariffs. This resilience is now being tested by a major geoeconomic shock triggered by the war in the Middle East. Disruptions to shipping through the Strait of Hormuz and attacks on energy infrastructure have led to significant volatility in global oil markets (**Chart 1**, panel a), higher oil and gas prices, as well as some relatively orderly adjustments, given the size of the shock, in financial markets. This supply shock poses upside risks to inflation and downside risks to economic growth. It could also increase market volatility and challenge debt servicing capacities as financing costs rise. Survey-based consensus forecasts project a material near-term impact on inflation (**Chart 1**, panel b), driven by higher energy prices. While growth is also expected to slow, the medium-term implications remain contingent on both the intensity and duration of the shock.

Chart 1

The war in the Middle East sparked a surge in energy prices and upside risks to inflation, while heightening cyber threats and infrastructure risks



Sources: Caldara and Iacoviello*, Bloomberg Finance L.P., Consensus Economics Inc., Financial Times and ECB calculations.
Notes: Panel a: the geopolitical risk index is a seven-day moving average, while oil price volatility reflects the CBOE Crude Oil Volatility Index. Panel b: the dashed lines represent values for average HICP and real GDP growth forecasts. HICP stands for Harmonised Index of Consumer Prices. Panel c: articles were retrieved from the Financial Times archive through a keyword search referring to multiple keywords capturing cyberattacks and hybrid warfare respectively. Results based on ECB calculations based on textual analysis of Financial Times journalism.
*) Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225.

Acute geoeconomic stress is being amplified by lingering uncertainty about global trade, international cooperation and cyber threats. While the war in the Middle East is the central theme shaping market sentiment, trade policy uncertainty persists and renewed spikes cannot be ruled out. Tariff announcements, pauses and reversals have become a structural feature of the global environment. Uncertainty surrounding the commitment of the US Administration to multilateral cooperation is also increasing the risk that policy shocks will disrupt the international order and spur geoeconomic and regulatory fragmentation around the globe. In addition, hybrid threats are adding to the risks facing the operating environment (**Chart 1**, panel c), especially if targeted at critical infrastructure. In fact, the possibility that cyberattacks will cause severe and widespread disruption is growing rapidly, as AI – especially newly emerging frontier models – enhances both the potential scope for, and the speed of, attacks staged by state and non-state actors alike. In an already highly complex geopolitical landscape, these additional layers of uncertainty increase the likelihood of more frequent and severe adverse tail events.

In this context, the euro area financial stability outlook is shaped by three closely intertwined risks. First, a further escalation in and/or more prolonged geopolitical tensions, along with growing concerns about the sustainability of public finances, could undermine financial market sentiment, potentially triggering an abrupt market sell-off and exposing sovereign vulnerabilities. Second, liquidity and leverage vulnerabilities in the non-bank financial intermediation (NBFI) sector, including opaque and interconnected private markets, could amplify any market stress through fire sales, increasing the risk of spillovers to other financial and economic sectors. Third, although euro area banks have been resilient to recent shocks, exposures to the NBFI sector, together with the effects of geopolitical tensions on the debt servicing capacity of borrowers, could expose credit, liquidity and funding vulnerabilities. The current highly uncertain geoeconomic environment is proving to be more prolonged than initially anticipated. In this context, the potential for these highly interconnected risks to materialise simultaneously, possibly amplifying each other further, increases the risks to financial stability.

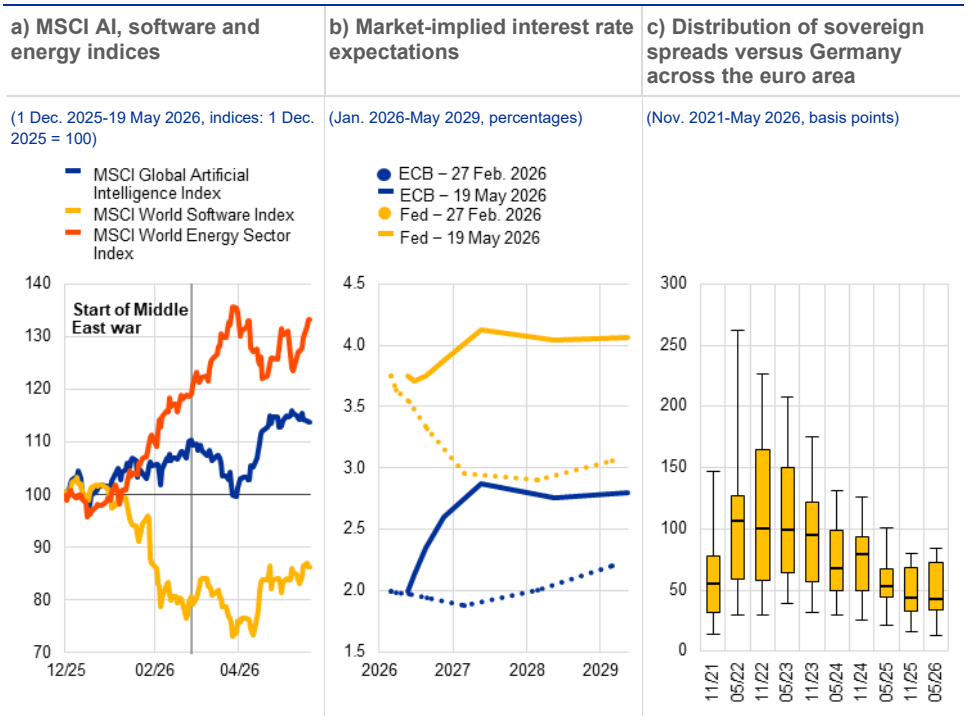
Prolonged geopolitical tensions and lingering fiscal challenges could test financial market sentiment

Markets are adjusting to geopolitical conflicts and energy supply disruptions, as well as lingering concerns about AI disruption risk. Financial market trends have been shaped by two key forces since the previous edition of the Financial Stability Review was published. First, market concerns about potential AI disruption, where industrial transformation driven by AI could render existing business models and jobs obsolete, triggered sharp declines in some large technology firms' stock prices and weakness in software-related stocks in early 2026. This had knock-on effects for private markets, indicating signs of growing differentiation within AI-exposed assets (**Chart 2**, panel a). Second, the war in the Middle East has disrupted global energy supply, which has led to sharp increases in oil and gas prices as well as adjustments in equity markets, disproportionately affecting countries dependent

on energy imports. Credit spreads have seen a short-lived widening, and volatility has risen across most asset classes, especially commodities, while market-implied policy rate expectations have shifted up considerably (**Chart 2**, panel b). Nevertheless, overall market functioning has remained orderly, with broader optimism about AI-driven productivity gains supporting risk sentiment and investors pricing in a short-lived war in the Middle East. A sustained rise in energy prices might also weigh on the optimistic AI narrative, as AI infrastructure and data centres are highly energy-intensive and sensitive to persistent energy cost shocks.

Chart 2

Market sentiment has grown more volatile, with the focus shifting from AI disruption risk to energy pricing, monetary policy expectations and sovereign vulnerabilities



Sources: Bloomberg Finance L.P., LSEG and ECB calculations.
Notes: Panel c: spreads are based on daily data corresponding to Financial Stability Review publication dates. The latest observation is for 19 May 2026.

Financial markets remain vulnerable to sharp adjustments, owing to persistently high valuations and concentrated exposures. Following the initial repricing, equity and corporate bond markets mostly rebounded on account of strong earnings reports in the United States and market expectations for further positive news regarding geopolitical developments. Accordingly, equity valuations remain stretched by historical standards, and corporate bond risk premia are compressed globally, which could be challenged by the very high level of geopolitical and policy uncertainty. Consequently, there is a fair risk that financial market sentiment could deteriorate, as downside risks related to geopolitical, fiscal and macro-financial developments appear underestimated. Negative surprises – including sharply deteriorating outlooks for energy markets, inflation and growth, a re-escalation of trade tensions, sudden shifts in monetary policy expectations or intensifying market concerns about AI disruption risk – could trigger abrupt sentiment shifts, with

spillovers across asset classes and regions. At the same time, market concentration among, and interconnection between, a handful of large US-based tech firms has risen further. This leaves global public equity markets − and increasingly also bond markets and private markets – sensitive to shocks emanating from individual firms, even though most of these firms continued meeting or surpassing earnings expectations.

Sovereign bond markets are a central transmission channel through which adverse shocks spill over globally, including to the euro area bond markets. Euro area sovereign bond markets face pressures from rising yields, a changing investor base and external fiscal risk spillovers. Sovereign yields have increased markedly across major advanced economies on account of higher term premia and renewed inflation concerns, resulting in higher sovereign debt service costs. Nonetheless, euro area sovereign bond markets have continued to function in an orderly manner. Spreads continue to be narrow, despite some early signs of divergence following the outbreak of the war in the Middle East (**Chart 2**, panel c). Changes in the demand from institutional investors for longer-dated debt, including in the context of the recent Dutch pension reform, have made issuance of shorter-dated securities more attractive while simultaneously increasing rollover risk (see **Section 1.2**). Also, the growing presence of more price-sensitive investors like hedge funds in euro area sovereign bond markets could amplify any abrupt repricing of sovereign risk. This could also raise the risk of spillovers to the funding costs of corporates and banks. A repricing of euro area sovereign risk could also be triggered by spillovers from global sovereign bond markets. US Treasuries have served as safe-haven assets since the outbreak of the war in the Middle East . Nonetheless, market concerns about US fiscal credibility as a result of persistently high fiscal deficits, expectations of higher debt service costs and high borrowing needs could lead to changing risk perceptions and a repricing of sovereign risk globally.

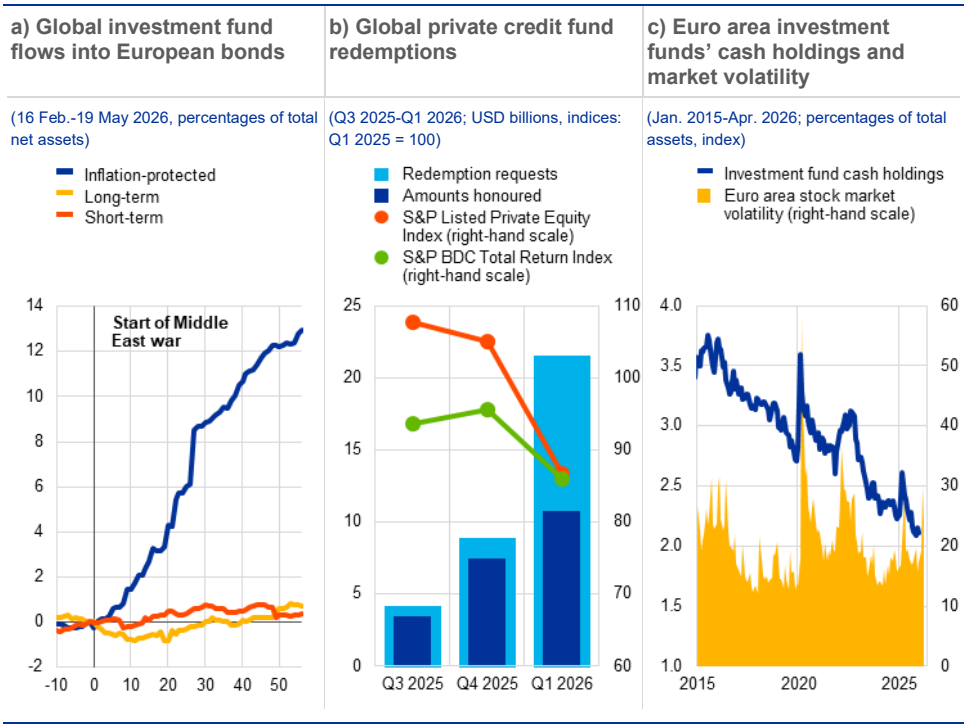
Fiscal expansion in a challenging geoeconomic environment, including the urgent need to expand defence spending, could strain public finances further. Fiscal fundamentals remain fragile in several euro area countries owing to long-term structural challenges related to digitalisation, low productivity growth, population ageing and climate change which add to existing imbalances. Additionally, higher energy prices in the context of the current geopolitical environment could multiply the broader calls for fiscal support measures aimed at cushioning the impact on vulnerable households and firms. This would come on top of the higher defence spending required to meet the recently revised NATO target. Persistently high deficits and debt levels limit the scarce fiscal space available to several euro area countries to respond effectively. Fiscal responses to the energy price shock, such as energy subsidies and price caps, have been relatively limited so far. Looking forward, any fiscal support needs to be temporary and targeted to avoid fuelling sustained inflationary pressures and further straining public finances. A more persistent disruption of energy supply and notably weaker growth could trigger a reassessment of sovereign risk by market participants.

Vulnerabilities among non-banks, including those active in private markets, could amplify financial market stress

Non-banks have proved largely resilient to the war in the Middle East but face risks from broad-based market downturns. The outbreak of conflict triggered flight-to-safety flows, with insurance corporations, pension funds and investment funds all reducing holdings in equities and bonds exposed to higher credit risk. Outflows from high-yield corporate bond funds were particularly strong (see **Section 4.2**), while fears of rising inflation led to a shift in fund flows from long-term bond funds into short-term and inflation-protected funds (**Chart 3**, panel a). Non-banks have to date navigated volatile market conditions without significant disruptions. However, additional outflows are likely if the macro-financial impact of the conflict proves to be more severe than currently anticipated by market participants. In this highly uncertain environment, sudden and correlated price drops in financial markets and spikes in volatility – potentially leading to margin calls – could quickly trigger liquidity stress.

Chart 3

Non-banks have proved resilient to the war in the Middle East, while private market risks add to their liquidity and leverage vulnerabilities



Sources: EPFR Global, company SEC filings, LSEG, ECB (BSI, IVF), Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: "Start of Middle East war" refers to 2 March 2026, the first trading day after the outbreak of the war in the Middle East on 28 February 2026. 0 on the x-axis marks the event date and other values indicate the business days before and after the event. Panel b: "Amounts honoured" and "Redemption requests" include data for a total of 26 non-traded business development companies (BDCs) that reported redemptions in the periods shown. Both indices are rebased to Q1 2025 = 100. Quarterly values correspond to the final business-day observation for each quarter. Panel c: "Euro area stock market volatility" refers to the EURO STOXX 50 Volatility Index (VSTOXX). The investment fund cash holdings series is available up to February 2026.

High portfolio valuations and concentrated exposures on non-banks' balance sheets increase the risk of forced asset sales that could amplify market stress. Despite adjustments in bond and equity markets following the outbreak of the war in

the Middle East, portfolio valuations of non-banks remain elevated by historical standards (see **Section 4.1**). Exposures continue to be heavily skewed towards US dollar-denominated assets, making the sector susceptible to US-specific shocks and exchange rate fluctuations. Vulnerabilities are being further compounded by the concentration of equity portfolios among a few large US issuers, especially AI-related firms, for which valuations are closely tied to the continuation of a positive AI narrative. Sudden valuation losses could trigger spikes in liquidity needs and increase the risk of forced asset sales that amplify market stress.

While not a systemic concern per se in the euro area, opaque and interconnected private markets warrant close monitoring owing to spillover risks, especially from the United States. Given their complex leverage structures, opaque valuation practices and limited liquidity, private markets are prone to unforeseen and potentially abrupt valuation changes. Events in the United States since the start of 2026 have highlighted the associated risks, with open or semi-open private credit funds − such as business development companies heavily exposed to software and AI − facing sizeable redemption requests, often testing redemption gates to their limits (**Chart 3**, panel b). Private credit markets in the euro area remain relatively small despite their rapid growth in recent years. That said, the risks stemming from spillovers from the United States are significant (see **Special Feature D**). Direct spillovers, which are expected to be limited, could arise from euro area investors' exposures to US private debt, potentially leading to losses and increased funding needs. More importantly, shifts in sentiment towards US private markets could indirectly affect euro area private markets regardless of underlying exposures. In this case, broader spillovers potentially could also affect some public markets, such as high-yield bonds (see **Section 2.2**). Growing ties between private markets and non-banks could amplify risks, with insurance corporations and pension funds being important investors in private markets in the euro area.

More broadly, structural liquidity and leverage vulnerabilities in the investment fund sector remain significant in this highly uncertain geopolitical environment. Inadequate liquidity buffers in times of heightened volatility (**Chart 3**, panel c) and liquidity mismatch in open-ended investment funds, especially in corporate bond and private credit funds, could exacerbate market volatility in times of stress through procyclical selling. Pockets of elevated financial and synthetic leverage in some entities, notably global hedge funds, may exacerbate the risk of financial contagion and expose liquidity vulnerabilities through margin calls when market volatility spikes. Although hedge funds remain a comparatively small subsector of euro area investment funds, it is a segment with a high concentration of potential leverage-related risks. Additionally, global hedge funds are highly active in European sovereign bond markets and could amplify price swings in times of sudden and substantial bond price movements.

Persistent liquidity and leverage vulnerabilities in the non-bank financial intermediation (NBFI) sector call for a comprehensive policy response. Recent stress episodes underscore the need to broaden monitoring and strengthen the policy framework for non-banks globally. Progress will depend on improved data availability and cross-border information-sharing, the timely implementation of

internationally agreed reforms and the development of a more comprehensive toolkit for addressing risks from NBFI leverage that combines entity and activity-based measures. Data gaps are particularly acute in private markets, where concerns about opaque exposures and weak lending standards have intensified. At the EU level, stronger supervisory coordination, enhanced macroprudential powers to address risks related to liquidity mismatch and leverage, and system-wide stress testing would help reinforce resilience. In addition, accelerating progress on the savings and investments union – by deepening equity markets, mobilising savings and strengthening integrated supervision – will be essential to support growth and competitiveness while safeguarding financial stability.

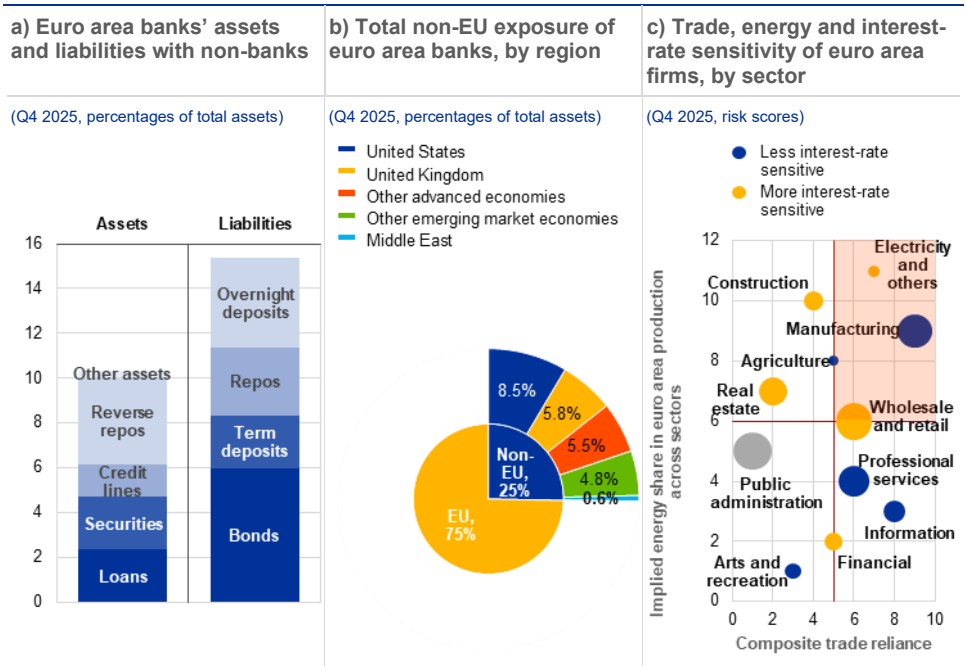
Banks' exposures to non-banks and vulnerable firms could expose credit, liquidity and funding vulnerabilities

Euro area banks have navigated recent bouts of uncertainty well, buoyed by strong profitability and ample capital and liquidity buffers. Their earnings have been consistently robust, with return on equity levels averaging close to 10% in 2025 albeit with persistent cross-country variation (see **Section 3.1**). Banks' resilience has also been underpinned by capital and liquidity ratios well above regulatory requirements. Sound fundamentals and expectations of higher dividends supported a substantial increase in banks' price-to-book valuations that started in early 2025 (see **Box 3**). However, rising concerns about their exposure to private markets and the potential of AI to disrupt their business models triggered a decline in bank stock valuations in early 2026 that continued after the war broke out in the Middle East. At the same time, bank bond yields have risen on the back of higher risk-free rates, although spreads have remained tight. These developments indicate that investors are adjusting for increased risks to bank earnings while not doubting the overall solvency of the sector.

Links with the NBFI sector expose euro area banks to credit, liquidity and funding vulnerabilities and could amplify market stress. In aggregate, euro area banks are net debtors to the NBFI sector, implying that bank-NBFI linkages could result in liquidity and funding vulnerabilities for banks (**Chart 4**, panel a). A significant portion of NBFI funding is tied to short-term maturities, exposing banks to rollover and redemption risks. Asset price shocks and liquidity shocks to non-banks could result in liquidity withdrawals from euro area banks. In response, banks may reduce lending to non-banks such as hedge funds, which would force these entities to liquidate trading positions. Even if bank exposures are collateralised and repo borrowing and lending positions are broadly balanced, losses could arise if non-banks are forced to deleverage into declining markets, triggering adverse price dynamics that also erode collateral values. In addition, euro area banks are exposed to private markets through direct lending to private market funds and lending to private market-backed firms. While direct lending is marginal, the opacity of financing structures of such investments, which often involve multiple layers of leverage, makes it difficult to assess the true level of risk for euro area banks.

Chart 4

Euro area banks have limited direct links to the Middle East but face credit, liquidity and funding risks from exposures to non-banks and trade- and energy-sensitive firms



Sources: ECB (supervisory data), Eurostat and ECB (MNA), OECD, S&P Global Market Intelligence and ECB calculations.
Notes: Panel a: banks' asset exposures to and funding from non-banks are ordered by their liquidity profile. Panel b: regional classification based on IMF world economic outlook groups, excluding all EU Member States. Panel c: economic sectors are ranked using the composite of the foreign market and foreign input reliance metric (see Avril et al.*) as well as the sectors' energy output multipliers. Total energy output multipliers are the sum of direct and indirect cost shares calculated using the FIGARO symmetric input-output table for 2022. Results are broadly aggregated at NACE level 1 categories based on production weights. High values indicate a high reliance on either foreign markets or foreign inputs. The size of the bubbles indicates the share of gross value added in Q4 2025. Less interest rate-sensitive sectors are defined as economic sectors with an interest coverage ratio (ICR) below the median, where ICR is defined as earnings before interest and taxes (EBIT) divided by interest paid. Interest paid and EBIT are taken from Capital IQ for the period between Q1 2016 and Q2 2025. No information is available for the public administration sector. The red horizontal and vertical lines represent the median values across euro area sectors.
*) Avril, P. et al., "Risks to euro area financial stability from trade tensions", *Financial Stability Review*, ECB, May 2025.

Euro area banks' asset quality may deteriorate if macro-financial conditions worsen markedly as a result of the war in the Middle East. Euro area banks' non-performing loan ratios remain close to historical lows in aggregate. However, some deterioration is evident in SME and consumer lending, with notable variation across countries (see **Section 3.3**). While corporate insolvencies have risen sharply in recent quarters, there is no evidence of a broad-based underestimation of corporate credit risk by banks (see **Special Feature B**). That said, asset quality risks could increase as the impact of the war in the Middle East unfolds. Banks' direct exposures to the region are small, at around 0.6% of their total assets (**Chart 4**, panel b), and concentrated among a few banks. Nevertheless, a prolonged shock could have material second-round effects, especially for euro area firms operating in sectors that are simultaneously trade, energy and interest rate sensitive, such as manufacturing, wholesale and retail, or electricity (**Chart 4**, panel c). Rising energy prices and higher interest rates would exacerbate cost pressures, as would lingering tariff-related uncertainty and potential supply chain disruptions. Euro area households' resilience could also be tested if stress in vulnerable parts of the corporate sector drives up unemployment. Furthermore, cost-of-living pressures from higher energy prices and inflation may weaken households' debt servicing capacity, especially among lower-income groups. Banks could face higher provisioning costs as a result.

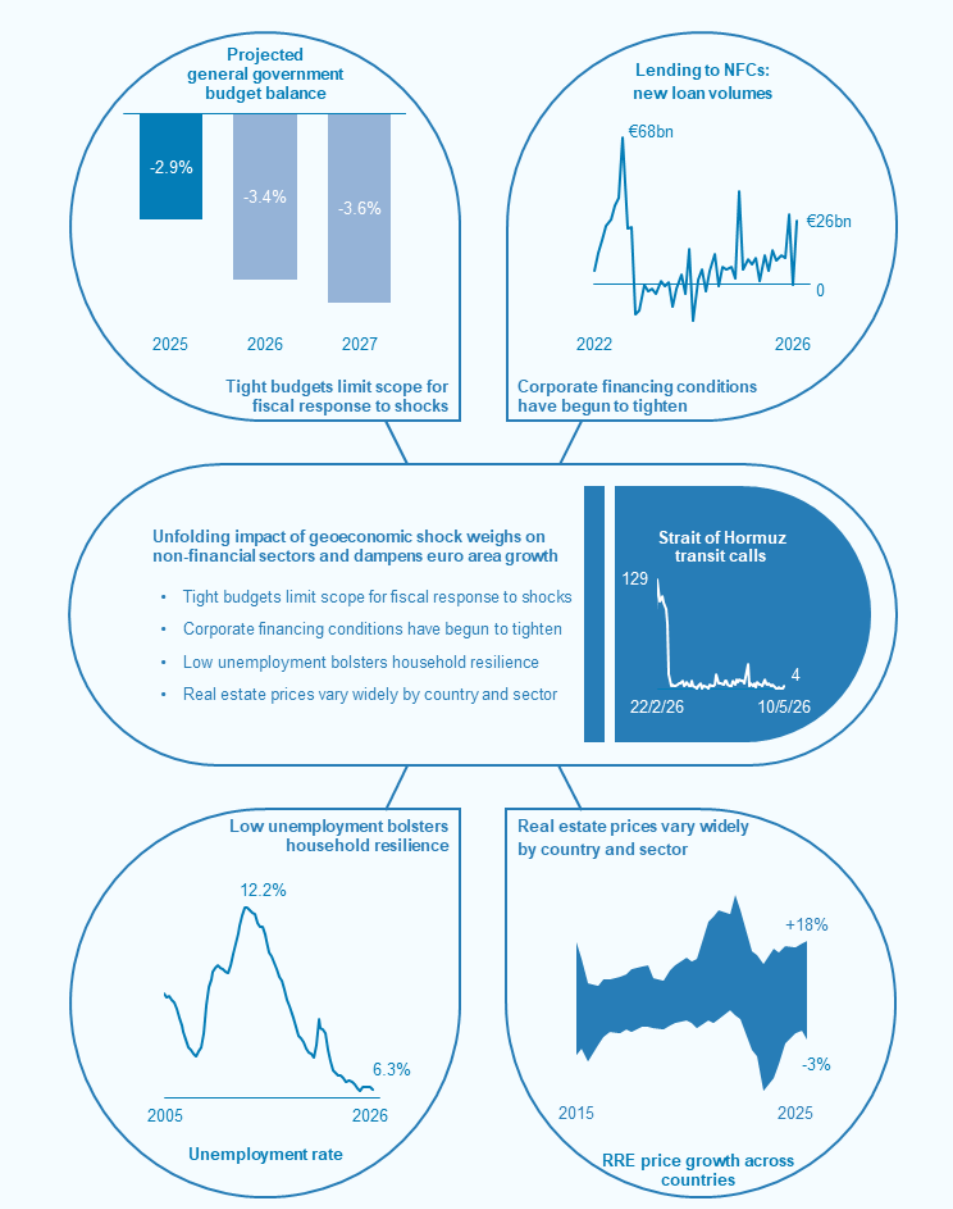
Preserving bank resilience remains a key priority for macroprudential policy in the context of elevated geopolitical and trade policy uncertainty. As such, releasable capital buffer requirements should be maintained to ensure headroom remains available to respond to severe shocks or bank capital constraints. Targeted increases in buffer rates might still be considered in countries with low releasable buffers, provided such measures do not pose procyclicality risks. At the same time, borrower-based measures should be used effectively to maintain sound lending standards (see **Section 3.5**). The prevailing regulatory and supervisory framework, including in the macroprudential remit, has been effective in safeguarding financial stability. There is, however, scope for making the framework more efficient and effective by reducing undue complexities, without compromising bank resilience. This is evidenced by the recommendations of the High-Level Task Force on Simplification and the European Commission's broad simplification agenda, the main objective of which is to increase the competitiveness of European banks. Strengthening the banking union would be an important element in creating the conditions for euro area banks to operate effectively both within the EU and globally, supporting their resilience and competitiveness.

Euro area financial stability vulnerabilities remain elevated as the geoeconomic shock unfolds

All in all, the outlook for financial stability is being shaped by geoeconomic stress and energy supply disruptions, with the severity and duration of the fallout still uncertain. While markets have held up relatively well despite some adjustment, risk sentiment has been seen to wax and wane. Sentiment may deteriorate as the full impact of the war in the Middle East unfolds or as elevated asset valuations adjust to reflect prevailing geoeconomic uncertainty. Sudden market drawdowns could pose balance sheet challenges for euro area non-banks, given their persistent liquidity and leverage vulnerabilities, increasing the risk of fire sales. Opaque private markets could also be an additional source or amplifier of market downturns. Meanwhile, euro area banks could face pressures from exposures to trade- and energy-sensitive firms and from closer ties with non-banks, potentially crystalising credit, liquidity and funding vulnerabilities.

In addition, several cross-cutting structural challenges remain critical for financial stability, with the potential to amplify existing cyclical vulnerabilities. These include rising vulnerabilities associated with cybersecurity weaknesses and hybrid threats against critical infrastructure in an increasingly complex geopolitical landscape. Moreover, the rise of artificial intelligence, especially newly emerging frontier models, and quantum computing provide not only opportunities but also risks of destabilisation along the innovation path. Additionally, risks stemming from global regulatory fragmentation and deregulation, challenges linked to ageing populations and rising risks associated with climate change, including the materialisation of physical risks, remain significant concerns. The potential for these cyclical and structural vulnerabilities to crystalise simultaneously and amplify each other heightens the materiality of risks to euro area financial stability.

1 Macro-financial and credit environment



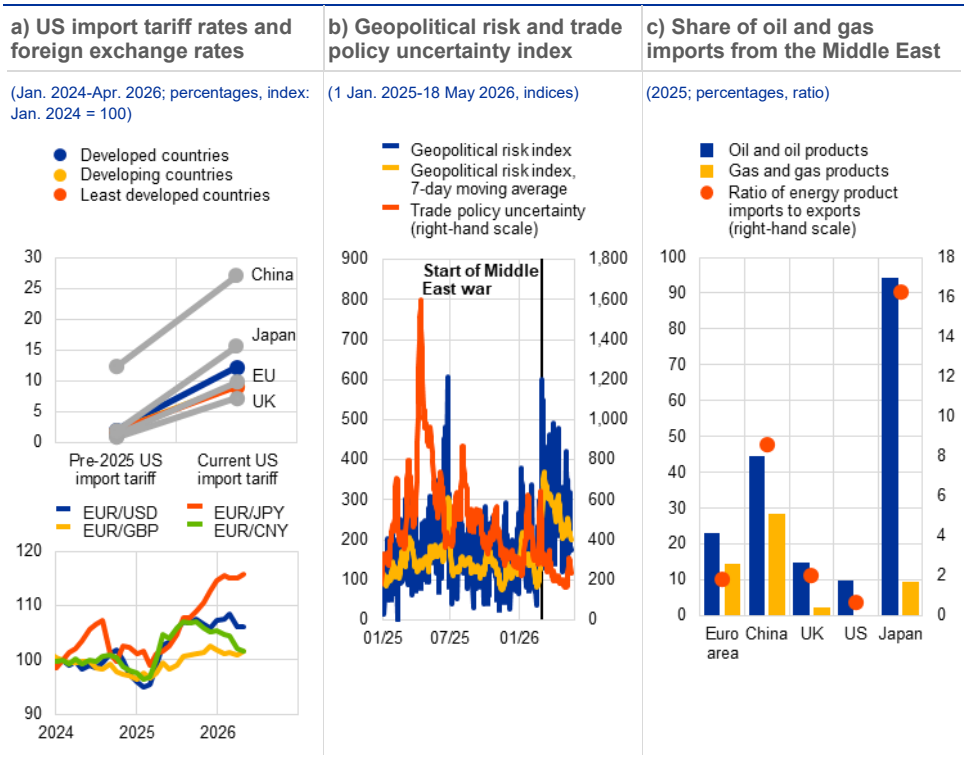
1.1 Trade fragmentation and energy supply disruptions are clouding the outlook for the euro area

US trade policy has remained a persistent source of external headwinds for the euro area, with tariffs structurally higher than they were before 2025. The increase in US import tariffs across all trading partners points to a more durable shift in the global trade environment (**Chart 1.1**, panel a). However, the EU has not suffered as badly as some other developed economies, and at this stage there is only limited evidence that US tariffs have led to broad-based diversion of Chinese

exports towards the euro area.[1] This has somewhat tempered the worst fears that euro area manufacturers could face intense competition, although pressure from China remains significant. Beyond tariffs, fluctuations between major currencies have not been a major additional driver of the euro area outlook since the previous edition of the Financial Stability Review was published. At the same time, the US dollar has acted as a safe haven and has appreciated against the euro recently, partly reflecting the euro area's greater exposure to the energy shock.

Chart 1.1

The external environment has become more challenging as trade frictions and uncertainty are compounded by geopolitical risk



Sources: Bloomberg Finance L.P., UN Trade and Development (UNCTAD), trademap.org, International Trade Centre and ECB calculations.
Notes: Panel a: the UNCTAD dashboard tracks the direction and magnitude of tariff changes, by country and product group, faced by countries in the US market. Trade weights are for the year 2024. Panel b: the geopolitical risk index is derived from Caldara and Iacoviello*, while the trade policy uncertainty index is derived from Caldara et al.** Panel c: data refer to the 2025 US dollar value of imports derived from trademap.org on 31 March 2026. "Middle East" refers to Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen.
*) Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225.
**) Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A. and Raffo, A., "The economic effects of trade policy uncertainty", *Journal of Monetary Economics*, Vol. 109, 2020, pp. 38-59.

Macroeconomic conditions are increasingly being shaped by the combination of elevated trade policy uncertainty and broader geopolitical shocks. Before the outbreak of the war in the Middle East, trade policy uncertainty had eased from the peaks reached in the second quarter of 2025 (**Chart 1.1**, panel b). At the same time, the geopolitical risk environment has become increasingly challenging and fluid (see **Box 1**). The war in the Middle East has resulted in a further, sharp increase in

[1] See Le Roux, J. and Spital, T., "Global trade redirection: tracking the role of trade diversion from US tariffs in Chinese export developments", *Economic Bulletin,* Issue 1, ECB, 2026.

geopolitical risk. It has involved attacks on energy infrastructure across the region, increasing the likelihood of more persistent disruptions to global energy supply.[2] The euro area is a net importer of energy and is therefore sensitive to disruptions in the Middle East through their impact on global energy prices, although it obtains less oil and gas from the region in relative terms than some other major economies (**Chart 1.1**, panel c).[3] The recent stress in the markets for refined petroleum products, particularly for jet fuel and diesel, highlights how dependence on energy imports remains a key vulnerability for the euro area.

The euro area is facing significant energy supply disruption at a sensitive time, with gas reserves at historically low post-winter levels. The war in the Middle East has effectively closed the Strait of Hormuz, as reflected by the sharp fall in transit through this critical chokepoint (**Chart 1.2**, panel a). The near standstill in shipping has resulted in sharp increases in energy prices, while the backlog could also disrupt wider supply chains, with potentially systemic effects. The war could lead to lower growth in the euro area economy and globally, as higher energy costs weigh on real incomes, consumption and investment while keeping inflation elevated. These effects could become more persistent in the event of a prolonged war in the Middle East or further escalation, if transport routes and production facilities remain disrupted and oil and liquefied natural gas supply is restrained. In addition, the euro area is facing this shock with gas reserves needing to be rebuilt from historically low levels (**Chart 1.2**, panel b). The current situation could make replenishment more expensive and difficult, prolonging the period of elevated energy prices, adding to the drag on growth and pushing public debt dynamics in a less benign direction (see **Section 1.2**).

The euro area entered this adverse phase with some macroeconomic buffers in place that should help to cushion – but not fully offset – the fallout. Before the latest geopolitical escalation, domestic demand had been gradually improving, while the external sector had remained the main drag on growth (**Chart 1.2**, panel c). Sentiment was bolstered by a relatively firm global baseline, euro area growth in the fourth quarter of 2025 had exceeded expectations, and activity in the first quarter of 2026 was still expected to remain positive.[4] Investment was being supported by public defence and infrastructure spending, continued digital and AI-related investment and the crowding-in of private capital expenditure in the context of the European Commission's Next Generation EU programme. Euro area inflation fell to 1.9% in February and was expected to increase to 2.6% in 2026 before falling back to around the ECB's target of 2.0% after that, according to the baseline March ECB staff macroeconomic projections for the euro area.[5] At the same time, the growth outlook had also weakened, with euro area GDP growth for 2026 revised down

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2 See El Dahan, M., Mills, A. and Saba, Y., "Exclusive: Iran attacks wipe out 17% of Qatar's LNG capacity for up to five years, QatarEnergy CEO says", *Reuters*, 20 March 2026.

3 According to the 2026 edition of Eurostat's Energy in Europe report, the EU's energy imports dependency rate was 57% in 2024.

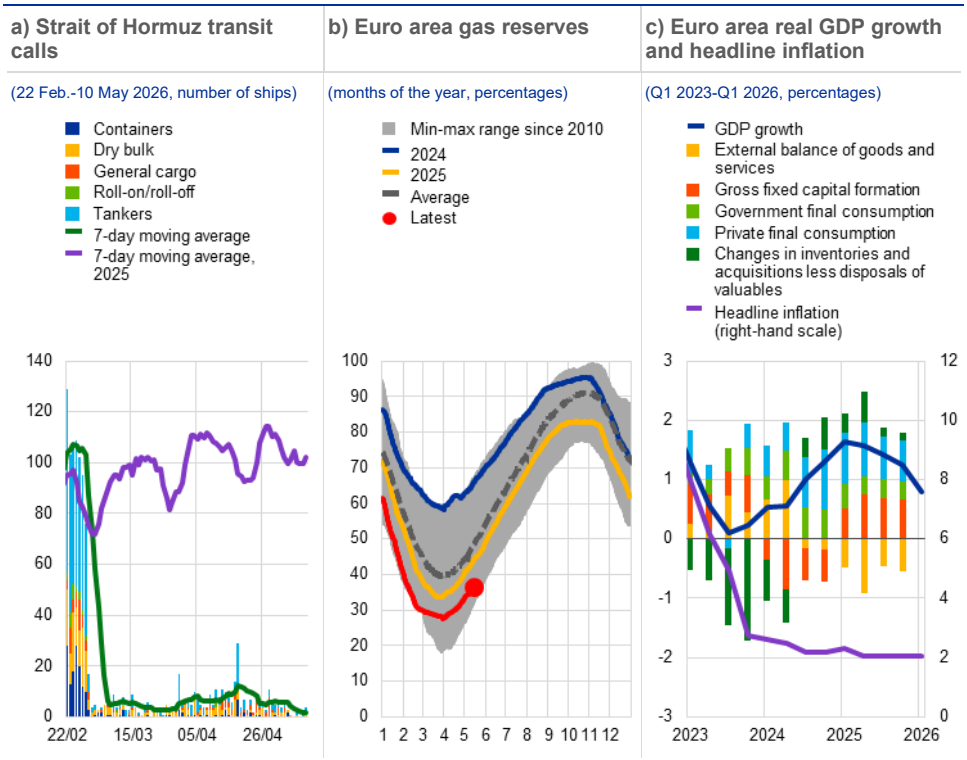
4 For instance, the composite output Purchasing Managers' Index increased to 51.9 in February 2026, with both the manufacturing output component and services business activity at that level.

5 See "ECB staff macroeconomic projections for the euro area, March 2026", published on the ECB's website on 19 March 2026.

by 0.3 percentage points. This baseline projection now appears increasingly benign, however, with risks tilted to the upside for inflation and to the downside for growth.

Chart 1.2

The war in the Middle East has disrupted energy supply, but the euro area entered the latest shock episode with some macroeconomic buffers



Sources: Bloomberg Finance L.P., UN Global Platform, PortWatch, ECB and ECB calculations.
Notes: Panel c: the chart shows average annualised year-on-year GDP growth rates and average contributions from different components. Headline inflation is measured by the Harmonised Index of Consumer Prices.

Overall, the macroeconomic outlook is clouded by energy supply disruptions and uncertainty, even though near-term resilience remains partially intact. Structurally higher tariffs, high trade policy uncertainty and geopolitical tensions are now interacting with stress in energy markets and disruptions to shipping. The main concern surrounds the effect of a potentially enduring disruption in global energy markets if the war in the Middle East lasts longer than financial markets currently expect or if it escalates further. The extent of the impact will depend critically on the size and duration of the energy price shock. If sustained, it could weaken growth, tighten financing conditions and amplify cost pressures, bringing vulnerabilities across sovereigns, firms and households more sharply to the fore. Downside risks to growth and upside risks to inflation have therefore intensified materially since the outbreak of the war in the Middle East.

Box 1
Financial stability implications of geopolitical and geoeconomic risks

Prepared by Paul Bochmann, Stephan Fahr and Giulia Lazzari

The outlook for global growth, inflation and financial stability has been adversely affected recently by unexpected geopolitical and geoeconomic events. Notably, the war in the Middle East has led to high levels of uncertainty and disruptions to the supply of oil and other energy commodities. This box evaluates recent developments in geopolitical and geoeconomic risks and assesses their impact on euro area financial stability.[6] To take into account the fact that these risks have multiple dimensions, the analysis reviews a wide range of up-to-date indicators relating to defence, trade and economic policy uncertainty, market volatility and migration (**Chart A**, panel a).[7] As a second step, it develops a new composite indicator of geoeconomic risk, integrating geopolitical, trade and financial market dimensions in a single metric, which can be used to analyse transmission to macro-financial risks (**Chart A**, panel b).[8]

Geoeconomic risks are currently heightened across several dimensions, in particular geopolitical risk, global supply chain pressure and trade policy. In the first quarter of 2026, renewed geoeconomic stress linked to tariff uncertainty and geopolitical events, including the war in the Middle East, led to a new spike in risk indicators. Some of these indicators exceeded the levels seen after the US tariff announcement in the second quarter of 2025 (**Chart A**, panel a). Comparing individual indicators with their historical distribution reveals that although the current shock has persisted at an elevated level since the second quarter of 2025, it differs markedly from the pandemic shock. While geopolitical and trade-related indicators were higher in the first quarter of 2026, the pandemic shock saw stronger pressures on global supply chains and higher financial market volatility.

The composite indicator for geoeconomic risks reached an all-time high in March 2026, suggesting adverse implications for macro-financial stability in the euro area. The main drivers of geoeconomic risk in April 2025 and early 2026 were associated with trade and defence

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6 The box builds on Avril, P., Bochmann, P., Fahr, S., Horan, A., Pancaro, C. and Pizzeghello, R., "Risks to euro area financial stability from trade tensions", *Financial Stability Review*, ECB, May 2025, and Dieckelmann, D., Kaufmann, C., Larkou, C., McQuade, P., Negri, C., Pancaro, C. and Rößler, D., "Turbulent times: geopolitical risk and its impact on euro area financial stability", *Financial Stability Review*, ECB, May 2024. The indicators are described in detail in the ECB/ESRB report "Financial stability risks from global fragmentation", European Systemic Risk Board, January 2026 and the associated technical annex.

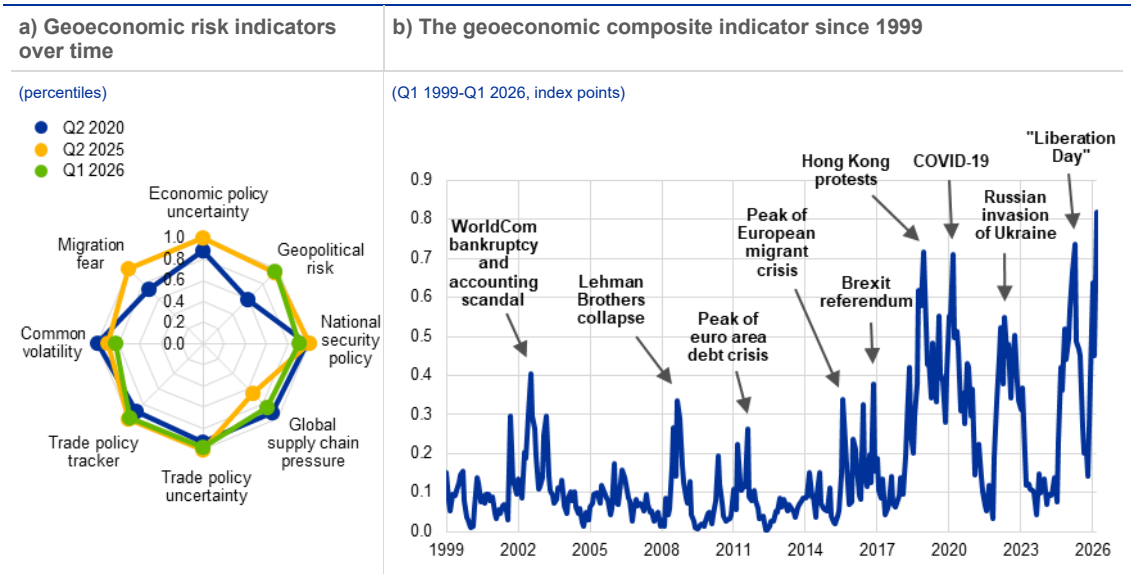
7 The indicators selected are as follows:
"economic policy uncertainty", taken from Baker, S.R., Bloom, N., Davis, S.J. and Kost, K.J., "Policy News and Stock Market Volatility", *NBER Working Paper Series*, No 25720, 2019; "geopolitical risk", taken from Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, 2022, pp. 1194-1225; "EMV national security policy and EMV trade policy tracker", taken from Baker, S.R., Bloom, N., Davis, S.J. and Kost, K.J., "Policy News and Stock Market Volatility", *NBER Working Paper Series*, No 25720, 2019; "global supply chain pressure", taken from Federal Reserve Bank of New York, Global Supply Chain Pressure Index, 2025; "trade policy uncertainty", taken from Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A. and Raffo, A., "Does Trade Policy Uncertainty Affect Global Economic Activity?", *FEDS Notes*, Board of Governors of the Federal Reserve System, 4 September 2019; "common volatility", taken from Engle, R.F. and Campos-Martins, S., "What are the events that shake our world? Measuring and hedging global COVOL", *Journal of Financial Economics*, Vol. 147, Issue 1, pp. 221-242, January 2023; "migration fear", taken from Bloom, N., Davis, S. and Baker, S., "Immigration fears and policy uncertainty", VoxEU, Centre for Economic Policy Research, 15 December 2015.

8 The composite indicator builds on a broad set of 12 individual indicators, beyond those represented in Chart A, panel a, and aggregated following the methodology by Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012. The indicator also quantifies contributions from the co-movement of individual metrics, representing episodes of a more systemic nature.

risks. If sustained over a long period of time, the recent increase could have adverse effects on financial stability in the euro area. To gauge the impact on macro-financial stability, an econometric quantile vector autoregression was estimated to assess the responses of real GDP, the financial cycle and financial stress to a shock to the geoeconomic composite indicator.[9]

Chart A

Following the spike of individual indicators in Q2 2025, the composite geoeconomic risk reached new highs in Q1 2026



Sources: ECB calculations.
Notes: Panel a: the percentile representation transforms the original indicators into their percentiles using the historical distribution. Panel b: the geoeconomic composite indicator is a monthly indicator based on 12 individual indicators, categorised as defence, trade or capital/finance. In addition to the dynamics of the individual indicators, the composite accounts for time-varying correlations to emphasise episodes of a systemic nature.

Spikes in geoeconomic risk pose significant downward risks to economic activity and raise the risk of financial stress. An increase in the geoeconomic composite indicator of 1 standard deviation induces a sharp decline in economic activity with marked asymmetry: downside risks for real GDP growth over the first six quarters ahead, represented by the 10th percentile of the GDP outlook distribution, rise significantly more than upside risks (**Chart B**). This asymmetry is accompanied by increased financial stress, as measured by the CISS, which increases for all categories of the composite indicator – defence, trade and capital/finance. Furthermore, all categories dampen the financial cycle, thereby weakening financial conditions and stability. Overall, the persistent and evolving nature of geoeconomic risks continues to pose challenges to financial markets and economic stability in the euro area.

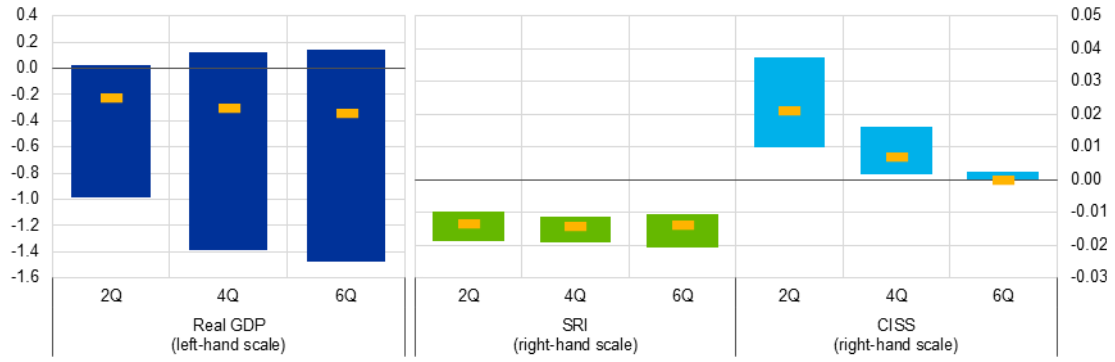
9 The econometric model includes the composite indicator, real GDP growth, HICP inflation, the ECB's Systemic Risk Indicator (SRI) and the ECB's Composite Indicator of Systemic Stress (CISS). For details on the SRI, see Lang, J.H., Izzo, C., Fahr, S. and Ruzicka, J., "Anticipating the bust: a new cyclical systemic risk indicator to assess the likelihood and severity of financial crises", *Occasional Paper Series*, No 219, ECB, February 2019; for details on the CISS, see Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012. See also the econometric model described in Bochmann, P., Dieckelmann, D., Fahr, S. and Ruzicka, J., "Financial stability considerations in the conduct of monetary policy", *Working Paper Series*, No 2870, ECB, November 2023.

Chart B

Geoeconomic risk shocks pose significant downside risks to real GDP growth and increase financial stress

Impact of shocks to the geoeconomic composite indicator on the distributions of macro-financial variables

(percentages, index points)



Sources: Eurostat, ECB and ECB calculations.
Notes: The results are based on a quantile vector autoregression and depict the impacts two, four and six quarters ahead. The bars represent the range of 10th to 90th percentile, whereas the yellow markers denote the medians of impulse responses to a 1-standard deviation shock to the geoeconomic composite indicator on GDP, the Systemic Risk Indicator (SRI) and the Composite Indicator of System Stress (CISS), in levels based on a quantile vector autoregression by Bochmann et al.* The shock is identified through a Cholesky decomposition in which the composite indicator is ordered first.
*) Bochmann, P., Dieckelmann, D., Fahr, S. and Ruzicka, J., "Financial stability considerations in the conduct of monetary policy", *Working Paper Series*, No 2870, ECB, 2023.

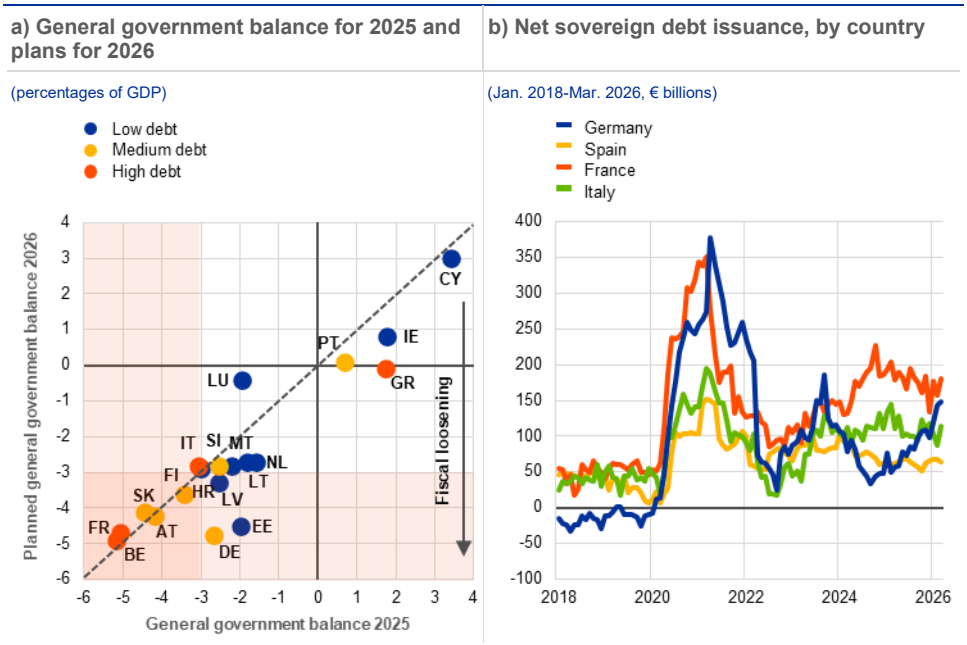
1.2 Public finances under pressure in a challenging geopolitical environment

Persistently high deficits and debt levels in some euro area countries remain key vulnerabilities. While many euro area countries have made progress on fiscal consolidation since the COVID-19 pandemic, some still have high deficits and debt levels. Governments face a long list of interrelated structural challenges, including the green and digital transitions, ageing populations, low productivity and, importantly, the urgent need to expand defence capabilities. Against this background, euro area government deficits are expected to remain sizeable or even to increase in 2026, driven in the case of Germany mainly by the implementation of the infrastructure and defence package (**Chart 1.3**, panel a). The positive impact of the Next Generation EU programme will fade going forward, given that it ends later this year, potentially without the full envelope of funds being disbursed.[10] With high deficits resulting in rising debt levels, governments have less room to respond to economic shocks, and doubts about future consolidation efforts could raise debt sustainability concerns among investors.

[10] See "NextGenerationEU – The road to 2026", European Commission, 4 June 2025.

Chart 1.3

High deficits in some euro area countries, exacerbated by geopolitical tensions and defence spending, raise debt issuance needs



Sources: ECB and Eurostat (GFS), European Commission (draft budgetary plans) and ECB calculations.
Notes: Panel a: low debt means a debt-to-GDP ratio below 60%, medium debt a ratio between 60% and 100% and high debt a ratio above 100%. Spain is missing from the chart as it has not submitted a draft budgetary plan for 2026. Bulgaria is missing as it only joined the euro area at the beginning of 2026 and was not yet required to submit a draft budgetary plan. Panel b: net debt issuance is shown in 12-month trailing sums.

A challenging geopolitical environment, including the war in the Middle East, is posing significant headwinds to fiscal positions. Elevated geopolitical tensions, shifts in Europe's security architecture and NATO's new spending target have put defence expenditure at the centre of fiscal expansion. The Stability and Growth Pact's national escape clause and the Security Action for Europe instrument were activated to help euro area countries meet necessary increases in defence spending. The war in the Middle East is presenting a significant additional challenge, especially via the resulting adverse energy price and supply shock. While the effect on euro area inflation and growth dynamics will clearly be adverse, the actual size of this effect is highly uncertain and will depend crucially on how long energy supply remains disrupted. However, several euro area countries appear to have limited capacity to create additional fiscal space to cushion the impact on households and firms, as they did during the energy crisis in 2022. Any support measures taken, such as reductions in taxes on fuel and other energy products, should be temporary, targeted and tailored.[11] If not, such measures could, in a worst-case scenario, risk destabilising fiscal positions.

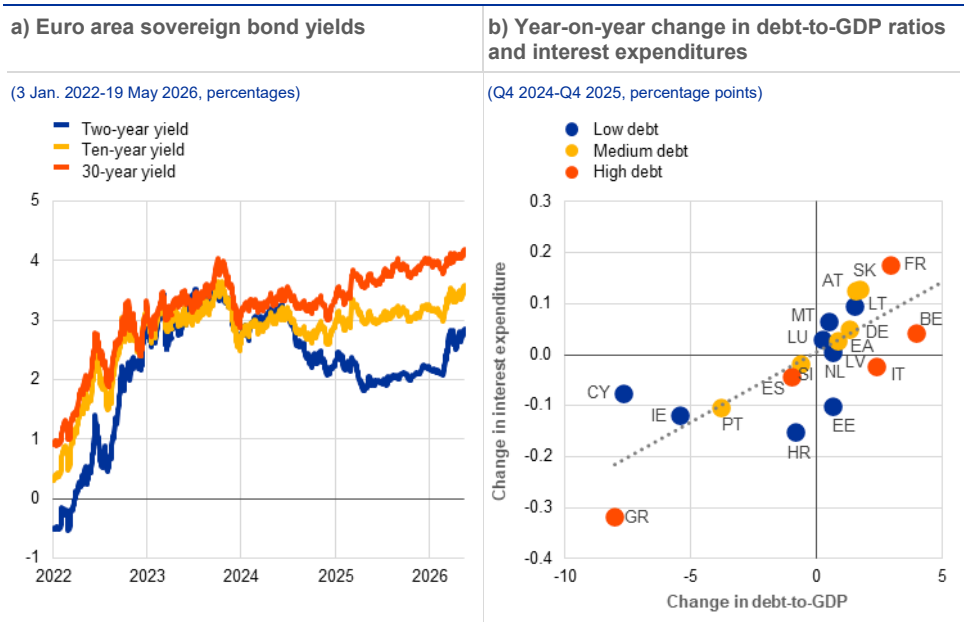
Higher debt issuance needs and tighter financing conditions are weighing on debt levels and interest burdens. Debt issuance needs are increasing to finance deficits, especially in countries where (defence-related) government spending is rising (**Chart 1.3**, panel b). Combined with both structural and cyclical factors, this is

[11] See also "Energy measures to attenuate the impact of the current spike in energy prices", European Commission, 26 March 2026.

increasing rollover and interest rate risks over the short to medium term. On the structural side, Dutch pension fund reform, among other factors, has contributed to a shift in institutional investors' demand for longer-dated debt, which has made the issuance of shorter-dated securities more attractive (see **Chapter 2** and **Box 2**). On the cyclical side, rising uncertainty and upside risks to inflation since the outbreak of the war in the Middle East have led to an increase in euro area sovereign funding costs (**Chart 1.4**, panel a). Interest burdens are set to rise as a result, especially in countries with growing debt levels, further limiting the fiscal space available to tackle pressing issues (**Chart 1.4**, panel b). In addition, there is a risk of government financing becoming more sensitive to short-term changes in interest rates, including over the medium term when consolidation pressures are likely to arise.

Chart 1.4

Tighter financing conditions and rising interest burdens are amplifying fiscal vulnerabilities in euro area countries



Sources: ECB and Eurostat (GFS) and ECB calculations.
Notes: Panel a: "Euro area sovereign bond yields" are the GDP-weighted averages of individual euro area countries' yields. Panel b: low debt means a debt-to-GDP ratio below 60%, medium debt a ratio between 60% and 100% and high debt a ratio above 100%.

In an uncertain global environment, euro area public finances are vulnerable to shocks and changes in investor sentiment. The impact of the energy price shock is adding to existing fiscal challenges and may prove difficult for some countries to cushion. In addition, euro area sovereign financing conditions could be vulnerable to spillovers from global benchmark bond markets as changing risk perceptions lead to a repricing of global sovereign risk. Investor confidence may also be undermined if fiscal measures are perceived to be imprudent, future consolidation efforts are cast into doubt or political uncertainty surges again. A repricing of sovereign risk could also carry the risk of spillovers to the funding costs of corporates and banks. Governments should therefore ensure that their countries' public finances are sustainable and comply with the EU's economic governance framework. At the euro area level, it will be necessary to consolidate public finances in a way that supports growth over the coming years. Prioritising essential growth-enhancing structural

reforms and strategic investment could make it easier to manage interrelated medium-term fiscal challenges. As an example, progress on the green transition could help to reduce critical dependencies on foreign energy sources.[12]

1.3 Renewed energy shock and tighter credit are testing corporate resilience

Corporate financing conditions have begun to tighten, as firms have continued to report weaker loan availability while banks have tightened credit standards. New lending to euro area non-financial corporations (NFCs) has weakened at the margin (**Chart 1.5**, panel a). In the latest survey data, firms reported unchanged needs for bank loans, while bank loan availability continued to weaken slightly, leaving the bank loan financing gap in positive territory in the first quarter of 2026.[13] Moreover, banks further tightened credit standards for loans to firms in the first quarter of 2026, the tightening being greater than expected and the most significant since the third quarter of 2023. Banks expect to see further marked tightening in the second quarter.[14] Against this backdrop, additional uncertainty and higher energy costs due to the war in the Middle East are likely to weigh further on firms' credit demand and investment plans in the near term.

Higher borrowing costs continue to weigh on corporate debt servicing capacity. Lending rates on new loans remain above long-time averages, while firms' debt service ratios are still high, even though interest payments have edged down at the margin (**Chart 1.5**, panel b).[15] Survey data indicate that interest expense has continued to rise, especially for small and medium-sized enterprises, while firms have also continued to report cost pressures from labour, materials and energy. At the same time, banks further tightened overall terms and conditions for new corporate loans in the first quarter of 2026, notably through higher lending rates, stricter collateral requirements and higher margins on riskier loans. Firms are thus entering this latest shock episode with less room to absorb further financial strain.

Signs of strain are becoming more visible in real-side indicators, as rising bankruptcies point to a tougher corporate environment. The continued increase in bankruptcies across sectors, together with weaker new passenger car registrations, is consistent with softer demand and renewed pressure on manufacturing (**Chart 1.5**, panel c). Banks have also tightened credit standards for loans to several sectors including construction, wholesale and retail trade, energy-intensive manufacturing and, most notably, the manufacturing of motor vehicles. Weakness in the car and manufacturing sector is likely related to trade tensions, but also to domestic structural factors as well as stronger Chinese competition in third

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12 Progress has been made on this under the European Commission's REPowerEU Plan, with additional measures laid out in the Citizens Energy Package. See "REPowerEU – 4 years on", European Commission, accessed on 19 May 2026, and "Communication on the Citizens Energy Package", European Commission, 10 March 2026.

13 See the ECB's "Survey on the access to finance of enterprises" for the first quarter of 2026.

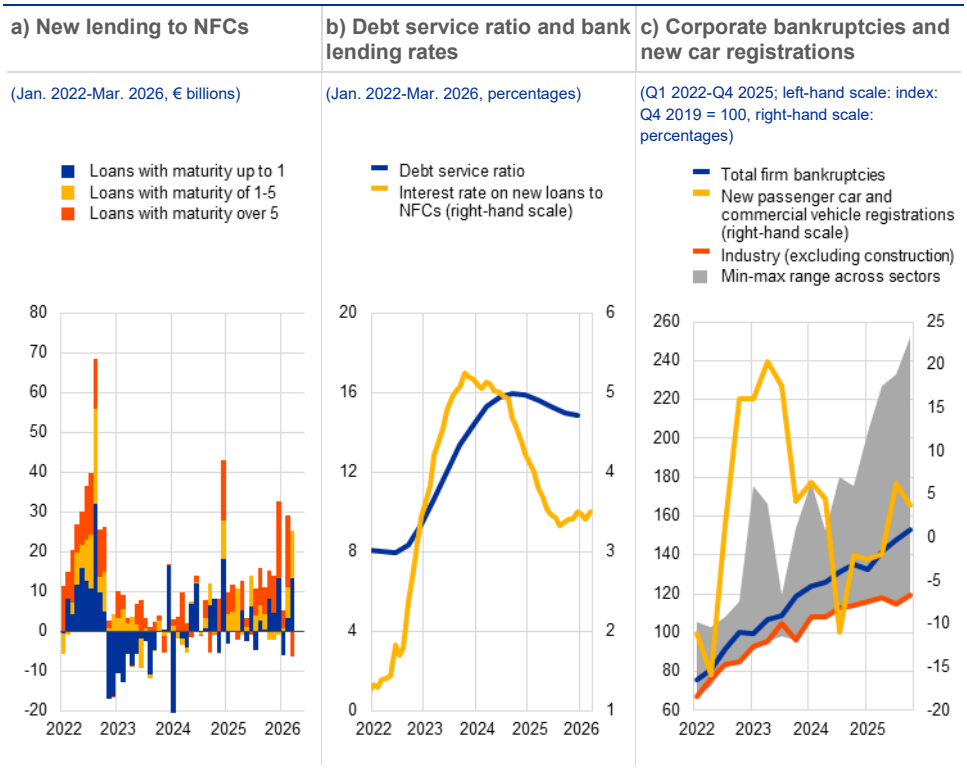
14 See the ECB's "Euro area bank lending survey" for the first quarter of 2026.

15 The average lending rate between January 2000 and January 2026 was 3.2%, while between January 2005 and January 2026 it was 2.89%.

markets. Also, the external environment has become even more challenging and is likely to weigh on confidence, profits and investment in the near term. However, rising insolvencies have not so far translated into either broad-based job losses (see **Section 1.4**) or a deterioration in bank asset quality (see **Special Feature B**).

Chart 1.5

Signs are emerging of a tougher corporate environment



Sources: Eurostat, ECB (BSI, QSA, MIR), ACEA and ECB calculations.
Notes: Panel a: adjusted loans to euro area non-financial corporations (NFCs) reported by monetary financial institutions in the euro area (transactions). Negative values represent repayments. Panel b: the debt service ratio is the sum of the interest paid in the current and the past three quarters divided by the sum of net operating surplus and property income in the current and the past three quarters for the NFC sector. Bank interest rates are for loans to corporations (new business) in the euro area. Panel c: the grey area shows the minimum-maximum range of index values across all sectors. New passenger car and commercial vehicle registrations are for the euro area 20 (fixed composition, year-on-year growth).

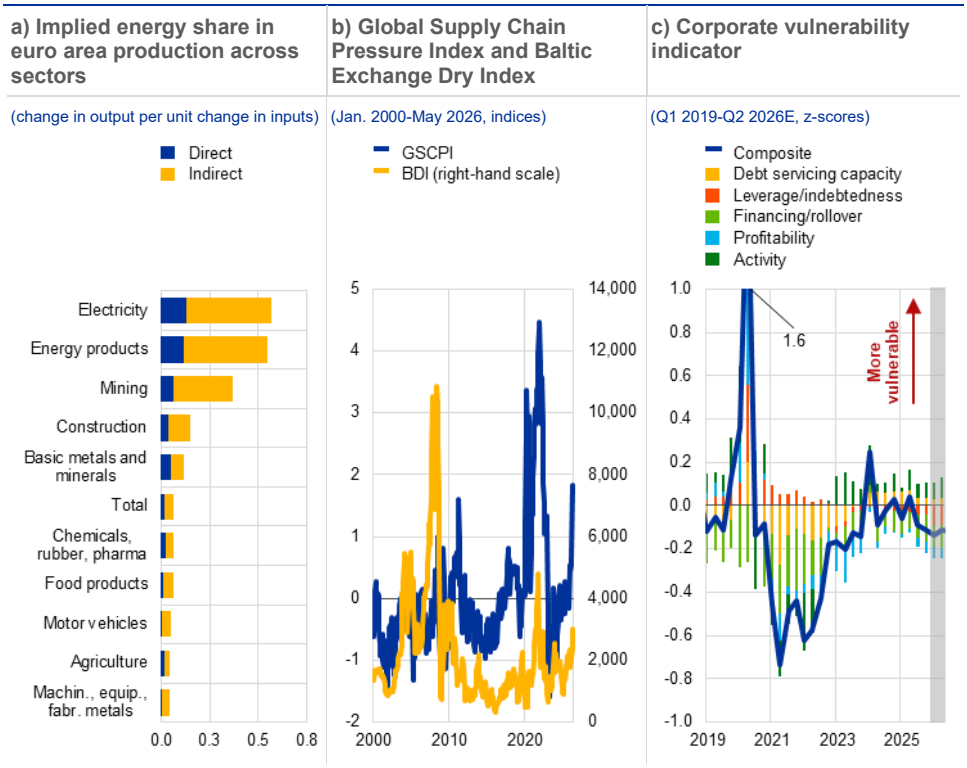
The war in the Middle East is likely to affect firms unevenly, with energy-intensive and supply chain-exposed sectors being the most vulnerable. The impact of higher energy prices, through direct and indirect input linkages, extends well beyond electricity and energy products to sectors such as construction, metals and chemicals (**Chart 1.6**, panel a). At the same time, shipping costs and supply chain pressure indicators have turned upwards again, although they remain below their global financial crisis and pandemic-era peaks (**Chart 1.6**, panel b). In a fragmented geopolitical environment, import dependencies and supply bottlenecks can magnify macroeconomic and firm-level vulnerabilities. Low gas storage levels at the onset of the war in the Middle East are likely to result in costly and difficult replenishment, prolonging the energy cost shock and potentially reviving broader supply-side frictions.[16] Even firms with lower direct energy intensity could come under pressure if a prolonged shock were to weaken aggregate demand more

[16] See Attinasi, M.-G., Boekelmann, L., Geronovics, R. and Meunier, B., "Unveiling the hidden costs of critical dependencies", *Economic Bulletin*, Issue 5, ECB, 2025.

broadly, as squeezed real income would likely curb discretionary household spending while elevated uncertainty could delay investment plans. Firms would therefore face an increasingly adverse combination of weaker demand, higher input costs and renewed logistical uncertainty.

Chart 1.6

Sectoral exposure to energy and supply chain shocks points to pockets of elevated corporate vulnerability



Sources: Eurostat, Federal Reserve Bank of New York, Bloomberg Finance L.P., S&P Global Market Intelligence and ECB calculations.
Notes: Panel a: direct and indirect cost shares are calculated using the FIGARO symmetric input-output table for 2022. Results are broadly aggregated at NACE level 1 categories based on production weights. Panel b: the Global Supply Chain Pressure Index (GSCPI) integrates transport cost data and manufacturing indicators, while the Baltic Exchange Dry Index (BDI) is a composite of dry bulk time charter averages. Panel c: for details of the construction of the corporate vulnerability index, see Gardó et al.* Positive values indicate higher vulnerability while negative values indicate lower vulnerability.
*) Gardó, S., Klaus, B., Tujula, M. and Wendelborn, J., "Assessing corporate vulnerabilities in the euro area", *Financial Stability Review*, ECB, November 2020.

Corporate balance sheets are not yet in a particularly fragile state, but underlying resilience is coming under increasing pressure. The composite corporate vulnerability indicator has edged down recently, moving below neutral levels (**Chart 1.6**, panel c). This is consistent with the broader balance sheet picture, as NFC gross operating surplus and entrepreneurial income strengthened further in the fourth quarter of 2025, while debt ratios declined as well.[17] At the same time, resilience buffers are becoming less comfortable: muted activity and weaker debt servicing capacity are exerting upward pressure on vulnerabilities, even as leverage and financing/rollover risks still act as offsets. Purchasing Managers' Index readings

[17] See "Households and non-financial corporations in the euro area: fourth quarter of 2025", *Statistical Release*, ECB, 9 April 2026.

were still pointing to expansion before the war in the Middle East and a part of investment may continue to be supported by digital and AI-related spending.[18]

Overall, while the corporate sector is not facing any immediate systemic stress, the risks are clearly tilted to the downside. Financing gaps have reopened, credit standards are tightening and bankruptcies are continuing to rise. Meanwhile, the external environment has become more challenging owing to tariffs, geopolitical risk and supply disruptions. NFCs entered the latest shock with balance sheets that were still resilient in aggregate but were already showing signs of gradual deterioration. Against this backdrop, a large and persistent disruption to energy supply, alongside renewed trade frictions and tighter financing conditions, could pose a significant test for corporates. The main implication is therefore not immediate distress but rather mounting downside risks that could increasingly weigh on corporate balance sheets if current shocks persist.

1.4 Labour market shelters household resilience, for now

Euro area households remained cautious and maintained an elevated level of saving in 2025. Growth in real disposable income slowed, while the saving ratio remained above its pre-pandemic average as households drew on their income gains, partly to rebuild balance sheet buffers (**Chart 1.7**, panel a).[19] Recent survey evidence suggests that the high levels of saving among households are mainly down to concerns about future income risk (precautionary motive) and concerns about future taxes (Ricardian motive).[20] Against this backdrop, the loss of purchasing power linked to the war in the Middle East may lead households to draw down savings in order to smooth consumption in the short term. However, it is likely to weigh on private consumption over the medium term.

Before the war in the Middle East, private consumption was recovering gradually, from a subdued starting point. Both private consumption and investment contributed strongly to growth in late 2025. Nevertheless, households remained cautious, with real total consumption recovering only gradually and real non-durable consumption still below pre-pandemic levels (**Chart 1.7**, panel b). Consumer confidence recovered from its trough but fell sharply again in April, with expectations about the broader economy remaining the weakest component overall (**Chart 1.7**, panel c). A more persistent rise in energy prices could hamper the recovery by squeezing disposable income, particularly for low-income and low-wealth households. Meanwhile, trade and geopolitical tensions, alongside more

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18 The composite output Purchasing Managers' Index increased to 51.9 in February 2026, with both the manufacturing output component and services business activity at that level.

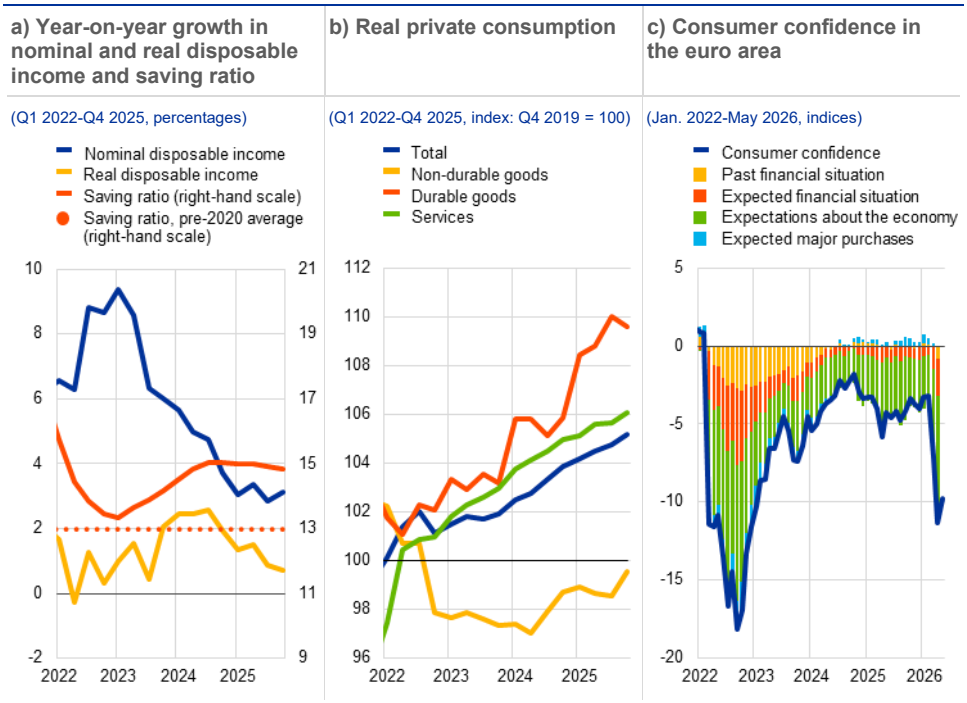
19 See Dimou, M., Flaccadoro, M. and Gareis, J., "The household saving rate revisited: recent dynamics and underlying drivers", *Economic Bulletin*, Issue 8, ECB, 2025.

20 See Dimou, M., Dossche, M., Hütten, T. and Kocharkov, G., "Consumption and saving amid uncertainty: recent insights from the CES", *Economic Bulletin*, Issue 1, ECB, 2026, and De Guindos, L., "Monetary policy and financial stability in the euro area", speech at the 16th edition of Spain Investors Day, Madrid, 14 January 2026.

general concerns about technological change and the impact of artificial intelligence, could add to fears about job security and affect overall household confidence.[21]

Chart 1.7

Household income growth moderates, but high levels of saving point to continued caution



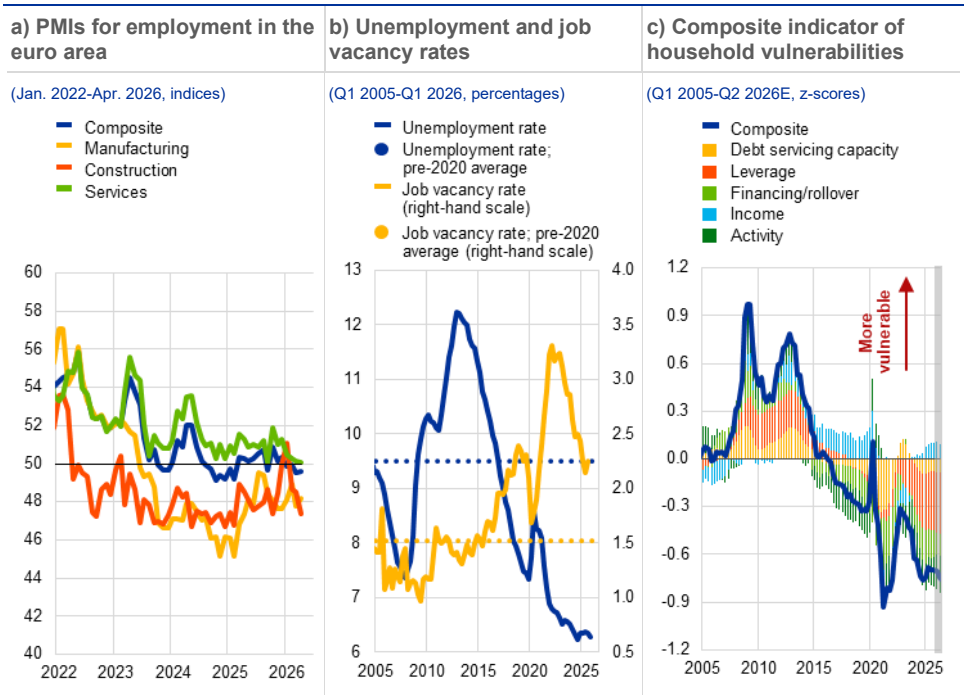
Sources: Eurostat, ECB (QSA, MNA), European Commission and ECB calculations.
Notes: Panel a: pre-2020 average saving ratio is calculated from the first quarter of 2000. Panel b: non-durable goods consumption is aggregated across those euro area countries for which there is a breakdown of consumption across different classes of goods and services. Non-durable goods consumption refers to the consumption of goods that can be used only once or that have a lifetime of considerably less than one year (including energy and food). Panel c: consumer confidence indicator (seasonally adjusted and demeaned). Euro area 20 (fixed composition) as of the 1 January 2023 European Commission (including Eurostat) Consumer Survey.

Labour market resilience continues, for now, to contain household vulnerabilities. Survey-based indicators of labour demand have edged down, particularly in manufacturing and construction (**Chart 1.8**, panel a). Hard data for the labour market are more reassuring, however, with unemployment still below and vacancy rates still above pre-pandemic averages (**Chart 1.8**, panel b). This helps to explain why the composite vulnerability indicator is still low overall and why the household sector does not currently appear to be a major source of financial stability risk (**Chart 1.8**, panel c). However, given the challenging external environment, a material deterioration in labour market conditions cannot be ruled out and would likely prolong consumption restraint and weaken household resilience.

[21] See Dias Da Silva, A. and Weißler, M., "AI adoption and employment prospects", *The ECB Blog*, ECB, 21 March 2025.

Chart 1.8

Household vulnerabilities remain contained amid a still-favourable labour market



Sources: S&P Global Market Intelligence, Eurostat, ECB and ECB calculations.
Notes: Panel a: a Purchasing Managers' Index (PMI) value above (below) 50 implies an improvement (deterioration) in employment. Panel b: the pre-2020 average of the unemployment rate is calculated from Q1 2000, while the pre-2020 average of the job vacancy rate is calculated from Q1 2005. Panel c: the composite indicator is based on a broad set of indicators along five dimensions: (i) debt servicing capacity (measured by gross interest payments/income ratio, saving ratio and expectation of personal financial situation); (ii) leverage (gross debt/income and gross debt/total assets ratios); (iii) financing (bank lending rate, short-term debt/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)); (iv) income (real income growth and income/GDP ratio); and (v) activity (labour participation rate and unemployment expectations). Positive values indicate higher vulnerability while negative values indicate lower vulnerability.

1.5 Dynamics in property markets differ markedly across countries and segments

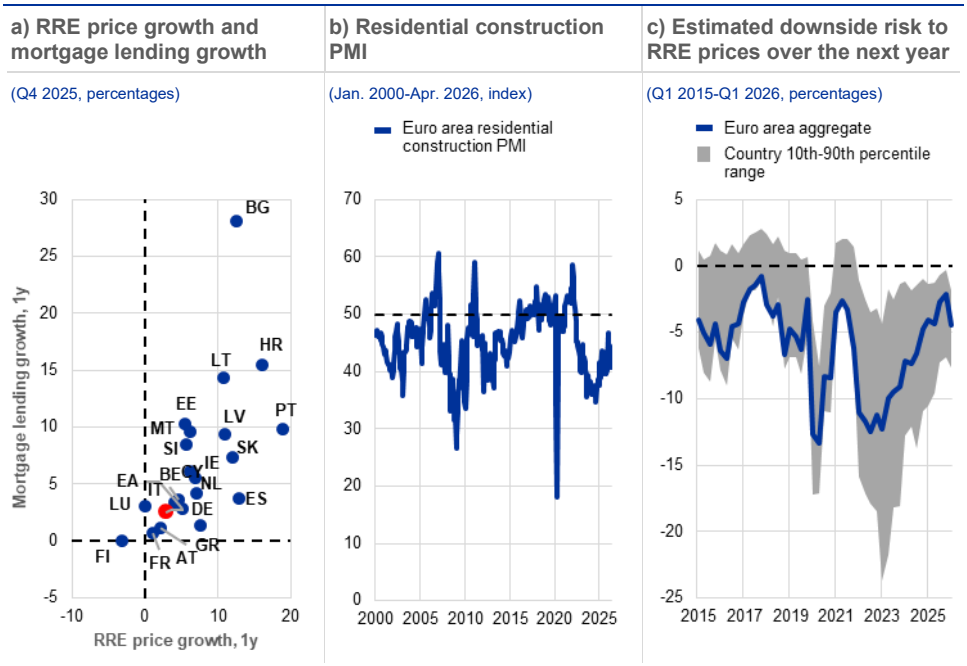
Residential real estate (RRE) prices saw a strong increase overall in the third quarter of 2025, albeit with significant cross-country variation. Euro area countries such as Bulgaria, Croatia, Lithuania and Portugal experienced solid growth in both RRE prices and mortgage lending (**Chart 1.9**, panel a), although household indebtedness remains relatively low in some cases. Conversely, countries such as Germany, France, Austria and Finland witnessed more subdued growth in both house prices and lending. At the same time, housing supply has failed to keep pace with rising demand in several countries. Indeed, the euro area Purchasing Managers' Index (PMI) for residential construction remains below 50, which indicates subdued construction activity (**Chart 1.9**, panel b). This mismatch is contributing to housing shortages, thereby amplifying upward pressure on prices across multiple markets.[22] RRE prices are growing at a faster pace than income in some markets, causing an

22 In a recent report, the European Commission's Joint Research Centre estimated that Europe needed to add 650,000 dwellings per year on top of the 1.6 million already expected to be constructed, in order to meet demographic pressures.

increase in overvaluation.[23] Consequently, rising measures of overvaluation, combined with tightening financial conditions, have resulted in a slight increase in tail risks for euro area RRE prices in early 2026 (**Chart 1.9**, panel c).

Chart 1.9

RRE markets in the euro area show contrasting developments in prices and lending growth, while housing supply remains subdued and downside risks increased mildly



Sources: ECB, S&P Global Market Intelligence and ECB calculations.
Notes: Panel a: the red dot represents the euro area (EA). Mortgage lending growth is adjusted for securitisation for all countries except Bulgaria. Data for Belgium refer to the second quarter of 2025 as RRE price data are not available for later dates. Panel b: a PMI value above (below) 50 implies an improvement (deterioration) in activity. Panel c: the chart shows the results obtained from an RRE price-at-risk model, based on a panel quantile regression on a sample including all euro area countries except Bulgaria and Croatia. The chart shows the fifth percentile of the predicted RRE price growth for the euro area aggregate and the 10-90th percentile range of this estimate across individual euro area countries. For further details, see Jarmulska, B. et al., "The analytical toolkit for the assessment of residential real estate vulnerabilities", *Macroprudential Bulletin*, Issue 19, ECB, October 2022.

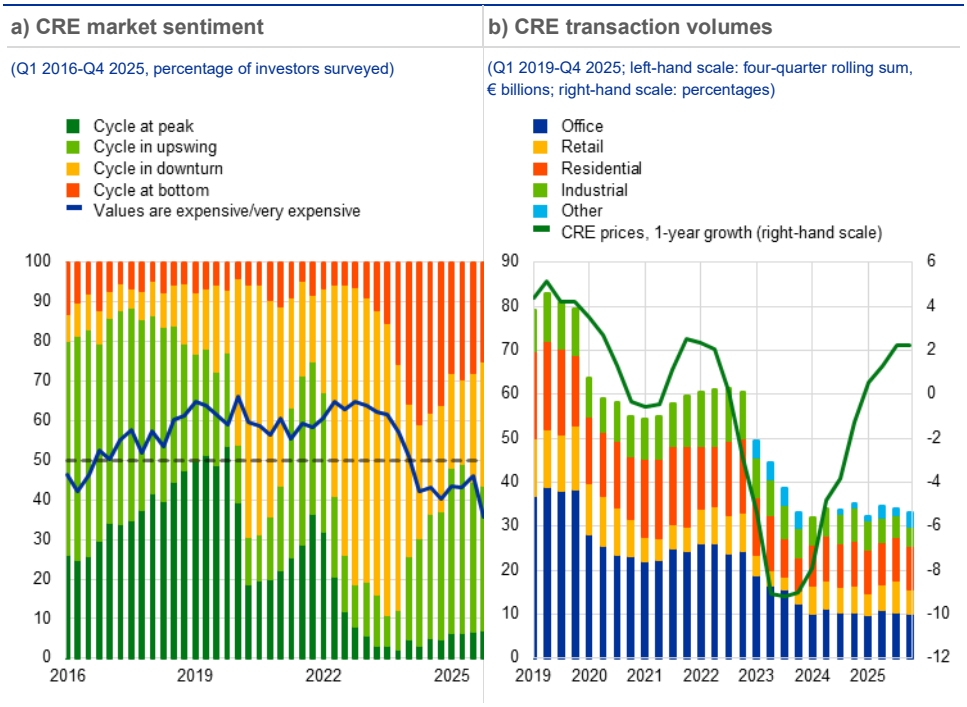
Commercial real estate (CRE) markets have stabilised during monetary easing, yet structural challenges remain. In recent quarters, the share of investors that consider the CRE market to be experiencing an upswing has remained broadly stable but subdued, at below 50% (**Chart 1.10**, panel a). At the same time, developments differ across countries: the majority of investors in markets such as Germany, France and Austria tend to view the market as being either near the bottom of the cycle or still in a downturn. Most investors in countries like Greece, Spain and Portugal, however, perceive market conditions as being either in an upswing or at the peak of the cycle. The share of investors who view CRE as expensive has also declined, suggesting that the CRE market is gradually being perceived as more attractive following the severe downturn seen in recent years. In line with these developments, CRE price indicators point to a return to positive annual growth. Sentiment, transaction activity and prices, while showing signs of stabilisation or modest improvement, remain at subdued levels overall compared

[23] In the third quarter of 2025, the ECB estimate of the deviation from the long-term average of the price/income ratio was positive and increased year on year in Bulgaria, Ireland, Spain, France, Croatia, Latvia, Malta, Netherlands and Portugal.

with a few years ago. In particular, market activity remains weak across all sectors, with euro area transaction volumes still about 60% below their 2019 peak (**Chart 1.10**, panel b). At the same time, structural headwinds continue to weigh on parts of the market, contributing to a growing divergence between prime and non-prime segments. This is particularly evident in office markets, where the shift towards hybrid working practices continues to dampen demand and the outlook for lower-quality assets remains especially challenging.

Chart 1.10

Stabilisation in euro area CRE markets is ongoing, but market activity remains subdued, particularly in office markets, reflecting broader investor uncertainty

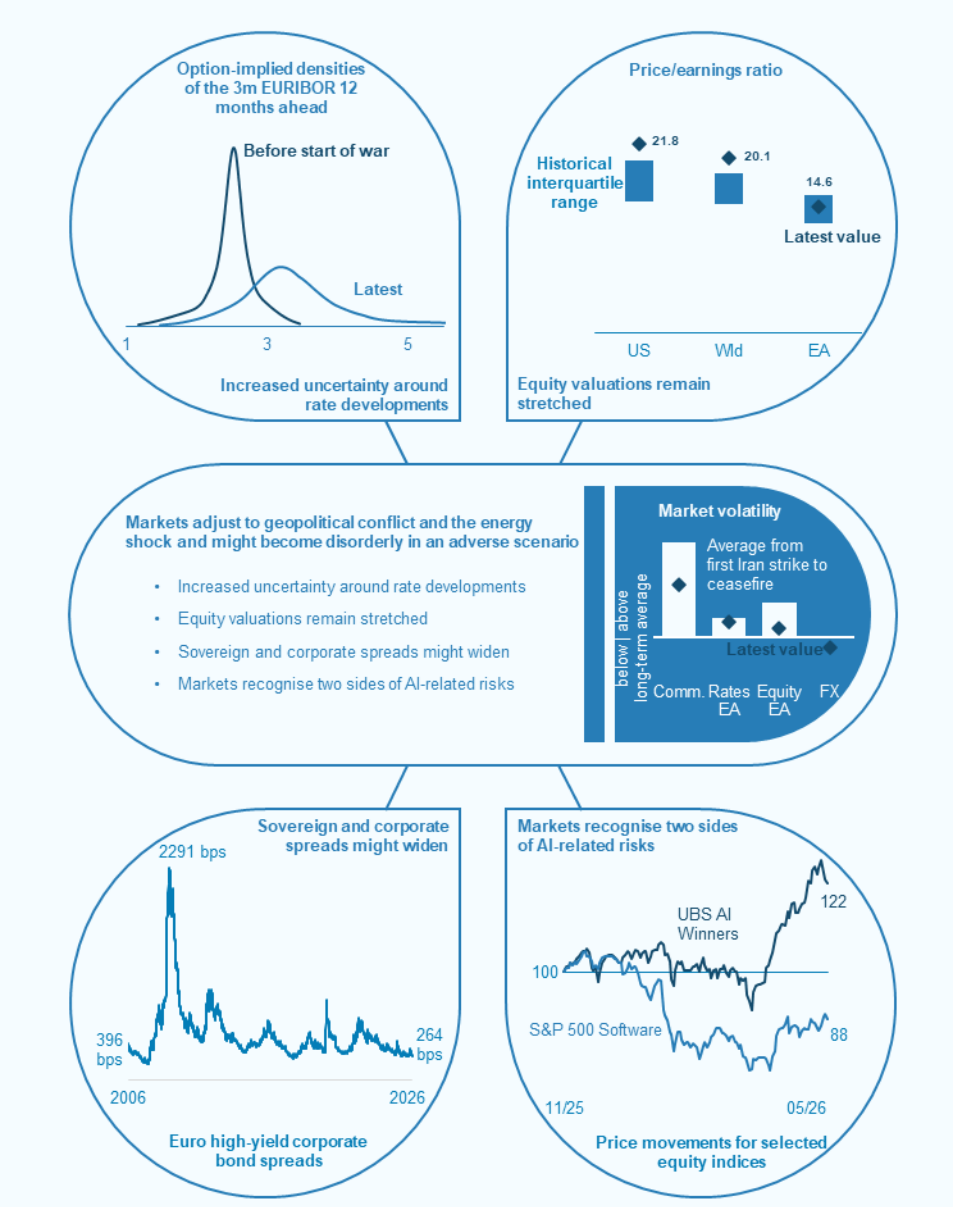


Sources: RICS, MSCI and ECB calculations.

The recovery in real estate markets continues to gain traction, but pockets of vulnerability call for risks to be closely monitored going forward. Real estate markets are highly sensitive both to developments in the broader real economy and to changes in medium to long-term interest rates and energy prices. This means that any escalation of geopolitical tensions which brings about a sharp deterioration in the economic outlook and/or a marked increase in interest rates is likely to weigh on demand for real estate. At the same time, a prolonged increase in energy prices might have a negative impact on supply. This might be particularly relevant in countries where housing valuations are stretched and in countries that have a large commercial office segment coupled with persistently high vacancy rates. Given the large size of banks' RRE mortgage books, a significant rise in unemployment could pose financial stability risks where it results in a substantial increase in credit risk in this portfolio. By contrast, the size of banks' exposures to CRE is more contained and unlikely to endanger the solvency of the euro area banking system. These exposures are not evenly spread across the banking system, however, and stress could arise among the euro area's most exposed banks. Hence, it is important to

continue to monitor risks stemming from property markets while preserving banking sector resilience (see **Section 3.5**).

2 Financial markets



2.1 Markets adjust to geopolitical conflict and energy shock

Geopolitical risks have materialised, and concerns about AI-related risks have re-emerged, challenging the prevailing benign market pricing. Market developments since the beginning of the year have been shaped by two forces – geopolitical events and uncertainty around the potential impact of artificial intelligence (AI). AI-related optimism may have partly offset the impact of geopolitical risks on market sentiment. At the same time, however, these forces may actually reinforce each other if the energy shock lasts longer than expected and challenges

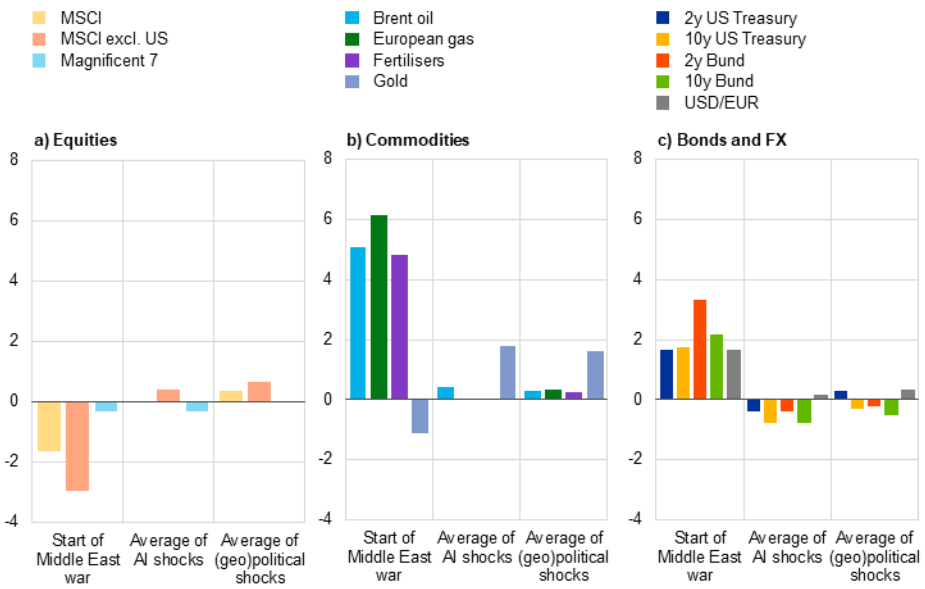
benign macro-financial expectations. Prior to the war in the Middle East, global markets were priced for a “Goldilocks” environment of resilient growth, moderating inflation and expectations of more accommodative monetary policies, supported by expectations of AI-driven productivity gains. This contributed to compressed risk premia, elevated valuations and increased risk taking. Until the outbreak of the war in the Middle East, market reactions to adverse geopolitical and AI-related shocks had remained relatively muted overall (**Chart 2.1**).

Chart 2.1

Market reaction to recent geopolitical and AI-related events had remained muted until the outbreak of the war in the Middle East

Reactions of selected asset classes to risk events since the November 2025 Financial Stability Review

(26 Nov. 2025-19 May 2026, z-scores)



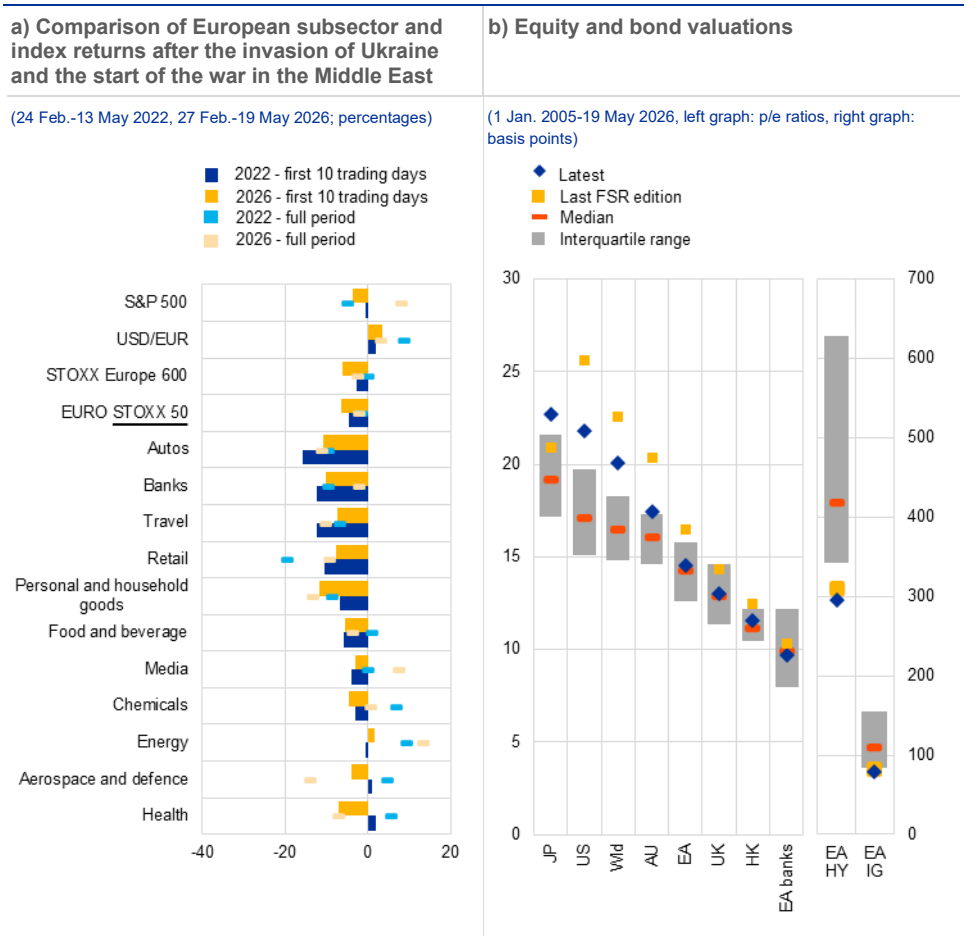
Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: “Start of Middle East war” refers to 2 March 2026, the first trading day after the start of the war on 28 February 2026; “Average of AI shocks” refers to the average of z-scores recorded on the days of the Anthropic announcement (17 February 2026) and of the publication of the Citrini report (22 February 2026); “Average of (geo)political shocks” refers to the average of z-scores recorded on the days of the US Supreme Court ruling on IEEPA (20 February 2026), of legal proceedings initiated against the Chairman of the Federal Reserve System and escalating tensions over Greenland’s sovereignty (9 January 2026) and of the US military intervention in Venezuela (3 January 2026). Z-scores are calculated by standardising the one-calendar-week change from the day before the shock, using the mean and standard deviation of rolling one-week changes over the preceding ten years. All changes are percentage changes except for two-year US Treasury, ten-year US Treasury, two-year Bund and ten-year Bund, which are simple differences. “Magnificent 7” comprises the stocks of Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla.

The war in the Middle East has disrupted global energy supply, triggering a repricing across asset classes. Oil and gas prices have risen sharply. Rising prices have also been observed in other commodities, including metals, fertilisers and helium, indicating broader cost pressures across sectors and supply chains, including those linked to AI-related infrastructure. The initial equity market reaction appears comparable to previous energy episodes, including in 2022, with euro area equity markets underperforming US markets (**Chart 2.2**, panel a), reflecting greater reliance on energy imports. Following the initial repricing, equity and corporate bond markets mostly rebounded on account of strong earnings reports in the United States, and market expectations for further positive news regarding geopolitical

developments. Accordingly, valuations have partly moderated but remain stretched by historical standards for most markets (**Chart 2.2**, panel b).

Chart 2.2

The energy price shock has triggered strong but mostly short-lived equity market adjustments, and valuations remain stretched

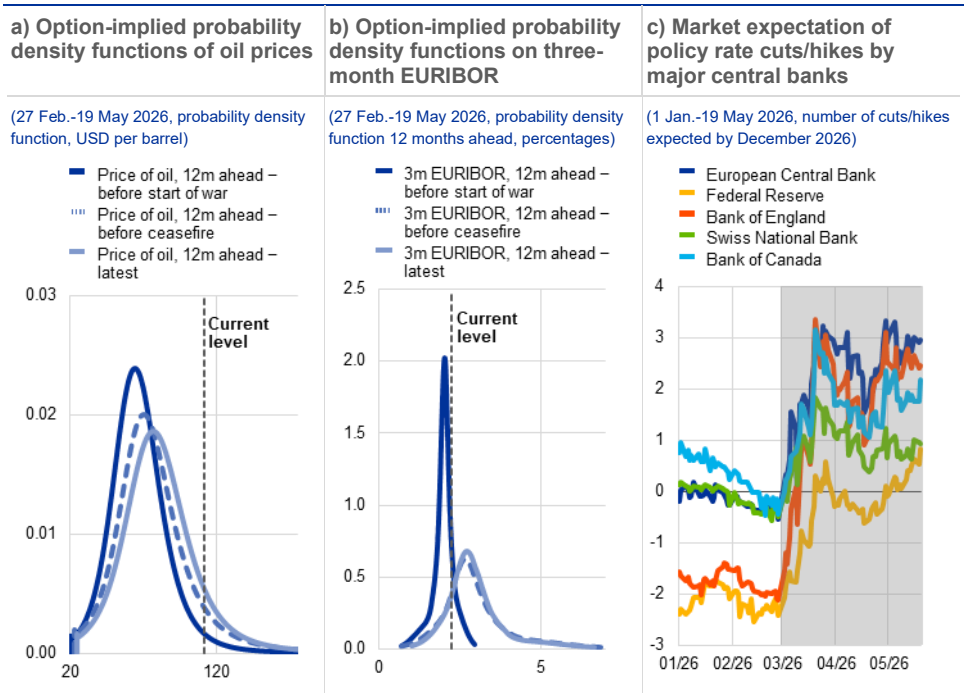


Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: 2022 and 2026 cover the ten trading days after the start of the Russian invasion of Ukraine and the outbreak of the war in the Middle East respectively. "Full period" covers the first 54 trading days, i.e. the number of trading days between the start of the war in the Middle East and the cut-off date for this edition of the Financial Stability Review. Panel b: for equities, the boxplot shows interquartile range of one-year forward price/earnings ratios relative to the distribution since 2005. The last edition of the ECB's Financial Stability Review was published on 26 November 2025. For Wld, the MSCI World Index is used; for bonds, the boxplot shows interquartile range of latest z-spread compared with distribution since 2000. AU stands for Australia; EA stands for euro area; HK stands for Hong Kong; HY stands for high yield; IG stands for investment grade.

The energy price shock is raising concerns among market participants about higher inflation, lower growth and tightening financial conditions. Higher energy and commodity prices are contributing to renewed inflationary pressures and tighter financial conditions. Option-implied distributions point to elevated uncertainty around future oil prices and interest rates, with fat right tails indicating a greater probability of severe outcomes (**Chart 2.3**, panels a and b). Consequently, investors have revised their global monetary policy expectations towards a tighter stance, by pricing out the likelihood of rate cuts in the United States and pricing in rate hikes in most major markets (**Chart 2.3**, panel c).

Chart 2.3

Markets are pricing in elevated levels of uncertainty and the macroeconomic implications of the Middle East war, while reassessing global monetary policy paths



Sources: Bloomberg Finance L.P. and ESRB/ECB calculations.
Notes: Panels a and b: "before start of war" option strike is on 27 February 2026; "before ceasefire" option strike is on 7 April 2026; "latest" option strike is on 19 May 2026. Panel c: shaded area is after the start of the war in the Middle East on 28 February 2026.

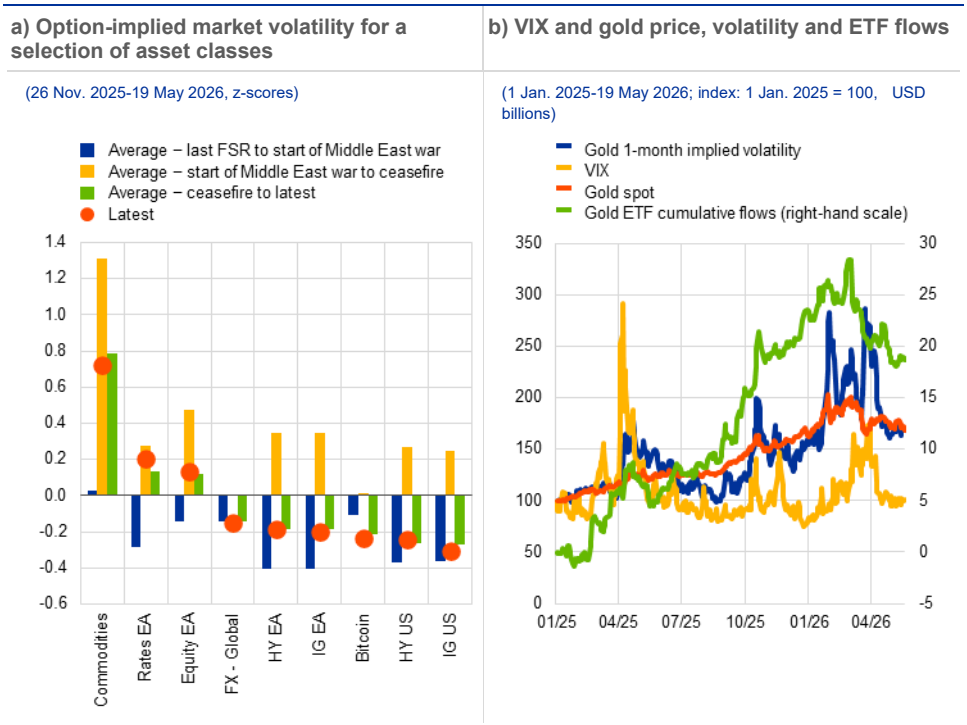
Market functioning has remained orderly, but several bouts of volatility points towards a more fragile environment. Activity in energy derivatives markets has increased significantly, with margin calls met so far without any signs of disorderly deleveraging. However, recent developments point to increased sensitivity to volatility bouts following a prolonged period of low volatility (**Chart 2.4**, panel a). While the recent spike has been temporary and levels have moderated in most markets, elevated and rising volatility − particularly in commodity markets − could lead to larger margin calls, acting as an amplification channel in stress scenarios. A more persistent energy shock that affects the real economy more visibly could challenge stretched valuations in risky asset markets, push up volatility and trigger abrupt and potentially disorderly market adjustments. In parallel, repricing related to the evolving AI landscape could also contribute to increased uncertainty and thereby volatility, as the global economy and financial markets continue to adjust to AI-related structural changes. Shifts in expectations around productivity, profitability and sectoral dynamics would be reflected in asset prices across sectors and economies (see **Section 2.3**).

Cross-asset correlations could rise sharply in response to further geopolitical or inflation shocks, leading to simultaneous repricing across asset classes. Recent episodes suggest that traditional correlations could become less reliable, reducing the effectiveness of standard hedging strategies and increasing vulnerability to mark-to-market losses in stress episodes. After a short-lived initial increase, gold prices declined after the start of the war in the Middle East. Bonds

could provide less effective diversification, increasing the likelihood of simultaneous losses and deleveraging across portfolios.[24] These dynamics could be reinforced by procyclical investment behaviour, particularly in an environment of persistently elevated valuations and compressed risk premia.

Chart 2.4

Volatility bouts and shifting safe-haven dynamics point to a more fragile market environment



Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: z-scores show how high or low volatility is compared to ten-year averages. "Commodities" measured by CBOE volatility. EA stands for euro area; IG stands for investment grade; HY stands for high yield. The last edition of the ECB's Financial Stability Review was published on 26 November 2025. "Start of Middle East war" refers to 28 February 2026 and "ceasefire" to 8 April 2026.

Safe-haven dynamics have been atypical in recent stress episodes, with no consistent pattern observed across assets. The price of gold has been volatile after reaching all-time highs at the beginning of the year. Its volatility has risen more than that of equities (**Chart 2.4**, panel b), reflecting rising real yields and deleveraging dynamics, as well as indications of recent central bank sales (including in some emerging market economies). Previous strong inflows into gold investment vehicles suggest increased retail participation, which may contribute to procyclical price dynamics and crowded positioning. While gold may offer protection against geopolitical uncertainty and sovereign risks over the medium term, its short-term performance is driven by market conditions. The emergence of tokenised gold instruments and the use of gold-backed assets in some stablecoin reserve structures point to financial innovation that may amplify price movements through procyclical flows and increased interconnectedness. The dynamics of other safe-haven assets

[24] See also Mosk, B., Pangallo, L. and Zema, S.M., "Cross-asset correlations in a more inflationary environment and challenges for diversification strategies", *Financial Stability Review*, ECB, November 2022.

have also been less stable.[25] Sovereign bond yields have increased (see **Section 2.2**) since the outbreak of the war in the Middle East, reflecting the inflationary nature of the conflict. At the same time, the US dollar has exhibited less consistent safe-haven characteristics through the different shocks over the last year, resulting in higher foreign exchange risk for euro area investors.

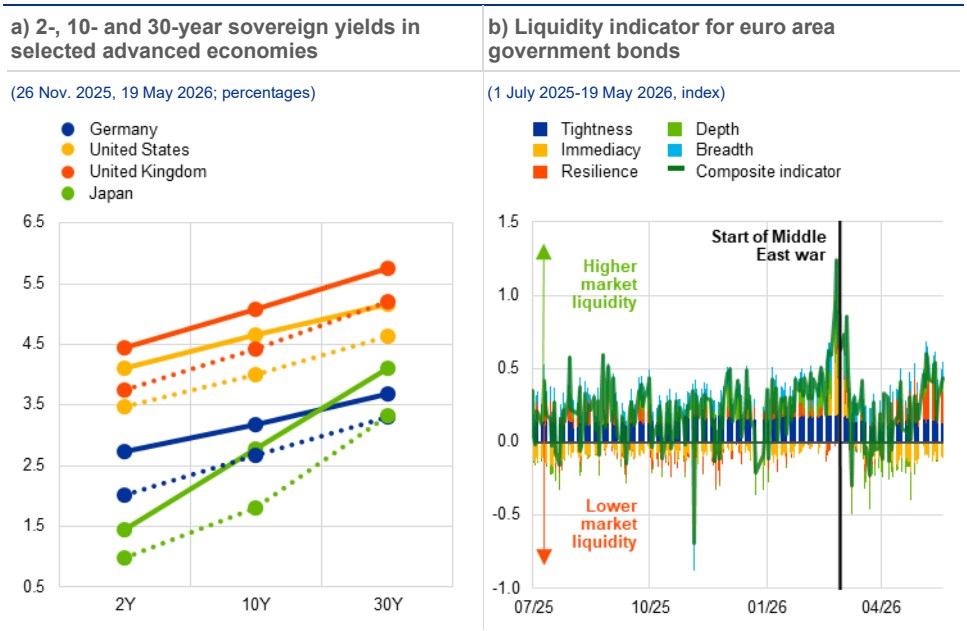
2.2 Bond markets start to be challenged by renewed macroeconomic uncertainties

Euro area sovereign bond markets face increasing pressure from rising yields, fiscal vulnerabilities and global spillovers. Across major advanced economies, sovereign yields have increased along the yield curve (**Chart 2.5**, panel a) since the previous edition of the Financial Stability Review was published. This in part reflects the rise in risk-free rates, driven by both higher term premia and expectations of higher rates amid renewed inflation concerns. Beyond the risk-free components, the rise in sovereign yields might also reflect concerns about fiscal vulnerabilities. In the United States, large fiscal deficits and sustained issuance have contributed to upward pressure on yields. Political uncertainty in May and resulting concerns about future fiscal sustainability have contributed to the rise in yields in the United Kingdom. In Japan, yields have risen significantly to reach levels comparable with other advanced economies. This could prompt global portfolio reallocation into Japan, reduce Japanese demand for foreign bonds and contribute to upward yield pressure globally, including in the euro area. In addition, geopolitical developments may lead to shifts in global capital flows, including changes in the recycling of oil revenues, which could further influence sovereign bond price dynamics. Euro area sovereign bond markets have continued to function smoothly, with spreads contained so far (see **Overview**, **Chart 2**, panel c). That said, some signs of liquidity deterioration emerged around the start of the war in the Middle East, although they were short-lived (**Chart 2.5**, panel b). Higher yields are, however, pushing up debt service costs, while a shift towards issuance with shorter maturities could raise rollover risks. A prolonged energy shock and its adverse impact on inflation, growth and fiscal positions could continue to weigh on sovereign bond markets.

[25] See also Baudino, P.A. et al., "What safe haven after the April US tariff announcement? Implications for euro area financial stability", *Financial Stability Review*, ECB, November 2025.

Chart 2.5

Rising yields and high issuance needs increase rollover and spillover risks in sovereign markets



Sources: Bloomberg Finance L.P., Euro MTS Ltd, S&P Dow Jones Indices LLC and/or its affiliates, MarketAxess and ECB calculations.
Notes: Panel a: solid line indicates the latest observation; dashed line indicates the 26 November 2025 publication date of the last edition of the ECB's Financial Stability Review. Panel b: market liquidity indicators are based on the methodology set out in "Systemic liquidity risk: a monitoring framework", ESRB, February 2025. Indicators are smoothed by a five-day moving average to adjust for seasonal patterns in weekdays. The composite indicator is based on bid-ask spread, bid-ask spread dispersion, market efficiency coefficient, share of non-quoted or non-traded securities, transaction spread, traded volume, turnover ratio and average number of market-makers. Some indicators are available with a time lag and are hence not included in the most recent data points.

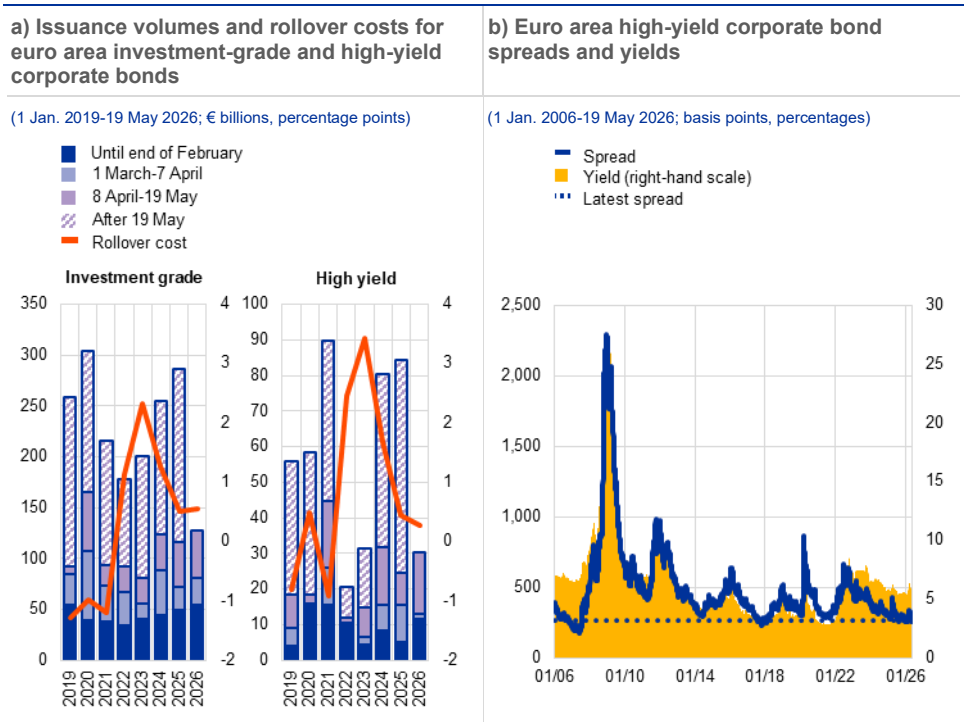
Structural fiscal vulnerabilities and shifts in the investor base may amplify the risks of abrupt repricing in sovereign bond markets, with potential spillovers to corporate bond markets. Changes in the investor base are shaping dynamics in sovereign markets (see **Box 2**), with global hedge funds increasing their presence in euro area sovereign bond markets. While supporting liquidity, their more price-sensitive and, in some cases, leveraged strategies may make market pricing more sensitive to changes in sentiment. At the same time, high sovereign financing needs related, among other things, to defence spending, the green transition and potential fiscal measures to cushion households and firms from rising energy prices, are likely to add to pressures over the medium term (see **Chapter 1**). A scenario of notably weaker growth associated with a more persistent energy shock could trigger a reassessment of fiscal sustainability and an abrupt repricing in sovereign bond markets. Such developments could spill over to corporate financing conditions, reinforcing adverse feedback loops between sovereigns, financial markets and the real economy and posing risks to euro area financial stability.

Spreads on riskier euro area corporate bonds remain compressed, despite heightened geopolitical tensions and strong issuance. In contrast to a slowdown in bank lending to corporates (see **Section 1.3**), issuance of euro area corporate bonds was on track to reach its highest level since the COVID-19 pandemic, until the outbreak of the war in the Middle East (**Chart 2.6**, panel a). This likely reflected benign refinancing conditions, as corporates could refinance at yields that were

similar to yields on bonds they had already issued. Issuance stalled among riskier corporates, as uncertainty rose in March, but picked up again after the ceasefire agreement. Neither the strong issuance nor the increase in geopolitical tensions has led to any significant widening of spreads, which have remained at around their long-term lows for euro area corporates with weaker ratings (**Chart 2.6**, panel b). In addition to market expectations on contained effects of the energy supply shock on risky euro area corporates, there are three possible factors behind this. First, corporate balance sheets are reportedly solid, while worries about fiscal debt sustainability have increased (see **Chapter 1**), which might have led to a convergence of credit risk in corporate and sovereign bond markets. Second, the riskiest issuers may have turned to private credit funding and reduced their issuance of corporate bonds. Third, attractive yields may have bolstered demand and caused investors to be less attentive to whether the spread component was adequately rewarding them for the risks taken.

Chart 2.6

Despite strong issuance and an increase in geopolitical tensions, spreads in euro area corporate bond markets remain compressed



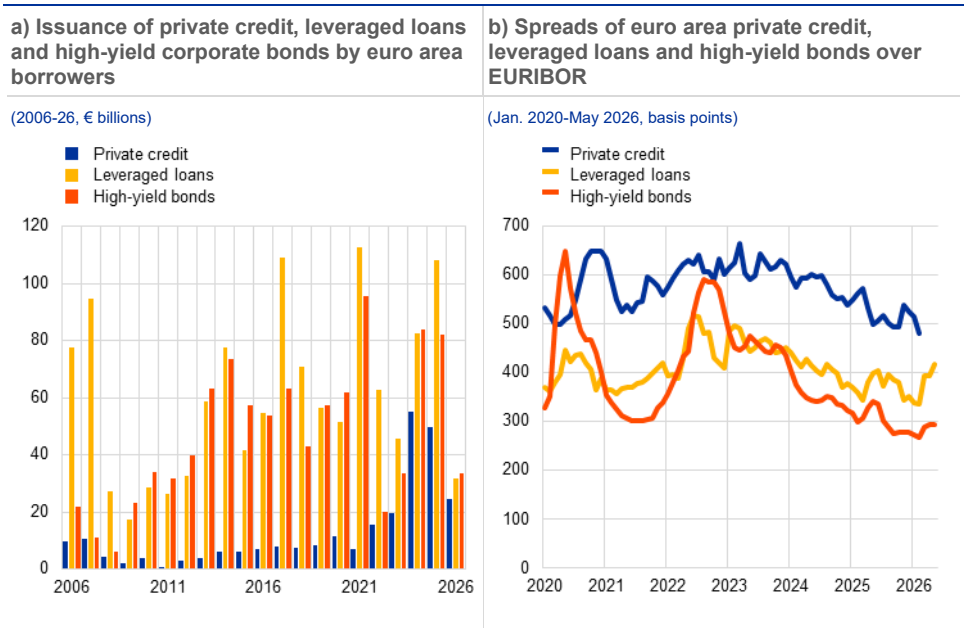
Sources: Dealogic, a service of ION Analytics, Bloomberg Finance L.P., ICE and ECB calculations.
Notes: Panel a: face value-weighted average difference between yield to worst and coupon rate of individual bonds in the ICE BofA Euro Corporate Index and ICE BofA Euro High Yield Index. Average of daily data per month. 28 February: start of the war in the Middle East; 8 April: first day of the ceasefire. Panel b: government option-adjusted spread and yield to maturity of the ICE BofA Euro High Yield Index depicted.

Risks from private credit markets could spill over to other debt markets with a similar risk profile. Private credit now accounts for a significant share of newly extended credit to riskier euro area corporates (**Chart 2.7**, panel a). Starting last autumn, concerns have arisen around the quality of private credit. Such concerns could intensify, should geopolitical tensions erode growth or worsen financing conditions. Survey results point towards investors assessing private credit as the

most likely source of a credit event.[26] Although private credit markets remain small in the euro area, they are characterised by significant cross-border flows and a high level of opaqueness (see **Special Feature D**). Stress in the private credit space could spill over to public bond and leveraged loan markets if private credit were to dry up and companies needed to revert to public bond markets.[27] Spreads that previously compressed simultaneously across private credit, leveraged loan and high-yield bond markets (**Chart 2.7**, panel b) might then rise in tandem.

Chart 2.7

Risk from private credit markets might spill over to other risky debt markets



Sources: PitchBook, a Morningstar company, Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: debt amount is used as the measure of issuance for private credit loans. As loan volume data are missing for a subset of transactions, the private credit series likely understates total issuance and should be interpreted as a lower bound. Amendments and repricings are excluded from the leveraged loan and high-yield bond series to isolate new financing activity. This distinction cannot be implemented for private credit data; however, given the opacity and bespoke structure of such transactions, amendments and repricings are expected to represent a relatively small share of overall private credit volumes. Latest available data are as of 19 May 2026 for private credit and 15 May 2026 for leveraged loans and high-yield bonds. Panel b: "Spreads" refers to euro area firms. Private credit and leveraged loans are priced over EURIBOR. High-yield bond spreads are measured using the ICE BofA Euro High Yield Corporate OAS. Series are shown as three-month rolling averages. Private credit spreads are trimmed at the 5th and 95th percentiles within the month. The latest available data are shown as of 19 May 2026. Due to insufficient observations, private credit spreads are shown only until February 2026. The cited data on both panels has not been reviewed by PitchBook analysts and may be inconsistent with PitchBook methodology.

Box 2

Along the curve: investor reallocation in euro area government bonds

Prepared by Carlos Miguel Aguiar da Glória, Paolo Alberto Baudino, Julian Metzler and Manuela Storz

After a period of relative flatness, the yield curve for euro area government bonds (EGBs) steepened markedly in 2025, driven mainly by rising yields at the long end. This trend has persisted amid continued upward pressure on yields, particularly for maturities beyond ten years. It

[26] In the March Bank of America global fund manager survey, a record high 63% of respondents said that private equity/private credit would be the most likely source of a credit event and according to the April and May editions, US shadow banking (e.g. private credit) has been considered the most likely source of a systemic credit event.

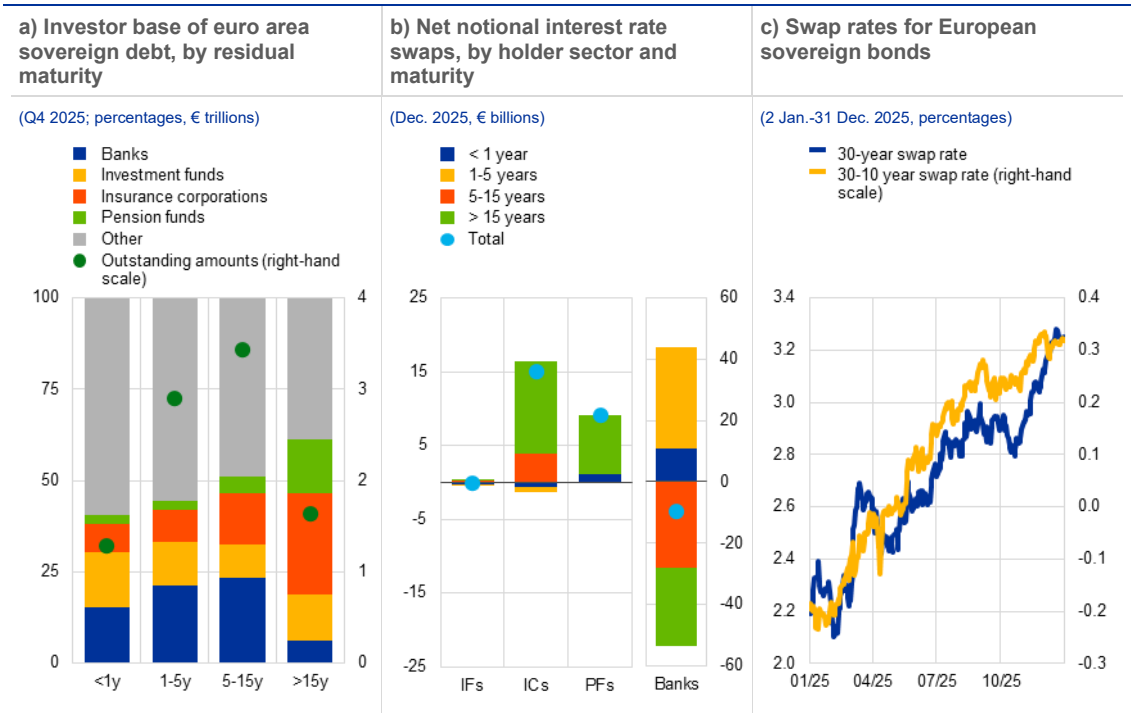
[27] Data from PitchBook show that around a quarter of euro area corporates that issued high-yield bonds and close to a third of companies that receive leveraged loans also received private credit between 1990 and 2025.

reflects several factors, including fiscal expansion in response to geopolitical uncertainty, reduced demand from central banks and structural shifts such as the recent Dutch pension fund reform.[28] This box sheds light on the role that euro area investor composition plays in EGB markets in a context of steepening yield curves.

Euro area non-banks hold over 50% of outstanding long-dated EGBs and are thus particularly exposed to valuation losses when long-term interest rates rise. Investor composition in EGB markets depends heavily on the maturity bucket concerned: whereas banks and foreign investors generally hold the largest share of EGBs, it is euro area non-banks that hold the majority of sovereign debt at very long maturities (**Chart A**, panel a). Insurance corporations and pension funds typically hedge the duration gap on their balance sheets by holding long-term bonds and acting as fixed-rate receivers in interest rate swaps, with banks as the main counterparties in such transactions (**Chart A**, panel b). Swap rates for 30-year maturities have risen above ten-year rates, increasing the cost of hedging interest rate exposure at very long maturities (**Chart A**, panel c).[29]

Chart A

NBFIs are particularly exposed to a steepening of the yield curve through the impact of valuation effects on their EGB portfolios and the increasing cost of hedging interest rate risk



Sources: ECB (SHS, EMIR), Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: Eurosystem holdings are excluded from the amounts outstanding. Panel b: net notional positions in euro-denominated fixed-receive interest rate swaps, broken down by residual maturity (less than 1 year, between 1 year and 5 years, between 5 years and 15 years, more than 15 years). The data cover outstanding contracts referencing the euro short-term rate (€STR), the euro overnight index average (EONIA) and the interbank offered rate (EURIBOR), as reported by euro area institutions. Notional exposures are netted at the level of each reporting institution within each maturity bucket. Sector enrichment based on Lenoci and Letizia*. IFs stands for investment funds; ICs stands for insurance corporations; PFs stands for pension funds.
*) 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 International Publishing, 2021.

[28] See Böninghausen, B. and Vladu, A.L., "Sloping up: the repricing of euro area yields in 2025", *The ECB Blog*, ECB, 16 January 2026.

[29] The absolute cost of hedging depends on a range of variables which, beyond the swap rates, also include the net present value of the institution's liabilities.

Euro area investors in EGBs react more strongly to changes in yields in other maturity segments than to changes in yields for the bonds they currently hold. Granular data on sectoral holdings of sovereign bond can be used to estimate demand elasticities for changes in yield across different maturity buckets.[30] Although positive and statistically significant across investor sectors, the elasticity of holdings for the "own" maturity yield is smaller than the cross-maturity elasticity. This suggests that investors are more likely to reallocate away from a given maturity bucket when yields rise in alternative segments (**Chart B**, panel a).[31]

As a result, a shift in the yield curve may trigger portfolio rebalancing across maturities rather than a proportional expansion of holdings within each bucket. In the event of yield curve steepening, non-banks may leverage a positive rebalancing effect to stabilise longer-term bond yields. The extent to which non-banks do this depends on whether the drivers of the steepening are a bigger drop in the short-term rate or a bigger increase in the long-term rate. Given the greater cross-elasticity towards other maturity buckets, non-banks' demand for long-term EGBs increases more if short-term rates fall than if long-term rates rise. Hence, during a steepening episode, non-banks generally increase their demand for long-term EGBs, but the magnitude of this increase is somewhat procyclical.

The presence of non-euro area investors in EGB markets increasingly reflects foreign hedge fund activity seeking to benefit from greater yield volatility. Data limitations prevent a decomposition of the foreign investor segment to estimate shifts in EGB holdings. For this reason, derivatives transaction data are used to gain insights into the behaviour of hedge funds from outside the euro area. Hedge funds pursuing arbitrage strategies have become an increasingly important source of liquidity in EGB markets.[32] Hedge fund activity in the EGB futures market during 2025 showed short positions concentrated in the first half and a marked repositioning towards the end of the year (**Chart B**, panel b). Notably, they maintained short positions in futures on very long-dated EGBs, potentially seeking to profit from heightened yield volatility at the long end of the curve.

30 See Jansen, K., Wenhao, L. and Schmid, L., "Granular Treasury Demand with Arbitrageurs", *NBER Working Paper Series*, No 33243, National Bureau of Economic Research, 2024.

31 The extent to which reallocation takes place along the yield curve is proportional to the amount of the actual sectoral holdings in the different buckets, as well as the investment mandate. As the "other yield" is calculated as an average across yields of holdings in other buckets, it represents to a larger extent long-term yields for sectors with sizeable holdings in long-term bonds, such as insurance corporations and pension funds. Banks and investment funds, on the other hand, are more heavily represented in shorter maturity bonds, meaning that the "other yield" represents a stronger tendency to reallocate to that part of the yield curve.

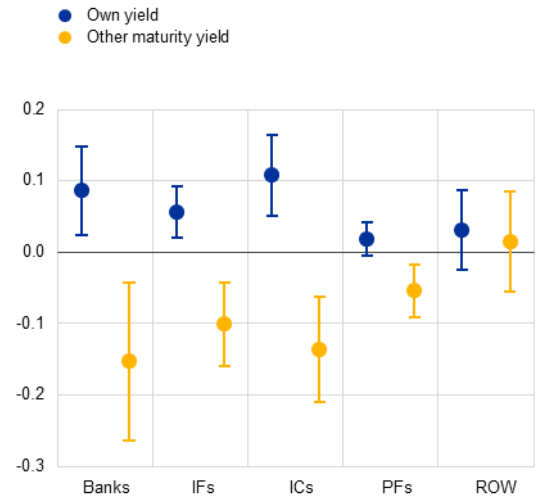
32 Given that the EMIR dataset only provides a view on the activity of non-euro area hedge funds in the European market, and not their offshore activities, this box can only refer to their dealings in the European market and cannot make a statement on the underlying hedge fund trading strategies that might be driving the activity.

Chart B

Changes in the yield curve prompt holder sectors to rebalance their exposure across different maturities, while hedge funds take positions in the EGB futures market to arbitrage pricing frictions

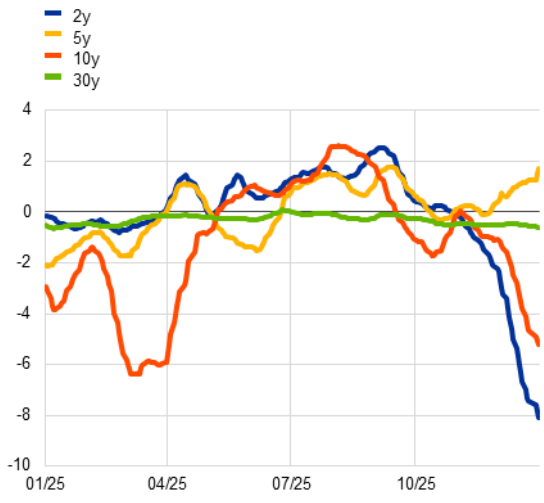
a) Impact of a 1 percentage point increase in own and other maturity yield on EGB holdings across investors

(Q1 2016-Q3 2025; regression coefficients, percentages of GDP)



b) Positions of selected hedge funds in EGB futures, by residual maturity of the underlying securities

(2 Jan.-31 Dec. 2025; net notional outstanding, € billions)



Sources: Eurostat, ECB (CSDB EMIR, MNA, SHS) and ECB calculations.
Notes: Panel a: the approach estimates demand elasticities to yields in different maturity buckets across sectors, based on security holdings data from Q1 2016 to Q3 2025. The respective maturity buckets are less than 1 year, between 1 year and 5 years, between 5 years and 15 years, and more than 15 years. The underlying model for estimating investor demand elasticities to yields in the own maturity bucket and cross-elasticities to yield changes in other maturity buckets is based on Jansen et al.* The regression equation follows the form: $D_t^i(m) = \beta_0^i + \beta_1^i y_t^i(m) + \beta_2^i y_t^i(-m) + \beta_3^i X_t + \gamma_c^i + \gamma_m^i + u_t^i(m)$, where $D_t^i(m)$ is the granular demand of sector *i* at time *t* for EGBs in maturity bucket *m*, $y_t^i(m)$ is the average yield to maturity in maturity bucket *m*, called "own yield", and $y_t^i(-m)$ is the average yield to maturity of all EGBs outside of bucket *m*, called "other maturity yield". X_t is a vector of macro variables including GDP, year-on-year GDP growth, sovereign debt-to-GDP ratio and core inflation at country level. γ represents fixed effects at the maturity bucket (m) and issuer-country (c) level. In line with Jansen et al.* and Fang et al.**, to address endogeneity concerns we instrument yields at the maturity-bucket and issuer-country level by regressing demand and supply on the macro variables and deducting a "pseudo-yield" from a market clearing condition. IFs stands for investment funds; ICs stands for insurance corporations; PFs stands for pension funds; ROW stands for the rest of the world, i.e. all non-euro area investors. Panel b: the sample comprises futures on German, French and Italian government bonds traded on Eurex, the most liquid and actively traded EGB futures market. Positions are measured as net open interest and netted at the level of the reporting counterparty and individual contract. Contracts are grouped according to the residual maturity of the underlying deliverable bonds (2-year, 5-year, 10-year and 30-year segments), allowing a decomposition of positioning along the maturity spectrum. The chart shows positions for a subset of hedge funds identified in the EMIR dataset as actively trading EGB futures during the sample period (2025).
*) Jansen, K., Wenhao, L. and Schmid, L., "Granular Treasury Demand with Arbitrageurs", *NBER Working Paper Series*, No 33243, National Bureau of Economic Research, 2024.
**) Fang, X., Hardy, B. and Lewis, K.K., "Who Holds Sovereign Debt and Why It Matters", *The Review of Financial Studies*, Vol. 38, Issue 8, August 2025, pp. 2326-2361.

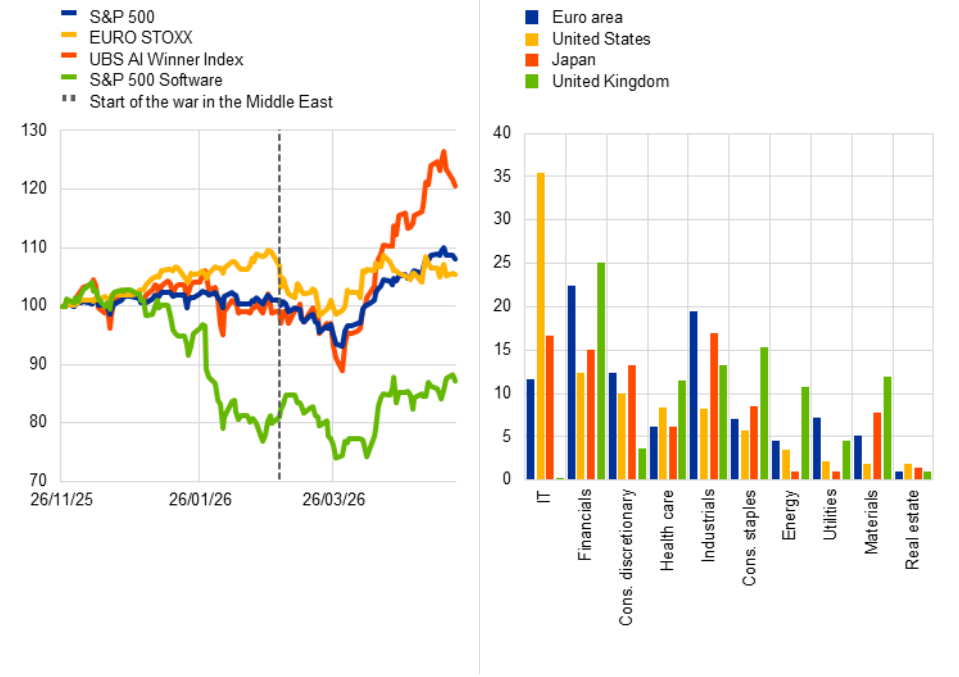
2.3 Concentrated exposures could increase the risk of abrupt cross-asset repricing

Prior to the resurgence of geopolitical risk (see Section 2.1), markets were mainly driven by a growing differentiation in AI-related exposures. It appears that, since the start of the year, investors have increasingly recognised that there are two sides to AI-related risk. On the one hand, there are long-standing concerns that AI could disappoint the lofty expectations associated with its ability to boost productivity and generate high earnings for "hyperscalers" − companies that operate large-scale cloud infrastructure and are expected to benefit from growing AI demand. This would be despite the good track records such companies have in meeting their earnings expectations. The result has been falling valuations across an index of "AI winners", although they have more than recovered since the end of March, driven by

a general turn in risk sentiment and strong earnings reports (**Chart 2.8**, panel a). On the other hand, worries have emerged that AI could exceed expectations. This could, in an extreme case, lead to a significant rise in unemployment or, in a more likely scenario, disrupt existing business models and structures in sectors like software. These worries are reflected in the sharply falling prices of software-related stocks.

Chart 2.8

Two-sided risks to the AI narrative moved markets before the outbreak of the war in the Middle East



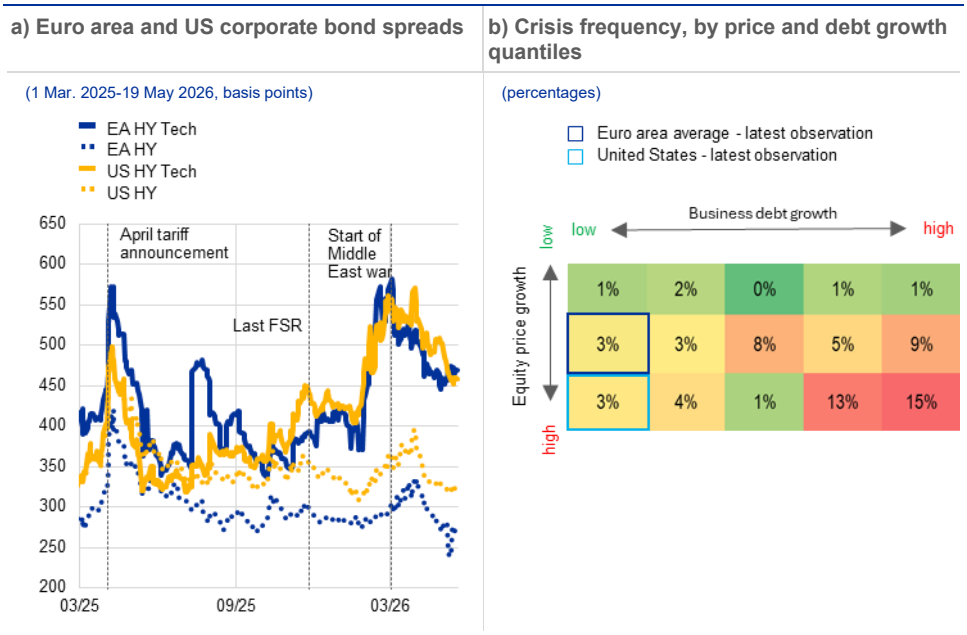
Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: detailed information on the UBS AI Winner Index (UBSXAIW Index) can be found in the associated Index Guideline. Indices are indexed to the 26 November 2025, publication date for the last edition of the ECB's Financial Stability Review.

Euro area equity markets appear less exposed to sectors at risk of being replaced by AI, but they could be vulnerable to changes in global risk sentiment. Broad euro area equity markets have been less affected by concerns around the software sector and AI investments than their US peers due to smaller IT exposures (**Chart 2.8**, panel b). Therefore, euro area equities outperformed their US peers for a short time. However, euro area equities started to underperform US markets after the war in the Middle East broke out, on account of the euro area's higher reliance on imported energy (see **Section 2.1**). Going forward, global equity markets may be driven by their dominant sectors' vulnerability to replacement by AI. Sectors that rely less on physical assets and more on intangible assets (such as IT and financials) could be particularly exposed, while sectors that are characterised more by significant investments in tangible, long-lived assets (such as industrials and utilities) could be better shielded. In addition, global markets are likely to be affected by changes in risk sentiment due to AI earnings prospects or disappointments, even in unrelated sectors or regions.

Debt markets are also signalling concerns about the IT sector, and the increased reliance of AI-related companies and infrastructure on debt financing warrants attention. In addition to equity markets, debt markets are now also showing signs of AI-related concerns, as the bond spreads of riskier IT companies have widened significantly more than broad bond spreads (**Chart 2.9**, panel a). While a large part of the AI-induced spending boom has been financed from profits, AI-related companies and infrastructure have started to rely increasingly on credit financing. This could become an issue from a financial stability perspective. Strong growth in either equity prices or business debt in isolation has not been associated with financial crises in the past. That said, 15% of those years that showed particularly strong growth in both equity prices and business debt have been followed by a financial crisis within two years (**Chart 2.9**, panel b). Equity price growth in the United States has been very rapid of late, but business debt growth currently stands at low levels for both the United States and the euro area. Nonetheless, it will be important to closely monitor whether the increasing credit financing of AI-related companies and infrastructure translates into a significant upswing in business debt.

Chart 2.9

Greater debt financing for AI is concerning for financial stability, as strong growth in both equity valuations and business debt preceded past crises



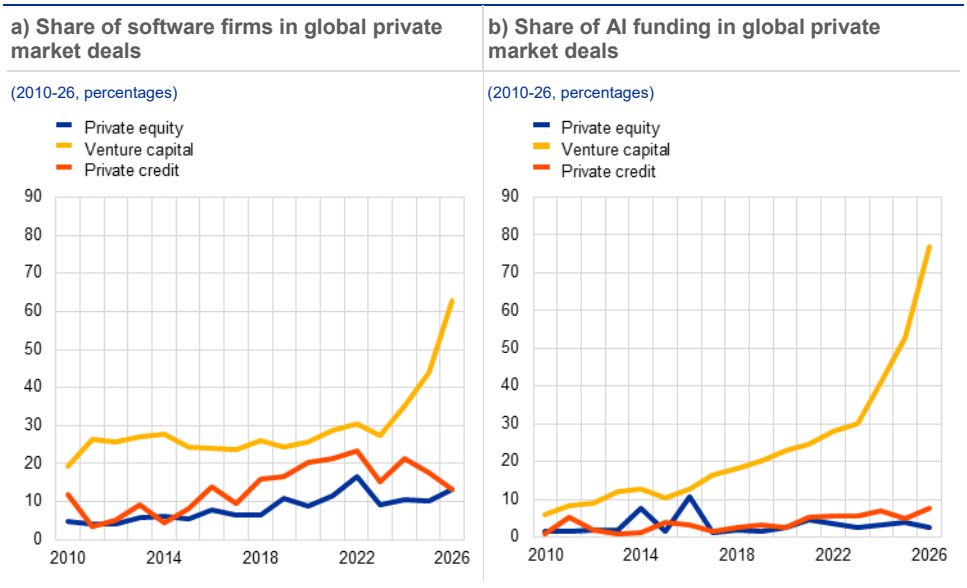
Sources: Jordà, Schularick and Taylor*, IMF, Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: corporate bond spreads calculated over the OIS swap curve and weighted by market value. EA stands for euro area; HY stands for high yield. Panel b: based on Greenwood et al.** Three-year change in business debt-to-GDP, three-year equity price growth, start of a crisis within the next two years. Current positions are calculated using 2024 debt-to-GDP figure and 2025 equity price. "Euro area average" consists of average of Belgium, Germany, Spain, France, Italy, Netherlands, Portugal and Finland. Probabilities are calculated using data terciles and quintiles with financial crisis indicators over total period.
*) Jordà, Ò., Schularick, M. and Taylor, A.M., "Macrofinancial History and the New Business Cycle Facts", in Eichenbaum, M. and Parker, J.A., *NBER Macroeconomics Annual 2016*, Vol. 31, National Bureau of Economic Research, 2017.
**) Greenwood, R., Hanson, S.G., Shleifer, A. and Sørensen, J.A., "Predictable Financial Crises", *The Journal of Finance*, Vol. 77, Issue 2, 2022, pp. 863-921.

Private markets are exposed to both sides of AI-related risk. The share of deals that involve software firms with venture capital and private equity has increased sharply and is also significant for private credit (**Chart 2.10**, panel a). At the same

time, venture capital and private credit are also particularly important sources of funding for AI-related investments (**Chart 2.10**, panel b). With their traditionally longer investment horizons and higher risk-bearing capacities, private markets appear well suited to financing these more innovative, higher-risk companies. Nonetheless, risks might be especially significant for private credit investors. This is because losses incurred by such investors due to the failure of AI or software firms are not counterbalanced by participation in the success of other companies in their portfolio, as is the case for private equity and venture capital.

Chart 2.10

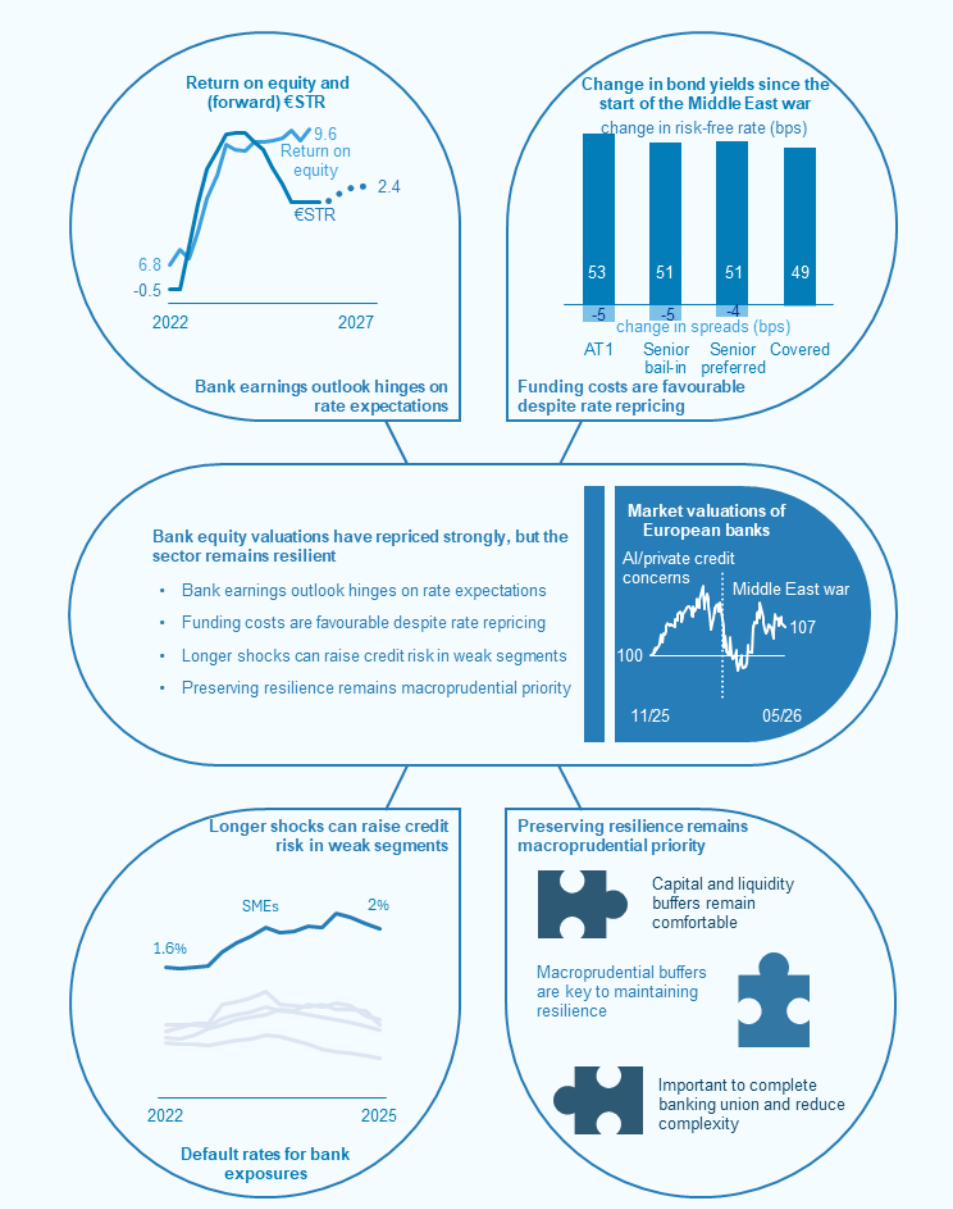
Private markets are highly exposed to both sides of AI-related risk



Sources: PitchBook, a Morningstar company, and ECB calculations.
Notes: Panel a: global private market transactions divided by primary industry sector and primary industry group. Panel b: AI funding share refers to deals involving firms operating in the PitchBook-defined verticals "Artificial intelligence and machine learning", "Big Data" and "Cloudtech and DevOps". Deals in both panels are not mutually exclusive, as a software firm might operate in these verticals. This is particularly relevant for venture capital deals. The cited data in both panels has not been reviewed by PitchBook analysts and may be inconsistent with PitchBook methodology. Both panels show the latest available data as of 19 May 2026.

Concentrated exposures to both sides of AI-related risk across markets set the stage for abrupt cross-asset repricing should sentiment shift further. Increased differentiation in AI-related exposures aids price discovery and, provided it happens gradually, might be beneficial in terms of financial stability. There are, however, concentrated exposures to AI-related investments and to sectors whose business models could be challenged by AI across public and private equity and debt markets. This leaves room for non-linear correlated losses for investors in various scenarios, especially in an environment of rising volatility and increasing sensitivity to tail risks (see **Section 2.1**). The currently high earnings growth of the largest AI-related companies might also be supported by growing interrelated business activities, which could amplify spillover effects if risks were to materialise. In addition, the current energy shock could interact with AI-related risk, as rising energy demand from AI-related infrastructure and data centres may further amplify cost pressures and investment needs in the AI sector.

3 Euro area banking sector



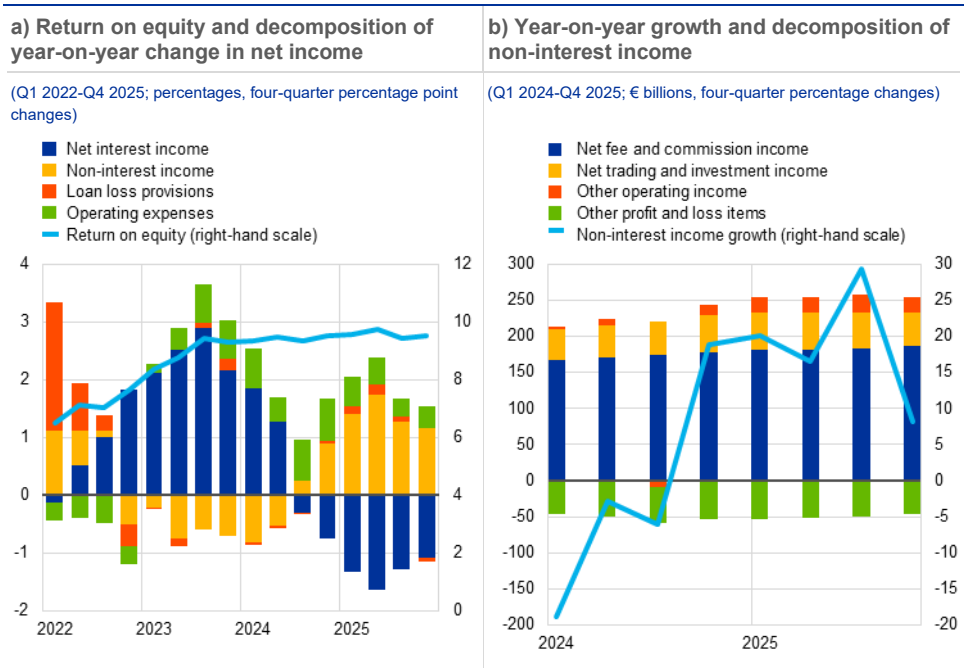
3.1 Aggregate bank profitability remains strong in a changing operating environment

Headline bank profitability remains strong, but revenue growth has decelerated. Banks' return on equity was hovering close to 10% in 2025. This came about despite a further decline in net interest income, which was offset by growth in non-interest income and an improved contribution from operating expenses (**Chart 3.1**, panel a). Non-interest income has been the largest driver of revenue growth since the ECB first started cutting rates again in June 2024, although its

contribution has diminished recently. Since the end of 2025, growth in non-interest income has come mainly from less conventional sources of income. By contrast, both net fee and commission income and net trading income, which together account for the bulk of banks' non-interest income, have remained at similar levels (**Chart 3.1**, panel b).[33] Going forward, the strength of banks' profitability remains uncertain, as revenue growth has relied heavily on historically volatile income streams. At the same time, rising IT and cybersecurity investment needs may add upward pressure on costs, amid heightened geopolitical uncertainty (see **Box 1**).

Chart 3.1

Euro area banks' profitability has increased slightly, supported by non-interest income



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. Income items are defined as the four-quarter trailing sum of flows divided by the book value of equity in a given quarter. Panel a: return on equity calculated as the four-quarter trailing sum of income items divided by the book value of equity in a given quarter. Panel b: "Other profit and loss items" are the residual, defined as the difference between net income and net interest income, non-interest income, loan loss provisions and operating expenses.

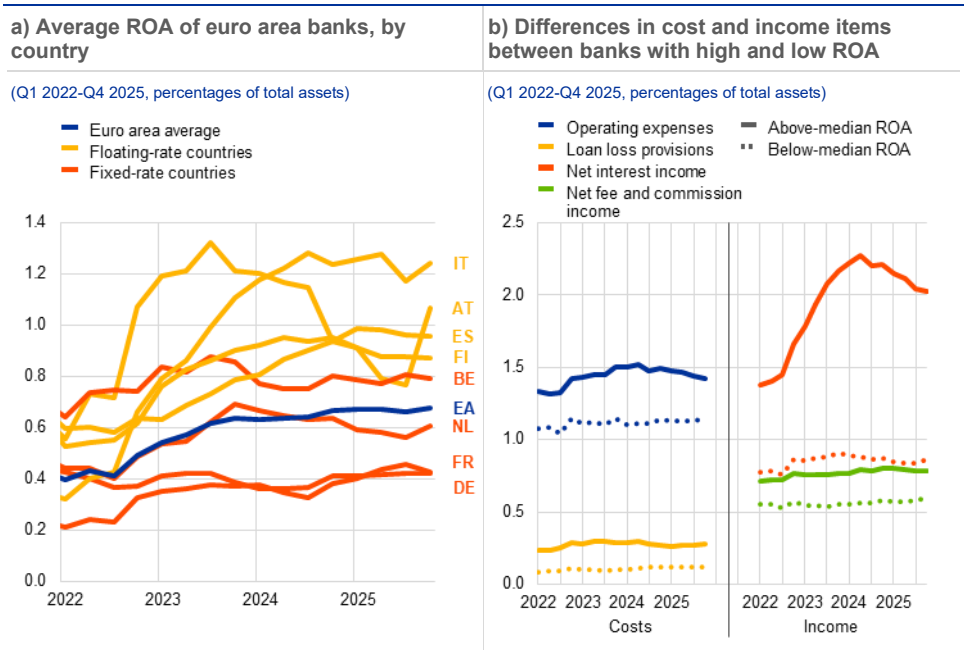
Bank profitability varies significantly across countries, due to persistent differences in net interest income. Since 2022 pronounced differences in bank profitability have emerged across euro area countries (**Chart 3.2**, panel a). Most of the dispersion is still driven by net interest income differentials that can be traced back to variations in structural factors, including interest rate fixation practices and competition within individual countries (**Chart 3.5**, panel c). That said, the gradual convergence of banks' net interest income has reduced the income gap between low and high earners. However, other factors have increased the differences, as it has been mainly banks with high returns that have experienced a decline in operating expenses relative to total assets (**Chart 3.2,** panel b). Moreover, the recent rise in

[33] The main drivers of the improvement in non-interest income were higher net gains on non-trading financial assets (mandatorily at fair value through profit or loss) and other operating income (for which a further breakdown is not available).

benchmark rates could lead to a renewed widening of the net interest income gap, reinforcing the differences between high and low earners.

Chart 3.2

Differences in profitability persist across countries and banks



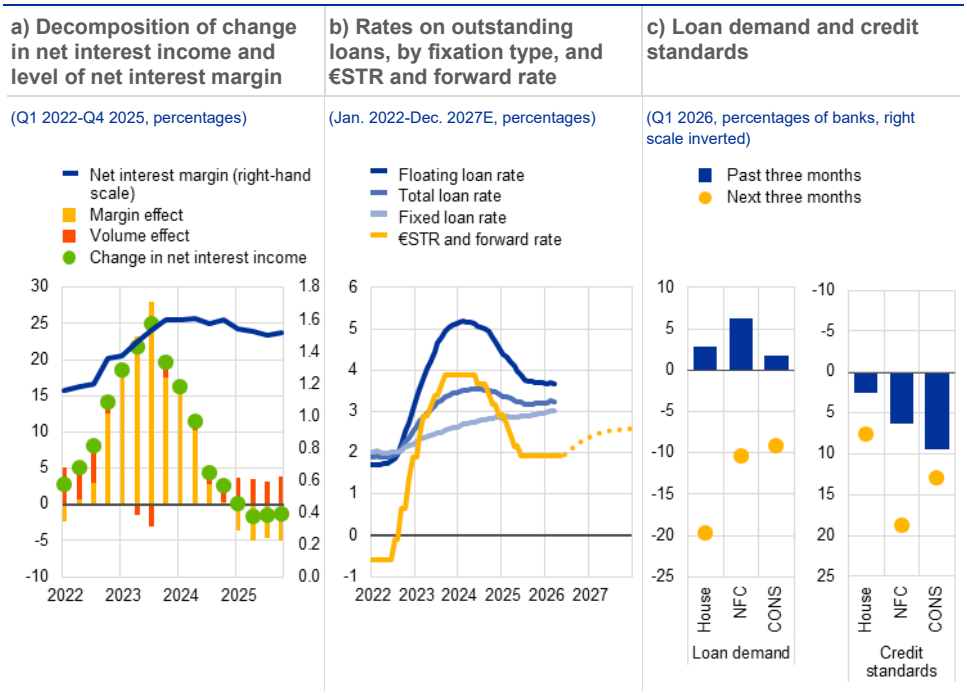
Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. ROA stands for return on assets. It is calculated as the four-quarter trailing sum of net income divided by the book value of total assets in a given quarter. Panel a: only the eight largest countries in terms of total assets with a minimum of three banks are shown. Floating-rate countries are those with a share of floating-rate corporate lending above 50%. EA stands for euro area. Panel b: the sample of above- and below-median ROA is fixed in Q4 2025 to prevent banks moving between categories. Contributions from net trading income, other operating income and other profit and loss items are not included in the comparison.

Net interest income has continued to decline, but the recent change in market rates could support an improving outlook. As a further erosion of margins outweighed modest volume growth, net interest income declined slightly in 2025 (**Chart 3.3**, panel a). These aggregate developments conceal two diverging trends: floating loan rates have declined steadily since the first ECB rate cut in 2024, while fixed loan rates have continued to rise (**Chart 3.3**, panel b). However, there are incipient signs that net interest income may have passed its trough, as net interest margins increased slightly during the last quarter of 2025, and the dynamics could change even more significantly in the light of developments in the Middle East. As market participants have started to price in rising benchmark rates in the course of 2026, bank analysts have lifted their forecasts for net interest income. While higher interest rates tend to increase net interest income,[34] the outlook is made more uncertain by the ongoing bear flattening of the yield curve, substantially lower loan demand and tighter credit standards (**Chart 3.3**, panel c).

[34] Banks are required to report on interest rate risk in the banking book. Based on a sample of 95 euro area significant institutions, 75% of those banks expect that a parallel upward shift of the yield curve by 200 basis points would increase net interest income. However, the rate sensitivity to upward shifts of the yield curve has diminished over time (on average, +7.8 percentage points in the fourth quarter of 2023 compared with +3.7 percentage points in the fourth quarter of 2025).

Chart 3.3

The outlook for net interest income turns more uncertain with current developments



Sources: ECB (supervisory data, BSI, BLS, MIR), Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: based on a full sample of euro area significant institutions. Panel b: based on a full sample of euro area monetary financial institutions. Lending rates are the weighted average outstanding rate on all retail lending, including non-financial corporate, house purchase and consumption loans. Panel c: numbers refer to the percentage of banks indicating a net increase in loan demand (left graph) and a net tightening in credit standards (right graph). The scale on the right graph is inverted, as positive numbers indicate a tightening. "House" stands for household for house purchase; NFC stands for non-financial corporations; CONS stands for consumer credit.

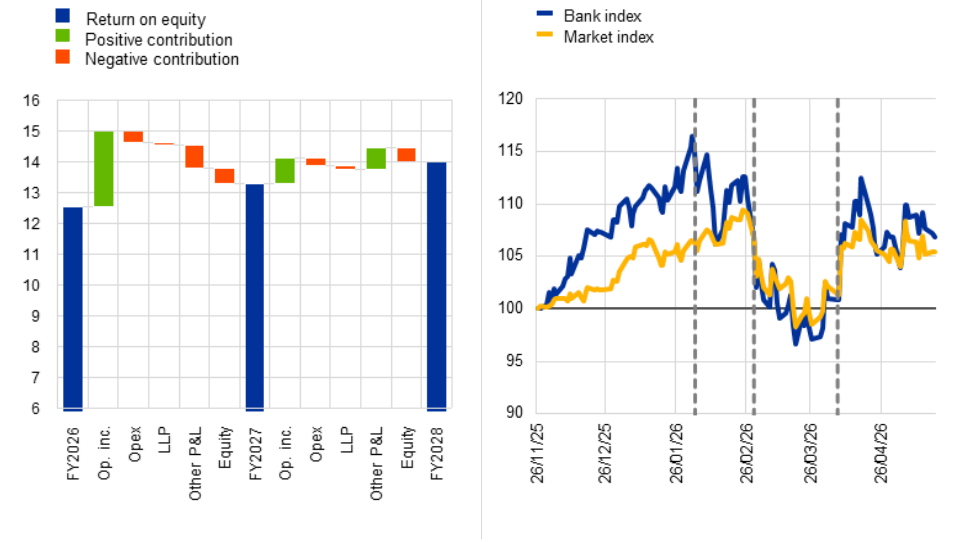
While recent events have affected the stock market valuations of euro area banks, profitability projections have remained strong. Analysts anticipate improved returns on equity for 2026 and 2027 on higher operating income (**Chart 3.4**, panel a). The war in the Middle East has further strengthened these expectations, given the impact of higher interest rates and financial market volatility on net interest income and trading and fee income. Expectations of improved profitability and payouts contributed to the continuing outperformance of euro area bank stocks until early 2026. However, concerns about private credit exposures and the potentially disruptive impact of artificial intelligence on business models triggered a decline in bank stock valuations on both sides of the Atlantic from February, especially for global systemically important banks.[35] The decline further intensified following the outbreak of the war in the Middle East and valuations have remained volatile following the ceasefire agreement (**Chart 3.4**, panel b).

Looking ahead, profitability projections and share prices will continue to be subject to downside risks. Geopolitical uncertainties may affect economic growth in a way not yet accounted for in forecasts, and heightened financial market volatility bears risks as well as opportunities for non-interest income. As the banking sector is one of the most cyclical given its leverage, its profitability and stock market

[35] For an analysis of banks' exposure to private markets, see Special Feature D in this edition of the Financial Stability Review.

valuations remain sensitive to overall market dynamics and, in particular, the macroeconomic outlook (see **Box 3**).

Chart 3.4
Volatile environment shapes operating profit expectations and valuations



Sources: LSEG, Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: based on a sub-sample of 25 banks from the EURO STOXX Banks index, using mean as consensus. The cut-off date is 19 May 2026. "Op. inc." stands for operating income; "Opex" stands for operating expenses; LLP stands for loan loss provisions; P&L stands for profit and loss. Panel b: the indices used are EURO STOXX Banks for banks and EURO STOXX for markets. Cumulative percentage changes with 26 November 2025, the publication date for the last edition of the ECB's Financial Stability Review, set at 100. The cut-off bars refer to 2 February, 27 February and 7 April 2026 for the last trading days before the start of the artificial intelligence/private credit concerns, the war in the Middle East and the ceasefire announcement respectively.

Box 3
The drivers of the 2025 surge in euro area banks' market valuations

Prepared by Dejan Krušec, Riccardo Meli and Csaba Móré

The market valuations of euro area banks rose sharply between the start of 2025 and early 2026 to reach levels last seen before the global financial crisis. Following more than a decade of persistently depressed valuations and low profitability,[36] euro area banks' price-to-book (P/B) ratios have been on an upward curve since late 2022, with the most significant increase seen during 2025. Euro area banks have converged with their US peers in terms of profitability, and consequently the gap between euro area and US bank valuations has narrowed significantly (**Chart A**, panel a). By February 2026, the euro area aggregate P/B ratio had reached a level not seen since before the global financial crisis, although it then receded, mainly due to the outbreak of war in the Middle East. In the period up to February 2026, increased shareholder payouts and an expectation that high payouts would continue for the next couple of years, along with a rising

[36] For an assessment of the reasons for low valuations in earlier periods, see Grodzicki, M., Rodriguez d'Acri, C. and Vioto, D., "Recent developments in banks' price-to-book ratios and their determinants", *Financial Stability Review*, ECB, May 2019, and Bochmann, P., Grodzicki, M., Kick, H., Klaus, B. and Pancaro, C., "Euro area bank fundamentals, valuations and cost of equity", *Financial Stability Review*, ECB, November 2023.

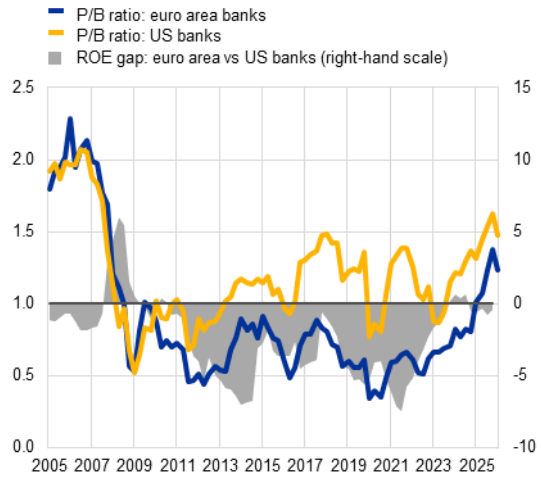
proportion of share buybacks, may have also helped to make euro area bank shares more attractive for investors (**Chart A**, panel b).

Chart A

The marked increase in euro area bank valuations up to early 2026 was aided by a sustained improvement in profitability and increased payouts to shareholders

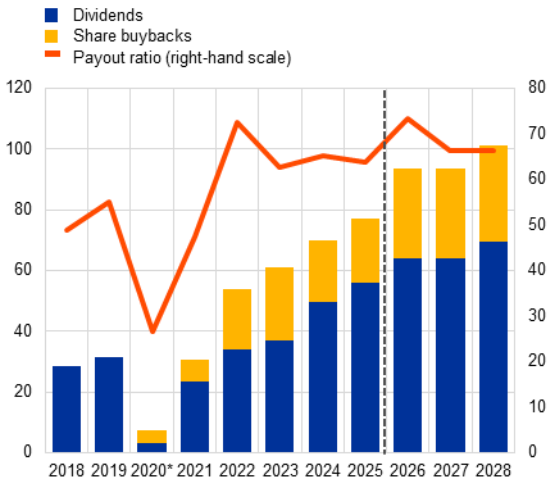
a) Banks' P/B ratios in the euro area and the United States, and the ROE gap between euro area and US banks

(Q1 2005-Q1 2026; multiples, percentage points)



b) Capital returned to shareholders by listed euro area banks

(2018-25, estimates for 2026-28; € billions, percentages)



Sources: Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: the price-to-book (P/B) ratio and return on equity (ROE) are based on banks in the EURO STOXX Banks index for the euro area and the KBW Nasdaq Bank index for the United States. Panel b: based on a sample of 28 banks (members of the EURO STOXX Banks index). The payout ratio is calculated as total return to shareholders divided by adjusted net income. Total return to shareholders is the sum of dividends paid and the value of share buybacks. The payout ratio is weighted by adjusted net income at bank level. *Payouts for the 2020 financial year were affected by the ECB recommendation that, until at least 1 October 2020, banks should not pay out dividends and should refrain from share buybacks aimed at remunerating shareholders.

The 2025 surge in banks' P/B ratios has raised questions about the sustainability of high valuations going forward and the risks for financial stability. While high market valuations for banks may reflect strong earnings power, they could also signal investor over-optimism and compressed equity risk premia. If the expectations for economic growth or banks' return on equity are not met, risk premia could be abruptly reassessed. Banks would not need to raise equity as long as they were not confronted by large losses. Nonetheless, a marked fall in equity valuations could weigh on investor confidence and, through increasing the cost of equity, could also influence banks' lending behaviour.

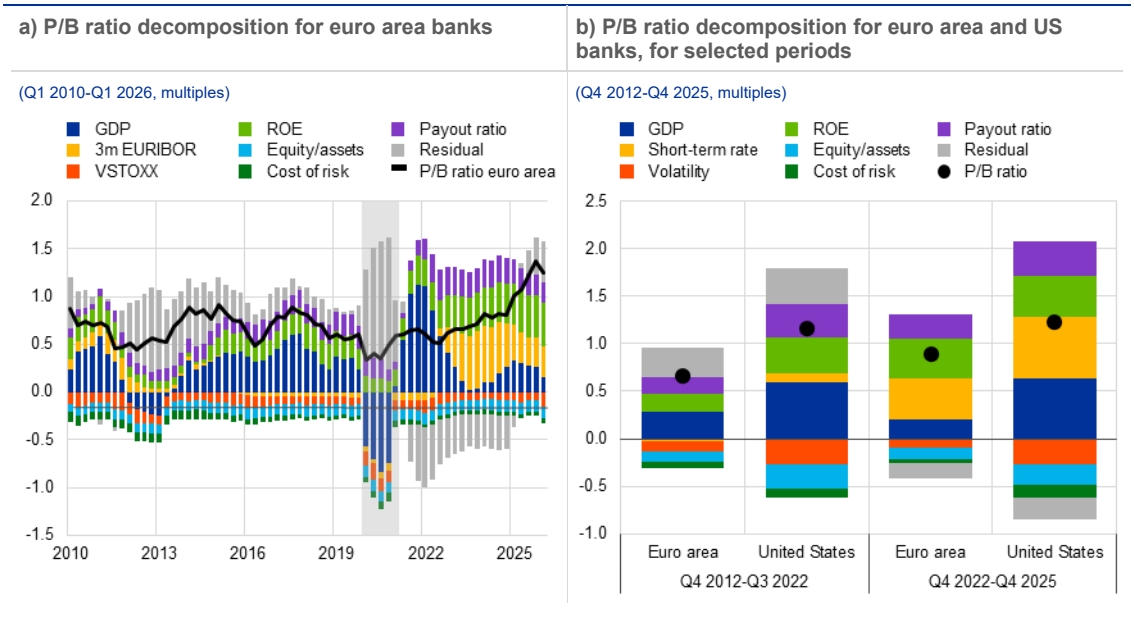
This box summarises an empirical investigation into the main drivers behind the marked increase in euro area bank valuations and the factors explaining the remaining gap with US banks. Specifically, the box decomposes euro area and US banks' P/B ratios into macroeconomic, bank-specific and market determinants,[37] drawn from the literature on the drivers of banks'

[37] Macroeconomic variables include real GDP growth and short-term interest rates (three-month EURIBOR and three-month Treasury bills), while bank-specific fundamentals include measures of profitability (return on equity), capitalisation (equity/total assets), asset quality (cost of risk, defined as provisions divided by total loans) and payout ratios (defined as the sum of dividends and share buybacks divided by adjusted net income). Finally, market volatility is accounted for by including the VSTOXX and VIX indices.

price/book ratios.[38] The breakdown is carried out using a Vector Error Correction Model (VECM). VECMs are run for the euro area and US aggregate P/B ratios, with the estimation period spanning from the first quarter of 2005 to the fourth quarter of 2025. The signs and magnitudes of the estimated coefficients are in line with those cited in the literature.[39]

Chart B

Higher bank profitability, payout ratios and short-term rates have all helped to boost euro area bank valuations, with weaker economic growth explaining most of the gap to US banks



Sources: Bloomberg Finance L.P., Haver Analytics, ECB and ECB calculations.
Notes: Panel a: the sample comprises 27 euro area banks. The shaded area indicates the period of the COVID-19 pandemic. Panel b: the sample comprises 27 euro area banks and 23 US banks. Average contributions by factor.

Higher short-term interest rates, bank profitability and payout ratios were the most significant factors contributing to increased euro area bank valuations between 2022 and 2025. Having made a contained, or even slightly negative, contribution for the period from 2010 to 2021, short-term interest rates have since accounted for a sizeable part of the rise in euro area banks' P/B ratios. This was particularly the case during the rate hiking cycle that ran from July 2022 to June 2024 and is consistent with the fact that exiting the low interest rate environment pushed the value of banks' deposit franchises back into positive territory.[40] Similarly, between 2022 and 2025, improvements in banks' fundamentals (profitability) and payout ratios (including both dividends and share buybacks) made a significant positive contribution to higher bank P/B ratios (**Chart B**, panel a). Stronger and more sustainable profitability helps banks to accumulate capital, thereby increasing their capacity to make larger shareholder payouts and reduce their equity risk premia. The residual, which was negative during the post-pandemic period, was close to zero in the

[38] See, for example, Calomiris, C.W. and Nissim, D., "Crisis-related shifts in the market valuation of banking activities", *Journal of Financial Intermediation*, Vol. 23, Issue 3, July 2014, pp. 400-435; Bogdanova, B., Fender, I. and Takáts, E., "The ABCs of bank PBRs", *BIS Quarterly Review*, Bank for International Settlements, March 2018; and Grodzicki, M., Rodriguez d'Acri, C. and Vioto, D., "Recent developments in banks' price-to-book ratios and their determinants", *Financial Stability Review*, ECB, May 2019.

[39] The VECM's explanatory power is also in line with the literature, as the model explains around 50% of the total forward error variance in P/B ratios.

[40] See Pancaro, C., Passantino, V. and Pietsch, A., "The deposit franchise value of euro area banks", *Financial Stability Review*, ECB, May 2025.

middle of 2025 and even turned positive in the third quarter of 2025.[41] This suggests that banks' actual P/B ratios are broadly consistent with their estimated fundamental values, given the assumed long-term relationship between bank valuations and their determinants. Estimates for the first quarter of 2026 suggest that a worsening macroeconomic environment and greater financial market volatility following the outbreak of war in the Middle East had a negative impact on bank valuations.

The persistently lower valuations of euro area banks compared with their US peers mainly reflect differences in macroeconomic conditions rather than bank fundamentals. Estimated results confirm that, on average, the narrowing of the euro area-US bank valuation gap since the fourth quarter of 2022 has been driven mainly by improvements in the profitability of euro area banks. The remaining gap seen since late 2022, can for the most part, be attributed to weaker macroeconomic conditions and, to a lesser extent, continuing lower payout ratios (**Chart B**, panel b).

Based on the estimated models, euro area banks' P/B ratios appear to be broadly in line with past regularities overall but remain vulnerable to negative surprises. The surge in P/B ratios during 2025 could be interpreted as the market value of euro area bank shares being raised from depressed levels as equity investors gradually acknowledged the impact of a positive interest rate environment and a sustained improvement in bank profitability. However, the recent increase in geopolitical uncertainties and the worsening of the macroeconomic outlook could have negative implications for banks' earnings outlooks and equity risk premia. Bank valuation trends should therefore be monitored to detect possible signs of overconfidence.

3.2 Bank funding conditions stay benign, but could tighten

Deposit rates have remained stable but could see upward pressure from higher benchmark rates and increased competition amid scarcer liquidity. Rates paid on overnight deposits, which constitute a large share of bank funding, have been virtually unchanged since August 2025, reflecting stable policy rates. There has been a marginal increase in new business rates on deposits with agreed maturity, in line with rising interbank rates. While the increase in benchmark rates remained modest until the end of February, it has picked up notably since then and could trigger renewed upward pressure on term deposit rates (**Chart 3.5**, panel a). Across countries, deposit rates tend to be higher in less concentrated euro area banking sectors, indicating greater competition (**Chart 3.5**, panel b). As higher deposit rates and fiercer competition also appear to coincide with tighter lending spreads, net interest income is squeezed from both the funding and the lending side (**Chart 3.5**, panel c). Given the high fragmentation of deposit and loan markets within the euro area,[42] differences are likely to persist. Competition for deposits could intensify, however, if liquidity became scarcer, wholesale funding conditions

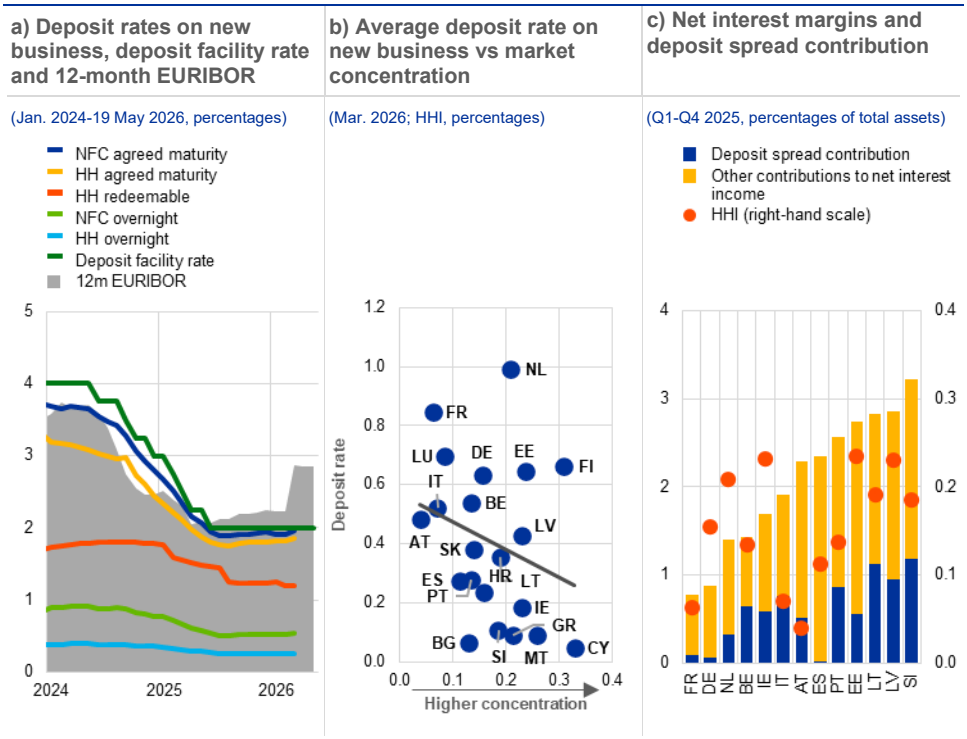
[41] The residuals mainly capture unexplained temporary shocks (e.g. temporary shifts in investor sentiment) which are not explained by the long-run cointegrating relationship. It should be noted that payout ratios, which are cash flow-based, may be understated for the third and fourth quarters of 2025. The residual in these periods should therefore be treated with caution.

[42] See also "Financial Integration and Structure in the Euro Area", ECB, May 2026.

worsened or more aggressive players entered the market.[43] Taking this together with the rising benchmark rates, banks might see some tightening of deposit funding conditions.

Chart 3.5

Deposit rates are broadly stable but very uneven across euro area countries



Sources: ECB (MIR, BSI, supervisory data), LSEG and ECB calculations.
Notes: Panel a: rates on new business until March 2026. NFC stands for non-financial corporation; HH stands for household. Panel b: Herfindal-Hirschmann Index (HHI) on total outstanding deposits in the euro area, consolidated at the bank-country level and calculated as the sum of the squared shares of banks within a market relative to the total deposit market. The new business deposit rate is the total deposit rate by country, including household and NFC deposits at all maturities. Panel c: net interest margins are net interest income divided by total assets. "Deposit spread contribution" is the difference between the hypothetical income earned from placing deposit funds in the overnight money market and receiving the euro short-term rate (€STR) and the actual expense paid on deposits. Reporting countries with less than three banks are excluded due to data confidentiality requirements. Data are consolidated across all exposure regions (including non-euro area) at the bank level.

Bank funding has gradually been shifting back towards a higher share of overnight deposits, supporting profitability at the margin. After contracting during the cycle of interest rate hikes, overnight deposits started to grow again following the first ECB rate cut in June 2024 (**Chart 3.6**, panel a). Although the total share of retail deposits in banks' funding has changed little,[44] the term structure of deposits is important, given the substantial negative spread over policy rates and the rate insensitivity of overnight deposit rates compared with other funding sources.[45]

[43] Digital banks, for instance, tend to engage more in cross-border deposit-taking and face higher deposit financing costs. Competition in the deposit market could intensify beyond country borders, should digital banks gain a larger market share. See Garcia, T., Grodzicki, M. and Radulova, P., "Digital banking: how new bank business models are disrupting traditional banks", *Financial Stability Review*, ECB, May 2025.

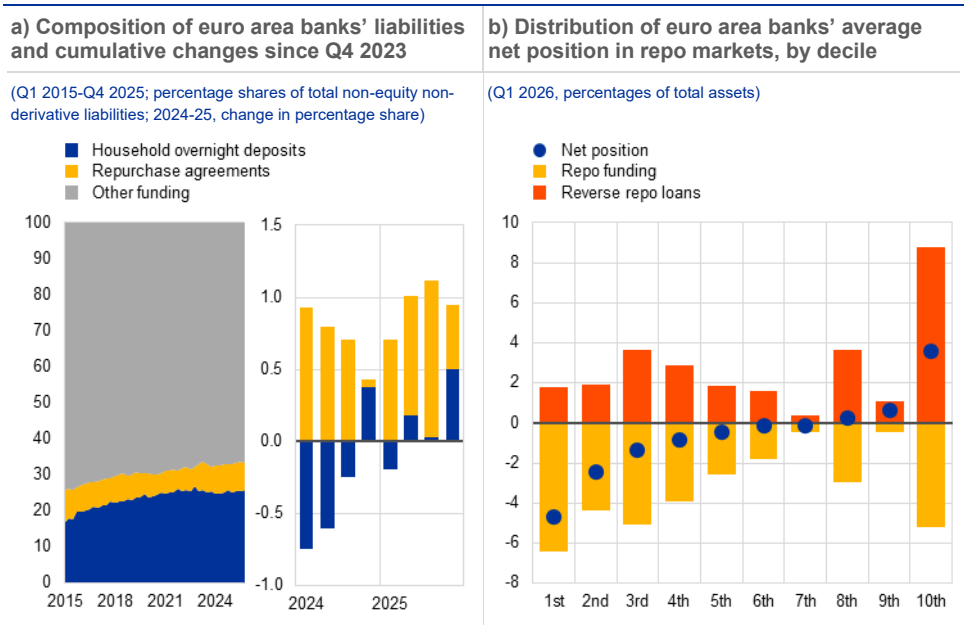
[44] Based on ECB supervisory data, the share of household and non-financial corporation deposits in banks' non-equity funding stood at 55.3% in the fourth quarters of both 2023 and 2025. Market-based funding grew from 38.8% to 39.7% between 2023 and 2025, making up for a decline in central bank and government funding.

[45] See Grodzicki, M., Klaus, B., Pancaro, C. and Reghezza, A., "Euro area bank deposit costs in a rising interest rate environment", *Financial Stability Review*, ECB, May 2023.

As overnight deposit rates are also less sensitive to interest rate changes than variable lending rates, an increasing share of overnight deposits in a bank's funding mix tends to support net interest income.[46]

Chart 3.6

Household overnight deposits and repos have gained importance in bank funding



Sources: ECB (supervisory data, MMSR) and ECB calculations.
Notes: Panel a: "Other funding" includes household term and deposits redeemable at notice, NFC deposits, unsecured funding from financials, and central bank, government and bond funding. Panel b: "Net position" is the sum of the average daily bank-level repo lending less repo borrowing in Q1 2026, for banks within a given decile of the net-borrowing distribution.

Repo liabilities have also increased, although this is partly linked to money market intermediation. The share of repos in banks' total liabilities has grown over the past two years. After accounting for banks' reverse repo lending activities, however, banks' average net funding position shrinks to about a quarter of its prior size. Although banks are net borrowers in the repo market, much of their repo activity reflects daily money market intermediation rather than funding needs (**Chart 3.6**, panel b). Nonetheless, a few banks with larger funding positions may be vulnerable to repo market gyrations.[47] The expansion of banks' repo intermediation is likely to continue alongside the decline in excess liquidity, and banks may also rely more on the repo market for funding in net terms.

Euro area bank bond yields have increased markedly since the outbreak of the war in the Middle East, but spreads have narrowed. The financing conditions for bank bonds have tightened significantly, as yields have risen by around half a percentage point since the end of February. This increase has been driven by higher

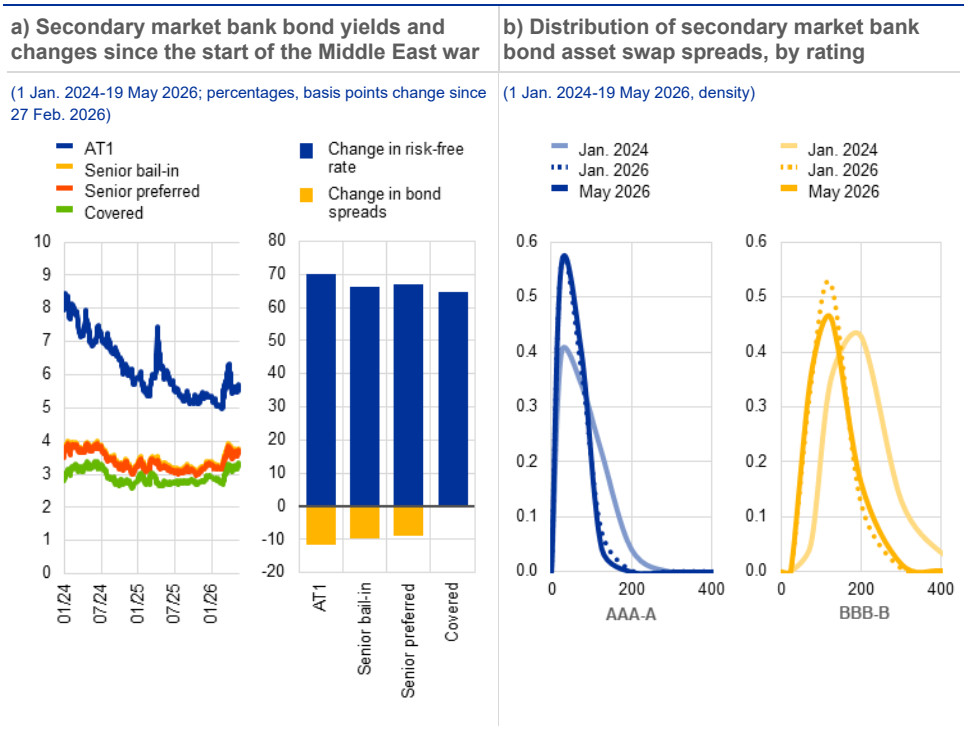
[46] See also Pancaro, C., Passantino, V. and Pietsch, A., "The deposit franchise value of euro area banks", *Financial Stability Review*, ECB, May 2025.

[47] More than 80% of non-bank repo funding is provided by about 10% of all non-bank lenders and might therefore be difficult to substitute with other repo funding (see "Financial stability risks from linkages between banks and the non-bank financial intermediation sector", ESRB and ECB, 12 February 2026, and Franceschi, E., Kaufmann, C. and Lenoci, F., "Non-bank financial intermediaries as providers of funding to euro area banks", *Financial Stability Review*, ECB, May 2024). Banks could instead seek other funding sources and deploy previously encumbered repo collateral. However, they might also cut repo lending to other banks and non-banks.

benchmark rates, whereas bank bond spreads have tightened (**Chart 3.7**, panel a). Bank bond issuance on primary markets halted briefly at the start of the war but resumed shortly thereafter. Banks will face higher funding costs for new issuances over the coming months, should benchmark rates remain elevated. By contrast, credit spreads across different ratings are softening the impact as the level and dispersion of spreads has narrowed substantially over the past two years (**Chart 3.7**, panel b). This suggests that investors currently perceive bank credit risk as low, likely supported by banks' robust capital ratios, profitability and asset quality, but also by the benign market sentiment overall.

Chart 3.7

Bank bond financing conditions remain favourable despite an increase in yields



Sources: S&P Dow Jones Indices LLC and/or its affiliates and ECB calculations.
Notes: Panel a: bond spreads are asset swap spreads over market benchmark rates. Panel b: spreads are averaged for each bond over a given month, and bonds are allocated to spread buckets with a width of 50 to 100 basis points. Density is the total amount outstanding of all bonds within a spread bucket as a share of total amount outstanding for the rating class. Bank bonds include unsecured and covered bonds and exclude AT1.

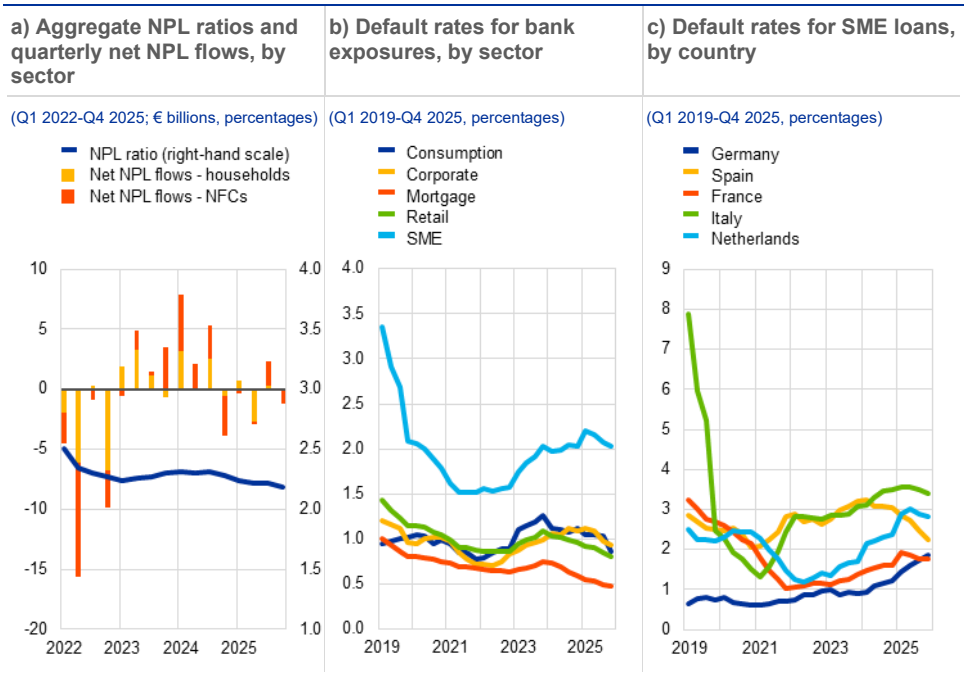
3.3 Asset quality continues to be high amid pockets of vulnerability

Aggregate bank asset quality remains stable at a high level. The aggregate non-performing loan (NPL) ratio was unchanged at a historical low of 2.2% across the second half of 2025 (**Chart 3.8**, panel a). Balanced NPL inflows and outflows underpinned this stability, aided by NPL workouts, sales, securitisations and cures. Early warning indicators of asset quality also pointed towards continued stability, as the Stage 2 ratio declined to 8.9% and the early arrears ratio remained below 1.5%.

Loans to small and medium-sized enterprises (SMEs) are gradually emerging as a pocket of vulnerability in some countries. While loan default rates have decreased across sectors, SME loan defaults remain significantly above the levels seen shortly after the COVID-19 pandemic (**Chart 3.8**, panel b). Country-level trends differ notably, with German banks continuing to experience rising SME loan defaults since the previous edition of the Financial Stability Review was published (**Chart 3.8**, panel c). The share of weaker credit, such as forborne performing loans and Stage 2 loans, has also increased markedly for German and French banks, indicating the emergence of potential vulnerabilities in these countries (see **Special Feature B**).

Chart 3.8

Disaggregated data show emerging regional vulnerabilities in the SME sector



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. Panel a: NPL stands for non-performing loan; NFCs stands for non-financial corporations. Panels b and c: four-quarter trailing figures.

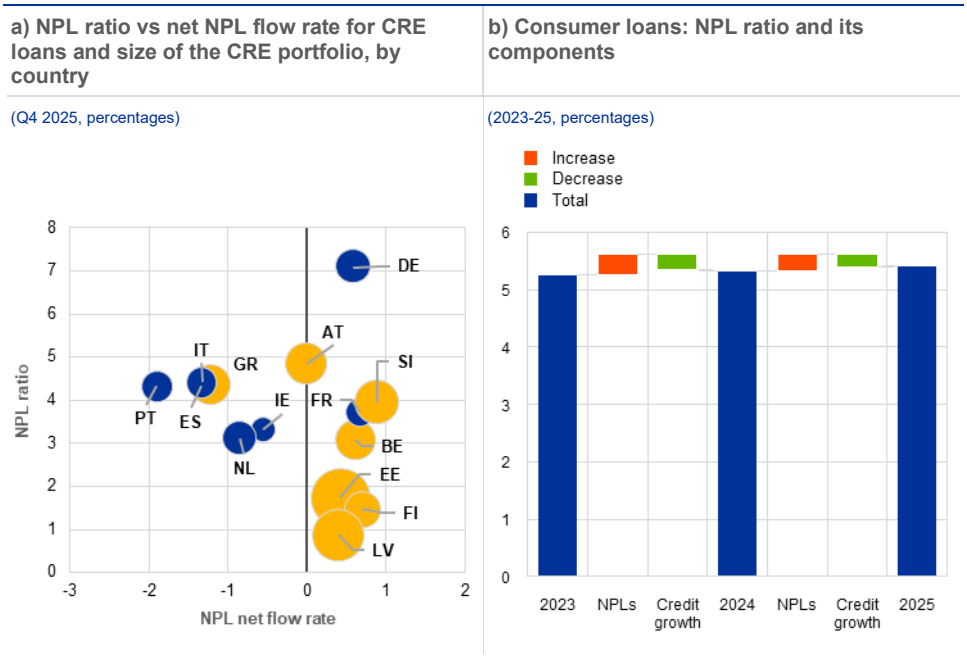
Commercial real estate (CRE) portfolios are stabilising, but differences across countries and a weaker economy require continued monitoring. Stabilisation reflects the generally improved financing conditions during the monetary policy easing cycle. However, vulnerabilities persist in those countries where bank exposures to the sector are significant, NPL ratios remain elevated and net NPL inflows are evident (**Chart 3.9**, panel a). The CRE sector is sensitive to macro-financial conditions and faces structural challenges, particularly with regard to non-prime and office properties (see **Section 1.5**). CRE asset quality therefore warrants continued monitoring. Any further escalation of geopolitical tensions could derail economic growth and increase interest rates, thereby affecting demand.

In the household sector, aggregate consumer NPL ratios have been slowly increasing since 2023. Loan growth has partially mitigated the impact of inflows on the NPL ratio (**Chart 3.9**, panel b). Going forward, this mitigating impact is likely to wane in light of the results of the most recent euro area bank lending survey,

conducted by the ECB.[48] The survey indicated a tightening of credit standards by banks due to higher perceived risks and lower risk tolerance. It also pointed towards a strong reduction in demand due to lower consumer confidence and weaker spending on durable goods. Banks expect these trends to continue in the second quarter. Overall, aggregate unemployment in the euro area remains low and household resilience appears strong. However, any marked deterioration in economic conditions could have a negative impact on asset quality for consumer credit and mortgages, especially for credit granted to the most vulnerable households.

Chart 3.9

Continued monitoring warranted for CRE and consumer loans



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of significant institutions. NPL stands for non-performing loan. Panel a: the bubble size represents the share of CRE loans of total loans for the banks in the sample; yellow bubbles indicate banking sectors where CRE loans constitute more than 10% of total loans and blue bubbles those where they constitute less. Net NPL flows are normalised by total CRE loans for the NPL net flow rate. The net NPL flow rate is calculated as a trailing figure. Data for some countries are omitted due to confidentiality restrictions, given too few data points. Panel b: the components reflect the contribution of the change in NPLs and that of credit growth to the change in NPL ratios over the given time period.

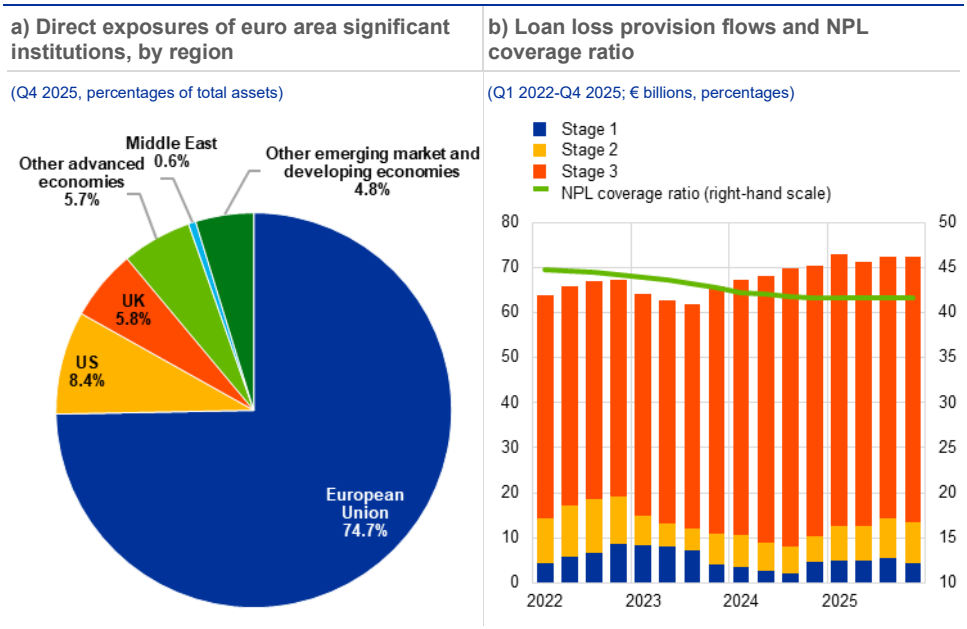
A worsening macroeconomic environment and higher energy prices may weaken bank asset quality, even if direct exposures to geopolitical events remain limited. Geopolitical tensions, policy uncertainty or sudden market repricing could have adverse macro-financial effects and challenge the debt servicing capacity of firms and households. The direct exposures of euro area significant institutions to Middle East assets remain limited, accounting for around 0.6% of total assets (**Chart 3.10**, panel a). However, the debt servicing capacity of euro area borrowers is likely to weaken due to the higher cost of energy and raw materials, as well as lower aggregate demand. At the same time, uncertainties surrounding tariffs continue to weigh on economic activity, particularly in sectors reliant on the United States, with a potential impact on borrower credit risk and direct exposures to sectors such as US

[48] See "April 2026 euro area bank lending survey", *press release*, ECB, 28 April 2026.

real estate.[49] In the case of both the war in the Middle East and tariff uncertainties, indirect effects are likely to matter more for bank asset quality in the euro area than direct exposures, and their impact will depend on the duration of the conflict and the severity of the related economic disruptions. Banks' pre-provision operating profits, together with sizeable capital headroom, provide ample capacity to absorb increased credit losses. In fact, the aggregate annual pre-provision operating profits of the banking sector were more than four times loan loss provisions in 2025.[50] Loan loss provision flows have shown no significant response so far, although a slight increase in provisions for Stage 2 loans in the fourth quarter of 2025 – linked primarily to SME portfolios – may be a sign that banks are beginning to acknowledge rising credit risks (**Chart 3.10**, panel b).

Chart 3.10

Limited accumulation of provisions amid contained exposure to external shocks



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. Panel a: country groupings are based on the classification of economies in the World Economic Outlook published by the IMF. "Middle East" comprises Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen. Panel b: four-quarter trailing figures.

3.4 Liquidity ratios and capital buffers have remained stable

Liquidity ratios remain high, while shrinking central bank liquidity has resulted in a compositional shift away from excess reserves towards sovereign bonds. Central bank liquidity is continuing to decline, already down by more than €2 trillion, or 45%, since its peak in 2022 (**Chart 3.11**, panel a), which also implies a substantial reduction in banks' cash holdings. By contrast, banks have raised their total liquidity

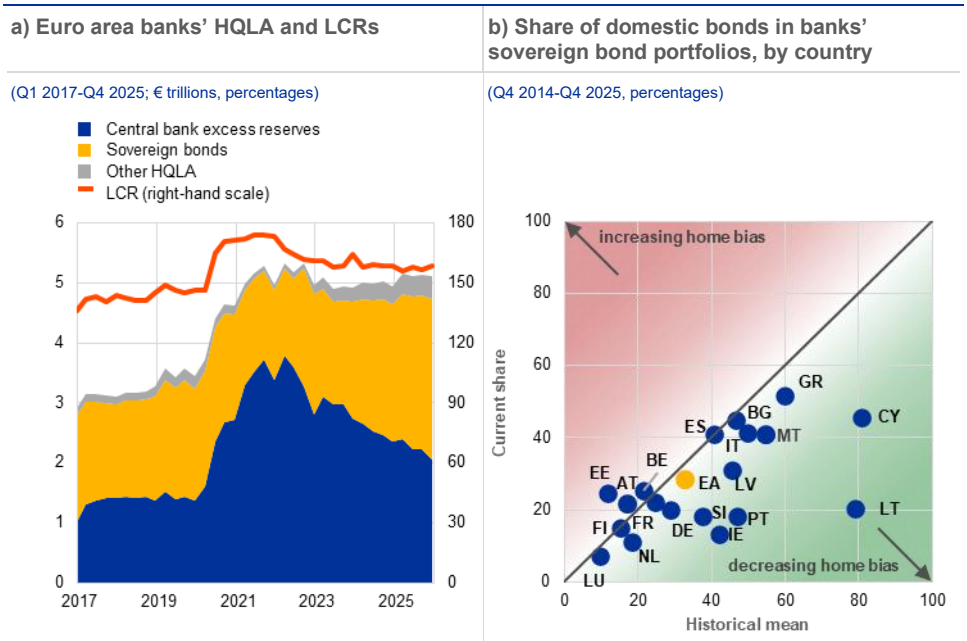
[49] For a detailed analysis of the impact on the euro area banking sector, see Avril, P., Bochmann, P., Fahr, S., Horan, A., Pancaro, C. and Pizzeghello, R., "Risks to euro area financial stability from trade tensions", *Financial Stability Review*, ECB, May 2025.

[50] See Supervisory banking statistics, year-to-date figures for the fourth quarter of 2025.

buffers slightly over the past calendar year, as they have replaced excess reserves with increasing amounts of mostly euro area sovereign bonds. The regulations governing liquidity coverage ratios classify euro area sovereign bonds and excess reserves as equally liquid. In practice, though, they differ in some other aspects: sovereign bonds usually offer a yield premium over the deposit facility rate, expose banks to valuation risk and may heighten concerns about the sovereign-bank nexus. However, a closer look at the sovereign bond portfolios held by euro area banks reveals a decline in home bias in most euro area countries (**Chart 3.11**, panel b), especially those with smaller fiscal deficits (see **Section 1.2**, **Chart 1.3**, panel a), which mitigates some concerns. Nonetheless, the growing reliance on sovereign bonds introduces a trade-off for banks, requiring them to balance enhanced liquidity buffers with increasing interest rate and credit risk exposures.

Chart 3.11

Liquidity ratios remain high, while HQLA composition shifts towards sovereign bonds



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. "Sovereign bonds" includes only level 1 sovereign bonds. HQLA stands for high-quality liquid assets; LCR stands for liquidity coverage ratio. Panel b: share of sovereign bonds issued by all global issuers. EA refers to the euro area aggregate.

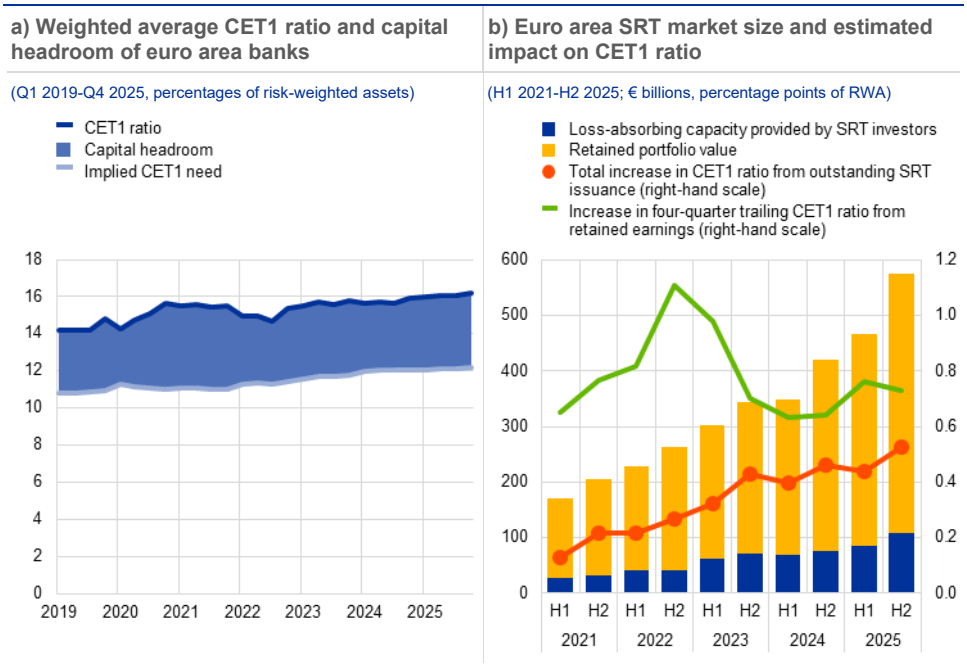
Euro area banks have continued to improve their solvency ratios by retaining earnings and transferring credit risk to non-bank investors. CET1 ratios have reached a new high, further increasing capital headroom and contributing to banking sector resilience (**Chart 3.12**, panel a). This growth is being driven mainly by retained earnings, which contributed more than 0.7 percentage points to the increase in the solvency ratio over the last year. Capital relief from issuing synthetic risk transfers (SRTs) has also become more prominent (**Chart 3.12**, panel b).[51] Indeed,

[51] SRTs are instruments that allow banks to transfer the credit risk of specific portfolios to third-party investors without selling the underlying loan portfolio. Risk is shifted through credit-linked notes, derivatives or guarantees, where non-banks are the typical counterparty. As a result, the risk-weight of the loan portfolio is reduced and banks' capital ratios increase. See also "Synthetic risk transfers", Basel Committee on Banking Supervision, 17 February 2026.

the total outstanding stock of SRTs in the second half of 2025 pushed up aggregate bank capital ratios by about 0.5 percentage points. The rapid growth of the euro area SRT market suggests that these instruments are gaining importance in banks' capital management and that an increasing portion of corporate credit risk is being transferred from the banking sector to non-banks.[52] While this protects banks from credit losses and allows investors to enhance their portfolio allocations, banks may become overly dependent on the availability of risk-absorbing capital from SRT investors for new lending if this market continues to expand.

Chart 3.12

Banks' capital ratios have increased further, with synthetic risk transfer issuance rising



Sources: ECB (supervisory data) and ECB calculations.
Notes: Based on a full sample of euro area significant institutions. Panel a: capital headroom is the difference between the implied CET1 capital need and banks' actual CET1 ratios. The implied CET1 need is banks' overall capital requirement + Pillar 2 guidance to be covered by CET1, plus any AT1/T2 shortfall that needs to be absorbed by CET1 and any eligible liability shortfall that must also be covered by CET1, accounting also for capital needs arising from leverage ratio and MREL regulations. Panel b: the retained portfolio is the portion that stays on banks' balance sheets where banks continue to absorb credit losses, typically comprising the senior and first loss tranches, while the mezzanine tranche is transferred in the securitisation. The CET1 ratio increase is calculated as the difference in CET1 capital over pre- and post-securitisation risk-weighted exposure amounts (RWA). Pre-securitisation RWAs are calculated as unexpected portfolio losses, divided by 8% and multiplied by total portfolio value less actual post-securitisation RWAs. Where the (KSA) divided by 8% and multiplied by total portfolio value.

3.5 Geopolitical risks underscore the need for bank resilience to be a macroprudential priority

Geopolitical risks are materialising, but euro area banks are on a sound footing to cushion potential systemic shocks. The euro area banking sector is

[52] SRTs are usually fully funded, meaning investors supply high-quality collateral or cash up front to cover the entire credit risk of the protected tranche. As a result, banks are not exposed to counterparty credit risk. However, SRT investors face the potential loss of their entire credit protection amount in the event of a default (see "Synthetic risk transfers", Basel Committee on Banking Supervision, 17 February 2026).

well capitalised, profitable and liquid (see **Sections 3.1**, **3.2** and **3.4**). While there are pockets of deterioration in credit quality in some sectors and banking union countries (see **Section 3.3**), there are so far no signs of widespread loss materialisation or credit supply constraints due to banks' capital positions.[53] Resilience within the banking union has increased, with all banking union countries having implemented some form of releasable capital buffer by early 2026. Since the previous edition of the Financial Stability Review, three countries have also increased their releasable capital buffers, and one country has decided not to extend a risk weight measure for bank mortgage loans.[54]

Maintaining bank resilience is a macroprudential priority in the current geopolitical situation. In a context of risks continuing to materialise, it is essential that existing releasable capital buffer requirements are maintained for as long as necessary to shield banks from any widespread loss materialisation and capital constraints on their lending activity. Having releasable buffers in place is extremely important in times when the economy is exposed to non-cyclical, supply-driven shocks, which reduce output and simultaneously drive up inflation. Only if buffers have been previously implemented can they be released to provide capital relief, allowing banks to absorb losses, prevent deleveraging and continue lending. Targeted increases in buffer rates may still be considered in countries with low releasable buffer requirements, provided that banking conditions are favourable and risks of procyclicality have abated.[55] The reduction of unwarranted heterogeneity in buffer rates for other systemically important institutions in the banking union will also strengthen the resilience of the banking system.[56]

Proactive macroprudential policy enhances complementarity with monetary policy in an uncertain economic environment.[57] In such an environment, macroprudential policy should remain firmly focused on safeguarding financial stability, and pressure to unduly relax capital requirements should be resisted.[58] At

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53 Balance sheet constraints and the cost of funds have had a broadly neutral impact on credit standards for loans or credit lines to enterprises and households in the last few quarters, with some differences across countries only in late 2025. For more details, see the ECB's "Euro area bank lending survey" covering the first quarter of 2026.

54 In December 2025 Croatia announced an increase in its countercyclical buffer rate from 1.5% to 2%, effective on 1 January 2027, to address a rise in cyclical vulnerabilities. During the same month, Malta decided to broaden the scope of its sectoral systemic risk buffer on loans secured by immovable property to cover both natural persons and legal persons, effective June 2026. In March 2026 Bulgaria announced an increase in its countercyclical buffer rate from 2% to 2.25%, effective April 2027, also to address a rise in cyclical vulnerabilities. In April 2026 the Netherlands decided not to extend the Article 458 risk weight measure, which will now expire on 30 November 2026. This decision was taken in light of the gradual decline in systemic risks in the Dutch housing market and expectations that banks will be resilient to housing market risks even without the measure.

55 As noted in the Governing Council statement on macroprudential policies of 7 July 2025, a targeted recalibration or simplification of macroprudential measures may also be considered when such actions would not substantially reduce the overall resilience of the banking sector.

56 For more details, see the Governing Council statement on macroprudential policies – the ECB's framework for assessing capital buffers of other systemically important institutions of 20 December 2024.

57 The ECB's 2025 monetary policy strategy statement stressed that resilience and thereby adequate loss-absorbing capacity within the financial system helps avoid potential situations of trade-off between price and financial stability. For more details, see Detken, C., Hempell, H.S. and Pirovano, M., "Macroprudential and monetary policy interaction: the role of early activation of the countercyclical capital buffer", *Macroprudential Bulletin*, No 31, ECB, 18 August 2025.

58 The previous edition of the Financial Stability Review stressed that effective macroprudential policy can help to enhance, rather than jeopardise, the euro area's competitiveness and productivity in the economy. See "Financial Stability Review", ECB, November 2025.

the same time, borrower-based measures should be used effectively to maintain sound lending standards, particularly in countries experiencing large increases in residential real estate prices.

The Governing Council endorsed 17 recommendations to address undue complexities in the European prudential framework. In March 2025 the Governing Council created the High-Level Task Force on Simplification (HLTF). Its objective was to identify undue complexities in the European regulatory, supervisory and reporting framework that may unnecessarily hamper the competitiveness of euro area banks. In December that year, the policy recommendations proposed by the HLTF were endorsed by the Governing Council and published in a report entitled "Simplification of the European prudential regulatory, supervisory and reporting framework". The principles underpinning the HLTF recommendations are essential to ensure that any proposal to simplify the European prudential framework does not result in deregulation and is effective in promoting the sustained competitiveness of euro area banks. These principles relate to the need to (i) preserve the current levels of resilience, (ii) maintain effectiveness in meeting prudential objectives, (iii) foster European harmonisation and financial integration, and (iv) uphold international cooperation.

The Eurosystem supports reforms to enhance the competitiveness of EU banks, while preserving the resilience and stability of the financial system. In February 2026 the European Commission launched a targeted consultation on the competitiveness of the EU banking sector as part of its broad simplification agenda. The replies to this consultation will underpin the Commission's report on the competitiveness of the EU banking sector, which is expected to be published in the second half of 2026. The Eurosystem's reply is based on the HLTF report in its entirety, and its proposals complement the HLTF recommendations. The reply should therefore be read in conjunction with the HLTF report.[59]

The Eurosystem has called for completion of the banking union, a more efficient Single Market and a reduction in undue complexities in the regulatory framework. In the context of increasing geopolitical and geoeconomic fragmentation, the European Commission's consultation provided a timely opportunity to consider, from a holistic perspective, what is needed to establish a truly integrated European banking market – a prerequisite for achieving the long-term economic objectives of the EU. The continued fragmentation of EU banking markets is holding European banks back from scaling up, realising economies of scale, competing both within and outside the EU, as well as limiting private risk sharing. The Eurosystem has made a strong call for synchronised progress on key banking union components, concrete steps towards the finalisation of a European Deposit Insurance Scheme, with a clear implementation timetable, and the promotion of deeper capital markets by advancing the savings and investments union. Work to strengthen the EU's crisis management and deposit insurance framework should be coordinated and synchronised with efforts to deepen banking integration, namely a greater harmonisation of rules and the removal of barriers to

[59] See "Eurosystem response to the EU Commission's targeted consultation on the competitiveness of the EU banking sector", ECB, April 2026.

the free flow of capital and liquidity in cross-border groups. This should be accompanied by adequate safeguards promoting resilience across the board for credit institutions and their subsidiaries, branches and consolidated groups, including through fair and timely transfers of resources within groups, particularly in times of stress.

Regarding macroprudential policy, the Eurosystem has called for fewer macroprudential buffers, as well as common principles and methodologies for their calibration, while preserving national competences. The main sources of complexity in the EU macroprudential framework stem from (i) the higher number of elements in the EU's risk-weighted capital stack compared with the Basel standards, (ii) differences in the implementation of instruments across countries (also owing to differences in the transposition of the relevant provisions of the Capital Requirements Directive[60] into national legal frameworks), and (iii) the current reciprocity arrangements for different instruments. To address these complexities, the Eurosystem has made the following proposals: (i) merge the existing five macroprudential buffers into two buffers, namely a non-releasable buffer and a releasable buffer;[61] (ii) establish a harmonised macroprudential toolkit by refocusing from directives to regulations; and (iii) establish clear common principles and methodologies, including a single exercise, to calibrate all elements and avoid unwarranted overlaps or inconsistencies, while preserving national competences.

The EU has postponed the implementation of the Fundamental Review of the Trading Book (FRTB) to ensure a level playing field. This addresses concerns over delays in Basel III implementation by other major global jurisdictions. In November 2025 the European Commission launched a targeted consultation on the FRTB, focusing on policy options to be adopted by a delegated act offering specific changes to mitigate the capital effects for EU banks.[62] The ECB published its response to the targeted consultation on 15 January 2026.[63]

60 Directive (EU) 2024/1619 of the European Parliament and of the Council of 31 May 2024 amending Directive 2013/36/EU as regards supervisory powers, sanctions, third-country branches, and environmental, social and governance risks (OJ L, 2024/1619, 19.6.2024).

61 The non-releasable buffer would merge the current capital conservation buffer with the buffers for global systemically important institutions and other systemically important institutions, while the releasable buffer would merge the current countercyclical capital buffer with the systemic risk buffer.

62 For further details, see "Commission seeks input on Basel III market risk rules for banks", Directorate-General for Financial Stability, Financial Services and Capital Markets Union, European Commission, 6 November 2025.

63 See "ECB staff contribution to the European Commission's targeted consultation on the application of the market risk prudential framework", *consultation response*, ECB, 15 January 2026.

4 Non-bank financial sector

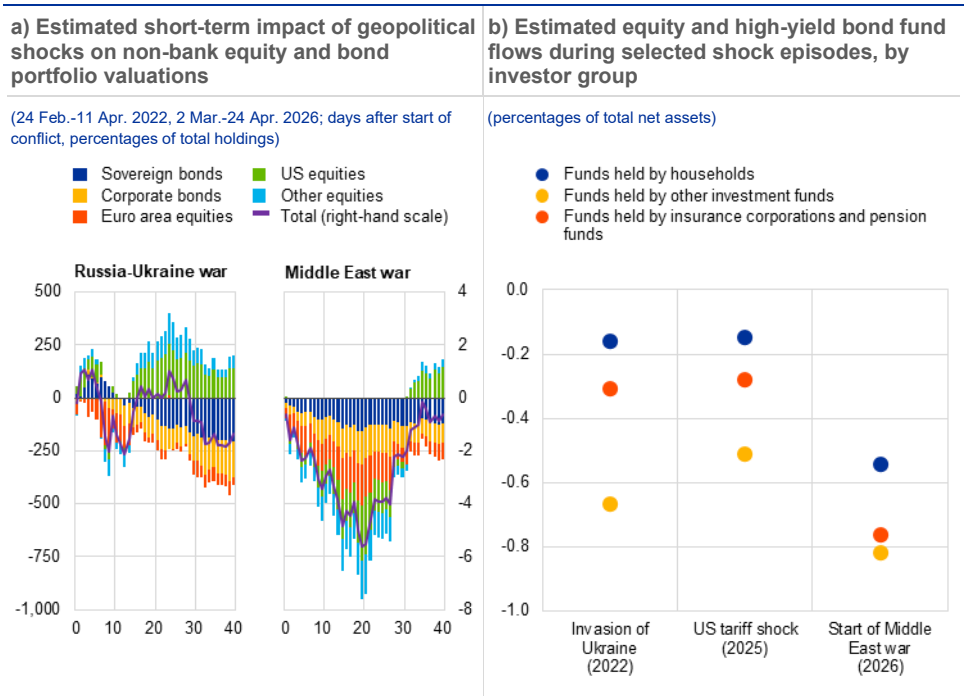
4.1 The non-bank financial sector weathers geopolitical risks

Non-banks have remained resilient, but the outbreak of the war in the Middle East has highlighted their vulnerability to correlated market downturns. After the start of the war, valuation losses in non-bank portfolios were initially more pronounced than those immediately following the Russian invasion of Ukraine. Equity markets fell and interest rate expectations shifted upwards, leading to a simultaneous decline in both bond and equity prices (**Chart 4.1**, panel a). This broad-based repricing was accompanied by a risk-off sentiment in fund flows, most

notably in high-yield corporate bond funds. Both retail and institutional investors reduced their holdings of investment fund shares exposed to higher market and credit risk. Unlike in other episodes of abrupt market adjustments over the past few years, the reaction of insurance corporations and pension funds was similar to that of investment funds, while outflows from funds with a household investor base were again less severe (**Chart 4.1**, panel b). While non-banks have so far absorbed losses without major disruptions, episodes of abrupt and correlated price declines can quickly translate into liquidity stress. In such environments, valuation losses can trigger fund share redemptions and margin calls. The resulting procyclical asset sales can amplify market downturns and generate spillovers across asset classes and sectors.

Chart 4.1

Non-banks experienced correlated valuation losses and procyclical risk-asset outflows following the outbreak of the war in the Middle East



Sources: EPFR Global, ECB (CSDB, SHS) and ECB calculations.
Notes: Panel a: estimated portfolio losses approximated on the basis of portfolio composition at the end of the previous quarter and daily changes in benchmark bond and equity prices following the start of the respective conflict. Only business days are included, starting from the onset of each event. Panel b: average 20 business day cumulative flows into euro area-domiciled equity and high-yield corporate bond funds after 7 March 2022 (euro area fund outflows following the invasion of Ukraine), 2 April 2025 (US tariff shock) and 28 February 2026 (start of Middle East war). Investor base for funds assigned on the basis of the largest holder sector.

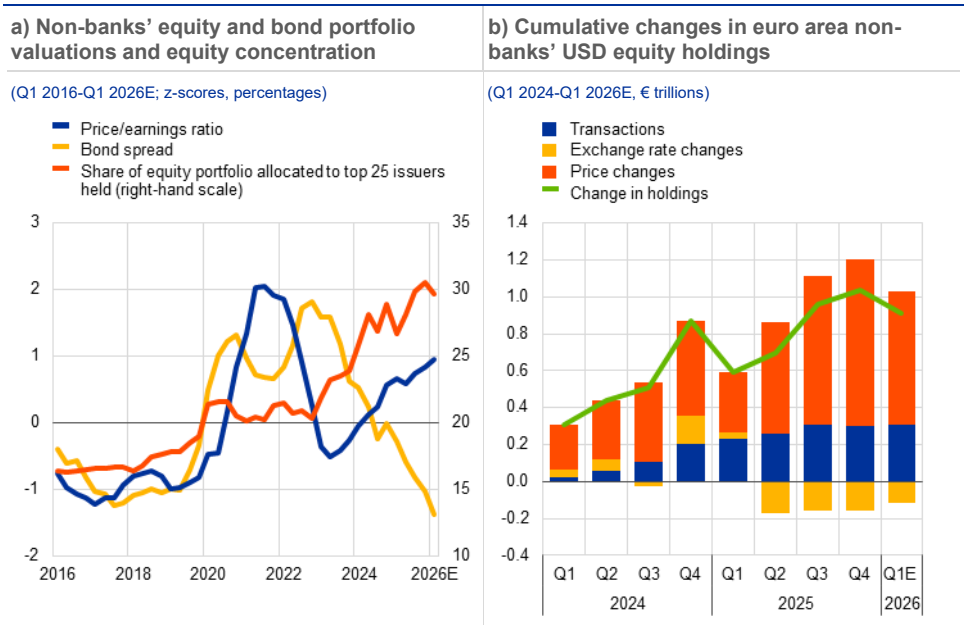
Non-bank portfolios remain exposed to further valuation risks, given still elevated prices, concentrated holdings and macro-financial uncertainties.

Despite the sharp adjustment in bond and equity markets following the start of the war in the Middle East, portfolio valuations of many non-bank entities are still high by historical standards, with equity holdings increasingly concentrated in a small number of firms (**Chart 4.2**, panel a). In a context of elevated geopolitical risk, sudden changes in the macroeconomic outlook, interest rate expectations or credit risk could trigger renewed price declines across a broad range of assets. Concentration risks are compounded by the fact that a large share of equity

exposures is to US companies, notably AI-related firms whose valuations are closely tied to a continued positive AI narrative (see **Chapter 2** and **Box 4**). This exposes euro area non-banks not only to equity market repricing but also to exchange rate risk. In 2025 US dollar depreciation implied around €150 billion of valuation losses on US equity holdings, which were offset by strong price increases that later reversed after the outbreak of the war in the Middle East. While overall holdings still rose, net purchases of US equities by euro area non-banks stalled in the second half of 2025 (**Chart 4.2**, panel b). Recent pressures on US private credit entities have also highlighted that exposures to private markets can represent an additional source of risk in non-bank portfolios. Private markets are characterised by complex leverage structures, opaque valuations and limited liquidity, making them susceptible to abrupt and potentially sizeable valuation adjustments when risk sentiment deteriorates (see **Section 4.2** and **Special Feature D**).

Chart 4.2

Non-bank portfolio valuations remain elevated and concentrated in US equities despite recent price declines and foreign exchange losses in 2025



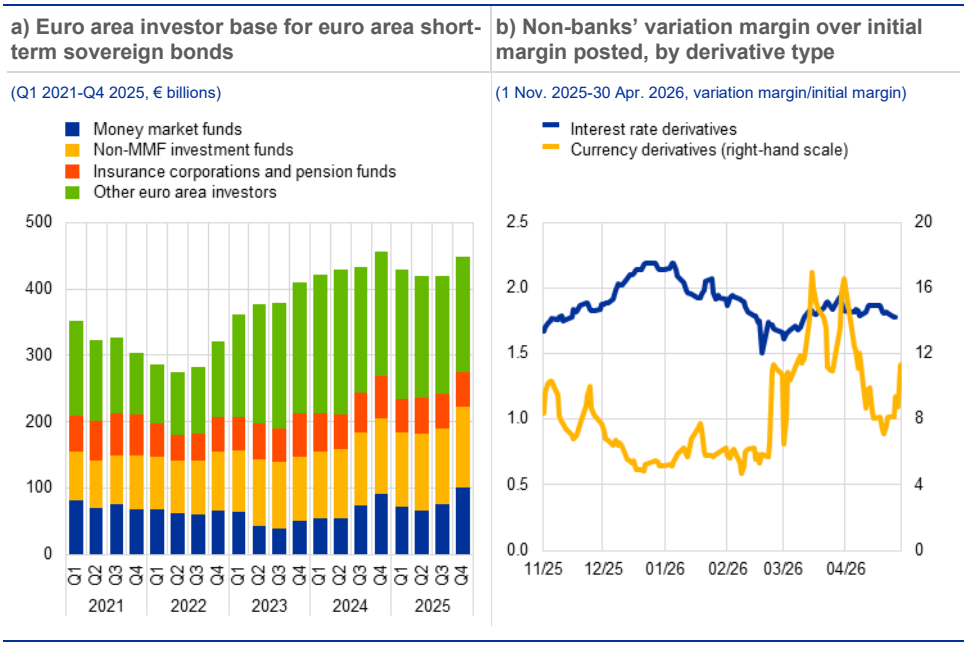
Sources: EPFR Global, Bloomberg Finance L.P., ECB (CSDB, SHS, EXR) and ECB calculations.
Notes: Q1 2026 values are estimates. Panel a: holdings are projected by repricing the Q4 2025 portfolio composition using the latest available Q1 2026 prices. Changes in estimated Q1 concentration therefore reflect only relative asset price movements, not active portfolio management. The price/earnings ratio calculation is limited to non-bank holdings within the S&P 500, STOXX Europe 600, Nikkei 225 and FTSE 100 indices, accounting for their changing compositions over time. The metric used is the 12-month forward price/earnings ratio. The spreads are calculated as the difference between an individual security's yield to maturity and a corresponding benchmark rate. Euro-denominated holdings are benchmarked against the euro area ten-year government benchmark bond yield while US dollar and all other currency holdings are benchmarked against the ten-year US Treasury yield. Each security's yield is compared with a common ten-year benchmark, regardless of its individual maturity. Panel b: total holdings are calculated by repricing the Q4 2025 portfolio using the latest available Q1 2026 prices, while transaction estimates are based on Q4 2025 transaction volume scaled by the percentage flows (as a share of total net assets) into US equities reported by euro area-domiciled funds during Q1 2026.

Shifts in interest rate expectations and macroeconomic uncertainty may lead non-banks to adjust their portfolios and may increase risks from margin calls. The steepening of the yield curve in the course of 2025 has been accompanied by changes in investors' maturity preferences, with non-banks increasingly shifting towards short-term bonds (see **Box 2**). As a result, non-banks – primarily money market and other investment funds – have become more important investors in

short-term euro area sovereign bond markets (**Chart 4.3**, panel a). While this may broaden the investor base and reduce duration risk in non-bank portfolios, insurance corporations and pension funds in particular remain vulnerable to liquidity shocks stemming from margin calls on derivative positions (see **Section 4.3**). During March, the variation margin posted by non-banks on interest rate derivatives increased as interest rate expectations shifted upwards, but the rise has so far remained contained relative to the initial margin (**Chart 4.3**, panel b). By contrast, the variation margin on foreign exchange derivatives has risen substantially with the spike in geopolitical risk after the outbreak of the war in the Middle East. Higher volatility in financial markets may increase both the need for hedging and the need for liquidity preparedness, which may be costly. In a more volatile macro-financial environment, sudden price adjustments can lead to more frequent spikes in variation margin and collateral calls. This may add to existing liquidity needs, prompting asset sales and amplifying price dynamics across markets.

Chart 4.3

Non-banks' role in short-term sovereign bond markets increases, while macroeconomic uncertainty raises the risk of margin calls



Sources: ECB (SHS, EMIR) and ECB calculations.
Note: Panel a: MMF stands for money market fund.

Box 4

Drivers of investor behaviour in highly valued equity markets

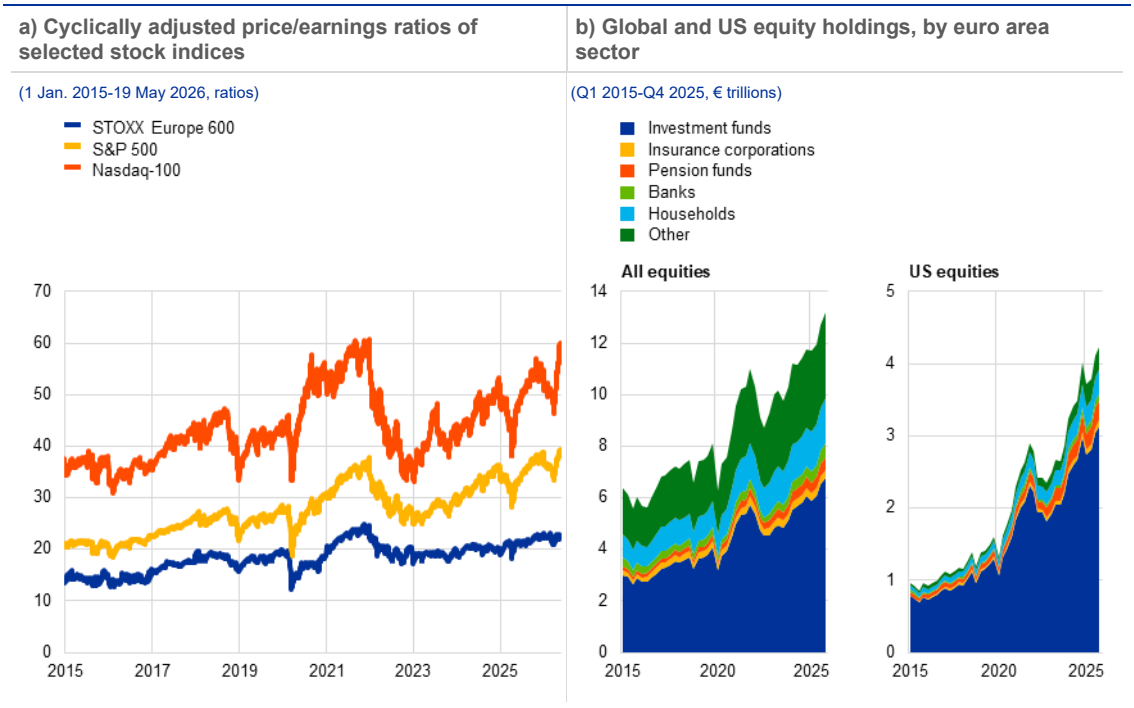
Prepared by Paolo Alberto Baudino, Federica Bosio, Daniel Dieckelmann, Christoph Kaufmann and Maria Leonor Puga

Asset price valuations are particularly high in the technology and artificial intelligence (AI) sectors, where euro area investors have significant exposures. Price/earnings ratios remain historically elevated across many equity markets, with US equity indices trading at notably higher levels than their European counterparts (**Chart A**, panel a). While euro area investors have doubled their holdings of all equities in the past decade, their holdings of US equities have quadrupled,

driven both by positive valuation effects and asset purchases.[64] The investment fund sector is the single largest euro area holder of equities overall and of US stocks in particular (**Chart A**, panel b). This concentration places investment funds at the centre of euro area exposures to assets with stretched valuations. Analysing investor flows into funds focused on such asset classes can, therefore, help gain an understanding of the observed drivers of the high market valuations and the associated financial stability risks.

Chart A

Investment funds are by far the largest holder of assets with currently high valuations



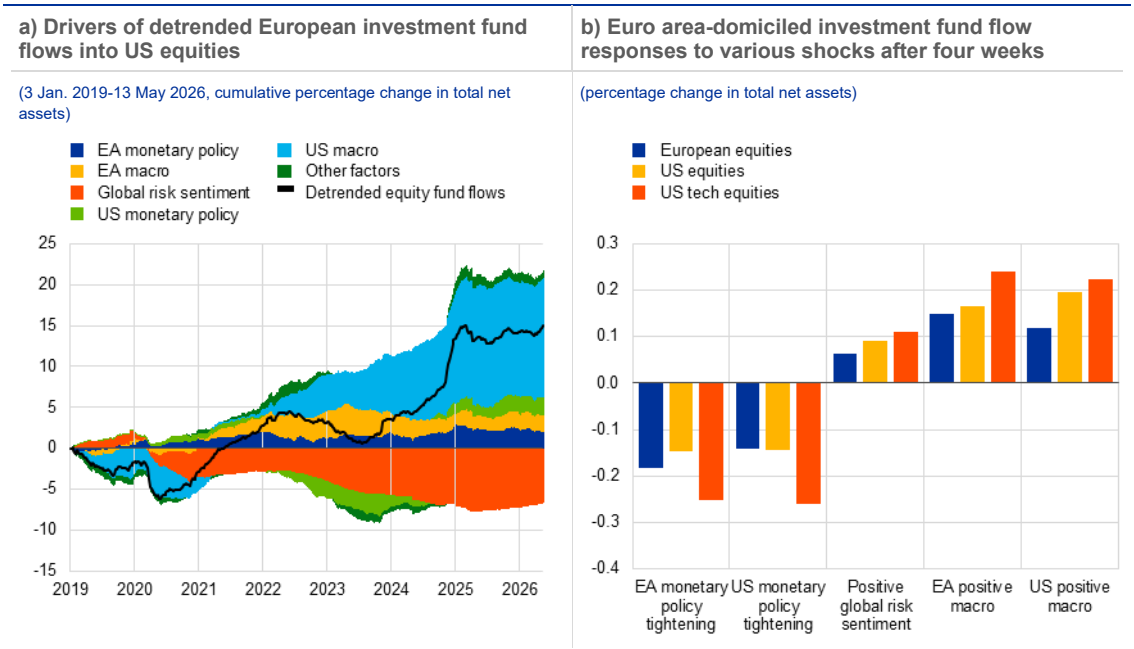
Sources: Bloomberg Finance L.P., ECB (CSDB, SHS) and ECB calculations.
Notes: Panel a: the chart shows cyclically adjusted price/earnings ratios, where earnings for the last ten years are adjusted by inflation and averaged.

The rapid advancement of AI and the associated surge in capital expenditure have driven euro area investment towards US tech equities. Breaking down euro area equity fund flows into five underlying drivers, based on a BVAR model, indicates that US macroeconomic factors (including the AI-related boom and investments) were the leading factor behind euro area inflows into US equities in recent years (**Chart B**, panel a). By contrast, negative global risk sentiment (partly reflecting ongoing geopolitical shifts) has exerted increasingly downward pressure on investor flows. Other factors have had a more limited impact. Accommodative US monetary policy, reflecting the Federal Reserve System's policy rate cuts starting in late 2024, has supported inflows recently, while euro area monetary policy and macroeconomic factors have been playing a small but supportive role for several years now.

[64] According to ECB calculations, around 70% of the increase in euro area holdings of US equities between 2015 and 2025 was driven by valuation effects, while the remaining 30% reflect net transactions. Valuation changes stem primarily from price developments, with exchange rate movements playing only a limited role.

Chart B

Euro area investment into US equities is driven by macroeconomic expectations of AI, with stronger outflows in the event of negative shocks



Sources: ECB (SDW), EPFR Global and ECB calculations.
Notes: Impulse response and historical decomposition based on the BVAR model of Kaufmann and Mazzolini*, estimated on weekly data from January 2007 to May 2026. The model includes detrended cumulative percentage flows of past total net assets of euro area-domiciled equity funds focusing on Europe, the United States and the US technology sector, US and German ten-year yields, the EUR/USD exchange rate, the EURO STOXX 50 and the S&P 500. Shocks are identified using sign restrictions, following Brandt et al.** Restrictions on fund flows are set in such a way that any monetary loosening or positive macro news in the euro area or the United States, or higher global risk appetite, all lead to inflows into equity funds. Detrended flows are deviations from the long-term trend in flow data, ensuring that the analysis focuses on the cyclical drivers of fund flows instead of explaining the structural drivers of the investment fund sector's long-term growth. EA stands for euro area.
*) Kaufmann, C. and Mazzolini, G., "Changing tides across the Atlantic: drivers of investor flows in the US and Europe", mimeo, February 2024.
**) Brandt, L., Saint Guilhem, A., Schröder, M. and Van Robays, I., "What drives euro area financial market developments? The role of US spillovers and global risk", *Working Paper Series*, No 2560, ECB, May 2021.

Euro area fund flows into highly valued equity markets, such as the US technology sector, tend to react more strongly to shocks than flows into lower-valued stocks. Generally, flows react positively to positive macroeconomic shocks and, similarly, a positive risk sentiment shock is associated with inflows (**Chart B**, panel b). On the other hand, tightening monetary policy shocks correlate negatively with flows. Notably, fund flows into US tech stocks react more strongly to monetary policy, macro and risk shocks than flows into broad US or euro area stocks. This points to elevated investor sensitivity in these segments, making these funds vulnerable to sudden flow reversals in the event of any adverse developments.[65] The drivers underpinning strong inflows into US (tech) equity funds could weaken quickly, should for example AI adoption, productivity gains or future profits from AI investments fail to meet expectations, or should the geopolitical environment deteriorate further. Given funds' limited cash buffers and pockets of leverage in US tech stocks, the resulting outflows could lead to asset sales, amplifying adverse market shocks.

A rapid repricing of highly valued equities could spill over to other key euro area markets and have a negative effect on the wealth of euro area investors. A deterioration in investor sentiment could propagate to other market segments, including the equities and bonds of European

[65] It is not immediately clear whether this increased sensitivity stems from structurally high valuations in the technology sector during the past decade or the more cyclical nature of the technology industry. Splitting the sample into before and after the COVID-19 pandemic, when the technology rally really took off in US equity markets, does not produce differential results of any statistical significance.

firms, thereby tightening their financing conditions and weakening their resilience to shocks. Additionally, significant exposures to markets with elevated valuations leave investors vulnerable to valuation losses. Given that investment fund share ownership is rising fast among households both directly[66] and indirectly[67] (through unit-linked insurance and defined contribution pension schemes), the implication is that there could be potentially significant second-round effects on consumption and the real economy.

4.2 Investment fund flows remain sensitive, with private credit adding further risk

The recent outbreak of war in the Middle East has led to significant flow responses in investment funds. The investment fund sector is generally highly sensitive to geopolitical shocks. Empirical analyses suggest that especially severe geopolitical shocks lead, on average, to outflows of 3.6% of total net assets from equity funds and 4.3% from corporate bond funds within six months (**Chart 4.4**).[68] Following the Russian invasion of Ukraine, the actual equity fund flow response was benign by historical standards, while the corporate bond fund flow response exceeded model predictions. Since the outbreak of the war in the Middle East, both equity and corporate bond funds have faced outflows, as expected, although the magnitudes of such outflows have so far been relatively limited. Past experience suggests that more outflows are likely in the future as economic consequences materialise, especially if the war continues for longer than financial markets expect.

66 For more on euro area households' increasing holdings of investment fund shares, see Baudino, P.A., Metzler, J., Storz, M. and Wagner, F., "The role of household investors in market downturns", *Financial Stability Review*, ECB, November 2025.

67 For changes in the composition of investment portfolios held by insurance and pension fund schemes, see Gardó, S., Klaus, B., Kurig, D. and Storz, M., "Navigating financial stability in an ageing world", *Financial Stability Review*, ECB, May 2025.

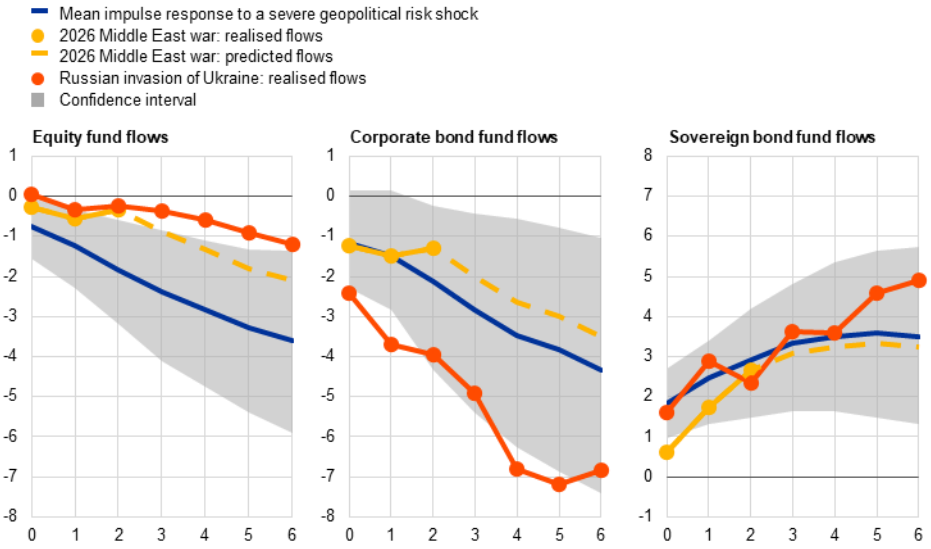
68 Especially severe geopolitical shocks are characterised by an increase of roughly 6 standard deviations in the monthly geopolitical risk index devised by Caldara and Iacoviello. Shocks of such magnitude include the Russian invasion of Ukraine and the outbreak of the war in the Middle East in February 2026 and occur in only 0.8% of monthly observations since 2002. See Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225.

Chart 4.4

Investment funds see flows out of risky assets and into safe-haven sovereign bonds when geopolitical risk materialises

Impulse responses of euro area-domiciled fund flows to severe geopolitical risk shocks, by fund investment policy

(Jan. 2002-Dec. 2023; months after shock, percentage shares of total net assets)

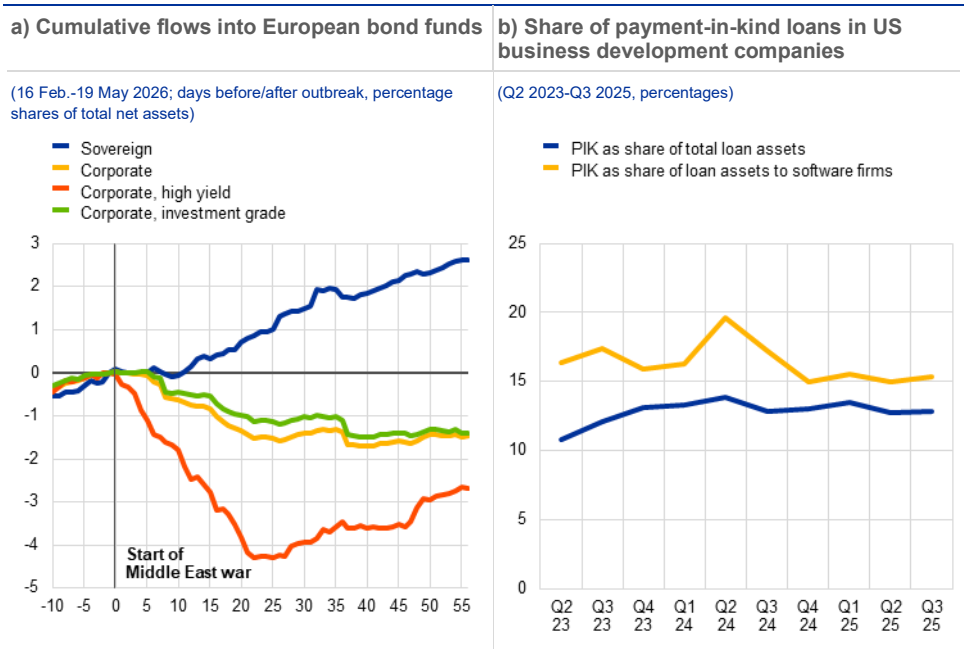


Sources: ECB (SHS, CSDB), EPFR Global, Bloomberg Finance L.P. and ECB calculations.
Notes: Impulse responses to a severe global geopolitical shock of 6 standard deviations (Caldara and Iacoviello*), based on a Bayesian vector autoregression model with monthly data from January 2002 to December 2023 as presented in Dieckelmann et al.** All responses are based on separate model estimations that include the geopolitical risk index, one category of cumulative flows into euro area-domiciled equity or bond funds, the VSTOXX index, the EURO STOXX 50 index and the two-year Bund rate. The shocks are identified using a Cholesky decomposition, with geopolitical risk ordered first. All values statistically significant at levels of at least 10%. The latest observations for realised flows in 2026 are for 19 May 2026.
*) Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225.
**) Dieckelmann, D., Kaufmann, C., Larkou, C., McQuade, P., Negri, C., Pancaro, C. and Rößler, D., "Turbulent times: geopolitical risk and its impact on euro area financial stability", *Financial Stability Review*, ECB, May 2024.

Opacity and declining investor sentiment may expose liquidity vulnerabilities in funds as demand for riskier credit assets, including private credit, weakens. High-yield bond fund flows quickly turned to net outflows after the start of the war in the Middle East, more so than investment-grade bond fund flows (**Chart 4.5**, panel a). The combination of high credit risk and illiquid underlying assets is particularly suited to exposing liquidity mismatches in the investment fund sector. Declining valuations tend to prompt redemption requests that may exceed available liquidity. Such risks have recently materialised in inherently illiquid private credit markets in the United States. There, open-ended or semi-open-ended private credit funds and business development companies have experienced sizeable redemption requests that have often exceeded redemption gates (see **Overview**).

Chart 4.5

Risk-off sentiment strongly affects high-yield corporate bond and private credit funds, with the latter facing high credit risk, especially in the software sector



Sources: EPFR Global and S&P Global Ratings Private Markets Analytics.
Notes: Panel a: "Start of Middle East war" refers to 2 March 2026, the first trading day after the initial strikes on Iran on 28 February 2026. 0 on the x-axis marks the event date and other values indicate the business days before and after the event. Fund flows are cumulative and rebased to zero on the last trading day before the war (27 February).The sample is based on globally domiciled funds investing primarily in Western European bonds, which include bonds issued in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. Panel b: the chart shows the share of loan assets making payments in kind (PIK) in total loan assets (at fair value) across all business development companies (including publicly traded, non-traded and interval funds) and compares it with the share of PIK loans in the software sector and related sectors (IT services and healthcare technology).

In the euro area, 79% of private credit funds are closed-ended as of the end of 2024 while the remaining funds allow for redemptions, exposing them to liquidity risk.[69] Beyond liquidity mismatches, concentrated lending exposures, interlinkages with other financial institutions and public credit conditions, opaqueness and complex leverage structures can be important shock amplifiers (see **Special Feature D**). Elevated credit risk increases the likelihood of further redemptions going forward. Business development companies, and likely also other private credit funds, are characterised by a high share of payment-in-kind (PIK) loans, indicating potential cash flow strains.[70] Additionally, a substantial share of the loans held by such companies are to software firms, whose business models could suffer from severe AI disruption. In this case the share of PIK loans is much higher than in the aggregate loan portfolio (**Chart 4.5**, panel b).

Rising leverage and insufficient liquidity preparedness remain concerns for financial stability in parts of the investment fund sector. Leverage and strong interlinkages with the broader financial system are major financial stability risks

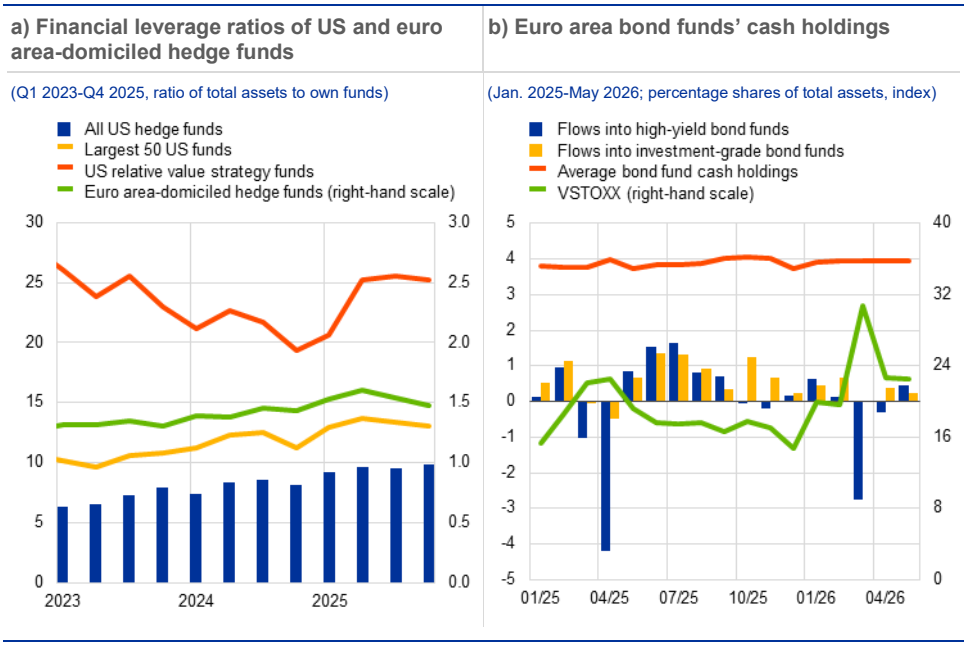
69 The figure is an update of Chart 12a from the 2024 NBFI Risk Monitor kindly provided by the European Systemic Risk Board. Notwithstanding the high share of closed-ended funds, rapid growth in the number of semi-open or open-ended European Long-term Investment Fund vehicles aimed at retail investors could point towards an increased risk of liquidity mismatches in the future.

70 Payment-in-kind refers to an interest payment in the form of additional debt instead of cash, likely due to cash flow problems on the part of the debtor.

posed by global hedge funds, which continue to lever up (**Chart 4.6**, panel a). In particular, the largest hedge funds maintain leverage ratios that are significantly above average. Relative value strategy funds tend to engage in highly leveraged basis trades, including in European sovereign bond markets, and have leverage ratios of around 25. Their leveraged positions may have to be unwound quickly if bond prices react sharply to geopolitical or risk sentiment shocks, for instance. In this way, hedge funds' procyclical deleveraging could exacerbate ongoing price moves and, through increased volatility in bond markets, erode the stable funding base of European governments.[71] Hedge funds domiciled in the euro area have also increased their financial leverage in the past few years, albeit with a slight decrease in the very recent past, but the level of their leverage remains below that of US hedge funds. Risks may be compounded by synthetic leverage in the form of derivatives, which can quickly translate into liquidity stress once market adjustments trigger margin or collateral calls.

Chart 4.6

The largest hedge funds keep on levering up, while continuously low cash buffers in the investment fund sector increase the risk of forced asset sales in stress periods



Sources: US Office of Financial Research, ECB (IVF), EPFR Global and Bloomberg Finance L.P.
Note: Panel b: the latest observation in the May series is for 19 May 2026.

Cash buffers in euro area investment funds have continued to decline overall. Sufficient liquidity levels – in the form of cash or other high-quality liquid assets (HQLA) – are essential to ensure resilience when facing liquidity shocks. HQLA holdings have generally declined over time[72], with cash levels further decreasing from slightly below 6% of total assets in bond funds and 4% in equity funds in the

[71] Investment funds investing in lower-rated euro area sovereign debt generally react negatively and more strongly than other financial sectors like banks, insurance corporations or pension funds to increases in financial market uncertainty. See Anaya Longaric, P. et al., "Sovereign bond markets and financial stability: examining the risk to absorption capacity", *Financial Stability Review*, ECB, November 2023.

[72] See also Baudino, P.A., Daly, P. and Storz, M., "Examining the dynamics of liquid asset holdings in the non-bank financial sector", *Financial Stability Review*, ECB, November 2025.

first quarter of 2020 to around 4% and 2% respectively in the first quarter of 2026. Several stress episodes in the past two years were marked by strong outflows, especially out of high-yield bond funds (**Chart 4.6**, panel b). During the tariff turmoil in April 2025, outflows from high-yield bond funds exceeded average cash buffers, indicating that these funds may have had to resort to precautionary or even forced asset sales to meet redemption requests. Such behaviour, especially in relatively illiquid assets like high-yield bonds, can exacerbate price movements. In turn, these can trigger margin calls or further redemptions elsewhere, amplifying aggregate financial stress. It is therefore a top priority for investment funds to ensure they maintain adequate liquidity levels and appropriate redemption terms to reduce liquidity mismatches (see **Section 4.4**).

4.3 Resilient insurance and pension fund sectors face volatile markets

Euro area insurance corporations and pension funds entered the latest episode of heightened geopolitical tensions with robust balance sheets and capital positions. The median solvency ratio of insurance corporations has remained above 200% – considerably above regulatory minima – providing a significant buffer to absorb potential losses (**Chart 4.7**, panel a). Profitability remains strong, although it may moderate in 2026 owing to competitive pressures, higher insurance rates and rising operational costs.[73] Pension funds' funding ratios have been supported by strong investment returns, rising equity prices and higher long-term interest rates, which have reduced the value of pension liabilities.[74]

Euro area insurance corporations' risks arising from insurance related to property and activities in the Middle East are contained. While euro area insurance corporations and reinsurers have some exposure to vessels and infrastructure in the Middle East, such risks are generally limited to specialised, globally distributed portfolios and do not represent a core systemic vulnerability. Reinsurance coverage and terms have tightened in response to war-related risks, while a prolonged conflict could negatively affect insurance corporations' balance sheets through higher costs relating to insurance claims and asset-side challenges.

The war in the Middle East has introduced heightened market volatility and increased valuation risk for investment portfolios. Direct exposures to markets in the region remain small. In 2025, on average only 0.07% of securities held by euro area insurance corporations and 0.10% of those held by euro area pension funds were issued by issuers based in Middle Eastern jurisdictions.[75] However, global markets are affected by the war in the Middle East and euro area insurance

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73 An insurance rate is the set price per unit of risk or exposure used to calculate an insurance premium.

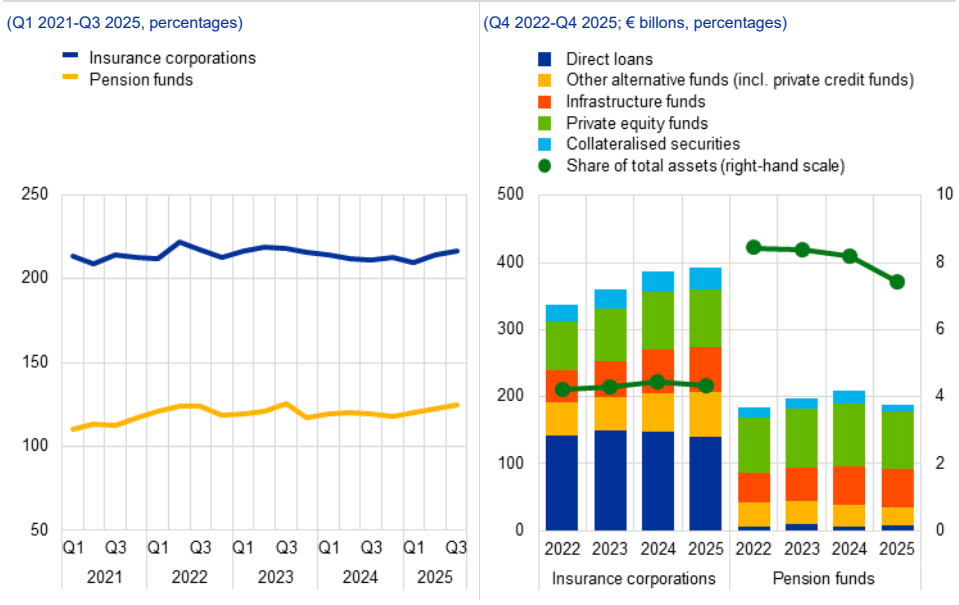
74 See EIOPA's April 2026 IORP Risk Dashboard.

75 Securities covered include listed shares, short-term and long-term debt securities as well as money market and non-money market investment fund shares/units. Euro area insurance corporations and pension funds held a total of €5.9 trillion and €2.6 trillion of these instruments respectively. For these purposes, the Middle East comprises Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen.

corporations and pension funds are invested in these markets. As a result, their portfolios are subject to market volatility and credit risk stemming from disruptions to oil exports and trade flows, as well as to weakening economic growth in general.

Chart 4.7

Insurance corporations' solvency ratios and pension funds' funding ratios remain strong and able to cater for risks from alternative or illiquid assets



Sources: EIOPA and ECB calculations.
Notes: Panel a: the chart uses data from the European Insurance and Occupational Pensions Authority (EIOPA) and shows medians for all insurance corporations and pension funds based in the European Economic Area (EEA). Insurance corporations are subject to Solvency II*, which requires a minimum solvency capital ratio of 100%. Pension funds, by contrast, follow the IORP II framework**, which does not set a uniform EU-wide funding ratio; national authorities define their own funding rules, typically requiring sufficient assets and recovery plans when schemes are underfunded. The funding ratio is defined as the ratio of assets to technical provisions. Panel b: "Pension funds" includes only occupational pension funds; "Direct loans" excludes mortgages; "Other alternative funds" covers alternative funds as categorised by EIOPA, which also includes private credit funds. The series refer to year-end data. Alternative assets in previous editions of the Financial Stability Review included real estate exposures, which have been excluded here. This was done to align more closely with the EIOPA methodology used to derive private credit exposures.
*) Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 335, 17.12.2009, p. 1).
**) Directive (EU) 2016/2341 of the European Parliament and of the Council of 14 December 2016 on the activities and supervision of institutions for occupational retirement provision (IORPs) (OJ L 354, 23.12.2016, p. 37).

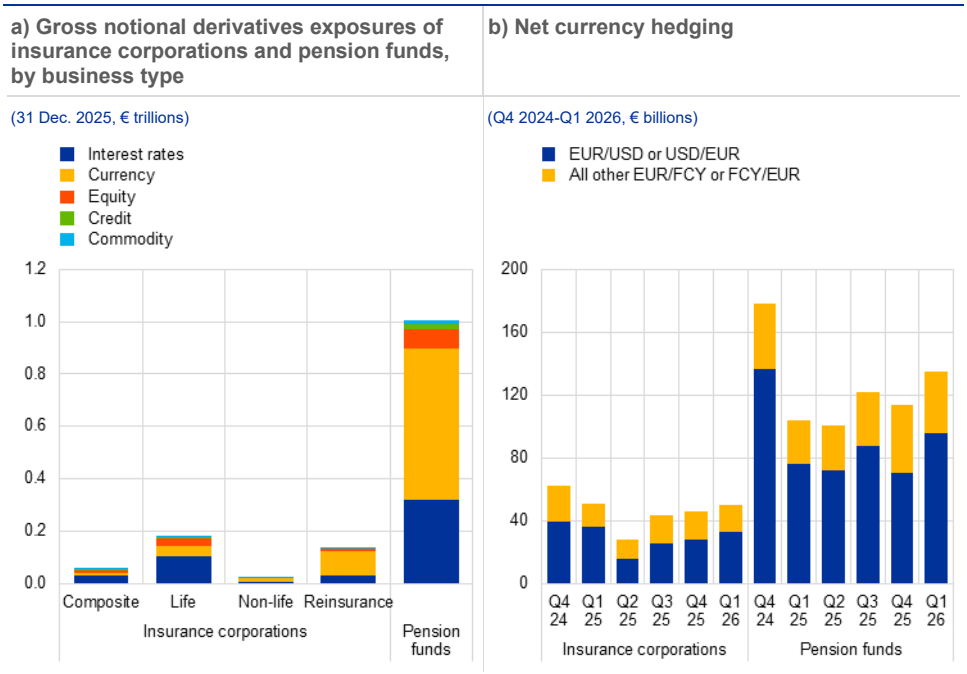
Insurance corporations and pension funds have exposures to illiquid assets that could give rise to additional risks. As of the third quarter of 2025, alternative assets (such as private credit, private equity and infrastructure) accounted for 4.4% and 6.6% of the total assets of insurance corporations and pension funds respectively. Since 2022 the trend has been slightly upwards for insurance corporations and downwards for pension funds (**Chart 4.7**, panel b).[76] Private credit and other alternative investment exposures pose challenges related to valuation uncertainty, given the illiquidity of these asset classes. In addition, it might not be

[76] According to Section 3 of EIOPA's Financial Stability Report December 2025, insurance corporations held 5.8% of their total assets in private credit (either directly or through funds) in the second quarter of 2025, a notable increase from the 3.9% recorded in 2016. Similarly, pension funds reported private credit exposure of 4.4% in 2024, up from 3.3% in 2020. EIOPA's methodology relies on non-publicly available Solvency II data to identify the exposures that are most representative of illiquid and opaque assets. It is important to note that EIOPA's reporting covers the EEA, while the data shown in this review (**Chart 4.7**, panel b) are limited to the euro area.

easy to sell such assets in the event of urgent need. Lastly, incomplete data reporting creates transparency issues.

Chart 4.8

Insurance corporations and pension funds actively implement hedging strategies to protect their balance sheets



Sources: ECB (EMIR) and ECB calculations.
Notes: Panel b: net currency hedging is the net notional amount expressed in euro summed across all types of FX derivatives. For each sector, net currency hedging is shown for EUR/USD transactions alone and for all net currency hedging positions aggregated across EUR/FCY positions. FCY stands for foreign currency.

Euro area insurance corporations and pension funds may face margin calls from hedging activities used to mitigate risks. Life-insurance corporations primarily hedge interest-rate risk because their liabilities are long dated and interest sensitive. Pension funds hedge foreign currency risk because their liabilities are single-currency while their assets are global, whereas reinsurers hedge foreign currency risk because their liabilities are multi-currency while their assets are concentrated in only a few currencies (**Chart 4.8**, panel a). Insurance corporations have increased their net currency hedging positions to protect euro-denominated balance sheets against US dollar fluctuations. This has notably been the case since the second quarter of 2025, whereas pension funds have only recently started to increase their net hedging positions again after the fall seen between the third and fourth quarters of 2025 (**Chart 4.8**, panel b). During times of macroeconomic uncertainty or elevated market volatility, hedging strategies may expose firms to a greater likelihood of margin calls, potentially leading to significant liquidity pressures.

4.4 Enhanced NBFI macroprudential and supervisory frameworks are key to developing EU capital markets

Concerns about leverage, liquidity mismatch and opacity in non-bank financial intermediation (NBFI) underline the need to enhance resilience within the sector. Vulnerabilities related to leverage, liquidity mismatch and opacity were evident in past crisis episodes, including the March 2020 market turmoil, the 2021 collapse of Archegos and the 2022 UK gilt market stress. Against a backdrop of elevated asset valuations, geopolitical risk and opacity in private credit markets, there are growing concerns that the NBFI sector could amplify market stress. Timely and consistent implementation of international reforms in the EU is essential to enhance resilience.

A number of international recommendations aimed at mitigating liquidity risk in the NBFI sector have yet to be fully implemented in the EU. International efforts are advanced when it comes to developing standards addressing liquidity risks from the NBFI sector. More work, however, is needed in the EU. The proposals put forward by the Financial Stability Board (FSB) in 2021 to enhance the resilience of money market funds have yet to be fully implemented. A key issue is how to reduce liquidity mismatch in the sector by increasing holdings of liquid assets, while ensuring that liquidity buffers remain usable in periods of stress.[77] With regard to the implementation of FSB work on open-ended funds, more work is needed on classifying funds according to the liquidity of their assets. Lastly, the EU has yet to implement the FSB's 2024 recommendations on enhancing the liquidity preparedness of NBFI participants when facing margin and collateral calls during times of market-wide stress.

Given the cross-border nature and opacity of certain NBFI activities, addressing leverage risks requires a global approach. A key component of the FSB's recommendations on NBFI leverage requires authorities to improve their risk monitoring frameworks by enhancing data availability and risk metrics. Given the presence of significant blind spots, authorities can only reach this goal through international cooperation aimed at increasing the visibility of cross-border risks. The work done by the FSB to address data challenges is critical, particularly with regard to removing barriers to effective cross-border data-sharing and strengthening public disclosures. In respect of policies addressing leverage risks, the FSB's recommendations call for a combination of entity-based measures (such as leverage limits) and activity-based measures (such as margins and minimum haircuts). These curb procyclical leverage dynamics and reduce regulatory arbitrage. Additional guidance from the FSB is needed to help authorities put these recommendations into practice. A key issue is how best to address risks from complex leveraged strategies

[77] The EU Commission has provided guidance to MMF managers and competent authorities that MMFs should hold levels of weekly liquid assets that are well above the minimum requirements so as to ensure market resilience. The Commission has not proposed to increase minimum requirements at this stage. 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", 11 May 2026.

– this is a concern in the euro area given the growing presence of hedge funds in sovereign bond markets (see **Box 2**).

The EU's efforts to develop private markets and enhance supervision as part of the savings and investments union have been well received. Progress on the savings and investments union is urgently needed to strengthen Europe's competitiveness, strategic autonomy and financial stability, while supporting the efficient financing of the real economy. Several key initiatives are under way in the EU to develop private markets and mobilise retail savings and institutional investors' capital more effectively. These include reviewing regulatory frameworks (e.g. revised rules for European Long-Term Investment Funds, the EU venture and growth capital funds reform) and boosting institutional investors' involvement (e.g. Solvency II and IORP II for insurance corporations and pension funds). Efforts are also under way to remove barriers restricting the cross-border integration of the European asset management sector. These initiatives are welcome and in line with the Governing Council's calls for urgent progress towards achieving a single market for capital.[78] A more integrated supervisory framework, including enhanced coordination and additional supervisory convergence powers for the European Securities and Markets Authority (ESMA) would help to ensure the consistent treatment of risk, promote a level playing field and reduce the potential for regulatory fragmentation or arbitrage.[79]

A more integrated framework for supervising funds and asset managers should be accompanied by amendments to the macroprudential framework. Further integration of the asset management industry and capital markets also entails a higher risk of cross-border contagion in the financial system. To fully gain the benefits of the savings and investments union, capital markets should be a resilient and sustainable source of financing, even in times of stress. This requires a prudential framework that can detect and address emerging systemic risk across the financial system. The review of the supervisory framework for asset management should be accompanied by a review of the macroprudential framework.[80] This would include targeted amendments to the Undertakings for Collective Investment in Transferable Securities (UCITS) Directive[81] and the Alternative Investment Fund Managers Directive (AIFMD)[82]. Key priorities, based on Eurosystem views, include introducing reciprocation mechanisms and granting "top-up" powers to ESMA in collaboration with national authorities and after consulting with the European Systemic Risk Board. The reciprocation framework should be primarily voluntary and should allow for a "comply or explain" process. There is also a need for a dedicated tool which could be used to address structural liquidity mismatch in open-ended

78 See the "Statement by the ECB Governing Council on advancing the Capital Markets Union", 7 March 2024.

79 See "Opinion of the European Central Bank of 9 April 2026 on proposals as regards the further development of capital market integration and supervision within the Union".

80 For a more extensive overview of the proposals, see "Strengthening the macroprudential lens in the regulation of non-bank financial intermediation", FSC high level task force on NBFI, ECB, May 2026.

81 Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS) (OJ L 302, 17.11.2009, p. 32).

82 Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) No 1060/2009 and (EU) No 1095/2010 (OJ L 174, 1.7.2011, p. 1).

funds. This would be similar to the existing legislative power to address systemic risk stemming from excessive leverage (see Article 25 of the AIFMD). Such a tool should allow authorities to address systemic risk ex ante, for example, by specifying longer notice periods for particular cohorts of funds.

As capital markets develop and the financial system evolves, so too will data needs for accompanying systemic risk assessments. To underpin a macroprudential approach to NBFI, it is important that authorities with a macroprudential mandate have direct access to granular data on non-banks. However, fragmented data continue to impede the assessment of systemic risk, both domestically and across borders. New sectors and market dynamics are emerging, as seen by the rapid growth of private credit markets. Opacity is therefore a key concern and relying on existing data might not be sufficient. Within the EU, there are three areas where progress is needed.[83] First, targeted legislative changes to data access and sharing provisions under the relevant EU regulations would enable euro area authorities to speedily exchange (including across borders) NBFI statistical and regulatory data. Second, a centralised data access and sharing mechanism is needed, with direct data still collected at the national level.[84] Third, existing reporting should be strengthened, especially for more opaque segments of the NBFI sector such as private credit. Enhanced data would also facilitate the development of system-wide stress testing, which would complement existing sectoral stress tests. At the global level, ongoing work by the FSB to improve the availability (including cross-border sharing) and comparability of NBFI data is critical.

Addressing data gaps in private credit markets is key to supporting authorities' ability to identify risks and protect investor confidence in private markets. Risks related to euro area investors' exposures to US private credit funds could erode confidence in private asset classes, which would undermine the objectives of the savings and investments union. EU supervisors should pay particularly close attention to these risks, actively strengthening resilience and protecting investors within their mandate and existing regulatory frameworks. However, data limitations could hamper their ability to assess financial stability risks in private credit, where vulnerabilities related to leverage, liquidity mismatch and opacity could all materialise at the same time. International efforts are needed to close data gaps and develop consistent definitions and taxonomies that enhance cross-jurisdictional comparability. In the EU, it is important to enhance cross-sectoral data access and introduce a specific alternative investment fund type dedicated to private credit funds. From a regulatory perspective, several frameworks apply to private credit funds in the EU, including leverage limits for loan origination funds under the AIFMD and liquidity rules under the European Long-Term Investment

[83] See "Strengthening the macroprudential lens in the regulation of non-bank financial intermediation", FSC high level task force on NBFI, ECB, May 2026.

[84] See also "Discussion paper on the integrated collection of funds' data", ESMA, 23 June 2025.

Funds Regulation.[85] This may imply that these frameworks have helped limit the build-up of risk in EU-domiciled funds. However, not all private credit activities are captured by these frameworks, and additional safeguards may be warranted from both a financial stability and an investor protection perspective. Liquidity mismatch in semi-liquid or evergreen structures should be addressed by ensuring that redemption terms align more closely with asset liquidity. This could be achieved through longer minimum notice periods and reduced redemption frequencies. Issues in private credit markets also raise important questions about the suitability of open-ended structures for funds invested in inherently illiquid assets. It may be necessary to reassess recent regulatory changes which allow this.[86] Supervisors should also identify the share of private credit funds that fall outside the definition of loan origination funds under the AIFMD, which therefore are not subject to the associated leverage limits. Supervisors should take appropriate action where such funds pose systemic risks.

A resilient global financial system based on an international level playing field is necessary for sustainable economic growth. The tensions outlined above come at a time when authorities are undertaking reviews of their regulatory and supervisory frameworks. The FSB has a key role to play in ensuring that such efforts do not lead to a "race to the bottom" or fragmentation in the implementation of its recent initiatives. A significant part of international policy work over the past decade has, in principle, focused on "modernising" regulatory and supervisory frameworks to ensure that they are resilient to an evolving financial system. This work includes addressing vulnerabilities stemming from the growth of NBFI, the emergence of new asset classes, such as crypto-assets and stablecoins, climate-related risks and cyber threats.

Box 5

Assessing the macroprudential impact of liquidity management tools for investment funds: a system-wide analysis

Prepared by Antoine Baena, Matthias Sydow and Garbrand Wiersema

Liquidity mismatches in open-ended funds can generate systemic risk when redemption pressures meet illiquid markets. During stress episodes, large outflows may force rapid asset sales at discounted prices. As asset values fall, investors may accelerate redemptions to avoid losses, creating run-like dynamics. Such feedback loops between outflows and prices can transmit localised stress to the broader financial system.[87] A number of liquidity stress episodes over the past few years have highlighted vulnerabilities in the fund sector. For example, the financial turmoil

[85] Commission Delegated Regulation (EU) 2024/2759 of 19 July 2024 supplementing Regulation (EU) 2015/760 of the European Parliament and of the Council with regard to regulatory technical standards specifying when derivatives will be used solely for hedging the risks inherent to other investments of the European long-term investment fund (ELTIF), the requirements for an ELTIF's redemption policy and liquidity management tools, the circumstances for the matching of transfer requests of units or shares of the ELTIF, certain criteria for the disposal of ELTIF assets, and certain elements of the costs disclosure C/2024/4991 (OJ L, 2024/2759, 25.10.2024).

[86] For example, the regulation governing ELTIF funds can allow for open-ended structures of private credit and real estate funds.

[87] See Falato, A., Goldstein, I. and Hortaçsu, A., "Financial fragility in the COVID-19 crisis: The case of investment funds in corporate bond markets", *Journal of Monetary Economics*, Vol. 123, October 2021, pp. 35-52, and "Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities", Financial Stability Board, 12 January 2017.

that followed the outbreak of the COVID-19 pandemic led to around 140 investment funds domiciled in the European Economic Area suspending redemptions due to valuation uncertainty or excessive outflows between March and May 2020.[88]

To mitigate risks stemming from liquidity mismatches, EU investment funds are required under UCITS VI[89]/AIFMD II[90] to operationalise at least two liquidity management tools (LMTs) as of 16 April 2026. ESMA recommends that investment funds adopt at least one price-based and one quantity-based LMT from a set of eight authorised tools.[91] Price-based LMTs such as anti-dilution levies (ADLs) are designed to transfer the costs associated with redeeming shares to the redeeming investors, the idea being to protect the remaining investors by preventing dilution of the fund's value.[92] In particular, ADLs charged to redeeming investors are directly calibrated against the estimated transaction costs of their redemptions. By contrast, quantity-based LMTs directly target redemption pressures by delaying or limiting the amount that can be withdrawn. For example, redemption gates limit total redemptions over a given period (typically one day) to a predetermined percentage of the fund's total net assets.

This box quantifies the potential impact of these measures on both investment funds and banks, using a system-wide agent-based model of the European financial system.[93] The model calculates the first-round impact on asset valuations of the 2025 EU-wide stress test's adverse scenario for banks, investment funds and insurers, as well as the first-round fund redemptions by external investors based on the funds' scenario-induced losses.[94] This triggers various second-round liquidity dynamics in the model, including second-round redemptions from funds by other agents in the model. This box evaluates the systemic impact of LMTs applied to second-round redemptions, covering both a price-based tool (ADLs) and a quantity-based tool (redemption gates).[95] For the sake of brevity, and given the limited relevance of insurers to this analysis, the box focuses only on banks and investment funds.

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88 See "Report: Recommendation of the European Systemic Risk Board (ESRB) on liquidity risk in investment funds", European Securities and Markets Authority, 12 November 2020.

89 Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS) (OJ L 302, 17.11.2009, p. 32).

90 Directive (EU) 2024/927 of the European Parliament and of the Council of 13 March 2024 amending Directives 2011/61/EU and 2009/65/EC as regards delegation arrangements, liquidity risk management, supervisory reporting, the provision of depositary and custody services and loan origination by alternative investment funds (OJ L, 2024/927, 26.3.2024).

91 See "Guidelines On Liquidity Management Tools (LMTs) of UCITS and open-ended AIFs", European Securities and Markets Authority, 12 March 2026.

92 In the absence of ADLs, the remaining investors bear these redemption costs (transaction fees, bid-ask spreads, etc.). The costs can generate strategic complementarities: an investor's incentive to redeem increases in line with the proportion of other investors doing so. This can give rise to (panic) runs on funds.

93 See Sydow, M. et al., "Shock amplification in an interconnected financial system of banks and investment funds", *Journal of Financial Stability*, Vol. 71, 101234, April 2024, and Sydow, M. et al., "Banks and non-banks stressed: liquidity shocks and the mitigating role of insurance companies", *Working Paper Series*, No 3000, ECB, November 2024.

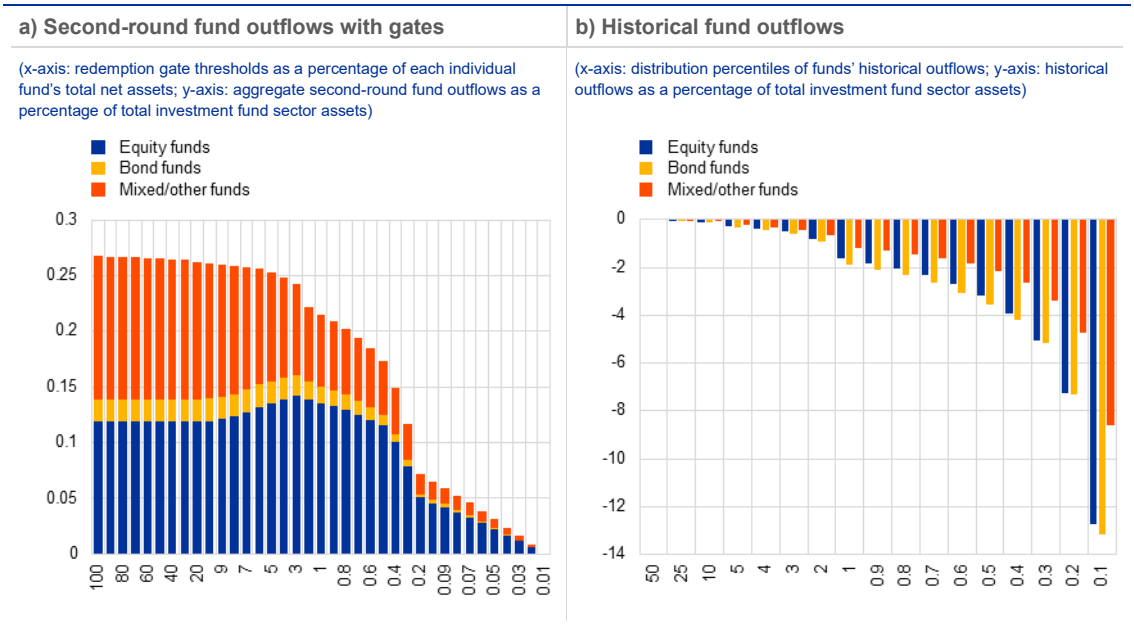
94 An extended description of the scenario and model (without LMTs) can be found in "Integrating contagion risk into the 2025 EU-wide stress test: a system-wide analysis with amplification effects between banks and non-banks", *Macroprudential Bulletin*, Issue 32, ECB, November 2025. The dataset covers euro area banks and insurance corporations, and investment funds globally. It is important to note that the results of the analysis are conditional on the applied scenario, so it is not guaranteed they can be generalised to other relevant stress scenarios.

95 Because the model cannot capture potential negative spillovers of LMTs to external investors, first-round redemptions by external investors are not subject to LMTs. Otherwise, the model would produce an unrealistically optimistic assessment of their impact.

Redemption gates reallocate redemptions across the sector towards less vulnerable funds, mitigating the risk of fire-sale spirals (Chart A, panel a). The chart shows aggregate second-round outflows by fund type, depending on how restrictive redemption gates are (100% means unrestricted redemptions). A redemption gate of about 2%, when applied by all funds in the model, has the potential to significantly rebalance redemptions across funds. There is an increase in outflows from equity funds, which are typically larger, but a decrease in outflows from smaller, more vulnerable and less liquid funds, such as bond funds. This happens because when redemption requests exceed the fund's gating threshold, investors redeem from other funds to meet their remaining liquidity needs.[96] In doing so, redemption gates redistribute liquidity pressure from less resilient to more resilient funds, reducing the risk of localised shocks escalating into fire-sale spirals.

Chart A

Redemption gates reallocate outflows to more resilient funds, while only restricting outflows which are exceptionally large by historical standards



Sources: LSEG Lipper and ECB calculations.
Notes: The sample of funds is the same in both panels. Panel a: aggregate outflows per fund category, depending on the severity of the gate. A gate of x% limits each fund's total outflows to x% of the fund's total net assets. When the requested redemptions exceed the gate, they are granted pro rata up to the limit set by the gate. Panel b: historical distribution of funds' daily outflows, from Q1 2019 to Q4 2024.

Appropriately calibrated redemption gates may protect vulnerable funds without significantly limiting the liquidity available to other sectors, such as banking. A gate of 2% of total net assets is at the restrictive end of what is used in practice, although it only affects unusually severe outflows in the tail of the historical distribution (**Chart A**, panel b).[97] When all funds apply a 2% gate, total redemptions from the sector fall by less than 5 basis points of fund sector assets. This amount is unlikely to create liquidity bottlenecks in other sectors. In practice, the gate is even less restrictive, as excess redemptions would merely be postponed to the next period (typically a day). For the sake of simplicity, in the model investors are forced to redeem from other funds

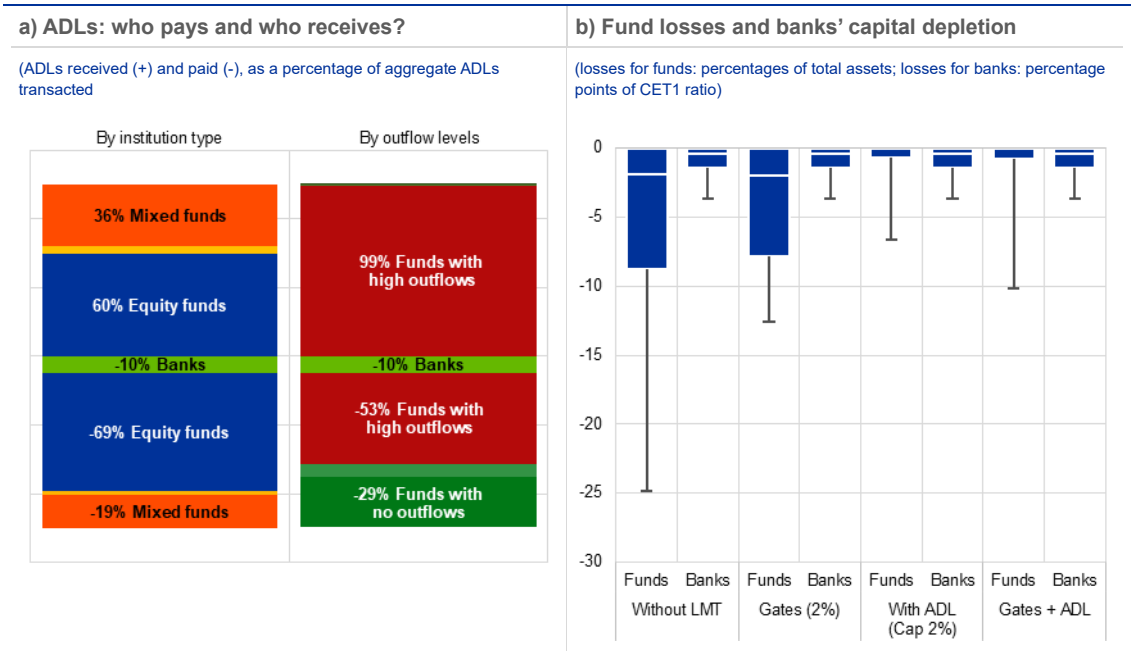
96 Second-round redemptions in the model are driven exclusively by liquidity needs. When gates block redemptions, investors are forced to raise liquidity through other means in the model.

97 According to IOSCO data from 2015, funds implementing redemption gates in jurisdictions where gates are already authorised typically used a threshold of between 5% and 25% of total net assets. See "Liquidity Management Tools in Collective Investment Schemes: Results from an IOSCO Committee 5 survey to members", FR28/2015, International Organization of Securities Commissions, December 2015.

instead. Overall, when applied consistently across the fund sector with appropriately stringent calibration, redemption gates seem to improve the stability of the fund sector and the broader financial system, without significantly restricting liquidity access to other sectors (e.g. banking). In practice, however, redemption gates are calibrated by individual fund managers, which may be suboptimal from a systemic perspective.

Chart B

Mixed funds and funds with high outflows would benefit the most from ADLs, and redemption gates and ADLs are both tools that are effective in protecting fragile funds during financial turmoil



Source: ECB calculations.
Notes: Panel a: the left bar shows the share of total transacted ADLs received (+) and paid (-) by institution type, when all funds apply ADLs capped at 2%. The unlabelled yellow segments correspond to bond funds. In the right bar, funds are categorised based on their second-round redemptions experienced: no outflows, low-to-medium outflows (< 66th percentile, unlabelled olive-green segments) and high outflows (> 66th percentile). Panel b) shows boxplots of the distribution of second-round fund losses and bank capital depletions, when a 2% gate and/or ADL capped at 2% is applied by all funds. Only European institutions are shown, such that the baseline result (no LMTs) matches that in the Macroprudential Bulletin*.
*) "Integrating contagion risk into the 2025 EU-wide stress test: a system-wide analysis with amplification effects between banks and non-banks", *Macroprudential Bulletin*, Issue 32, ECB, November 2025.

ADLs may generate significant liquidity transfers to funds suffering high liquidation costs. Following ESMA guidelines[98], in this analysis ADLs are calculated as the difference between the price when the order is placed and the final executed price.[99] Assuming that all funds in the sample impose ADLs, the gross amount of liquidity transferred by these levies is significant, amounting to about 5% of the total value of second-round redemptions. **Chart B**, panel a) shows the fraction paid and/or received of the total transacted ADL volume, with ADLs capped at 2% of the redeemed

98 See guideline 37 in "Final Report: Guidelines on LMTs of UCITS and open-ended AIFs", European Securities and Markets Authority, 15 April 2025.

99 In the model, asset sales depress prices, reflecting the price impact of (fire) sales and reducing the cash recovered. The ADLs determined in the model are chosen to cover this cost exactly. In practice, however, ADLs cannot be based on liquidation costs realised ex post and would be estimated ex ante from historical data. As such, when market prices fall sharply and redemptions spike simultaneously, as they do in the simulation, ADLs determined ex ante will not fully capture the severity of the liquidation costs, in contrast to the ADLs calculated in the model. Furthermore, an important feature of ADLs is that they may discourage redemptions because they offset first-mover advantages. This is not captured in the model, as investors are not deterred by ADLs but just pay the levy for the sake of simplicity. For these reasons, the amount of ADLs transacted in the model is very conservative and likely overestimates the amount that would be levied in practice.

amount.[100] As ADLs are predominantly paid to funds suffering high liquidation costs, they offset some of these more vulnerable funds' losses and reduce the risk of funds being forced into fire sales that could spill over to other sectors. ADLs transfer liquidity from the banking sector to the fund sector, as about 10% of ADLs are paid by banks. However, ADLs mainly transfer liquidity between funds, with large equity funds receiving the greatest share of gross levies, and mixed funds and funds with large outflows benefiting the most in terms of net levies received.

ADLs and redemption gates both prevent tail losses in the fund sector, with minimal impact on banks' capital (Chart B, panel b). The chart shows box plots of second-round fund losses and banks' capital depletions for four policy configurations: (1) a baseline without LMTs; (2) a 2% redemption gate applied by all funds, but no ADLs; (3) ADLs, capped at 2%, levied by all funds, but no redemption gates; and (4) the combined application of gates and ADLs. The 2% gate significantly reduces the 75th and, in particular, the 90th percentile of the loss distribution. By comparison, ADLs with a 2% cap have an even greater impact, while the combination of ADLs and gates appears less effective at reducing fund losses in the tail of the distribution than ADLs alone. Note, however, that in the event of a crisis gates may prevent the forced selling of securities below their fundamental value. This advantage of gates over ADLs is not visible in **Chart B**, panel b), because the results presented do not distinguish between unrealised mark-to-market losses and losses realised when selling. All the combinations of LMTs considered show no significant impact on banks' capital ratios. This indicates that LMTs do not limit banks' access to liquidity to the extent that they could be forced to conduct fire sales of substantial asset volumes.

Overall, strictly and consistently implemented LMTs can protect vulnerable funds, reducing the risk of dilution and negative spillovers to other sectors. The impact of LMTs on systemic liquidity risk appears to be positive – this is particularly evident when tail losses are analysed.[101] By redistributing liquidity pressure from fragile entities to more resilient institutions, the system-wide stress test simulation indicates that LMTs prevent localised shocks from escalating into fire-sale spirals. These findings suggest that strictly and consistently applied LMTs can help bolster the resilience of the non-bank financial sector and safeguard broader system-wide stability.[102] At the same time, redemption gates and ADLs may create new incentives for pre-emptive redemptions, whereby investors redeem shares before gating thresholds are reached or ADLs are raised. Moreover, when redemptions are blocked or ADLs spike in one class of funds, this may signal distress to the broader market and trigger pre-emptive redemptions in other classes of funds. These potential downsides of LMTs are not captured by the model.

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[100] The results in Chart B, panels a) and b) are calculated with a 2% cap on ADLs, which is a commonly chosen cap on price-based LMTs. This was observed for French investment funds by Baena, A. and Garcia, T., "Swing Pricing and Flow Dynamics in Light of the Covid-19 Crisis", *Working Papers*, No 914, Banque de France, 2022.

[101] By reducing redemption risks, LMTs may facilitate increased risk taking by funds. This is not captured by the model.

[102] Where necessary, national macroprudential authorities can coordinate with the competent authorities to support the application of stricter measures when systemic risks are identified.

Special features

A From dictionaries to AI: a new era in sentiment analysis for financial stability

Prepared by John Fell, Sándor Gardó, Benjamin Klaus, Pucho Vendrell, Jonas Wendelborn and Stefan Wredenborg

Financial stability communication is challenging because its task is not to forecast financial crises, let alone predict their precise timing. Rather, it is to identify vulnerabilities and explain how the financial system is likely to fare should it be confronted with adverse shocks. Great care is needed in this endeavour, because the sentiment of financial stability communication can influence market perceptions and risk assessments, as well as broader economic and financial outcomes. Given the presence of this potential feedback loop, the task of financial stability communication at the ECB has long been guided by a broad concept of financial stability: the smooth allocation of financial resources, effective management of risk by financial institutions and the capacity of the financial system to absorb shocks. Using the messages conveyed in the ECB's Financial Stability Review over two decades, this special feature compares dictionary-based, FinBERT and prompt-based AI approaches to extracting financial stability sentiment. It finds broad co-movement across methods, while the GPT-based filter isolates sentences that contain explicit risk assessments, capturing subtle shifts in tone and context that were previously difficult to quantify. Used carefully, such tools can support risk monitoring and drafting consistency over time, but they remain complementary to expert judgement, vulnerability analysis and stress testing, rather than substitutes for it. A deep-dive box in the special feature also shows how AI can be used to systematically extract information from financial news to create an indicator for the severity and probability of triggers (SPOT) for financial stability risks.

1 Introduction

ECB communication on financial stability has long been organised around a broad analytical framework. In that framework, a financial system is stable when it supports the smooth and efficient allocation of financial resources, when financial institutions manage their risks effectively, and when the system can absorb adverse shocks and surprises.[103] Financial stability reviews (FSRs) are important vehicles used by central banks to communicate judgements of this type. But this form of communication is inherently challenging: it is not economic forecasting and it should not be judged as if it were. An FSR may appear to have been wrong ex post because a shock never materialised, because vulnerabilities unwound more

[103] See Fell, J. and Schinasi, G., "Assessing Financial Stability: Exploring the Boundaries of Analysis", *National Institute Economic Review*, No 192, April 2005, pp. 102-117, and Fell, J. and Schinasi, G., "Assessing Financial Stability: Conceptual Boundaries and Challenges", *Financial Stability Review*, ECB, June 2005, pp. 117-125.

gradually than expected, or because preventive action was taken. Given this complexity, a more realistic ambition would be to identify vulnerabilities and explain the type of shocks which might test the stability of the system, rather than to predict the exact trigger or timing of stress. That said, the language and tone central banks use in financial stability communication can play an important role in shaping market perceptions and influencing risk assessments. Ultimately, this can affect economic and financial outcomes.[104] Because of this, monitoring sentiment in FSRs can play a valuable role. This has long been done with sentiment metrics, which offer a structured perspective on how vulnerabilities and resilience are characterised over time. Now, with recent advances in artificial intelligence (AI) and especially large language models, the door has been opened to a more nuanced and adaptive form of sentiment analysis, overcoming some of the limitations of more traditional approaches such as survey-based and market-based methods.

This special feature explores how these methods can be used to extract and interpret financial stability sentiment. Section 2 sets out the three text-based approaches and clarifies the different objects they capture. Section 3 examines how ECB FSR communication has become more concise, more focused on assessment and more forward-looking over time. Section 4 relates the sentiment indicators to systemic stress and shows how they can complement vulnerability monitoring. Section 5 discusses practical applications in drafting and internal risk monitoring, and Section 6 concludes.

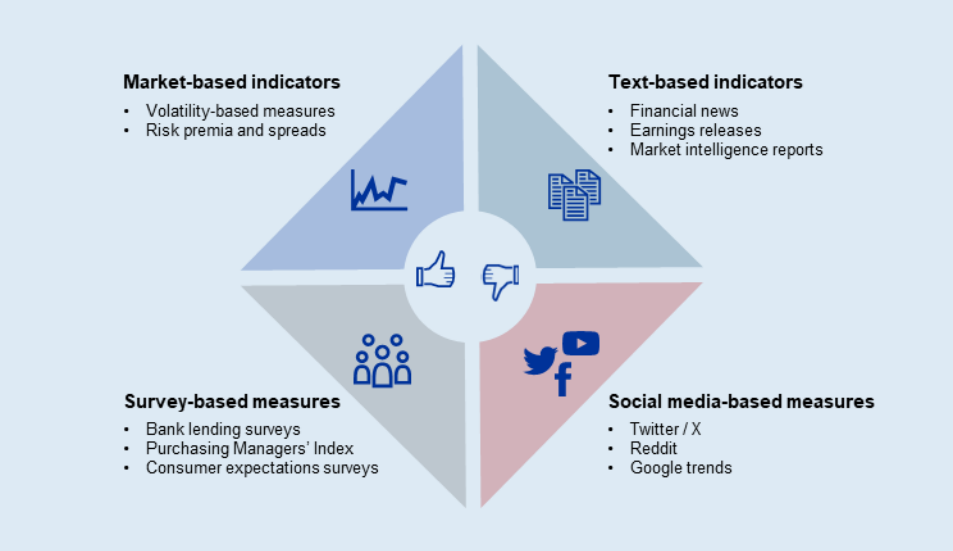
2 Measuring financial stability sentiment in ECB FSRs

There is a range of quantitative approaches employed to measure sentiment relevant to financial stability, each with its own strengths and limitations. These approaches can be grouped into four broad categories (**Figure A.1**). First, market-based indicators are derived from asset prices and offer valuable high-frequency signals from financial markets. However, they often capture a complex interplay of factors, such as risk appetite, liquidity conditions and expectations, which are difficult to disentangle. Second, survey-based approaches capture expert judgement directly and offer rich qualitative insights, but are costly to administer and difficult to backfill historically. Third, social media-based approaches extract insights from trending topics on social media platforms or search trends to gauge public sentiment in real time. However, they are prone to "noise", biased content, representation issues and manipulation risks that can skew sentiment analysis results. Finally, text-based analyses systematically extract sentiment from existing publications (e.g. earnings releases, financial news or commentaries from market analysts) over extended periods of time, eliminating the need for additional data collection.

[104] See Fell, J., Gardó, S., Klaus, B., Wendelborn, J. and Wredenborg. S., "Communication for financial crisis prevention: a tale of two decades", *Financial Stability Review*, ECB, November 2024.

Figure A.1

Various quantitative approaches can be employed to extract and evaluate sentiment metrics relevant for financial stability



Source: ECB.

Text-based methods, which are advancing rapidly through the growing use of AI, offer a valuable means of gauging financial stability sentiment. Within this evolving field, three distinct methodologies for analysing textual data stand out: (1) dictionary-based word counting, which measures linguistic tone using pre-defined word lists; (2) transformer-based neural classification, such as FinBERT, which classifies sentence-level tone in context; and (3) prompt-based generative-AI classification, which can be instructed to identify whether a sentence contains an explicit financial stability assessment and, if so, the direction of this assessment. These approaches differ not only in sophistication but also in the object being measured, so they are best treated as complementary than as substitutes, allowing cross-checks against one another, thereby making sentiment analysis more robust and reliable (**Table A.1**).

Table A.1

Overview of the strengths and limitations of various text-based methods used to measure financial stability sentiment

Approach	Strengths	Limitations
Dictionary-based models	Simple, need no model training or external application programming interface (API), produce deterministic results	Context blind
Transformer-based neural classification models	Context aware, capture sentence-level nuance, adaptable to specific domains through fine-tuning	Require labelled data and fine-tuning, opaque decision-making, resource intensive
Generative AI-based models	Flexible task instructions; can combine relevance, time-orientation and risk-direction classification with few-shot examples	Non-deterministic outputs, often dependent on external APIs, sensitive to prompt/model settings, potentially expensive

Source: ECB.

Text-based methodologies are also useful for assessing the sentiment of a central banks' own financial stability communication over time. To obtain a comprehensive view of sentiment embedded in the ECB FSR, the three text-based methods discussed above are applied to the full corpus of 43 issues of the ECB FSR published between 2004 and 2025. This made it possible to systematically analyse textual data tracking sources of risk and vulnerabilities to financial stability, revealing sentiment trends and shifts over time.

Traditional dictionary-based methods offer a transparent and fully reproducible baseline for sentiment measurement. The approach relies on matching individual words in the text against pre-defined lists of positive and negative terms. The analysis of the text of the ECB FSRs follows the same approach as for the Fed financial stability dictionary created by Correa et al.[105], which comprises 391 terms (96 positive and 295 negative) curated on the basis of financial stability communication. All sentences are tokenised for each edition of the ECB FSR and, after stopwords have been removed, the remaining tokens are matched against the dictionary.[106] Net sentiment is then calculated as the difference between negative and positive word shares. The main advantage of this method is its simplicity: it requires no model training, no API and produces deterministic results. Its main limitation is its context blindness: it cannot distinguish, for instance, between "the contraction is deepening" and "the contraction is easing" since both sentences contain the same word flagged as a negative (i.e. contraction).

Transformer-based models address the context blindness of dictionaries by classifying sentiment at the sentence level. The standard BERT model[107] is a multi-layer neural network designed to understand the meaning of words on the basis of the context in which they appear. The FinBERT model used in this special feature is a BERT model pre-trained on financial news from Reuters and fine-tuned on the Financial PhraseBank, a corpus of roughly 4,800 sentences with human-annotated sentiment labels. Each sentence receives a probability distribution across three categories (positive, negative and neutral) and the highest-probability class is assigned as the hard label. As FinBERT processes the full sentence, it can capture negation, qualification and clause-level structure that word-counting methods miss. FinBERT was trained on economic/financial news rather than central bank language and is applied here without further tailoring to FSR vocabulary. But its independence from the specific text being analysed makes it a useful tool for cross-checking the robustness of sentiment patterns identified by other methods.

Generative AI models combine sentiment classification with structured reasoning about relevance to financial stability and temporal orientation. Unlike BERT models, the generative pre-trained transformer (GPT) method can evaluate complex relationships such as relevance for financial stability and time

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105 Correa, R., Garud, K., Londono-Yarce, J.-M. and Mislang, N., "Constructing a Dictionary for Financial Stability", *IFDP Notes*, Board of Governors of the Federal Reserve System, 28 June 2017.

106 Tokenisation is the process of breaking down a sentence into smaller pieces, called "tokens", which are usually individual words or items of punctuation. Stopwords are common words like "and", "the" or "is" that are often removed because they do not add much meaning to the analysis.

107 BERT stands for bidirectional encoder representations from transformers. It represents the state-of-the art language model prior to the introduction of GPT models. Being pre-trained on a large corpus of text, the BERT model can be fine-tuned relatively easily for specific purposes.

orientation within an integrated multi-step reasoning framework. In this special feature, the GPT method is employed by designing a prompt that encodes a three-step decision process.[108] The model first determines whether a sentence conveys a view on financial stability risk (an "assessment-bearing" filter).[109] Next, it classifies its temporal orientation (backward-looking, forward-looking or mixed)[110] and then, finally, it assigns a sentiment label (negative, neutral or positive: framed as the direction of financial stability risk).[111] The resulting series should thus be understood as a tailored measure of explicit risk judgements in the text, rather than as a formal benchmark of model accuracy. Crucially, sentiment is defined not as the general tone of the language but as the implied direction of financial stability risks and vulnerabilities. The label "negative" denotes higher or deteriorating risk, "positive" denotes lower or improving risk, and "neutral" applies where the assessment is balanced or implies no clear direction.

Harmonised summary sentiment scores can then be constructed from the three approaches. At the ECB FSR edition level, each method is aggregated into shares of negative, neutral and positive classifications of sentences (or word matches in the case of the dictionary) and net sentiment is defined as the difference between negative and positive shares. The score ranges from minus one to plus one. This provides a common summary metric for comparing directional patterns across methods, while keeping in mind that the underlying concepts are not identical.

3 Evolving sentiment of financial stability communication

Financial stability sentiment metrics are broadly consistent across methods. Comparing net sentiment scores across the three methods allows robustness to be checked, revealing similar patterns (**Chart A.1**, panel a). The time series are highly correlated across methods: the dictionary and generative AI series show a correlation of 0.82, generative AI and FinBERT a correlation of 0.73 and the dictionary and FinBERT a correlation of 0.84. This three-way agreement suggests that the three approaches capture similar cyclical shifts in the ECB's communication over time, even though they are not measuring exactly the same object: the

[108] The prompt was calibrated through iterative human review and few-shot examples drawn from sentences with strong annotator consensus. Few-shots are meaning a small number of carefully chosen illustrative samples used to guide a model's task performance and improve accuracy with minimal training data. The examples were drawn from sentences with strong annotator consensus and are included to anchor the model's classifications. For this special feature, generative AI sentence-level classification was carried out using a variety of GPT-based models. The results presented are based on a model which had the best fit with human annotation while being cost efficient. Given the absence here of a full benchmark exercise, the GPT-based results are interpreted with caution and used mainly as a structured cross-check on explicit risk assessments.

[109] Explicit inclusion and exclusion criteria guide the relevance filter: sentences containing only generic risk language, purely descriptive statistics or policy descriptions without stated financial stability consequences are classified as "not assessment-bearing".

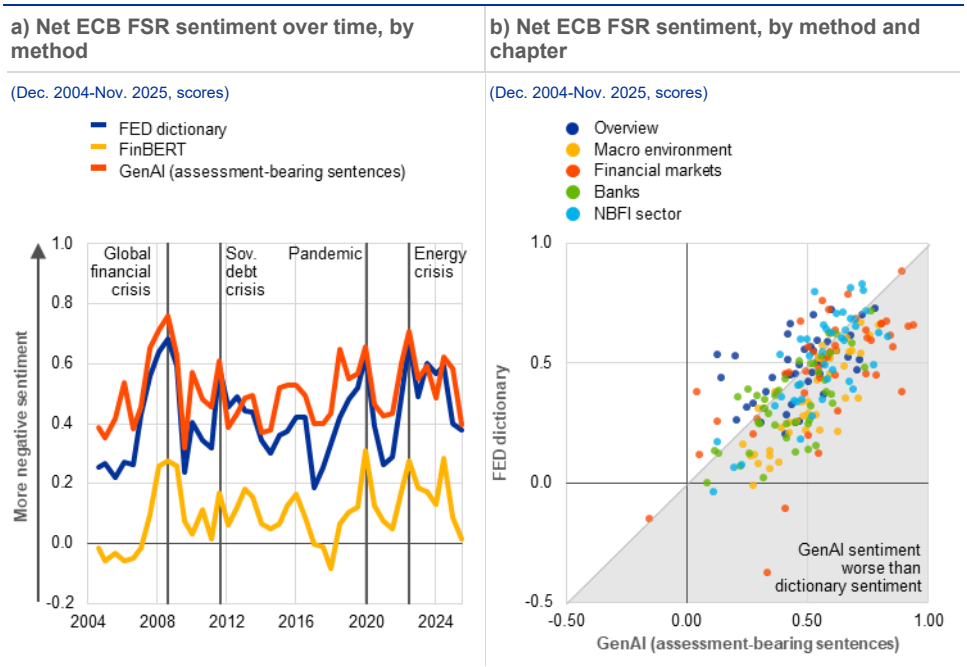
[110] A sentence is classified as backward-looking if it reports past/realised developments or is merely setting up for a forward-looking message. A forward-looking sentence contains expectations, projections or future-oriented uncertainty. A sentence is classified as mixed if backward- and forward-looking elements are both equally substantial or the sentence is contemporaneous without a clear past/future tilt.

[111] This design allows the generative AI approach to produce two informative variants of the sentiment time series – one based on all sentences (comparable to FinBERT) and one restricted to assessment-bearing sentences. We focus our analysis on the latter which more closely reflects the language embedded in ECB FSRs.

dictionary and FinBERT series are closer to linguistic tone, while the GPT-based series is designed to capture the direction of risk assessments.

Chart A.1

Different sentiment analysis methods broadly align, with the assessment-bearing GPT measure producing a sharper signal during stress episodes



Sources: ECB and ECB calculations.
Notes: GenAI stands for generative AI. Panel b: NBFI stands for non-bank financial intermediation.

Where the methods diverge, the differences are in themselves informative. The generative AI approach tends to produce more negative sentiment, including sharper peaks during crisis episodes, because the assessment-bearing filter concentrates the signal on sentences that carry explicit risk judgement. Notably, it signals a higher level of risk in the run-up to the global financial crisis than the other two methods. The dictionary and FinBERT methods, on the other hand, dilute the signal by considering all text, including more descriptive passages. Moreover, the level of sentiment produced by the FinBERT model tends to be more neutral than it is for the other two methods. This is because the model was trained on financial news, which typically features more emotionally charged language, whereas the ECB FSR employs a more restrained and formal tone. While this makes the GPT-based series a closer proxy for explicit risk assessments in the text, it does not necessarily make it a demonstrated benchmark of superior accuracy. The more negative sentiment produced using the generative AI approach can be seen as a reflection of the ECB FSR's focus on downside risks. At the same time, a somewhat less volatile series is produced by this method in comparison with the dictionary approach.

Calculating sentiment scores at the chapter level makes it possible to compare risk assessments across sectors. While the structure of the ECB FSR has evolved over time, the overall coverage of topics has remained the same. Each ECB FSR features an Overview that summarises the risk assessment, as well as sections on the macro-financial and credit environment, financial markets, the euro area banking

sector and the euro area non-bank financial sector. While, on average, the generative AI approach produces more negative scores at chapter level, this is not consistently the case for the whole body of the ECB FSR (**Chart A.1**, panel b). Notably, for individual chapters there are several outliers where the generative AI approach arrives at much lower or much higher sentiment scores than the dictionary, indicating periods in which the dictionary is prone to dilution. In addition, the differing variance of sentiment scores across chapters points towards structural differences between their subject topics. The assessment of financial markets shows the greatest variance in sentiment scores, reflecting the higher volatility of markets compared with, for instance, the real economy.

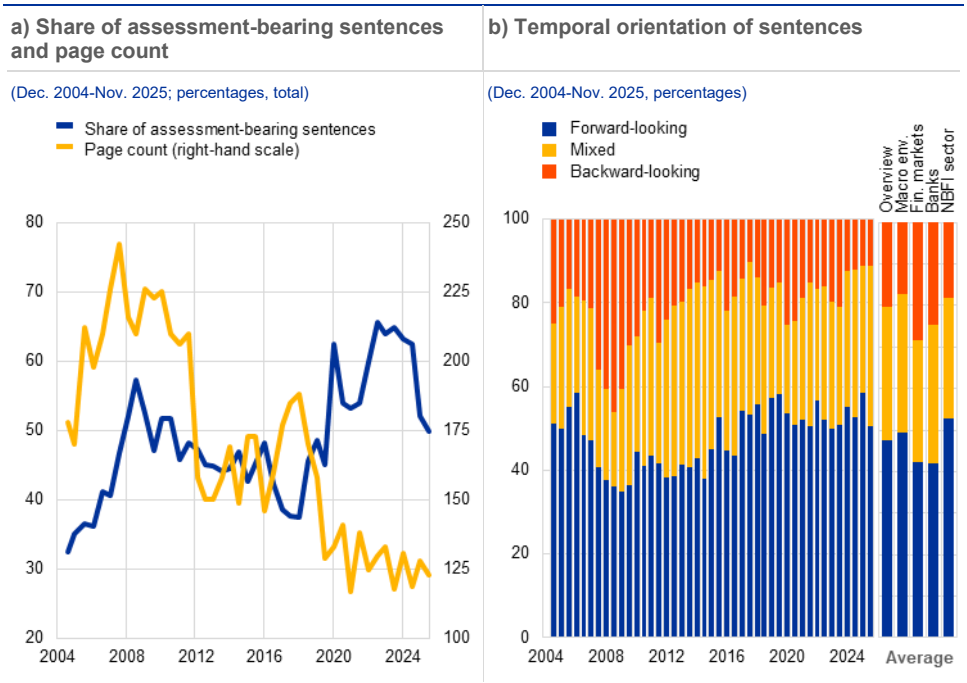
The share of assessment-bearing sentences has trended upwards over time, reflecting shifts in central bank communication. On average, around half of ECB FSR sentences are classified as "assessment-bearing", providing an explicit judgement on financial stability (**Chart A.2**, panel a). Over time, this share has changed substantially, with a pronounced increase seen since the end of 2018. The share of assessment-bearing sentences was particularly low for issues which had a high page count, indicating that the additional length came mostly from more descriptive passages. This partly reflects structural changes made to the content of the ECB FSR, with earlier editions dedicating much more space to descriptions of international developments. However, the substantial shift to more concise editions and a higher share of assessment-bearing sentences since end-2018 is consistent with a more concise and more targeted communication style. Part of this shift reflected deliberate editorial choices, including responses to reader feedback,[112] while year-to-year movements still depend on the amount of contextual material needed to frame the risk assessment. Finally, while each ECB FSR undergoes a rigorous editing process, such trends can also be explained by changes in the editorial team, which can influence stylistic drafting choices.

The temporal orientation of ECB FSR sentences has gradually adopted a more forward-looking perspective. Given that the ECB FSR's objective is to warn about sources of risk and vulnerabilities, sentences tend to be forward-looking or have a mixed temporal orientation, meaning they balance forward-looking and backward-looking elements or contain contemporaneous statements (**Chart A.2**, panel b). Since its trough in 2009, the share of more forward-looking statements has gradually trended up and has stabilised at around 50%. On the other hand, the share of purely backward-looking statements is generally much lower. However, during or shortly after crisis episodes (depending on when the crisis materialised relative to the publication dates of the ECB FSR), backward-looking statements spike as an account is provided of the developments during the episode. There are also differences across chapters in this case, with the chapters on financial markets and on the banking sector generally having the greatest backward-looking orientation.

[112] See the box entitled "Results from the May 2024 FSR readership survey" in Fell, J., Gardó, S., Klaus, B., Wendelborn, J. and Wredenborg, S., "Communication for financial crisis prevention: a tale of two decades", *Financial Stability Review*, ECB, November 2024.

Chart A.2

Over time the ECB FSR has become shorter, more assessment-bearing and more forward-looking



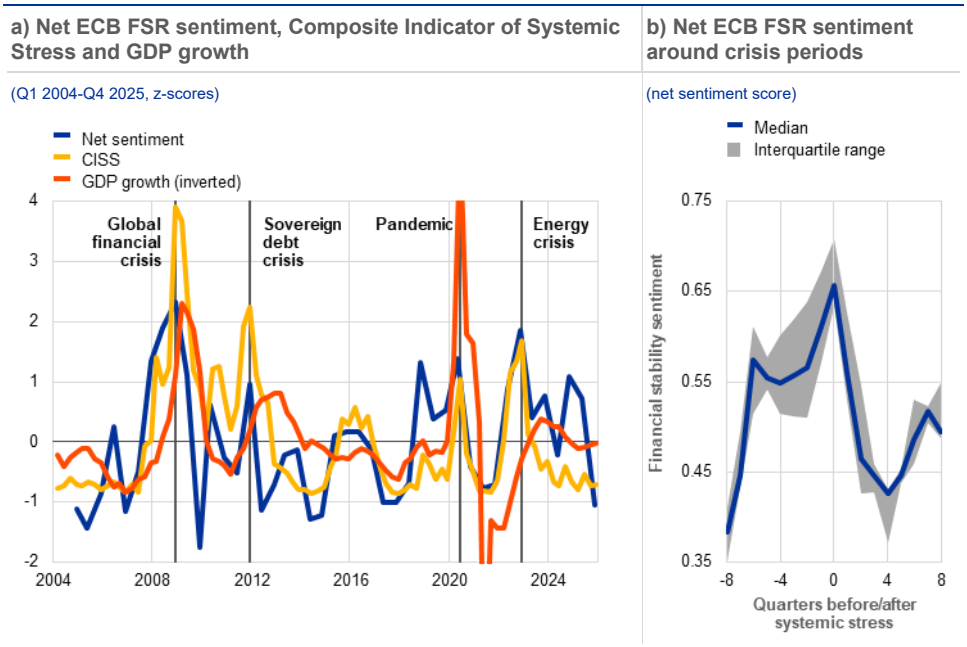
Sources: ECB and ECB calculations.
Note: Panel b: NBFI stands for non-bank financial intermediation.

4 Sentiment as a summary metric for financial stability risk assessments

Sentiment embedded in the risk assessments articulated in ECB FSRs co-moves with systemic stress. Periods of acute financial turmoil tend to be associated with pronounced increases in systemic stress and marked shifts in ECB FSR sentiment (**Chart A.3**, panel a). In vulnerability-driven episodes, such as the global financial crisis and the sovereign debt crisis, heightened stress coincided with the materialisation of structural weaknesses in credit intermediation and sovereign balance sheets. By contrast, the COVID-19 pandemic shock originated outside the financial system but still prompted a sharp reassessment. Financial instability often arises when shocks meet vulnerabilities. Because the timing of shocks is inherently difficult – if not impossible – to predict precisely, financial stability communication does not seek to forecast them. It aims instead to identify the vulnerabilities that may amplify stress once shocks materialise and the kinds of shocks to which the system would be exposed (see **Box A**). The pandemic shock is the clearest illustration: its timing and form could not have been predicted, but some of the vulnerabilities it exposed had already been signalled. Sentiment therefore captures changes in the intensity of those communicated risk assessments. While it broadly co-moves with market stress, it does not simply mirror contemporaneous financial conditions and may also capture forward-looking evaluations of financial stability risks.

Chart A.3

ECB FSR sentiment co-moves with systemic stress and macroeconomic conditions



Sources: ECB and ECB calculations

Notes: The Composite Indicator of Systemic Stress (CISS) is aggregated from daily to quarterly frequency by taking the arithmetic mean of all daily observations within each quarter. For details of the CISS, see Holló et al.* Panel b: semi-annual sentiment is linearly interpolated to quarterly frequency. The chart shows the respective sentiment metric in the quarters before and after episodes of systemic stress. The blue line shows the median and the shaded band the interquartile range across the selected stress episodes. Event time 0 marks the quarter of peak (systemic) stress as measured by the peak in the CISS. Only the first three episodes (global financial crisis, euro area sovereign debt crisis and COVID-19 pandemic) coincided with euro area recessions.

*) Holló, D., Kremer, M. and Lo Duca, M., "CISS – A composite indicator of systemic stress in the financial system", *Working Paper Series*, No 1426, ECB, March 2012.

Sentiment also displays cyclical and mean-reverting dynamics that may be informative for vulnerability monitoring. There is a rise in sentiment ahead of systemic stress, followed by a decline and gradual normalisation (**Chart A.3**, panel b). The observed mean-reverting dynamics reflect shifts in financial stability communication. Around the height of the stress, assessments often emphasise stabilisation measures and resilience factors. As uncertainty declines, the narrative rebalances towards a focus on medium-term risks and structural vulnerabilities, contributing to the gradual decline in negative sentiment after the peak. Improvements in macro-financial conditions therefore shift the emphasis of risk assessments rather than eliminate the underlying vulnerabilities. From an early-warning perspective, monitoring the speed and extent of this mean reversion might help in the identification of phases in which favourable conditions coincide with the gradual build-up of new imbalances.

Sectoral sentiment patterns provide an additional insight into how systemic and sector-specific risks evolve over the cycle. Crisis episodes are associated with broadly elevated sentiment intensity across ECB FSR chapters, reflecting the system-wide nature of stress (**Chart A.4**). During such periods, assessments across macroeconomic conditions, financial markets, banks and non-bank financial institutions move up in tandem, signalling a generalised increase in risks. As stress recedes, sentiment moderates and becomes more differentiated across chapters. As a result, cyclical improvements in overall aggregate sentiment do not necessarily

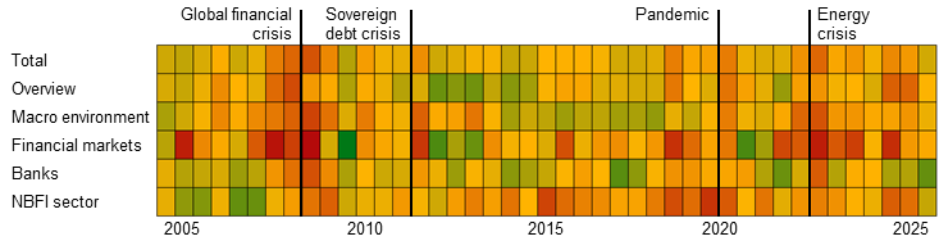
indicate a broad-based reduction in systemic risk. Instead, they may be masking persistent vulnerabilities in specific segments of the financial system.

Chart A.4

Sectoral sentiment dynamics highlight cyclical shifts in systemic risk assessments

Net sentiment scores across sector assessments

(Dec. 2004-Nov. 2025, net sentiment score)



Sources: ECB and ECB calculations.
Notes: Red indicates more negative sentiment, green more positive sentiment. NBFI stands for non-bank financial intermediation.

Box A

Using artificial intelligence to assess the severity and probability of triggers (SPOT) for financial stability risks

Prepared by Domenic Kellner, Jan Hannes Lang, Lukas Nagy and Marek Rusnák

Financial stability risks comprise vulnerabilities and the potential triggers which could expose such vulnerabilities, but so far mainly qualitative methods have been used to assess triggers. As explained in previous editions of the ECB's Financial Stability Review,[113] vulnerabilities are imbalances or fault lines within the financial system or within non-financial sectors that can propagate or amplify shocks, whereas triggers are events that could unearth vulnerabilities or cause them to unravel in a disorderly manner. In recent years, considerable progress has been made in measuring vulnerabilities. Examples of vulnerability measures developed at the ECB include the Systemic Risk Indicator (SRI) and the corporate vulnerability indicator.[114] By contrast, measuring potential triggers has proven more difficult, partly because triggers can have a variety of sources including growth shocks, major policy changes, geopolitical events, wars and pandemics. For this reason, the methods used to assess potential triggers associated with financial stability risks are still mainly qualitative. This is an area in which recent advances in artificial intelligence (AI) could prove promising: newspaper articles often discuss potential trigger events and large language models (LLMs) could be used to extract this information systematically.

Recent research by ECB staff has used LLMs and financial news to construct a forward-looking indicator measuring the severity and probability of triggers (SPOT) associated with financial stability risks.[115] The proposed approach applies a structured three-stage prompting

[113] See, for example, Fell, J., Gardó, S., Klaus, B., Wendelborn, J. and Wredenborg, S., "Communication for financial crisis prevention: a tale of two decades", *Financial Stability Review*, ECB, November 2024.

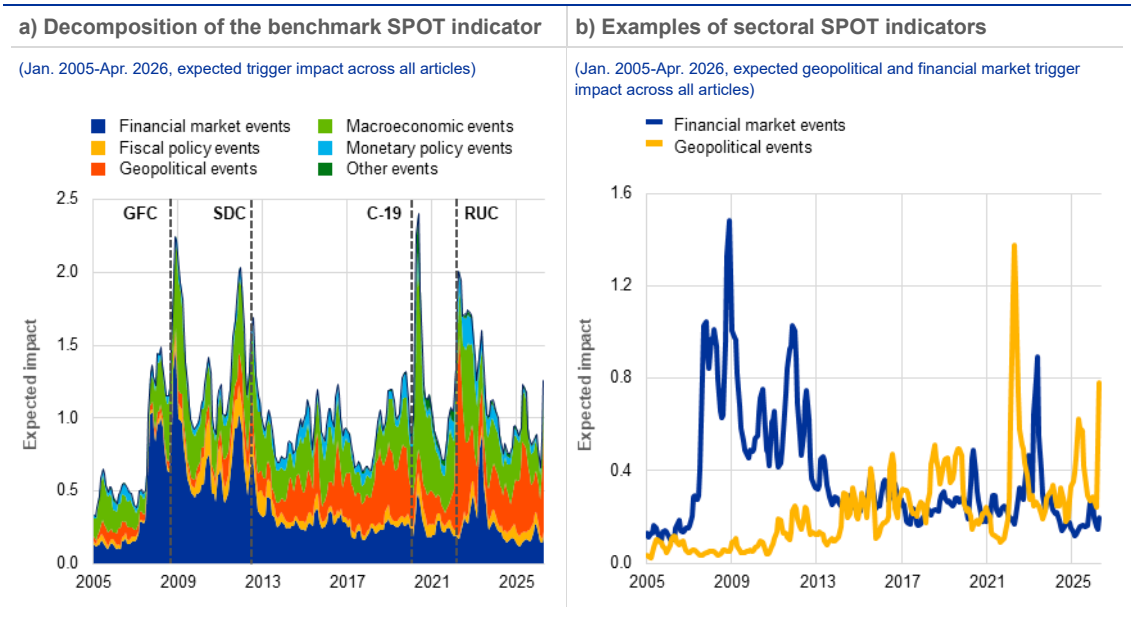
[114] See Lang, J.H., Izzo, C., Fahr, S. and Ruzicka, J., "Anticipating the bust: a new cyclical systemic risk indicator to assess the likelihood and severity of financial crises", *Occasional Paper Series*, No 219, ECB, February 2019, and Gardó, S., Klaus, B., Tujula, M. and Wendelborn, J., "Assessing corporate vulnerabilities in the euro area", *Financial Stability Review*, ECB, November 2020.

[115] See Kellner, D., Lang, J.H., Nagy, L.J. and Rusnák, M., "A SPOT in the dark: using AI to assess financial stability risks", *Working Paper Series*, ECB, forthcoming. A draft paper is available on SSRN.

process to a large dataset of Financial Times articles from 2005 onwards.[116] The first prompt pre-filters the data to obtain a dataset of relevant articles that have a primary economic or financial focus. The second prompt is applied to this dataset. It classifies whether the articles signal a potential trigger event that could have a severely negative impact on the euro area economy or financial stability over a one-year horizon. Finally, the third prompt is applied to articles identified as signalling potential trigger events and assigns several attributes based on information contained in the articles. These are: the probability that a trigger event could materialise, the potential severity of its impact, the time horizon over which the trigger event is most likely to occur and the main source of the trigger event.[117] The benchmark SPOT indicator combines the frequency of articles covering trigger events at a given point in time with information about the potential severity of such trigger events and the probability of them occurring, to capture their overall expected impact. Moreover, the extracted attributes allow for decompositions of the benchmark SPOT indicator by trigger source, time horizon and risk characteristics.[118]

Chart A

The SPOT indicator increases ahead of major historical trigger events and makes it possible to identify different trigger sources



Sources: Textual analysis of Financial Times journalism and ECB calculations.
Notes: Indicators are shown as three-month moving averages. Panel a: the expected trigger impact is calculated as the average of probability*severity across all articles used in the second step of the prompting process. An article that is classified as not signalling a potential trigger event has probability*severity equal to zero. The black dashed lines indicate major events, including the global financial crisis (GFC), the euro area sovereign debt crisis (SDC), the COVID-19 pandemic (C-19) and the outbreak of the Russia-Ukraine conflict (RUC).

[116] The full dataset comprises roughly 1.1 million articles. GPT-4o mini is used to implement the three-stage prompting strategy.

[117] The probability ranges from 0 (unlikely) to 3 (high probability). Severity ranges from 0 (negligible impact) to 3 (very severe impact). The time horizon ranges from 0 (impact already realised) to 4 (within 12-36 months), with intermediate categories corresponding to 1-3 months, 3-6 months and 6-12 months. Trigger sources are classified as macroeconomic events, financial market stress events, geopolitical events, monetary policy events, fiscal policy events or other (exogenous) trigger events.

[118] Pre-trained LLMs may incorporate information from the training period when evaluating articles, potentially affecting their interpretation as ex ante signals. However, this concern is partially mitigated in our application, through prompt design aimed at limiting look-ahead bias.

The SPOT indicator increases ahead of major historical trigger events and accurately identifies different trigger sources, making it a useful tool for monitoring financial stability risks. For example, the benchmark SPOT indicator reached peaks around the onset of the global financial crisis in 2008, the euro area sovereign debt crisis in 2011, the COVID-19 pandemic in 2020 and the Russian invasion of Ukraine in 2022 (**Chart A**, panel a). The decomposition of the benchmark SPOT indicator into trigger sources offers further insights into underlying drivers and helps form a risk narrative. For instance, financial market triggers dominated before and during the global financial crisis and the euro area sovereign debt crisis, while other exogenous triggers increased in importance during the COVID-19 pandemic (**Chart A**, panel a). More recently, geopolitical triggers spiked following Russia's invasion of Ukraine in 2022, again in 2025 amid heightened geopolitical and trade tensions, and once more in 2026 due to the war in the Middle East. Sectoral SPOT indicators for individual trigger sources render these patterns even more visible and can be used to complement the benchmark SPOT indicator (**Chart A**, panel b). Overall, these patterns suggest that the proposed AI-based SPOT indicator can measure potential trigger events systematically and provide meaningful information about underlying drivers.

The SPOT indicator contains significant information about future downside risks to the economy, especially when combined with indicators that reflect underlying vulnerabilities. A comparison can be made between the SPOT indicator and established text-based risk indicators such as the geopolitical risk index (GPR) or the EU economic policy uncertainty index (EPU).[119] This reveals that the SPOT indicator identifies not only peaks similar to those for established indicators but also peaks related to potential trigger sources not captured by the narrower indicators (**Chart B**, panel a). Moreover, the amplitude of SPOT peaks can differ from other indicators, as the SPOT indicator explicitly incorporates information about the expected impact of a potential trigger on the economy and financial stability. Panel growth-at-risk model estimates for euro area countries show that various SPOT indicators add more information about future downside risks to the economy than other risk indicators suggested in the literature, such as the GPR, the EPU or the Composite Indicator of Systemic Stress (CISS) (**Chart B**, panel b).[120] The growth-at-risk model results also show that it is useful to combine information about the probability and severity of triggers, as SPOT indicators reflecting the expected impact (combining probability and severity) perform best. In addition, when SPOT indicators interact with measures of underlying vulnerabilities, the explanatory power for future downside risks to the economy increases further (yellow bars in **Chart B**, panel b). This suggests that while triggers act as immediate catalysts for stress, the differential impact on GDP tail risks is driven by pre-existing vulnerabilities. Hence, it is important to monitor vulnerabilities and the severity and probability of potential triggers jointly in order to form a holistic picture of financial stability risks.

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119 See Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225, and Baker, S.R., Bloom, N. and Davis, S.J., "Measuring Economic Policy Uncertainty", *The Quarterly Journal of Economics*, Vol. 31, No 4, November 2016, pp. 1593-1636.

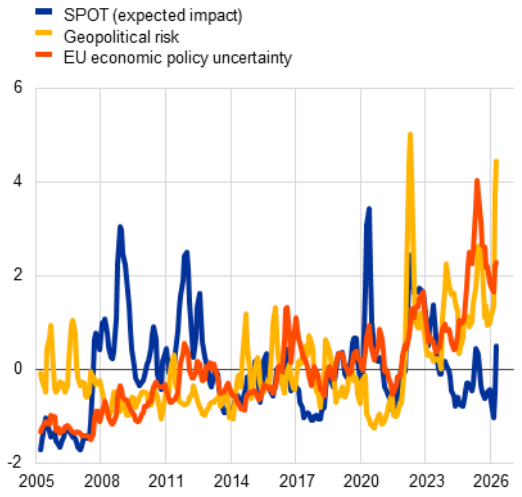
120 The marginal information content of the various indicators is assessed by comparing the percentage improvement in model fit (tick loss) when adding each indicator separately to a benchmark growth-at-risk model that conditions on current real GDP growth and the Systemic Risk Indicator. For details of the benchmark model, see Lang, J.H., Rusnák, M. and Greiwe, M., "Medium-Term Growth-at-Risk in the Euro Area", *IMF Economic Review*, International Monetary Fund,13 March 2025.

Chart B

The SPOT indicator complements other existing risk indicators and helps to improve the early identification of downside risks to the economy

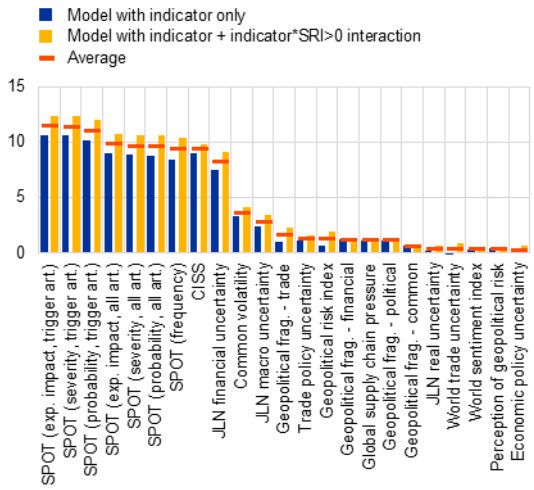
a) Comparison of SPOT and other text-based indicators

(Mar. 2005-Apr. 2026, z-scores)



b) Additional information content of various indicators for future downside GDP risks

(percentages)



Sources: Textual analysis of Financial Times journalism, Caldara and Iacoviello*, Baker et al.** and ECB calculations.
Notes: Panel a: indicators are shown as the three-month moving averages. Panel b: the benchmark growth-at-risk model includes current GDP growth and the Systemic Risk Indicator (SRI) (including its lag and a dummy variable for cases when SRI>0). The chart measures the percentage improvement in model fit (tick loss function) for the 10th percentile of annual real GDP growth one-year ahead relative to the benchmark model. The models are estimated for the panel of euro area countries from Q1 2005 to Q1 2024, including country fixed effects and pandemic period dummies. "exp. impact" stands for expected impact; "trigger art." denotes articles that were classified as containing information about trigger events. JLN stands for Jurado et al.***; CISS stands for Composite Indicator of Systemic Stress; "Geopolitical frag." stands for geopolitical fragmentation.
*) Caldara, D. and Iacoviello, M., "Measuring Geopolitical Risk", *American Economic Review*, Vol. 112, No 4, April 2022, pp. 1194-1225
**) Baker, S.R., Bloom, N. and Davis, S.J., "Measuring Economic Policy Uncertainty", *The Quarterly Journal of Economics*, Vol. 131, No 4, November 2016, pp. 1593-1636.
***) Jurado, K., Ludvigson, S.C. and Ng, S., "Measuring Uncertainty", *American Economic Review*, Vol. 105, No 3, March 2015, pp. 1177-1216.

Overall, the results presented in this box suggest that AI-based signal extraction from text offers a promising avenue for enhancing the monitoring of financial stability risks. Recent research shows that machine learning and LLMs can be used to extract relevant information from unstructured data to construct indicators of sentiment, uncertainty and macro-financial risks.[121] Building on these advances, the SPOT indicator presented in this box demonstrates how LLMs applied to financial news can provide a systematic and interpretable measure of potential trigger events, thereby complementing existing vulnerability indicators used for monitoring financial stability risks. Looking ahead, a promising avenue would appear to be the application of similar approaches to new or previously underutilised data sources, including financial disclosures, supervisory information, market intelligence findings and social media posts.[122] While challenges related to model reliability, interpretability and data governance remain, AI-based approaches have the potential to become an important component of financial stability surveillance frameworks.

[121] See, for example, de Bondt, G.J. and Sun, Y., "Enhancing GDP nowcasts with ChatGPT: a novel application of PMI news releases", *Working Paper Series*, No 3063, ECB, 2025; Audrino, F., Maly, J. and Stalder, S., "Quantifying Uncertainty: A New Era of Measurement through Large Language Models", Working Paper Series, No 12/2024, Swiss National Bank, 2024; and Kwon, B., Park, T., Rungcharoenkitkul, P. and Smets, F., "Parsing the pulse: decomposing macroeconomic sentiment with LLMs", *SUERF Policy Briefs*, No 1316, SUERF, 27 November 2025.

[122] See, for example, Baudino, P.A., Metzler, J., Storz, M. and Wagner, F., "The role of household investors in market downturns", *Financial Stability Review*, ECB, November 2025.

5 Practical applications for improving financial stability communication

Central bank communication on financial stability and systemic risks plays a key role in safeguarding financial stability. Financial stability communication is inextricably intertwined with financial stability analysis.[123] Effective communication forms an important part of crisis prevention by informing market participants' risk assessments. These assessments, in turn, can bring about preventive action within the financial industry, strengthen market discipline and enhance the financial system's resilience. Furthermore, financial stability communication helps central banks maintain transparency, ensuring they remain accountable as they fulfil their financial stability mandates.

Sentiment indicators can help in ensuring that financial stability assessments and communication are aligned. The output from risk identification and assessments is regularly communicated by central banks and other authorities through financial stability reports, among other formats. One use may be during the ECB FSR drafting cycle: a chapter-level dashboard can compare the sentiment of successive drafts with the risk rankings agreed in the underlying assessment process, flagging cases where the text has become materially more sanguine or more alarmist without a corresponding change in the analysis. This is especially important for ensuring that different parts of the text written by different authors are not unduly influenced by individual drafting styles and preferences. Any such influence could create perceived differences in assessments across different parts of reports and over time. A second use may be as a consistency check across chapters and publications: if related vulnerabilities are discussed in markedly different language or with a very different time orientation, editors can review whether the difference reflects substance or drafting style. In this setting, metrics on assessment-bearing sentences and temporal orientation are more defensible than claims about readability. Sentiment metrics can also be used to cross-check the tone of different types of communication within an institution or across institutions addressing similar topics. That said, where external LLMs are used on internal draft material, institutions also need clear governance on confidentiality, access controls, data retention and approved use cases.

6 Conclusion

To sum up, AI-based text analysis can enrich financial stability communication, but its contribution is best understood with some caution. Dictionary-based, FinBERT and GPT-based approaches show broadly similar cyclical patterns across two decades of ECB FSRs, even though they do not measure exactly the same concept. The GPT-based series is best understood as a tailored measure of explicit risk judgements in the text, not as a demonstrated accuracy benchmark. The evidence also points to a shorter, more assessment-

[123] See Fell, J., Gardó, S., Klaus, B., Wendelborn, J. and Wredenborg. S., "Communication for financial crisis prevention: a tale of two decades", *Financial Stability Review*, ECB, November 2024.

bearing and more forward-looking ECB FSR. These tools can serve as useful cross-checks during drafting and monitoring of financial stability vulnerabilities, especially in a field where shocks are inherently difficult, if not impossible, to predict and where the central tasks are to identify vulnerabilities and assess shock-absorption capacity. As such, these new tools can complement − but not replace − expert judgement, vulnerability analysis and stress testing.

B Rising bankruptcies, resilient loan books: unpacking euro area corporate credit risk

Prepared by Peter Bednarek, Lara Coulier, Katri Mikkonen, Cosimo Pancaro and Jonas Wendelborn

Corporate bankruptcies in the euro area have been on the rise, but the aggregate asset quality of banks' corporate lending has remained broadly stable. This special feature analyses this divergence and its implications for financial stability. It shows that rising bankruptcies may partly be explained by the normalisation of firm turnover since the COVID-19 pandemic, albeit with marked cross-country unevenness. At the same time, firm-level evidence suggests that balance sheet and profitability challenges are concentrated in a vulnerable tail of firms, but have remained stable for the average euro area company. Structural changes in corporate financing, including a declining reliance on bank loans and a larger role for equity, debt securities and non-bank lending, imply that a greater share of corporate risk might be outside the banking system. The analysis also shows that broadly stable aggregate asset quality reflects diverging trends in loan performance across countries and firm sizes, as well as banks' proactive management of non-performing loans. Overall, it does not find any systematic evidence for banks delaying the recognition of non-performing loans in their loan books. Instead, the analysis indicates that weaker firm fundamentals result in a higher probability of bank exposures being reclassified from performing to non-performing.

1 Introduction

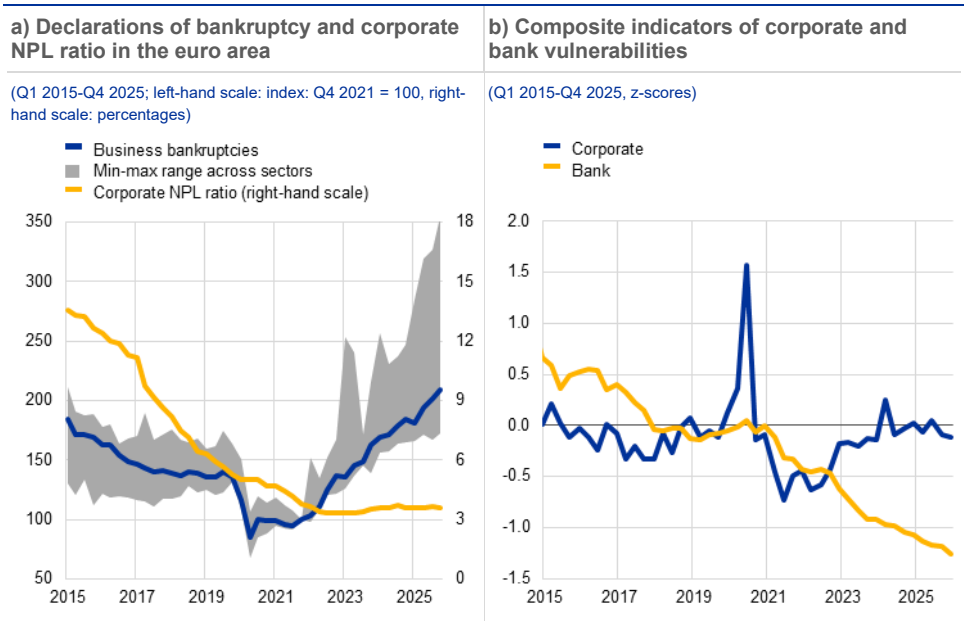
Corporate bankruptcies have been on the rise, but the aggregate asset quality of corporate loan portfolios remains remarkably strong. The number of euro area corporate bankruptcies has increased markedly since the withdrawal of pandemic-era support measures, surpassing pre-pandemic levels and broadening across sectors (**Chart B.1**, panel a).[124] By contrast, composite vulnerability indicators suggest that corporate vulnerabilities have increased only moderately from their trough (**Chart B.1**, panel b) and euro area banks' aggregate corporate asset quality has remained robust (**Chart B.1**, panel a). The rising number of business failures has thus not translated into a broad-based deterioration in banks' corporate loan books. In other words, the current insolvency cycle has, so far, not resulted in a visible deterioration in bank-facing aggregates. There could be several explanations for this. It may well be that the firms declaring bankruptcy are small or that they are mainly funding themselves using internal or market-based finance. Asset quality dynamics can diverge across countries and firm sizes, the recognition of non-performing loans (NPLs) can lag increased credit risk and the action taken by banks to deal with problem loans early can dampen net NPL dynamics. This special feature

[124] It is important to note that Eurostat figures for bankruptcy declarations in Spain are inaccurate – and likely biased upwards – from the third quarter of 2022 to the third quarter of 2023. As Spain has a sizeable weight in the euro area aggregate, this also affects the euro area series over the same period. For Spain, Eurostat estimates the number of business bankruptcies during that period (covering both corporations and sole proprietors) using the total number of bankruptcy filings (including individuals without entrepreneurial activity) and historical relationships.

investigates the role played by some of these potential factors and their implications for financial stability.

Chart B.1

Corporate bankruptcies have surpassed pre-pandemic levels, while banks' corporate asset quality is stable and broader vulnerabilities remain contained



Sources: Eurostat and ECB (QSA), ECB (supervisory data), S&P Global Market Intelligence and ECB calculations.
Notes: Panel a: the blue area shows the minimum-maximum range of index values across the following sectors: construction, trade, transport, accommodation and food services, information and communication, finance and real estate and professional services, industry excluding construction, education and health care. Panel b: for details of how the corporate vulnerability index is constructed, see Gardó et al.* The composite bank vulnerability indicator is based on a set of indicators along five dimensions: capital (CET1 ratio and leverage ratio), asset quality (NPL ratio), management (cost/income ratio), earnings (return on equity and return on assets) and liquidity (loan/deposit ratio). Positive values indicate higher levels of vulnerability while negative values indicate lower levels of vulnerability.
*) Gardó, S., Klaus, B., Tujula, M. and Wendelborn, J., "Assessing corporate vulnerabilities in the euro area", *Financial Stability Review*, ECB, November 2020.

2 Firm entry-exit dynamics and corporate balance sheet heterogeneity shape the insolvency cycle

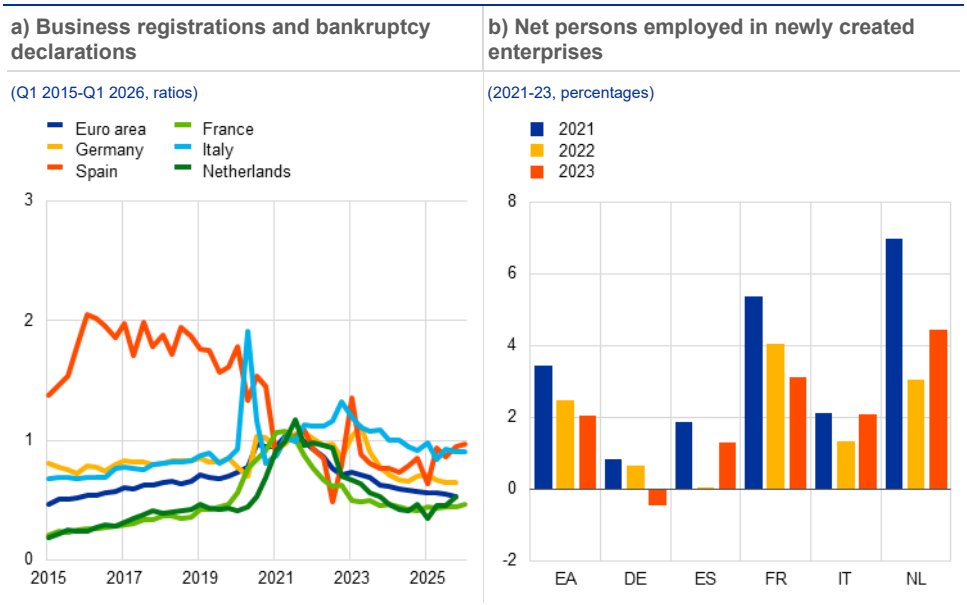
Firm entry-exit dynamics have normalised since the pandemic, which partly explains the recent rise in bankruptcies. During the pandemic, extensive government support measures – including debt moratoria, public guarantees and other schemes – distorted the usual entry-exit dynamics by suppressing insolvencies and cushioning firms' cash flows.[125] Against this backdrop, a first step when interpreting rising bankruptcies is to look beyond failures alone and to assess broader entry and exit developments. The registrations/bankruptcies ratio spiked in around 2020-21 and then declined as bankruptcies "caught up", pointing to a partial "return of exit" after the pandemic (**Chart B.2**, panel a). It would appear that this normalisation had largely played out by around 2023, when the ratio returned close

[125] See, for example, Nicoletti, G., Setzer, R., Tujula, M. and Welz, P., "Assessing corporate vulnerabilities in the euro area", *Economic Bulletin*, Issue 2, ECB, 2022, and Metzler, J., Mosk, B., de Vette, N. and Welz, P., "Identifying the corporates most vulnerable to price shocks following the pandemic", *Financial Stability Review,* ECB, May 2022.

to its pre-pandemic level. The subsequent gradual downward drift suggests that bankruptcies have continued to rise beyond the level implied by normalisation alone. At the same time, both business registrations and bankruptcy declarations show notably different patterns across countries. The data also highlight that firm exits persistently exceed entries in several countries, although there is no clear relationship between this phenomenon and standard measures of corporate stress or NPL dynamics. This suggests that part of the observed exit dynamics may reflect structural forces (e.g. demographic trends or changes to business models) rather than financial distress alone.[126] Moreover, start-up job creation – an additional indicator of economic health – has cooled unevenly: employment gains associated with newly established enterprises have been stronger in some countries than others such as Germany, where net employment in newly created enterprises has turned negative at the margin (**Chart B.2**, panel b). This cross-country unevenness matters for financial stability because countries showing a sharper rise in insolvencies may be those where banks have larger or more concentrated exposures to vulnerable firms, increasing the scope for localised credit losses.

Chart B.2

Firm creation has normalised since the pandemic, while start-up job creation has cooled unevenly across countries



Sources: Eurostat and ECB calculations.
Notes: Panel a: ratio of new business registrations to declarations of bankruptcy. A value below one indicates more bankruptcy declarations then registrations. Panel b: persons employed in newly born enterprises minus persons employed in enterprise deaths divided by total persons employed.

Tail vulnerabilities appear persistent, with a non-negligible share of firms close to distress. Available cross-country evidence suggests that micro and small firms

[126] Structural forces that can depress firm entry and alter firm turnover include demographic change and evolving market structure. See, for example, Röhe, O. and Stähler, N., "Demographics and the decline in firm entry: Lessons from a life-cycle model", *Discussion Papers*, No 15/2020, Deutsche Bundesbank, 2020, or "OECD Economic Surveys: Germany 2025", Organisation for Economic Co-operation and Development, 12 June 2025.

account for much of the recent rise in insolvencies.[127,128] To shed further light on whether these dynamics reflect broad-based weakening or pressures concentrated in a subset of firms, aggregate evidence is complemented with firm-level indicators of viability, debt servicing capacity and distress risk. Based on firm viability scores, the most recent share of non-viable firms (V=1) stands at around 6%. A further share of roughly 6% clustered just below the non-viability threshold (0.9<V<1), pointing to a non-negligible density of firms close to distress (**Chart B.3**, panel a). The incidence of weak firms increased markedly after the global financial crisis, peaked in the early 2010s, and has declined gradually since then. It has remained broadly stable in recent years, suggesting that the vulnerable tail is not merely cyclical. Patterns at the country and sector levels are consistent with differing growth trajectories across countries and the uneven impact of major shocks (most notably the global financial crisis and the COVID-19 pandemic) across sectors.[129]

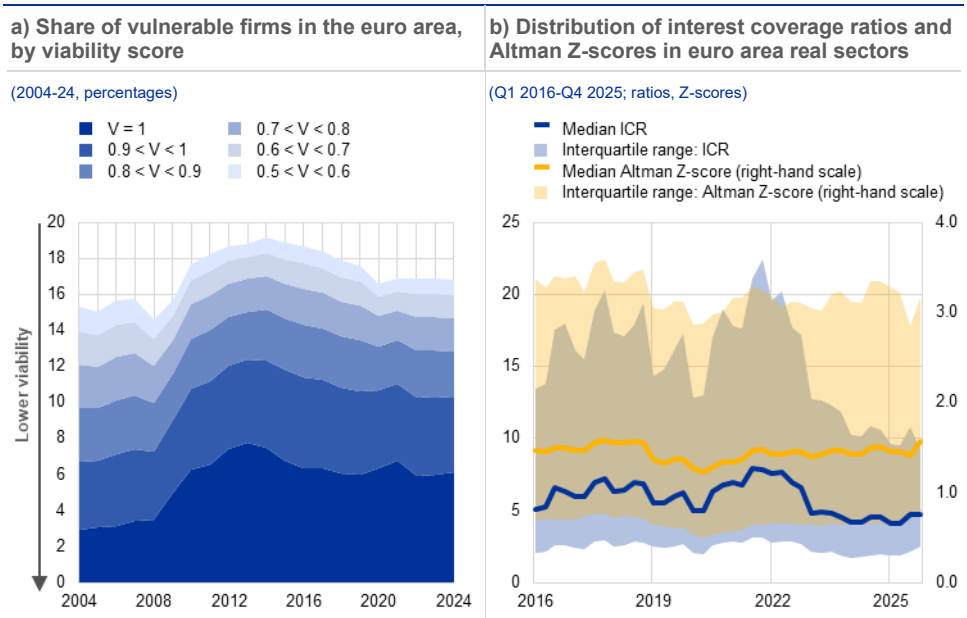
[127] See, for example, the national accounts of Germany, Spain and France.

[128] To some extent, this is surprising, as filing for bankruptcy can be more expensive than other procedures; see for example, García-Posada, M. and Mora-Sanguinetti, J.S., "Are there alternatives to bankruptcy? A study of small business distress in Spain", *SERIEs*, Vol. 5, Issue 2-3, Springer, 2014, pp. 287-332.

[129] Real estate stands out as persistently more vulnerable, while the pandemic weighed particularly on accommodation, recreation and transport. A key caveat, however, is that around half of the observations in the dataset are drawn from Spain and Italy.

Chart B.3

Firm-level fragility metrics point to a relatively small but persistent vulnerable tail, while for the average firm dynamics remain flat



Sources: Moody's, S&P Global Market Intelligence and ECB calculations.
Notes: Panel a: the viability score V takes values between 0 and 1, where 1 denotes non-viable firms. Non-viable firms are defined as those firms that meet all of the following three criteria over two consecutive years: (i) negative returns on assets, (ii) low debt servicing capacity (EBITDA/financial debt of below 5%), and (iii) negative net investment (annual change in total fixed assets). Scores below 1 capture the distance between the median firm and the threshold for each of these criteria. The measure is based on the identification of "zombie" firms by Storz et al.* and the extension into a continuous score by Mingarelli et al.** Panel b: interest coverage ratio (ICR) is defined as EBIT divided by interest paid. The Altman Z-score calculation is sector specific, as set out in Altman***, Altman**** and Altman, Hartzell and Peck*****. A higher Altman Z-score corresponds to a healthier balance sheet structure. Other real sectors include firms involved in agriculture, arts and recreation, construction, information and communication, other industry, professional services, real estate, and wholesale and retail trade.
*) Storz, M., Koetter, M., Setzer, R. and Westphal, A., "Do we want these two to tango? On zombie firms and stressed banks in Europe", *Working Paper Series*, No 2104, ECB, October 2017.
**) Mingarelli, L., Ravanetti, B., Shakir, T. and Wendelborn, J., "Dawn of the (half) dead: the twisted world of zombie identification", *Working Paper Series*, No 2743, ECB, October 2022.
***) Altman E.I., "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy", *The Journal of Finance*, Vol. 23, No 4, September 1968, pp. 589-609.
****) Altman, E.I., *Corporate Financial Distress: A Complete Guide to Predicting, Avoiding, and Dealing With Bankruptcy*, *Wiley Interscience*, John Wiley and Sons, Hoboken, 1983.
*****) Altman, E.I., Hartzell, J. and Peck, M., "Emerging market corporate bonds − a scoring system", in Levich, R.M. (ed.), *Emerging Market Capital Flows*, Vol. 2, The New York University Salomon Center Series on Financial Markets and Institutions, Springer, Boston, MA, 1998.

Recent indicators point to contained aggregate pressures, even though debt servicing capacity has fallen from its post-pandemic highs. Firm-level evidence based on more recent S&P Capital IQ data do not indicate any broad-based deterioration of corporate health until the end of the fourth quarter of 2025. Interest coverage ratios (ICRs) indicate that the typical firm is still covering its interest expenses by a comfortable margin, even though the median ICR has declined from its post-pandemic highs as funding costs have risen, and liabilities have repriced. Since 2022, dispersion in the ICR distribution has narrowed, largely reflecting a deterioration at the upper end as firms with previously solid interest coverage have seen their buffers decline (**Chart B.3**, panel b).[130] This upper-tail compression does not in itself signal any imminent risk of insolvency, given that these firms remain less leveraged and are more profitable than their peers. It does, however, reduce the buffers of firms that are otherwise resilient and could increase their sensitivity to

[130] It is important to note that the results are not driven by changes in the composition of the sample. Given the limited sample size, however, we did not undertake further disaggregation by sector.

further adverse shocks. Similarly, both the median and the interquartile range for Altman Z-scores, a more holistic measure of firm distress risk, have remained relatively stable. Nevertheless, the risk of defaults and near-term credit losses remains more closely linked to developments in the lower tail, where buffers are limited in size. In this regard, both metrics point to a persistent vulnerable tail.

The long-running shift in corporate financing towards deprioritising bank credit forms the background to the recent disconnect between rising bankruptcies and resilient bank asset quality. Over the past two decades, euro area non-financial corporations (NFCs) have gradually become less reliant on bank loans. The share of lending by monetary financial institutions (MFIs) in total financing has trended down while equity has gained in importance, with debt securities and non-MFI loans playing an increasingly important role on the liability side (**Chart B.4**, panel a).[131] Nevertheless, bank lending remains the largest single component of liabilities, even if its share has declined notably since the global financial crisis. While these shifts largely pre-date the post-pandemic upswing in bankruptcies, they suggest that a non-negligible share of corporate risk may be outside the banking system.[132] Also, the marginal failure of firms seen today may involve less bank finance than in earlier cycles, dampening the pass-through from insolvencies to banks' NPL ratios. Stable firm risk indicators, coupled with the recent erosion of debt servicing capacity for comparatively less risky firms, align with the view that banks' exposures remain tilted towards more resilient borrowers.

3 Stable aggregate bank asset quality can be explained by cross-sectional heterogeneity and balanced NPL inflows and outflows

The resilient aggregate asset quality of bank corporate lending is also a reflection of heterogeneous dynamics across corporate sizes and countries. Disaggregated data point to marked divergences: while loans to large firms have maintained persistently high asset quality, NPL ratios for medium as well as those for small and micro firms have been increasing since 2023 (**Chart B.4**, panel b). This is consistent with the broader picture showing that the recent rise in bankruptcies has been concentrated among smaller firms. As lending to small and medium-sized enterprises (SMEs) accounts for only around 27% of total corporate lending in the euro area banking sector, the impact of deteriorating asset quality in this segment on the aggregate corporate NPL ratio has been relatively contained (**Chart B.1**, panel a). Diverging country patterns are also emerging. While corporate loan NPL ratios have continued to decline for banks located in countries that were more

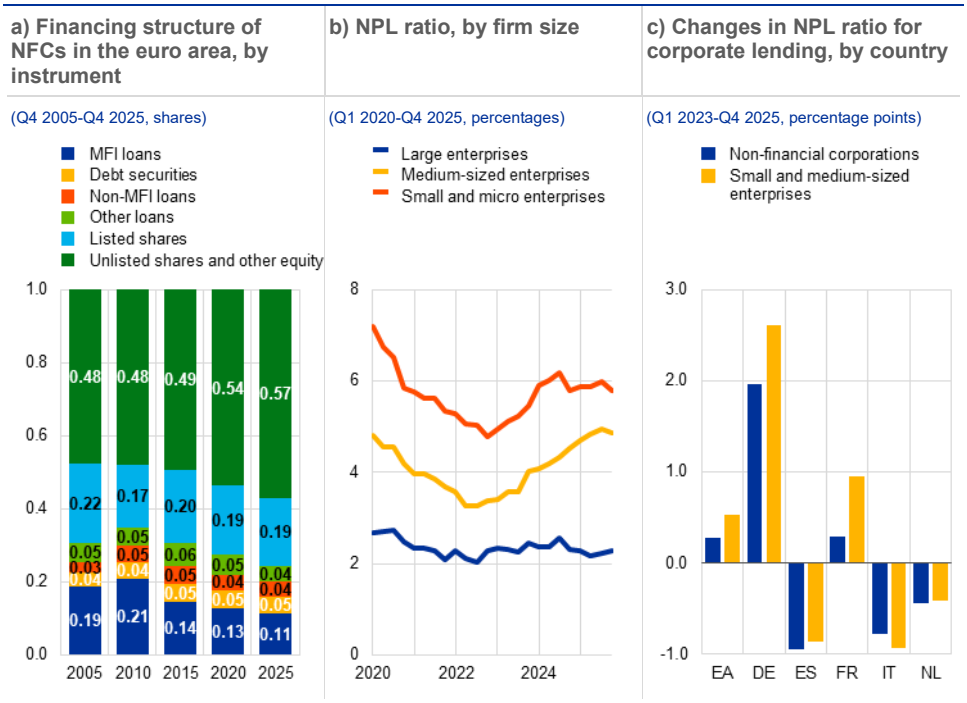
[131] Equity valuations that structurally growth faster than bank loans as well as the inclusion of NFC-to-NFC credit might overemphasise non-bank financing. However, the results are quantitatively similar to those set out in Box 2 in the report on "Financial Integration and Structure in the Euro Area", ECB, April 2022.

[132] That said, risk outside of the banking system can still affect banks indirectly via contagion, non-bank-to-bank linkages, etc.

affected by the euro area sovereign debt crisis, they increased, in particular, in Germany and France (**Chart B.4**, panel c).[133]

Chart B.4

The aggregate corporate NPL ratio is at a historically low level, but marked divergencies in trends across corporate types and countries have emerged



Sources: ECB (supervisory data, AnaCredit, RIAD), Eurostat and ECB (QSA) and ECB calculations.
Notes: Panel b: classification of enterprises by size, in accordance with the Annex to Commission Recommendation 2003/361/EC based on number of employees, annual turnover and balance sheet size. Panels b and c: based on a full sample of significant and less significant institutions. Panel c: EA stands for euro area.

Significant NPL outflows, driven in particular by workouts and sales, have helped to keep net flows low and NPL ratios stable. The stability of NPL ratios may be partly explained by material NPL outflows (**Chart B.5**, panel a). Net NPL flows have remained relatively contained due to bank-internal workouts, cures, sales of non-performing and/or still-performing but risky portfolios, risk transfers for such portfolios through securitisations and forbearance on non-performing exposures.[134] These measures have contributed to lower inflows and faster NPL turnover than in the past and have reduced net NPL flows, particularly in countries that accumulated experience in managing large legacy portfolios following the euro area sovereign

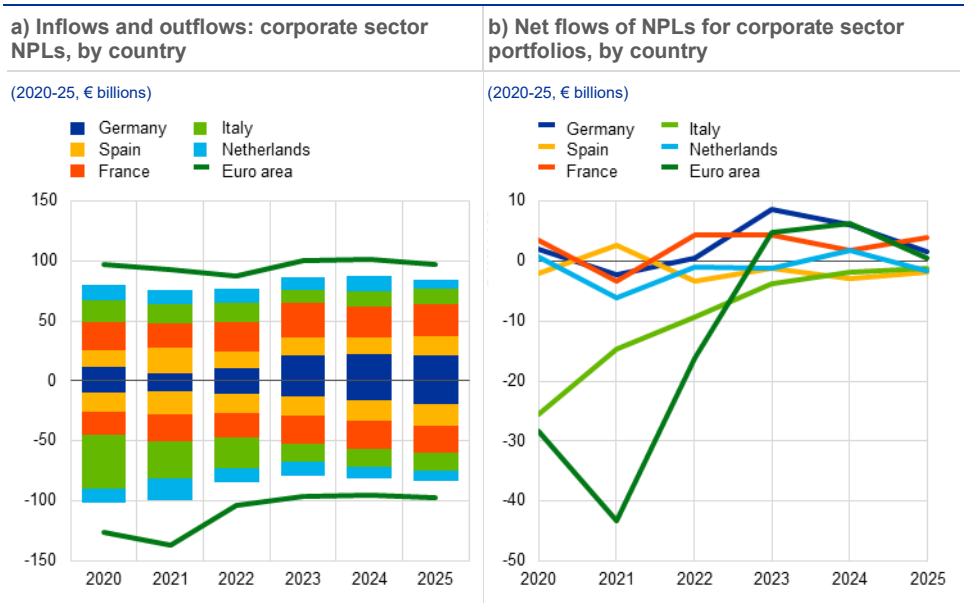
[133] In line with this analysis, changes in asset quality also differ across sectors, with NPL ratios for construction and real estate, for example, increasing since 2023, while the NPL ratio for accommodation has decreased steadily since it peaked during the pandemic.

[134] Stable NPL ratios could also be explained by banks actively rebalancing their portfolios towards safer borrowers. For example, a study shows that during the pandemic, bank liquidity was more likely to be allocated to larger, less risky firms. See Chodorow-Reich, G. et al., "Bank liquidity provision across the firm size distribution", *Journal of Financial Economics,* Vol. 144, No 3, 2022, pp. 908-932.

debt crisis (**Chart B.5**, panel b).[135] The introduction of ECB Banking Supervision's NPL calendar has also incentivised NPL workouts for euro area banks.[136]

Chart B.5

NPL outflows contribute markedly to reduced NPL ratios



Source: ECB (supervisory data).
Note: Based on a full sample of significant and less significant institutions.

Early warning indicators show potential vulnerabilities in some countries. Some potentially problematic corporate loans for German and French significant institutions may currently be still-performing forborne loans, which have increased markedly since the pandemic (**Chart B.6**, panel a).[137] Persistently elevated stocks of still-performing forborne loans may point to delayed recognition of credit deterioration, warranting scrutiny of how borrower fundamentals are incorporated

[135] For more information, see Fell, J. et al., "Creditor coordination in resolving non-performing corporate loans", *Financial Stability Review*, ECB, November 2021, and NPL Advisory Panel, "Further developing secondary markets for non-performing loans: The role of securitisation", European Union, 2023.

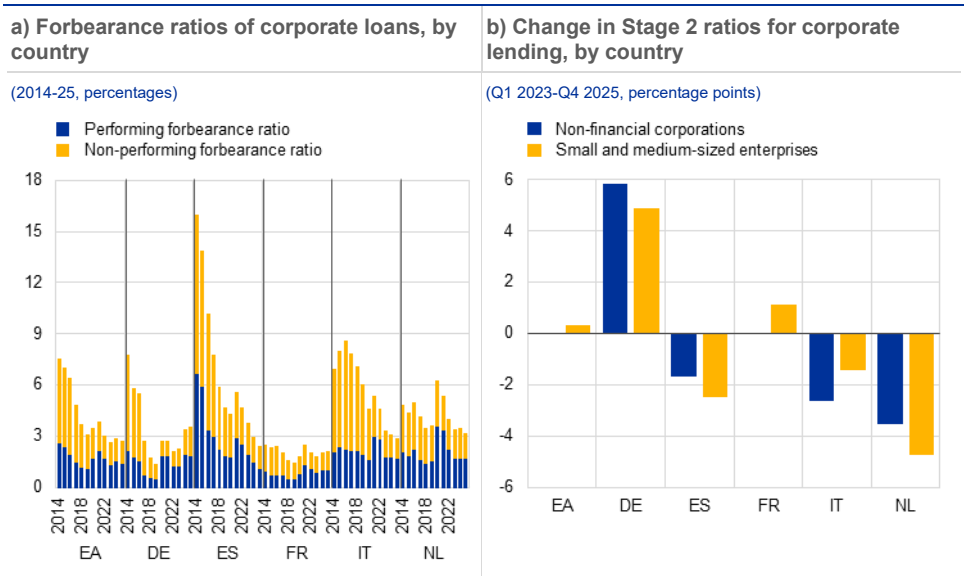
[136] See, for example, Budnik, K. et al., "The economic impact of the NPL coverage expectations in the euro area", *Occasional Paper Series*, No 297, ECB, July 2022.
Following the persistently high NPL levels seen in the European banking sector, the newly established ECB Banking Supervision prioritised the reduction of these levels and set supervisory expectations for the recognition and management of NPLs. These expectations were further strengthened by adding calendar-based provisions for a non-performing asset, increasing with time spent in default. See the ECB's 2017 Guidance to banks on non-performing loans, followed by an addendum in 2018 and a further communication in 2019. Since 2021 the calendar-based capital deductions have been part of the Capital Requirements Regulation (CRR).

[137] Performing forborne loans are loans that are subject to forbearance measures due to difficulties already experienced (or likely to be experienced) by the borrower in meeting its financial commitments, but that do not qualify as non-performing in accordance with Article 47a(3) of the Capital Requirements Regulation. This would apply in the case, for example, of non-defaulted loans for which the concessions (such as, for example, payment suspensions, reduced payments and interest rate reductions) result in insignificant changes to the net present value of the loan, or in the case of loans that have exited non-performing status but continue to follow the restructured conditions. Forborne loans also increased significantly during the pandemic, owing to a combination of unprecedented economic shock, proactive regulatory support and widespread lender initiatives designed to prevent massive borrower defaults. Forbearance was used to offer short-term cash-flow relief, especially to NFCs, helping them to avoid immediate default and allowing banks to avoid immediate, large-scale loan losses.

into asset quality classification.[138] Similarly, large differences can be observed in Stage 2 ratios across countries, with German and – to a lesser extent – French banks recording increasing ratios (only for SMEs in the case of France), which could indicate rising NPL ratios in the future (**Chart B.6**, panel b). At the same time, banks in these countries have recorded decreasing NPL coverage ratios for SME lending. Taken together, these vulnerabilities call for close monitoring and further analysis as the build-up of vulnerable loans could translate into higher NPL inflows. The following section investigates the relationship between borrower fundamentals and asset quality classification in bank balance sheets in greater detail.

Chart B.6

Early indicators of deteriorating asset quality are appearing in Germany and France



Source: ECB (supervisory data).
Notes: Based on a full sample of significant and less significant institutions. EA stands for euro area.

4 Micro-level evidence shows that bank asset quality classifications reflect the fundamentals of the borrowing firms

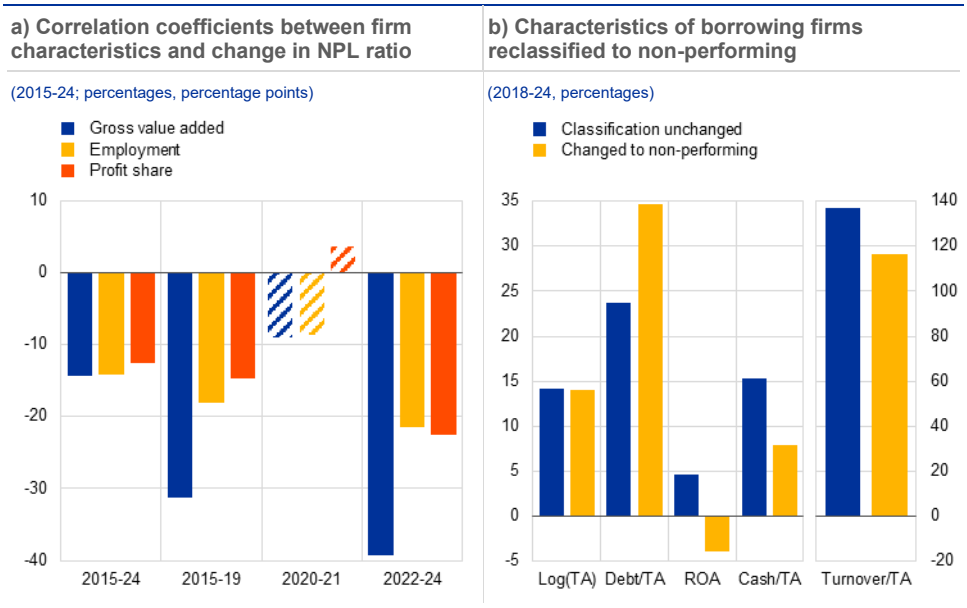
Data at the country level and at the bank-firm level confirm that NPL ratios tend to increase when firm fundamentals deteriorate. The correlations between relevant firm characteristics, such as gross value added, employment and profit share, and changes in the NPL ratio at the country level were negative and significant over the period from 2015 to 2024 (**Chart B.7**, panel a). However, correlations showed some variation over time. The extraordinary policy measures adopted during the pandemic, such as debt moratoria and government guarantees on lending, resulted in a temporary break in the relationships in 2020 and 2021. After

[138] This concern is reinforced by evidence showing that the average firm with performing forborne loans is similar to the average firm with NPLs, with significantly lower cash and turnover ratios, lower profitability and a higher debt ratio than the average firm with performing loans (based on combined AnaCredit-Orbis data).

this two-year period, however, the correlations once again turned negative and significant. Furthermore, granular data at the bank-firm level taken from the AnaCredit and Orbis datasets show that firms which had (part of) their bank exposure reclassified from performing to non-performing were on average smaller, more indebted and less profitable, and had lower turnover and weaker cash buffers, than firms whose bank exposures remained classified as performing (**Chart B.7**, panel b).[139]

Chart B.7

Weaker corporate fundamentals correlate with higher NPL ratios, except during the pandemic years



Sources: ECB (supervisory data, AnaCredit), Moody's and ECB calculations.
Notes: Panel a: data at the country-year level for 19 euro area countries. Gross value added and employment reflect percentage growth rates, while profit share reflects changes in percentage points. Hashed areas indicate insignificant relationships at the 10% significance level. The profit share of NFCs is the gross operating surplus divided by gross value added. Panel b: the average across groups is significantly different for each variable. Debt is defined as debt due in more than a year. TA stands for total assets; ROA stands for return on assets.

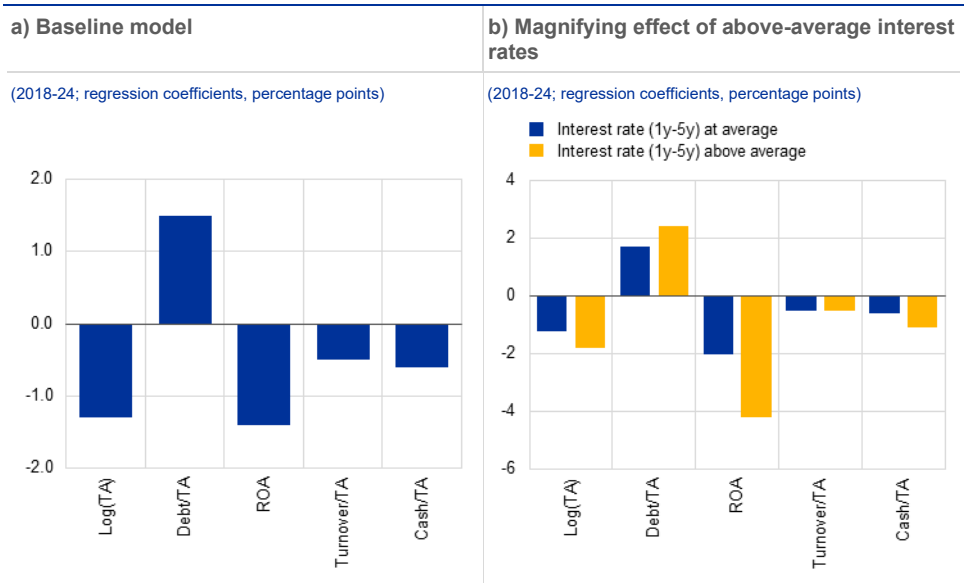
A weakening of firm fundamentals results in the reclassification of bank exposures from performing to non-performing. Even when controlling for multiple firm characteristics simultaneously, our analysis finds that smaller firm size, lower profitability, weaker cash buffers, weaker turnover and a higher debt ratio increase the probability of a firm's exposure being reclassified from performing to non-performing (**Chart B.8**, panel a). Indeed, estimations at the bank-firm level show that a 1 percentage point decrease in a firm's return on assets, cash buffers or turnover is significantly associated with an increase in the probability of bank exposures transitioning to non-performing of 140, 60 and 50 basis points respectively. Furthermore, a 1% smaller firm size is significantly associated with an increase in the probability of bank exposures transitioning to non-performing of 130 basis points, while a 1 percentage point increase in firm leverage increases the probability by

[139] The result is in line with previous work on stage classification transitions during the pandemic set out in Grodzicki, M. and Spaggiari, M., "Bank asset quality in the COVID-19 pandemic and prior corporate vulnerabilities", *Economic Bulletin*, Issue 2, ECB, 2022.

150 basis points.[140] While higher levels of turnover and profitability indicate strong revenues and earnings, firms with larger cash holdings can use this buffer to continue their debt repayments in the event of sudden shortfalls in cash flows.[141] Smaller firms are often less diversified and more financially constrained, making them more vulnerable to idiosyncratic shocks that could trigger default. Finally, a higher debt ratio signals heavier payment requirements.[142]

Chart B.8

Multiple firm characteristics have predictive power over NPL classification, especially when interest rates are high



Sources: ECB (AnaCredit, MIR), Moody's and ECB calculations.
Notes: TA stands for total assets; ROA stands for return on assets. Results from regressions at the bank-firm level with firm, bank x time and country x time fixed effects. The dependent variable is a dummy which is 1 when a bank reclassifies the exposure of the firm from performing to non-performing from year t-1 to year t while firm fundamentals are measured at the end of the year. The results are robust to using lagged firm fundamentals. The exposure magnitude at the bank-firm level is controlled for and is also positively related to the probability of being reclassified. The coefficients reflect an increase in the firm characteristic by 1% (log (TA)) or 1 percentage point (ratios). ROA is defined as profit before taxes divided by total assets. Debt is defined as debt due in more than year. Panel b: the average interest rate (1y-5y) in our sample is 2.56%. The difference between the bars is statistically significant for all variables except the turnover ratio.

The relationship between firm fundamentals and banks' credit risk assessments is stronger when bank interest rates are higher (Chart B.8, panel b). In other words, in times of higher interest rates, firm fundamentals (with the exception of the turnover ratio) matter more for predicting a reclassification from performing to non-performing.[143] In these phases, firm fundamentals become more important as higher borrowing costs and tighter credit conditions expose underlying

[140] The results also reveal non-linear effects. First, at lower levels of cash buffers, turnover and profitability, a 1% decrease in these variables leads to a greater increase in the probability of bank exposures transitioning to non-performing than at higher levels. Second, the effect of a 1% increase in the debt ratio is greater as indebtedness rises.

[141] In line with the empirical literature; see, for example, Acharya, V.V., Davydenko, S.A. and Strebulaev, I.A., "Cash Holdings and Credit Risk", *The Review of Financial Studies,* Vol. 25, No 12, 2012, pp. 3572-3609, and Gupta, J. and Gregoriou, A., "Impact of market-based finance on SMEs failure", *Economic Modelling,* Vol. 69, 2018, pp. 13-25.

[142] See Cathcart, L., Dufour, A., Rossi, L. and Varotto, S., "The differential impact of leverage on the default risk of small and large firms", *Journal of Corporate Finance,* Vol. 60, February 2020.

[143] Within our sample period, the period of above-average rates largely coincides with post-pandemic years.

weaknesses. Firms with stronger fundamentals can still service their debt, while weaker firms struggle with rising interest payments and refinancing. As cheaper credit disappears, differences in financial health become more pronounced, making fundamentals more predictive of whether exposures might turn non-performing. Overall, the results suggest that banks' credit risk assessments reflect the health of firms' balance sheets with no time lag (i.e. in the same year), particularly during periods of higher interest rates.

5 Conclusions and outlook

Rising bankruptcies of late have mainly reflected post-pandemic normalisation and tighter financing conditions. Financially weaker firms are often smaller and are likely to be internally financed. All the same, balance sheet health indicators for the median firm have remained broadly stable. Structural features, including the gradual shift in corporate financing towards equity and market-based instruments, are weakening the direct link between firm failures and bank asset quality. Overall, headline bankruptcy rates remain an imperfect gauge of risks to financial stability, and a full assessment should take into account differences in firms, financing structures and cross-country dispersion.[144]

Aggregate bank asset quality resilience nonetheless masks important cross-sectional differences and possible risks to credit quality. Disaggregated data indicate divergent patterns across countries and firm sizes. The build-up of still-performing forborne and Stage 2 exposures in some countries suggests that a further deterioration in credit quality may be on the way. NPL inflows could therefore increase, with a lag, if − against the backdrop of heightened uncertainty − refinancing risks crystallised, growth weakened or sectoral pressures intensified to such an extent that they eroded corporate fundamentals. The analysis finds no systematic evidence that banks are delaying the recognition of NPLs. Instead, it shows that the reclassification of exposures to non-performing is tied to the deteriorating financial health of the borrowing firms. Furthermore, the asset quality of the euro area banking sector is high, with an aggregate NPL ratio close to the historical low. Banks are better equipped to handle NPLs now than they were in the past, thanks to the experience they have gained with legacy assets and the development of NPL markets following the euro area sovereign debt crisis. Furthermore, ECB Banking Supervision's NPL calendar incentivises fast NPL turnover in euro area banks. All these factors may be contributing to structurally lower NPL accumulation, all else being equal.

Looking ahead, the war in the Middle East and higher energy prices could amplify adverse dynamics, squeezing the margins and liquidity of vulnerable firms. Energy-intensive sectors with exposed supply chains and firms with limited pricing power would be particularly at risk, the materialisation of which would raise

144 This is in line with good practices shared by ECB Banking Supervision. These recommend that banks rely on early warning indicators such as those based on firm fundamentals rather than on late indicators such as insolvency, bankruptcy and days past due. See McDonald, M.-T., Castro Quintas, C., Chen, F., Roldão, M., Rizza, S. and Fröhlke, T., "Extinguishing sparks before the fire: credit crisis managed well", *Supervision Newsletter*, ECB, 13 August 2025.

the probability of vulnerable but still-performing exposures being reclassified. If higher energy prices were to reignite inflation and keep financing conditions tighter for longer, the sensitivity of credit risk to firm fundamentals could increase further, consistent with the stronger link observed in high-rate environments.

C House price booms and policy choices: insights from a meta-regression analysis

Prepared by John Fell

This special feature examines policy-assignment dilemmas facing macroprudential authorities when housing markets boom: which instruments work best, on which objectives, and in combination with which other tools? It does so by revitalising Mundell's Principle of Effective Market Classification,[145] *the policy-space analogue of Ricardo's comparative advantage principle, and by applying it to macroprudential policy. The analysis uses a novel G-search literature-search algorithm and an AI-supported, replicable data-extraction system to assemble estimates of policy-impact parameters from the empirical literature. It then distinguishes standard, instrument-by-instrument evidence, from jointly estimated policy-impact parameters, which are needed to account for rival instruments acting in the same empirical setting. Three findings emerge. First, the results confirm earlier meta-analytic evidence that macroprudential policy moderates household credit growth more clearly than it does house price growth, that tightening has more visible effects than loosening, and that instruments differ in their strengths and weaknesses. Second, joint estimates sharpen policy-assignment analysis by revealing how relative effects change when instruments are assessed together rather than alone. Third, applying the Mundell framework identifies instrument pairings that satisfy necessary conditions for substitutability or complementarity. Overall, the menu of options available to effectively tame housing market booms is wide, provided instruments are assigned to objectives by their relative – not absolute – effectiveness.*

1 Introduction

The annals of financial-crisis history are replete with episodes of housing booms and busts. A familiar pattern recurs: house prices gradually rise, optimism strengthens, collateral values improve and borrowing increases. As the boom matures, rising housing wealth lifts consumption, easier credit conditions fuel further demand and confidence in continued price appreciation spreads through the economy. Yet these dynamics can leave the financial system increasingly fragile, as leverage rises, lending standards weaken and balance sheets become more exposed to the risk of price reversals. If a shock lands – whether tighter financing conditions, a reassessment of risk or a broader financial disturbance – the dynamic can reverse abruptly, typically at much greater speed than during the boom. Households cut spending, debt servicing problems emerge, losses spread to bank balance sheets and credit conditions tighten, leading to wider economic contraction. It is precisely to reduce the likelihood and cost of such episodes that macroprudential policy has developed as a domain in its own right, aiming to contain the build-up of housing-finance vulnerabilities before they become unmanageable. For central banks and other authorities, this raises a practical question: when housing markets

[145] See Mundell, R.A. "The appropriate use of monetary and fiscal policy for internal and external stability", *IMF Staff Papers*, Vol. 9, No 1, International Monetary Fund, 1962, pp. 70-79.

boom, which policy tools are most effective in leaning against the build-up of vulnerabilities without imposing unnecessarily large costs on the broader economy?

The Tinbergen rule – prescribing one independent instrument for each independent objective – is a popular point of departure for answering policy-assignment questions. However, when instruments are not independent, the rule falls short.[146,147] Before the global financial crisis, macroprudential toolkits were narrow in scope. Since then, they have expanded markedly to include capital-based measures, borrower-based tools and liquidity instruments. Furthermore, these instruments sit alongside broader housing-market policies which are themselves situated outside standard macroprudential policy toolkits – such as housing-related taxes and levies – that may affect credit and house prices.[148] In some jurisdictions, although not all instruments are macroprudential, there are now arguably more of them available than clearly defined objectives. Mundell's Principle of Effective Market Classification (PEMC) can help in resolving the policy-assignment dilemma: instruments should be assigned to objectives according to their relative, not absolute, effectiveness. This is the same comparative-ratio logic that underpins the Ricardian principle of comparative advantage.[149] For macroprudential policy, this raises a demanding empirical question, because several authorities, each with their own responsibilities, may seek simultaneously to restrain housing credit growth and moderate house price inflation, while not always having a financial stability objective in mind. Existing meta-analyses have made useful progress on measuring average instrument effects, but they have not explicitly addressed this assignment question.[150]

This special feature examines these macroprudential policy-assignment questions through meta-regression analysis. Section 2 sets out the Mundell-Ricardo perspective for analysing policy-assignment issues and explains how meta-analysis can inform this conceptual framework through jointly estimated effects of policy actions on the growth of real household credit and real house prices. Section 3 describes the database-building approach that is applied to extract these policy-context conditional effects. Then, Section 4 reports unconditional findings on instrument effectiveness, while Section 5 turns to the jointly estimated effects and the assignment perspective. Section 6 concludes.

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146 See Tinbergen, J., *On the Theory of Economic Policy*, North-Holland, Amsterdam, 1952.

147 Fahr, S. and Fell, J., "Macroprudential policy – closing the financial stability gap", *Journal of Financial Regulation and Compliance*, Vol. 25, Issue 4, 2017, pp. 334-359.

148 See, among others, Araujo, J., Patnam, M., Popescu, A., Valencia, F. and Yao, W., "Effects of macroprudential policy: Evidence from over 6000 estimates", *Journal of Banking & Finance*, Vol. 169, 107273, 2024, and Kholodilin, K.A. "The impact of governmental regulations on housing market: Findings of a meta-study of empirical literature", *Discussion Papers*, No 2113, Deutsches Institut für Wirtschaftsforschung, 2025.

149 See Mundell, R.A., op. cit.

150 See Araujo, J. et al., op. cit.; Kholodilin, K.A., op. cit.; Malovaná, S., Hodula, M., Bajzík, J. and Gric, Z., "Bank capital, lending, and regulation: A meta-analysis", *Journal of Economic Surveys*, Vol. 38, Issue 3, 2023, pp. 823-851; and Malovaná, S., Hodula, M., Gric, Z. and Bajzík, J., "Borrower-based macroprudential measures and credit growth: How biased is the existing literature?", *Journal of Economic Surveys*, Vol. 39, Issue 1, 2025, pp. 66-102.

2 Many objectives and many tools: meta-analysis and the Mundell approach to policy-assignment

The starting point for assigning instruments is to treat Mundell's PEMC as a general rule for policy-assignment. The question posed by Ricardo was: which country should produce which good? Mundell asked a different, yet similar – in the sense of the solution – question: which policy instrument should pursue which objective? In both cases, the answer depends on relative effectiveness rather than exclusivity. A country need not be absolutely the best at producing a good to possess a comparative advantage in it; likewise, a policy instrument need not be the most effective to be optimally assigned to a policy goal. Viewed this way, Mundell's PEMC is the policy-space analogue of Ricardian comparative advantage.

The rise of macroprudential policy has, arguably, revived the relevance of Mundell's PEMC. Before the global financial crisis, the binding constraint was Tinbergen's: too few instruments for too many objectives. Today, the opposite problem can also arise. Macroprudential authorities frequently have several partially overlapping tools – capital-based instruments, sectoral risk weights, exposure limits, borrower-based limits, liquidity measures, etc. – all of which transmit through correlated channels to a smaller set of vulnerabilities. The risk is no longer one of too few instruments but, in some configurations, one of potentially overlapping instruments: redundancy, blurred accountability and over-assignment. Policy actions taken in housing market booms can illustrate the point. Housing market cycles have consequences not only for macroprudential policy but also for fiscal and social policies. If, for instance, a fiscal authority raises stamp duties to cool house prices for affordability reasons, the macroprudential authority is no longer operating in a closed policy space; another instrument has entered the same transmission channels.

The macroprudential meta-analytic literature has begun to establish an empirical basis for addressing policy-assignment issues. However, it has not yet posed the question directly. Four studies are particularly relevant. Araujo et al. provide the broadest synthesis, extracting more than 6,000 estimates from 58 studies and finding that tightening reduces credit growth more reliably than house prices, with borrower-based tools concentrating in the credit channel.[151] Kholodilin broadens the scope to include housing taxes alongside macroprudential regulations and, similarly, finds that both reduce loan growth and property prices.[152] Malovaná et al. focus on borrower-based instruments and find debt-service-to-income (DSTI) and debt-to-income (DTI) limits somewhat more potent on credit than loan-to-value (LTV) limits used alone;[153] a related capital-based meta-analysis finds that a 1 percentage point increase in capital requirements reduces annual credit growth by roughly

[151] See Araujo, J. et al., op. cit.

[152] See Kholodilin, K.A., op. cit.

[153] See Malovaná, S. et al., *Borrower-based macroprudential measures and credit growth: How biased is the existing literature?,* op. cit.

0.7 percentage points after correcting for so-called publication selection bias.[154][155] The qualitative message across these studies is fairly consistent: tightening has more visible countercyclical impacts on housing credit than on house prices, with marked heterogeneity across instruments.

What these studies share methodologically is also where a gap can be found. Each of them pools estimates of policy-impact parameters on an instrument-by-instrument basis, treating individual coefficients, not studies, as the unit of observation. None systematically addresses how the effectiveness of instruments compares when several are active at the same time, nor whether they substitute for or complement one another. These are assignment questions, and they require a different angle to be taken when analysing the evidence base: the subset of estimates produced from regressions in which more than one policy variable enters simultaneously. When two policy variables appear in the same empirical model, each estimated coefficient is interpreted as being conditional on the other policy variable and on the model's other controls. The two estimates share the same outcome definition, sample, controls and identifying choices. When put on a common scale, through standardisation, they contain information about relative policy effectiveness within a common empirical environment. In other words, their comparative advantage, in the Mundellian sense, is revealed.

This special feature develops an approach to informing Mundell's PEMC with meta-analysis findings in two complementary steps. Following a discussion in Section 3 of the approach taken to meta- database building, where coding for jointly estimated policy-impact parameters is key, it then reports the unconditional, instrument-by-instrument evidence (see Section 4), against which the prior meta-analyses can be benchmarked. It then turns to the jointly estimated subset (see Section 5), where the same exercise directly addresses relative effectiveness, overlap and trade-offs. The contribution is more organisational than it is econometric: by separating jointly estimated from individually estimated policy-impact parameters, the dataset can be queried to answer questions which the primary literature did not address explicitly. By zooming in on joint estimates, it sharpens the questions policymakers can ask of the evidence, shifting the discussion from "does this instrument work?" to "where is its comparative effectiveness greatest, and what is being missed when an instrument setting is calibrated in isolation?"

3 A novel approach to meta-database building

The conceptual framework for the discovery, screening and extraction pipeline for relevant policy-impact parameters is set out in Box A. This section describes its application to the present study, which is best viewed as an example of how an end-to-end pipeline can be deployed on an already-established meta-analysis literature. The four prior meta-analyses mentioned above provided a natural baseline

[154] See Malovaná, S. et al., *Bank capital, lending, and regulation: A meta-analysis*, op. cit.

[155] Publication selection bias arises when studies producing statistically significant or "expected" results are more likely to be written up, accepted by academic journals and cited more frequently. In other words, what ends up in print may not always be a faithful record of all that was found by researchers, meaning that averaging reported estimates, which contain such bias, can be misleading.

of candidate studies for the studies analysed here. Still, because the meta-analysis question posed by each of these prior analyses was not the same as the one posed here, working from this baseline does not provide grounds for bypassing the discipline of a fresh systematic review: every candidate study was screened in precisely the same way.

The process moved through several stages, each building on the previous one. First, all primary studies cited in the four meta-analyses were retrieved, and those confirmed as containing extractable estimates while also meeting the target-variable/policy-variable pairing requirements for this study were retained.[156] Second, version snowballing – that is, searching for an earlier version of a published study – identified working-paper or pre-publication versions of journal articles; the rationale for retaining unique estimates from earlier versions is discussed in Box A.[157] Third, a version comparison index quantified the extent of unique content across model specifications, samples and reported estimates, with near-identical versions excluded to avoid double-counting. Throughout, the unit of inclusion is the estimate, not the study.

Terminology from the titles and keywords of the resulting baseline study set was used to calibrate the structured syntax of a smart bibliographic search. In this fourth step, the content words extracted from the titles and the author-supplied keywords of those studies were sorted by their marginal coverage of the calibration set, yielding an optimised search syntax. The syntax was then run against Web of Science and Scopus,[158] raising the candidate pool to 266 studies.[159] Fifth, already-discovered studies, verified as usable for the analysis, were removed to create a yet-to-be-screened short-list from this pool, and the remaining candidates were abstract-screened to retain only empirical studies of macroprudential policy effectiveness – excluding purely theoretical, DSGE and other simulation-based work. Sixth, the candidates were scored on a study relevance index (SRI), a data extraction complexity index (DECI) and a combined study usability score (SUS), reflecting the fit of the study to the dependent variables examined in this study and the manual effort required to convert findings into comparable quantitative evidence. Seventh, a final round of version snowballing was combined with backward snowballing (i.e. checking reference lists of eligible studies) with AI assistance to handle volume. 81 eligible studies emerged at the end of this data extraction process.

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156 Cross-checking that primary studies met requirements for this analysis was greatly facilitated by the meta-study set out in Araujo, J. et al., op. cit., as the authors make their underlying dataset publicly available.

157 For quality control, working papers or unpublished studies were only included if the related final version was published.

158 Web of Science and Scopus are large, curated databases of peer-reviewed academic literature that allow users to search publications across disciplines and track citations for research evaluation and policy analysis.

159 Total number of studies discovered by the search string displayed in Table A.1 as of 12 May 2026.

Box A

From search to synthesis: an end-to-end pipeline for metadata extraction

The credibility of any meta-analysis depends as much on how the evidence is assembled for a database as on how it is analysed. This box describes the metadata extraction pipeline used in the related special feature. It is designed to satisfy the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) – the international reporting standard most top-tier journals expect of published systematic reviews. PRISMA requires that every stage of evidence assembly, from identification through screening to inclusion, is documented in a way that another researcher could reproduce. The pipeline described below was built around that requirement, using quantitative screening metrics. Rather than relying on the more usual qualitative approach to inclusion decisions,[160] each stage produces explicit numerical indices that can be audited end-to-end.

Smart search. Identification begins with a search strategy designed to recover known relevant studies efficiently while keeping the screening burden manageable. A "smart" meta-search, named G-search here, inverts the usual logic of query design. Rather than starting from a long, manually assembled list of candidate terms, it begins from calibration to a set of studies already known to be relevant and treats the content words in article titles and author-supplied keywords as data. The compact term set is then assembled using a greedy set-cover algorithm: at each step, the term that recovers the largest share of the calibration set not yet covered is added.[161] This produces short, auditable Boolean queries that are robust to the character-string limits imposed by some bibliographic platforms. The four-column structure in Table A.1 illustrates the result for the 63 calibration studies pooled from the four prior meta-analyses: synonyms of macroprudential policy, terms naming policy objectives, terms denoting effectiveness and terms identifying use of an empirical method. Two of the four columns recovered the full calibration set with seven or fewer terms; the remaining two came reasonably close.

Triage and structured extraction. Once a candidate study has been identified, the pipeline applies a structured triage and extraction process supported by an AI engine, used as a checking and extraction tool rather than a source of substantive judgement.[162] Each study receives three scores. A study relevance index (SRI) summarises how closely the paper matches the target dependent variables, policy instruments, their combinations, and other design features of interest. A data extraction complexity index (DECI) records the expected difficulty of converting the study into comparable quantitative evidence, given how completely the paper reports policy-impact parameter estimates, their precision metrics, samples and specifications. A study usability score (SUS), combining the previous two indices, sequences the coding effort while leaving the underlying scores visible for audit. Studies with sibling or earlier versions enter an additional version-control step, in

[160] See Page, M.J. et al., "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews", *BMJ*, Vol. 372, n71, 2021.

[161] See Chvátal, V., "A greedy heuristic for the set-covering problem", *Mathematics of Operations Research*, Vol. 4, No 3, 1979, pp. 233-235, and Johnson, D.S., "Approximation algorithms for combinatorial problems", *Journal of Computer and System Sciences*, Vol. 9, Issue 3, 1979, pp. 256-278. The greedy set cover algorithm was developed to handle problems where the objective is to "reach everything" using as few choices as possible, but where finding the perfect minimum is computationally too expensive. The greedy rule is straightforward: at each step, select the group that covers the largest number of items not yet covered, and repeat this step until everything is covered.

[162] The prompt architecture used to structure and sequence AI interactions in this study was developed with the assistance of ChatGPT 5.5 Pro. Claude Opus 4.7 in adaptive mode was then used to implement this architecture for metadata collection. All research design decisions, inclusion/exclusion criteria and final interpretations are the author's own. As such, the process conforms with the principles described in Cook, N. et al., "Guidance for the use of AI in the meta-analysis of Economics Research", *Journal of Economic Surveys*, 2026.

which a version comparison index (VCI) assesses whether an earlier version contains unique estimates that the published version does not. Following recent best practice in the macroprudential meta-analytic literature, the unit of inclusion is the estimate, not the article: unique estimates from an earlier version are retained where they meet the same quality criteria; near-duplicates are excluded.

Layered metadata. Each retained estimate is stored within a layered metadata structure: Study → Analysis → Model → Estimate. This structure matters because a single empirical paper often contains several dependent variables, alternative specifications and many estimates, any subset of which may later prove relevant for moderator analysis or for the joint-estimation sub-sample analysis discussed in Section 5. Every estimate carries a hierarchical identifier, traceable back to its source, which makes errors easier to detect and corrections easier to propagate.

Replicability. The pipeline is designed so that two researchers working independently on the same topic, using the same inputs and settings, should be able to produce datasets that coincide closely. The combination of structured search, transparent scoring, version control and layered metadata ensures this: each decision is recorded, each filter is rule-based, and the role of the AI engine is confined to executing pre-specified instructions rather than exercising discretion. The pipeline therefore produces evidence that can be both audited and updated as new studies appear.

Limits. No automated pipeline removes the need for judgement. Calibration choices (e.g. choosing which prior meta-analyses to seed from), threshold settings on the SRI, DECI and SUS, and inclusion rules for version siblings all involve choices the researcher must justify. These are documented alongside the dataset rather than embedded in a "black box". The aim is not to eliminate analyst judgement, but to make it visible.

Table A.1

The language of macroprudential policy effectiveness: construction of an efficient search string with the G-search algorithm

Four non-overlapping search strings for discovery of 63 studies on the effectiveness of macroprudential policy in taming housing market booms

(bibliographic search terms)

Boolean AND/OR	Macroprudential policy	AND Policy objective	AND Effectiveness	AND Empirical
First term	Macroprudential policy (40)	Credit growth (21)	Effect (54)	Evidence (22)
OR Second term	Macroprudential policies (11)	House prices (12)	Impact (6)	Banks (13)
OR Third term	Loan-to-value ratio (4)	Household credit (8)	Affect (3)	Economies (8)
OR Fourth term	Borrower-based measures (4)	Systemic risk (5)		Experience (2)
OR Fifth term	Macroprudential measures (2)	Housing market (4)		Credit register (2)
OR Sixth term	Macroprudential instruments (1)	House price growth (2)		Cholesky identification (2)
OR Seventh term	Macroprudential tool (1)	Financial stability (2)		Estimating (2)
OR Eighth term		Mortgage lending (2)		Causal forests (2)
OR Ninth term		Housing loans (2)		Cointegration (1)
OR Tenth term		Household leverage (1)		Household micro data (1)
Total discovered	**63**	**59**	**63**	**55**

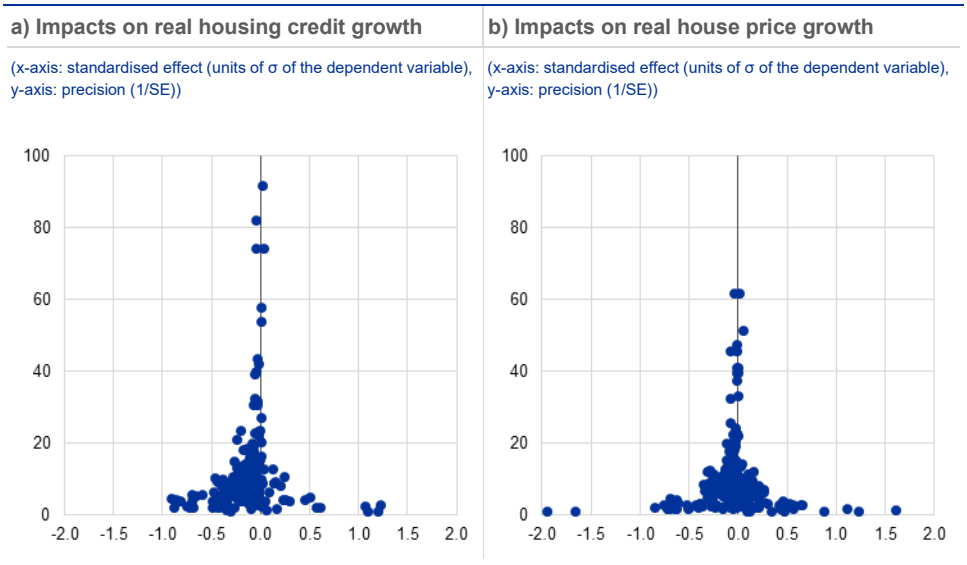
Source: ECB calculations.
Notes: Each column in the table shows the incremental number of studies identified with the addition of one more term. Beyond the last populated row in each column, no term exists among the combined list of terms which can discover additional studies. If column search strings are combined, using the AND Boolean operator, the total number discoveries will equal the minimum shown in the "Total discovered" row. Lowered coverage, if applicable, must be traded-off against a potentially vast reduction in the number of studies to screen from a list produced by a curated database of peer-reviewed academic literature.

4 Unconditional findings: how potent are individual macroprudential policy instruments in taming housing market booms?

The unconditional evidence begins with the standard effectiveness question: do macroprudential instruments, on average and taken one at a time, slow the growth of real housing credit and real house prices? The metadata gathered for this special feature are broad enough to compare instruments but also narrow enough to preserve a common policy question. They focus on two target outcomes – the growth of real housing credit and real house prices – and on policy actions aimed at leaning against housing-cycle vulnerabilities. At the metadata-gathering stage, study relevance was scored in part according to whether instruments are core to macroprudential policy toolkits (capital-, borrower- and liquidity-based tools), peripheral (such as provisioning) or benchmark (such as housing taxes). The instruments differ in their point of contact with the housing market: borrower-based limits affect household borrowing capacity, lender-based measures affect bank incentives or balance sheet constraints, and housing-related taxes operate through the cost of buying or owning a home.

Chart C.1

Evidence for countercyclical effectiveness of macroprudential policy is more dispersed for the growth of real household credit than real house price growth



Source: ECB calculations, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). Precision is measured as the reciprocal of the standard error of the estimate, similarly Y-standardised. All estimates are included, covering capital-based, borrower-based, liquidity-based and housing-related tax measures. Where relevant, estimates are sign standardised (i.e. estimates for a loosening of macroprudential policy are re-expressed as "negative" loosening) for comparability.

Funnel plots provide an initial check on the distribution of extracted policy-impact parameter estimates before instrument-specific evidence is considered. Each point combines a standardised effect with a measure of its precision, facilitating the eyeballing of clustering, asymmetry and small-study effects (**Chart C.1**). These estimates measure the impact of activating macroprudential policies over the following four quarters. They are based on raw estimates, where -

1/0/+1 indices were used in the primary studies to measure a loosening, a neutral stance or a tightening of policy tools. The evidence is more dispersed for housing credit than it is for house prices, with larger effects appearing more frequently for the former in the estimated impact distributions than they do for the latter. Also, several estimated impacts with high precision are situated close to zero or, in some cases, have an unconventional sign, thus calling for a deeper probe of the data for so-called publication selection bias.

Formal diagnostic testing can separate genuine effects from publication selection bias. If publication selection bias is absent from the data, the frequency distribution should be symmetric around the true effect. This is not the case for the two funnel plots shown in **Chart C.1**. The strength of asymmetry can be estimated using a funnel asymmetry test (FAT). Here, the FAT finds evidence of asymmetry for policy impacts on both the growth of real housing credit growth and of real house prices, pointing to publication bias which is stronger for household credit. A precision-weighted average (the PET column in **Table C.1**) is, therefore, very close to zero for both dependent variables. This is not because policies have no effect, but because publication selection bias is being averaged in with the signal. A precision-effect estimate with standard error (PEESE) can correct for this bias, with the corrected estimates markedly different from the uncorrected ones. Combining the impacts of all measures considered here, a macroprudential tightening reduces the growth of real housing credit by 0.037 and of real house prices by 0.022 standard deviations of the respective dependent variable over four quarters (**Table C.1**).

Table C.1

Correcting estimates of policy-impact parameters for publication selection bias

Summary statistics for all measures and all estimated effects

(cumulative four-quarter response to a macroprudential tightening, standardised)

Outcome variable	Sample size	Uncorrected effect (PET, β_1)	Evidence for publication selection bias	Bias-corrected effect (PEESE, β_1)
Housing credit growth	1,140	-0.0005	Very strong	-0.0369***
House price growth	927	-0.0098	Strong	-0.0220***
Total observations	2,067			

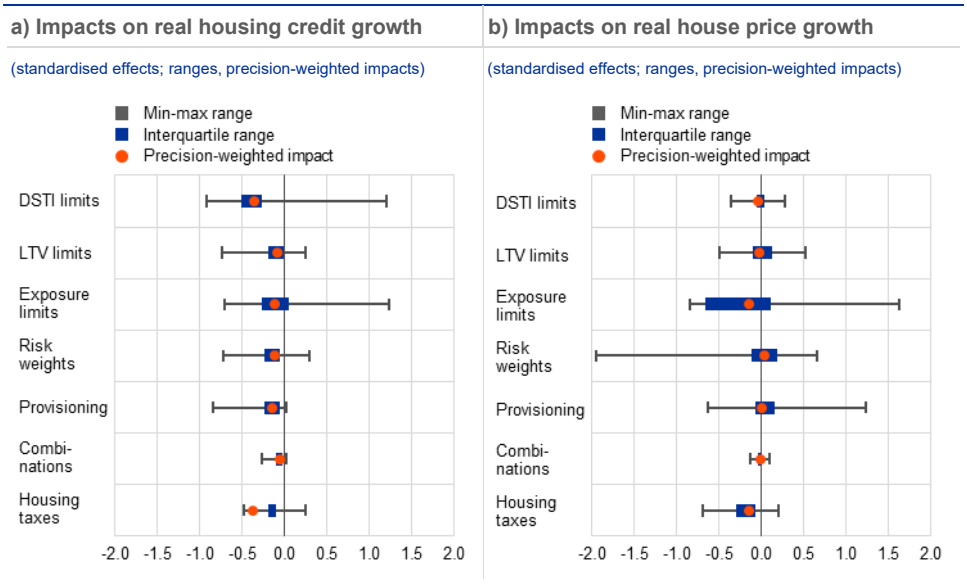
Source: ECB estimates, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). They measure cumulative responses over four quarters to a tightening of a policy, expressed in units of standard deviations of the dependent variable. PET reports the intercept β_1 from the weighted regression $eff_i = \beta_0 \cdot SE_i + \beta_1 + \varepsilon_i$ (weights = $1/SE_i^2$); under publication selection, β_1 is biased toward zero. PEESE reports β_1 from the analogous specification $eff_i = \beta_0 \cdot SE_i^2 + \beta_1 + \varepsilon_i$, which approximates more closely the non-linear relationship between an estimate and its standard error in the presence of selective reporting, yielding a less biased estimate of the underlying effect. The funnel asymmetry test (FAT) corresponds to the significance of β_0; its outcome is reported qualitatively in the fourth column, with "moderate", "strong", and "very strong" denoting rejection of the no-bias null at 10%, 5% and 1% significance. *** denotes statistical significance at the 1% level, ** the 5% level and * the 10% level.

Instrument-level estimates suggest that the credit channel dominates the house price channel. Borrower-based instruments – especially DSTI but also LTV limits – appear to have material effects on credit. This is because they constrain households at the point where credit decisions are made, through either affordability or collateral limits (**Chart C.2**). Housing-related taxes stand out for a different reason: their reach extends visibly to both credit and house prices, consistent with their closer connection with the user cost of housing. By contrast, broad-based capital measures and some bank-balance-sheet tools show more muted or heterogeneous

effects on housing credit. This is unsurprising. Broad-based measures are not specifically targeted at mortgage lending and may, depending on banks' portfolio choices, allow credit reallocation across sectors rather than reducing mortgage credit directly. Their primary purpose is to strengthen borrower and lender resilience rather than to moderate the housing-credit cycle. Their main contribution to financial stability lies in that resilience role, which the unconditional credit-growth estimates do not capture.

Chart C.2

Macroprudential policy effectiveness appears to be stronger for real household credit growth than real house prices

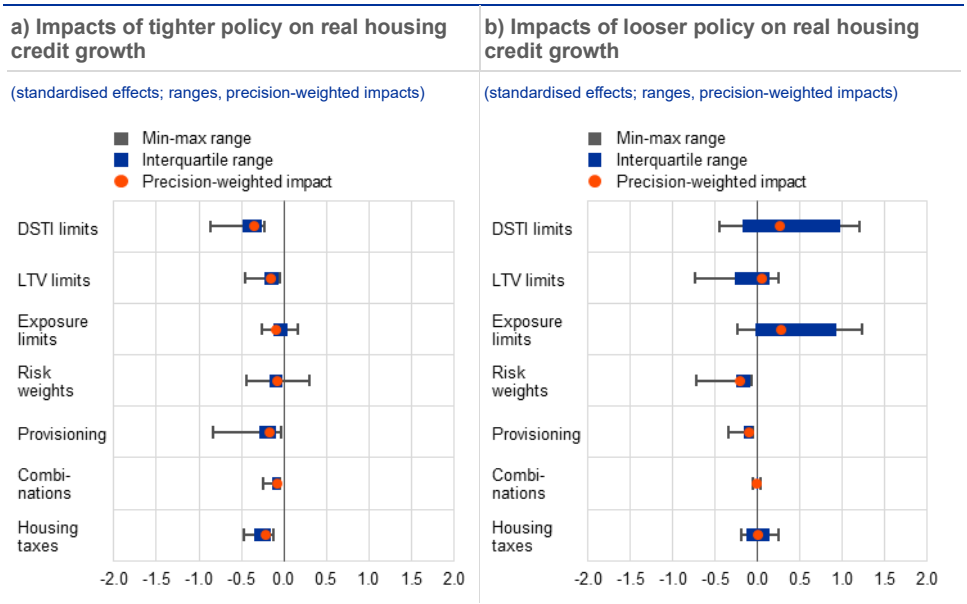


Source: ECB calculations, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). The combinations category groups instrument combinations which do not fit neatly under any one of the main macroprudential policy instrument categories: capital-based, borrower-based and liquidity-based tools. The charts depict the min-max and interquartile ranges, with precision-weighted impacts of each instrument on each dependent variable towards the centre. Precision-weighted impacts place greater weight on estimates with lower standard errors. Where relevant, estimates are sign standardised (i.e. estimates for a loosening of macroprudential policy are re-expressed as "negative" loosening) for comparability.

Particular caution is demanded in the interpretation of these averages. The precision-weighted summaries used here apply a conventional inverse-variance scheme commonly used in macroprudential meta-analysis. Precision is a statistical property: it captures how tightly an estimator pins down its target and it improves with sample size and reductions in residual variance. Identification quality is a separate property of the research design (i.e. whether the target is the right one). The two are conceptually distinct. A study can be highly precise about a biased quantity or imprecise about an unbiased one. Precision-weighting alone is therefore not a guarantee that the most credibly identified estimates receive the greatest weight. No consensus alternative weighting scheme exists, however, which is why inverse-variance weighting remains the standard summary device. Heterogeneity across study characteristics is addressed through moderator analysis, in line with the methodology literature.

Chart C.3

Macroprudential policy effectiveness in moderating real household credit growth appears to be stronger for tightening than for loosening



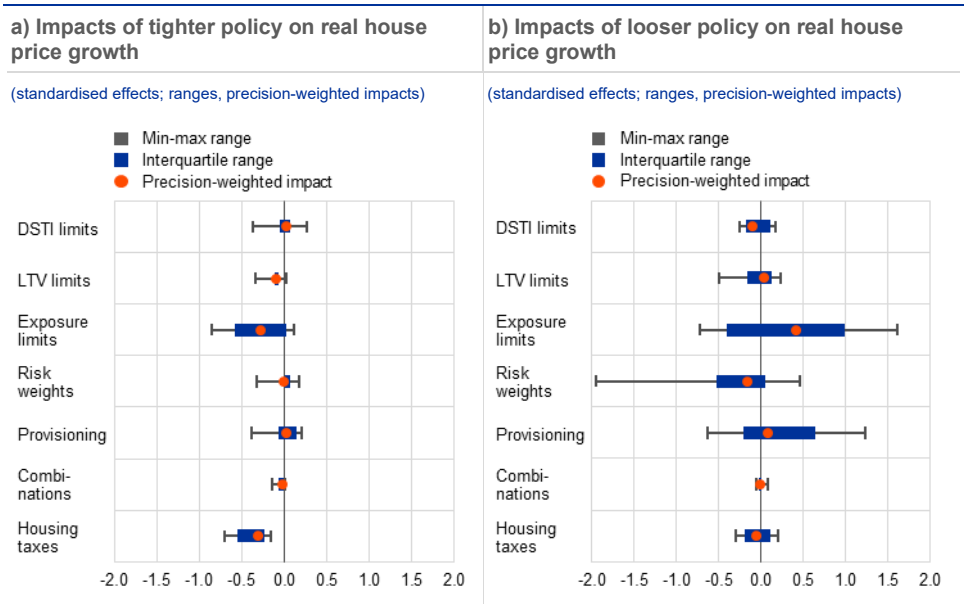
Source: ECB calculations, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). The combinations instrument category groups instrument combinations which do not fit neatly under any one of the main macroprudential policy instrument categories: capital-based, borrower-based and liquidity-based tools. The charts depict the min-max and interquartile ranges, with precision-weighted impacts of each instrument on each dependent variable towards the centre. Precision-weighted impacts place greater weight on estimates with lower standard errors. Where relevant, estimates are sign standardised (i.e. estimates for a loosening of macroprudential policy are re-expressed as "negative" loosening) for comparability.

Visible asymmetries between the effects of tightening and loosening policy instruments reinforce a resilience-based interpretation of macroprudential policy effectiveness. Tighter measures are associated with clearer reductions in housing credit than looser measures are with increases (**Chart C.3**), and a similar but weaker pattern is found for impacts on real house prices (**Chart C.4**). This asymmetry should not be over-interpreted as evidence that loosening is impotent. Most underlying studies pool episodes unconditionally on the state of the financial cycle, while loosening is, by construction, deployed when credit is expected to contract – generating a selection bias that attenuates estimated effects. The relevant counterfactual is what credit would have done absent the action; reduced-form averages cannot distinguish "no effect" from "prevented a sharper contraction". Better-identified bank- and loan-level evidence around actual releases, notably during the COVID-19 pandemic, finds that banks with greater capital headroom sustained lending more robustly. Releasable buffers also aim at preserving credit supply, not at stimulating demand. The absence of a positive credit impulse should, therefore, not be interpreted as evidence of policy impotence. The headline policy message to be drawn from these findings is consistent with the wider meta-analytic literature: tightening is often found to be more impactful on real household credit growth than on real house price growth. Also, borrower-based tools are found to have more meaningful effects on credit than other instruments. Notably, housing taxes appear to have a substantial impact on both credit and house prices. At the same time, the impacts of broader lender-based tools depend more on institutional structure, timing and bindingness. Overall, these findings are consistent with the

view that the focus of macroprudential measures should unequivocally be on restraining the build-up of housing-finance vulnerabilities, rather than fine-tuning or lowering house prices.

Chart C.4

Macroprudential policy effectiveness in moderating real house price growth appears to be stronger for tightening than for loosening



Source: ECB calculations, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). The combinations instrument category groups instrument combinations which do not fit neatly under any one of the main macroprudential policy instrument categories: capital-based, borrower-based and liquidity-based tools. The charts depict the min-max and interquartile ranges, with precision-weighted impacts of each instrument on each dependent variable towards the centre. Precision-weighted impacts place greater weight on estimates with lower standard errors. Where relevant, all estimates are sign standardised (i.e. estimates for a loosening of macroprudential policy are re-expressed as "negative" loosening for comparability).

5 Conditional findings: how the marginal impacts of individual instruments can inform assignment

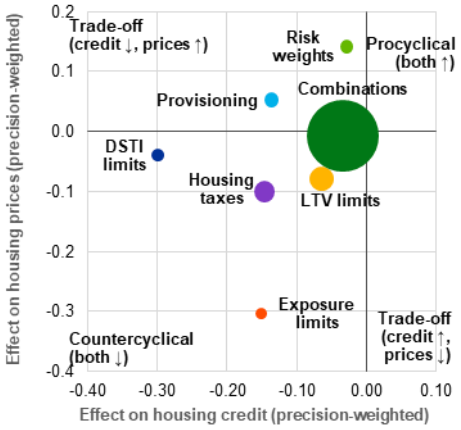
To move from effectiveness to policy- assignment, joint estimation of policy-impact parameters is key. When two or more policy variables enter the same empirical model, each coefficient is estimated conditional on the other policy variables and on the model's remaining controls. The estimates therefore share an outcome definition, sample and identifying structure, making them closer to the policy environment in which authorities often act together rather than in isolation. This matters for an empirical application of Mundell's principle because assignment depends on relative effectiveness: which instrument has the stronger impact on which objective? **Chart C.5**, panel a) shows a first mapping. Each instrument is located by its jointly estimated impact on real housing credit growth and real house price growth, using policy-impact parameters that are not yet corrected for publication-selection bias. The map is therefore a diagnostic starting point, not the final estimate of conditional effectiveness.

Chart C.5

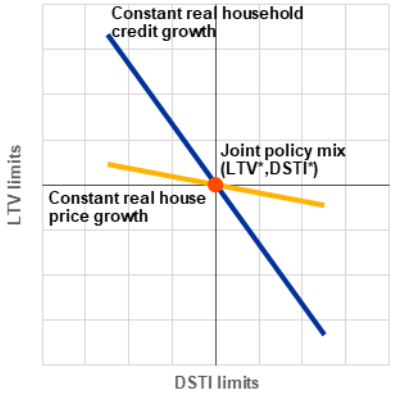
Mapping policy impacts can reveal relative effectiveness and inform assignment

a) Standardised dual impacts of individual macroprudential policy instruments

(standardised effects; joint precision-weighted impacts)



b) Calibration of Mundellian assignment for LTV and DSTI limits to tame housing market booms



Source: ECB calculations, based on data extracted from academic studies.
Notes: Panel a: standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). The combinations instrument category groups instrument combinations which do not fit neatly under any one of the main macroprudential policy instrument categories: capital-based, borrower-based and liquidity-based tools. The chart depicts jointly estimated precision-weighted impacts of each instrument on real housing credit growth and real house price growth, and a measure of the precision of estimated impacts. Precision-weighting here is joint, but the measure used assumes independence. The metric places greater weight on estimates with lower standard errors around estimated impacts for both real housing credit growth and real house price growth. Where relevant, estimates are sign standardised (i.e. estimates for a loosening of macroprudential policy are re-expressed as "negative" loosening) for comparability. Panel b: each iso-target line is calibrated from the jointly estimated policy- impact parameters reported in Table C.3. With b1 denoting the joint coefficient on the y-axis instrument (here, LTV limits) and b2 the joint coefficient on the x-axis instrument (here, DSTI limits), the slope of the iso-target line in (DSTI, LTV) space is given by −b2 / b1. For the constant-credit-growth line, b1 = -0.0477 and b2 = -0.3182, giving a steep slope of approximately -6.67 − indicating that DSTI limits are relatively more effective on household credit. For the constant-house-price-growth line, b1 = -0.0695 and b2 = -0.0626, giving a much shallower slope of approximately -0.90 − indicating that LTV limits are relatively more effective on house prices.

For policy-assignment, the next step is to correct policy-impact parameters for publication selection bias. Table C.2 repeats the publication-selection-bias adjustment used earlier, but now only for jointly estimated policy impacts. The corrected impact on real housing credit growth is larger than in the full sample, with the PEESE estimate rising in absolute value from 0.0369 to 0.0661 standard deviations over four quarters. By contrast, the corresponding house-price estimate changes only modestly, from 0.0220 to 0.0251. This could mean that joint specifications isolate conditional effects more cleanly, but it could also reflect the narrower joint-estimate subset. The key diagnostic is whether instruments behave differently when estimated jointly rather than alone.

Table C.2

Correcting joint estimates of policy-impact parameters for publication selection bias

Summary statistics for all measures and jointly estimated effects

(cumulative four-quarter response to a macroprudential tightening, standardised)

Outcome variable	Sample size	Uncorrected effect (PET, β_1)	Evidence for publication selection bias	Bias-corrected effect (PEESE, β_1)
Housing credit growth	390	-0.0265	Very strong	-0.0661***
House price growth	316	-0.0095	Moderate	-0.0251**
Total observations	706			

Source: ECB estimates, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). PET reports the intercept β_1 from the weighted regression $eff_i = \beta_0 \cdot SE_i + \beta_1 + \varepsilon_i$ (weights = $1/SE_i^2$); under publication selection, β_1 is biased toward zero. PEESE reports β_1 from the analogous specification $eff_i = \beta_0 \cdot SE_i^2 + \beta_1 + \varepsilon_i$, which approximates more closely the non-linear relationship between an estimate and its standard error in the presence of selective reporting, yielding a less biased estimate of the underlying effect. The funnel asymmetry test corresponds to the significance of β_0; its outcome is reported qualitatively, with "moderate", "strong", and "very strong" denoting rejection of the no-bias null at 10%, 5% and 1% significance. *** denotes statistical significance at the 1% level, ** the 5% level and * the 10% level.

For an interpretation of how joint estimates differ from the full sample of policy-impact parameters, a comparison of joint versus solo estimates provides the cleanest diagnostic. Solo estimates come from specifications in which one policy instrument is included; Joint estimates come from specifications in which two or more policy-impact parameters are estimated together (**Table C.3**). At the aggregate all-measures level, statistical tests find that differences are not significant, possibly reflecting PEESE non-linearities and instrument heterogeneity. Yet an instrument-level comparison is more revealing. For real housing credit growth, the joint impacts of LTV limits and risk weights are significantly smaller in absolute value than their solo impacts. For real house price growth, the joint impact of risk weights is significantly larger than the corresponding solo impact. When the aim is to assign instruments according to their relative effectiveness, even one such difference matters, because each instrument enters several pairwise slopes; mismeasuring one coefficient therefore propagates throughout the entire assignment map.

The assignment implications become more visible using Mundell's original diagram. In **Chart C.5**, panel a, horizontal coordinates map the precision-weighted joint effects on real housing credit growth, while vertical coordinates map the corresponding effects on real house price growth, with bubble sizes scaled by joint precision.[163] The chart space can be divided into four regions: countercyclical, procyclical, and two trade-off regions where one objective falls while the other rises. Housing taxes sit firmly in the countercyclical region. DSTI limits look like a near-pure credit-moderating tool. LTV limits sit closer to housing taxes than to DSTI limits. Some lender-based measures, including risk weights and provisioning, fall into trade-off regions, indicating that their housing-cycle effects should be interpreted alongside their resilience role.

[163] Specifically, for instrument k, joint precision is measured as $JP_k = (SE_{k,credit}^2 + SE_{k,price}^2)^{-1}$, where $SE_{k,credit}$ and $SE_{k,price}$ denote the standard errors of the jointly estimated standardised impacts on real housing credit growth and real house price growth respectively. This metric gives greater visual weight to instruments whose estimated impacts are more precisely measured across both target variables, while abstracting from covariance between the two estimates.

Table C.3

Comparing the information content of joint estimates of macroprudential policy-impact parameters with solo estimates

Solo and joint PEESE meta-regression estimates of macroprudential policy- impact parameters on the growth of real household credit and real house prices by instrument

(cumulative four-quarter response to a macroprudential tightening, standardised)

	Impacts on real household credit growth			Impacts on real house price growth		
	Solo	Joint	Comparison	Solo	Joint	Comparison
All measures	-0.0922***	-0.0661***	Solo ≈ Joint	-0.0289***	-0.0251**	Solo ≈ Joint
DSTI limits	-0.3717***	-0.3182***	Solo ≈ Joint	-0.0441	-0.0626	Solo ≈ Joint
LTV limits	-0.1395***	-0.0477*	|Joint| < |Solo|	-0.0520*	-0.0695**	Solo ≈ Joint
Exposure limits	-0.1688**	-0.2676*	Solo ≈ Joint	-0.1389	-0.3669**	Solo ≈ Joint
Risk weights	-0.0748***	-0.0130	|Joint| < |Solo|	0.0238	0.2051**	|Joint| > |Solo|
Provisioning	-0.1021***	-0.1318***	Solo ≈ Joint	-0.0281	0.0480	Solo ≈ Joint
Combinations	-0.0377***	-0.0276**	Solo ≈ Joint	-0.0036	-0.0019	Solo ≈ Joint
Housing taxes	-0.1347***	-0.1669***	Solo ≈ Joint	-0.0685**	-0.0598	Solo ≈ Joint

Source: ECB estimates, based on data extracted from academic studies.
Notes: Standardisation of effects is achieved by expressing them in units of standard deviations of the dependent variable (i.e. Y-standardisation). In the columns headed Solo and Joint, *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. Solo refers to PEESE meta-regression estimates derived from primary-study specifications in which a single macroprudential instrument is included; Joint refers to estimates derived from specifications in which two or more impact parameters are estimated jointly. The "Comparison" columns report the verdict of a one-sided directional z-test on the disjoint Solo and Joint sub-samples: cells flagged "|Joint| < |Solo|" or "|Joint| > |Solo|" indicate rejection at the 5% level, while cells reading "Solo ≈ Joint" indicate that the directional hypothesis cannot be rejected at that level. PEESE estimates follow Stanley, T.D. and Doucouliagos, H., "Meta-regression approximations to reduce publication selection bias", *Research Synthesis Methods*, Vol. 5, Issue 1, March 2014, pp. 60-78.

From this mapping, a more explicit Mundell assignment exercise becomes feasible. Using the joint estimates in **Table C.3**, so-called iso-target lines can be drawn for combinations of two instruments that hold a target unchanged.[164] In the LTV-DSTI illustration (**Chart C.5**, panel b), the constant-credit-growth line is steep, because DSTI limits have a much larger relative effect on credit than LTV limits. The constant-house-price-growth line is flatter, because LTV limits are relatively more connected to house prices. The point is not that house prices should become the objective of macroprudential policy. The macroprudential objective remains the containment of housing-finance vulnerabilities and the resilience of borrowers and lenders. Rather, the diagram shows when an instrument's strongest cyclical association differs from its usual institutional assignment.

The same framework can discipline the discussion of substitutability and complementarity of policy instruments. In the Mundell sense, two instruments are substitutes for a target when both push that target in the same direction, so that more of one can in principle offset less of the other along an iso-target line. They are complements when their coefficients have opposite signs, so that stabilising the target requires them to move in a coordinated way. This is a linear, conditional classification. It does not establish econometric complementarity in the cross-partial sense, because the primary-study specifications generally do not include interaction

[164] To illustrate the point more rigorously, for a single target with coefficients β_1 on instrument X_1 and β_2 on instrument X_2 in the same model, the so-called iso-target line – that is, the locus of (X_1, X_2) pairs that holds the target constant – has a slope of $-\beta_2/\beta_1$. When β_1 and β_2 share the same sign, the slope is negative: more of one substitutes for less of the other, so the two instruments are substitutes. By contrast, when policy action requirements are offsetting, the slope is positive: more of one requires more of the other to hold the target constant, indicating complementarity. The slope of the iso-target line therefore reveals substitutability or complementarity without recourse to explicit interaction terms.

terms. The analysis therefore tests necessary conditions for Mundellian substitution or offsetting, not structural interaction effects.

Pairwise testing of policy instrument effectiveness can nevertheless add useful information beyond visual inspection. For each target and instrument pair, a procedure for testing individual effectiveness was carried out. It confirmed the joint sign configurations, computed relative-effectiveness slopes and their uncertainty, and tested whether implied substitution rates differed from one-for-one policy- impact parameters, with sensitivity to within-study correlation treated explicitly.[165] The findings are asymmetric across target variables. For real household credit growth, 15 of the 21 possible pairings are classifiable at the 10% level, six at the 5% level and three at the 1% level. DSTI limits feature prominently in policy instrument pairings for real household credit growth, while risk weights do not enter any classifiable pairing for this objective. For real house prices, only three pairings are classifiable, but all survive at the 1% level: LTV-Exposure limits as substitutes, and LTV-Risk weights and Exposure limits-Risk weights are classified as complements. Macroprudential policies which aim at moderating real household credit growth therefore have a wider menu of substitutable instruments to choose from, while house-price effects are sparser and more coordination-dependent.

These findings also reveal some policy-assignment dilemmas. For instance, housing taxes are outside the standard macroprudential toolkit and may be set for revenue, affordability or distributional reasons, yet they can materially affect the same targets that macroprudential authorities monitor. This can create a “right instrument in the wrong hands” issue: the instrument with the stronger cyclical impacts may be controlled by an authority pursuing different objectives, while the macroprudential authority may hold instruments that are second-best for the cyclical task but indispensable for resilience. The value of the Mundell perspective is therefore diagnostic. It helps authorities see where instruments overlap, where coordination may be needed, and where calibration needs to take account of actions taken elsewhere in the same system.

6 Concluding remarks

This special feature has examined what macroprudential policy can do when housing markets boom, how empirical evidence can be assembled more systematically, and how this can inform policy-assignment. It confirms earlier meta-analytic findings that macroprudential measures affect real household credit growth more visibly than they do real house price growth, that tightening effects are clearer than loosening effects, and that different instruments have distinct strengths and weaknesses. It does so by using a novel G-search literature-search algorithm,

[165] The testing procedure involved four steps. First, each coefficient was tested for individual statistical significance. Second, the joint sign configuration was tested using an intersection-union test, so that the substitutability or complementarity classification was not based on point-estimate signs alone. Third, the Mundell relative-effectiveness slope, $-\beta_j/\beta_i$, was computed with its standard error, allowing for the covariance between the two coefficient estimates where possible. Fourth, a linear-hypothesis test assessed whether the substitution rate differed from one-for-one. Within-study correlations used in the covariance term are estimated from jointly estimated within-study evidence, with sensitivity checks used where the relevant covariance is not directly reported.

an AI-supported and replicable data-extraction pipeline, and a focus on jointly estimated policy-impact parameters. In that sense, the article offers a first practical application of Mundell's Principle of Effective Market Classification to macroprudential policy- assignment.

Jointly estimated policy- impact parameters are needed for policy-assignment because authorities rarely activate instruments in isolation. When two or more instruments enter the same empirical model, their coefficients are conditional on one another, making them better suited to assessing relative effectiveness than estimates taken from separate specifications. This does not transform the framework into a mechanical rule for calibration. Rather, robust empirical measures of policy-impact parameters can serve as a complementary diagnostic tool, especially where an authority lacks the instrument that appears most effective and must consider a credible second-best.

The Mundell framework also makes the substitutability question multi-dimensional. Two instruments can be substitutes for one target but complements for another: for example, the LTV-risk weights pair cannot be classified with any degree of confidence as satisfying necessary conditions for either substitutability or complementarity in moderating real household credit growth, but they can be classified as complements for dampening real house price growth. The framework reaches its limits here, because it identifies necessary conditions from linear, jointly estimated coefficients rather than structural interaction effects. More primary studies with policy interaction terms would therefore help in showing when instruments truly reinforce one another, and future meta-analysis could extend the policy-assignment perspective to objectives beyond household credit and house prices.

Finally, the findings also point to practical dilemmas in overlapping policy spaces. Housing taxes, for instance, may materially affect variables monitored by macroprudential authorities even though they are fiscal instruments with broader objectives. Space constraints prevent a full display of all pairwise results, but the implication is clear: assignment, coordination and second-best choices deserve closer attention. Overall, the menu of options available to effectively tame housing market booms is wide, provided instruments are assigned to objectives by their relative – not absolute – effectiveness.

D Stress in global private credit markets and its implications for euro area financial stability

Prepared by Katharina Cera, Daniel Dieckelmann, Kalin Nikolov, Glenn Schepens and Oscar Schwartz Blicke[166]

Recent stress in parts of the US private credit market − including concerns about exposures in the software sector and redemption pressure in semi-liquid vehicles − has led to renewed focus on possible financial stability risks stemming from private credit and the potential relevance of such risks for the euro area. This special feature looks at the exposure of the euro area financial system to private credit. Using available commercial, public and proprietary data, it finds that euro area financial institutions appear to have limited direct exposure to private credit. This makes it unlikely that private credit in isolation could be a source of systemic financial instability at present. However, insurance corporations and pension funds in particular could, in an adverse scenario, face more material second-round revaluation losses from broader spillovers to leveraged loans, high-yield bonds and equities. Private credit could promote long-term growth by channelling funds from long-term investors to innovative firms, thereby supporting the objectives of the EU's savings and investments union. The market should nonetheless be monitored closely, especially in view of worsening credit quality, possible expansion into retail-oriented structures and a potential role of private credit in AI-related financing. Reducing private credit's opacity, addressing data gaps and working towards a harmonised definition of private credit at a global level would avoid a potential underestimation of direct exposures and enable risk to be assessed more completely.

1 Current concerns in private credit markets

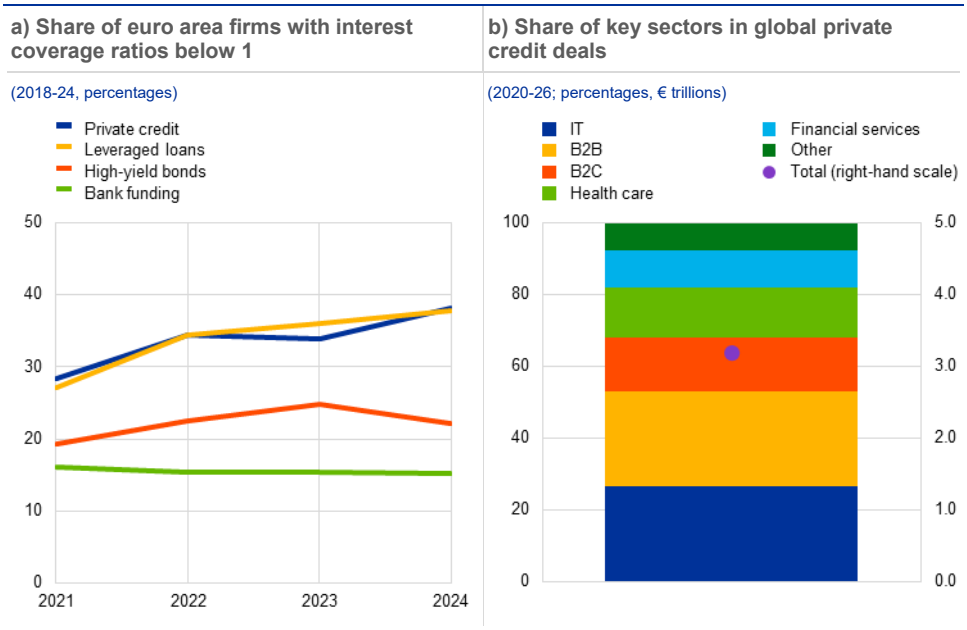
Private credit markets have come under scrutiny from investors and policymakers over concerns about credit quality and concentrated exposures to the software sector. Since autumn 2025, several defaults linked to private credit markets – including First Brands, an auto parts manufacturer, and Tricolor, a subprime auto lender − have illustrated how weak underwriting standards and opacity can transmit losses across parts of the financial industry. While these incidents may partly involve fraud, they have drawn attention to the ease with which firms can accumulate excessive leverage in this opaque industry. In addition, the ability of private credit-backed firms in the euro area to service interest payments from operating cash flows has deteriorated in recent years. This trend can also be observed among firms funded through broader leveraged loan and high-yield bond markets, while it is absent for firms relying on bank loans. (**Chart D.1**, panel a). Furthermore, investors have recently become concerned about the substantial exposure of private credit to the software sector, the biggest subsector of the IT industry (**Chart D.1**, panel b). This is because substantial improvements in the capabilities of AI models have triggered concerns that the technology could disrupt

[166] We are thankful to Maria Leonor Carrilho Puga for assistance with data work.

the business models of some software firms. These developments are particularly illustrative of the interactions between credit risk and market risk. They are relevant for the euro area not because direct domestic exposures are large, but because euro area investors, borrowers and asset managers are linked to global private credit markets.

Chart D.1

Credit quality in euro area private credit markets has deteriorated, and a high proportion of global private credit deals involves IT companies



Sources: ECB (AnaCredit), Moody's, PitchBook, a Morningstar company, and ECB calculations.
Notes: Panel a: the interest coverage ratio is defined as EBITDA divided by interest expenses. Firms are included in a funding category when they have outstanding debt of that type (i.e. the funding has been issued by the observation date and has not yet matured). Where maturity dates are missing, they are imputed using the issue date plus the median tenor of the respective funding category. Private credit refers to directly originated, non-syndicated lending − typically involving non-bank institutional investors − including direct lending and mezzanine financing. Leveraged loans are syndicated loans arranged by banks and distributed to institutional investors. High-yield bonds are corporate bonds rated below investment grade. Panel b: B2B refers to business products and services; B2C refers to consumer products and services. Only the "primary industry sector variable" from PitchBook is used. The cited data in both panels have not been reviewed by PitchBook analysts and may be inconsistent with PitchBook methodology.

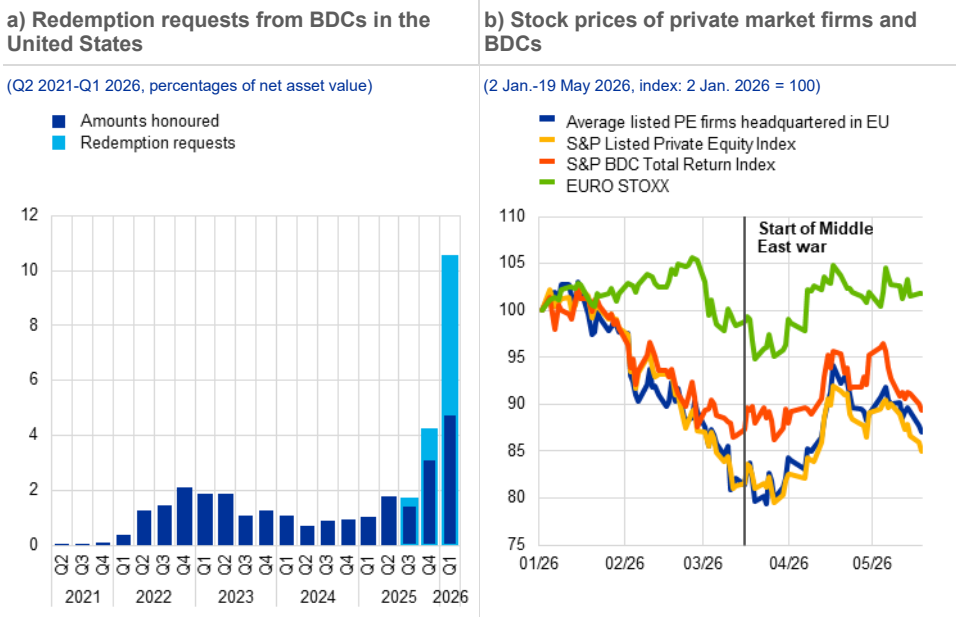
Concerns around credit quality and software-sector exposures have led to a wave of redemption requests from semi-liquid private credit vehicles in the United States. Semi-liquid private credit vehicles such as business development companies (BDCs) have been hit by sizeable redemption requests since the beginning of 2026 (**Chart D.2**, panel a).[167] While some funds have met investor requests in full, others have capped redemptions at a specific share of fund assets, in line with contractual agreements. These outflows illustrate how a deterioration in risk sentiment can spur investors to withdraw their capital from funds offering redemptions at a regular frequency, despite their portfolio holdings being less liquid. In addition, the outflows have triggered doubts among investors about the future growth of private credit markets, which is reflected in a decline in the stock prices of

[167] BDCs are investment vehicles that lend primarily to small and medium-sized US firms. They come in two forms. Listed BDCs trade on public exchanges, providing investors with liquidity through the secondary market despite the fund's closed-end structure. Non-listed BDCs function more like semi-open-ended funds, offering quarterly redemptions at net asset value, but are typically subject to redemption gates that can limit or suspend withdrawals during stress periods.

listed private market firms (**Chart D.2**, panel b). These companies' income depends on fund management fees, which are directly linked to private credit fund assets.

Chart D.2

Sizeable redemption requests from US private credit funds weigh on equity valuations of listed private market firms



Sources: Company SEC filings, Bloomberg Finance L.P. and ECB calculations.
Notes: Panel a: data for a total of 26 non-traded BDCs that reported redemption requests in the periods shown. Panel b: "Start of Middle East war" refers to 28 February 2026. Listed private equity firms headquartered in the EU include EQT (Sweden), CVC (Luxembourg), Eurazeo (France), Antin Infrastructure Partners (France) and Sofina (Belgium).

The rest of this special feature is organised as follows. First, it gives an overview of risks posed by private credit. It then goes on to discuss direct exposures of euro area financial institutions and the potential losses from a simulated shock stemming from private credit. The conclusion comprises an outlook and policy considerations.

2 Sources of financial stability risk posed by private credit

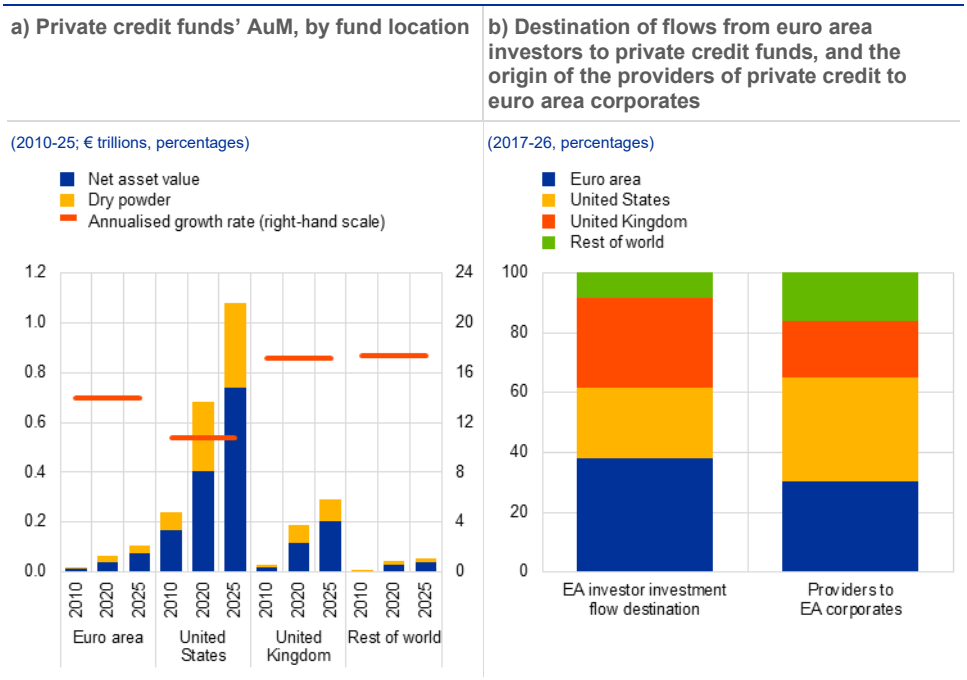
Private credit markets in the euro area are still smaller than they are in the United States but have grown strongly in recent years. In this special feature, private credit generally refers to directly originated, non-syndicated lending by non-bank financial entities to non-financial corporations. Where data limitations require private credit fund data to be used, this narrower scope is stated explicitly.[168] A significant share of private credit is extended to finance company acquisitions made by private equity firms. This means that developments in private credit and private equity are highly interconnected. Estimates of the size of euro area private credit vary, depending on whether the measure captures the location of fund management teams, the legal domicile of the fund, or the location of investors or borrowers. On a

[168] Owing to data limitations, this special feature mainly focuses on private credit funds, which are the main conduits through which private credit is intermediated. However, other non-banks, such as insurance corporations and pension funds, can also extend private credit directly.

management-location basis, the assets under management (AuM) of private credit funds managed from euro area headquarters amounted to roughly €100 billion in 2025 (**Chart D.3**, panel a).[169] The AuM of private credit funds in the euro area have seen significant growth (an average of 14% per annum since 2010) but remain small compared with domestic public bond markets and bank lending, and with private credit markets in the United States. There are significant cross-border links, as euro area investors allocate around 60% of their private credit investments to foreign funds and euro area non-financial firms receive around 70% of private credit funding from non-euro area funds (**Chart D.3**, panel b).

Chart D.3

Private credit is small in the euro area and most investment flows and firm credit are to/from abroad



Sources: PitchBook, a Morningstar company, and ECB calculations.
Notes: Panel a: bars show institutional funds' AuM, broken down by fund location. The red line shows the compound annual growth rate between Q4 2010 and Q3 2025. 2025 refers to Q3 2025. Fund location is defined as where the fund management team is based. Panel b: EA stands for euro area. Investment flow destination is based on commitments by euro area-located limited partners to private credit funds, classified by the region where the funds are located. Private credit providers' regional origin is classified using the location of lenders associated with each debt instrument. Regional categories are not mutually exclusive, as individual debt instruments may involve lenders from several regions. Shares are calculated relative to the sum of regional provider debt amounts and normalised to add up to 100%. The cited data have not been reviewed by PitchBook analysts and may be inconsistent with PitchBook methodology.

Risks in private credit funds stem from credit risk, valuation uncertainty, leverage, funding risk and liquidity mismatches.[170] Private credit loans are typically provided to unrated mid-sized companies at floating interest rates and involve lower reporting requirements than public corporate bonds or syndicated loans. Although the benefit of this is faster and more flexible funding, it also creates

[169] A fund may be managed by an asset management company headquartered in a different country from its legal domicile. With regard to funds domiciled in the euro area, the European Systemic Risk Board reports €365 billion in the AuM of Luxembourg-domiciled private credit funds at the end of 2022; see "EU Non-bank Financial Intermediation Risk Monitor 2024", ESRB, No 9, June 2024.

[170] For an introduction to the characteristics of private markets and related risks, see Cera, K. et al., "Private markets, public risk? Financial stability implications of alternative funding sources", *Financial Stability Review*, ECB, May 2024.

several risks. First, credit risk is significant, as private credit borrowers tend to have weaker credit quality as measured by interest coverage ratios (**Chart D.1**, panel a). Second, there is significant asset valuation uncertainty, as the loans are largely illiquid, meaning that valuations rely on subjective model assumptions. Third, while leverage in private credit funds is relatively low on average, it comes on top of leverage at the firm or investor level, thus accumulating total leverage along the intermediation chain.[171] Fourth, funding risk appears contained at present, as banks continue to lend to private credit funds, and funds' dry powder − committed but not yet invested capital − remains sizeable, although this assessment could change if bank financing or fundraising conditions deteriorated.[172] While high amounts of dry powder can provide a cushion against a slowdown in freshly committed capital, they could also incentivise fund managers to weaken underwriting standards as they attempt to deploy capital despite diminishing investment opportunities. Fifth, liquidity mismatch in private credit funds appears limited in traditional closed-ended private credit funds, which do not offer regular redemptions between launch and closure. However, it could grow as new partly retail-oriented semi-open private credit vehicles − offering regular redemptions at a specified frequency − expand.

3 Direct exposures of euro area financial institutions to private credit

Non-banks are typical investors in private credit markets, whereas banks are the main lenders to the private credit ecosystem as a whole. For clarity, direct exposures as understood here means holdings of private credit fund shares, lending to private credit funds or, in the case of insurance corporations, direct lending to non-financial firms. Indirect exposures through leveraged loans, high-yield bonds or equities are considered separately below. Large institutional investors like insurance corporations and pension funds are major investors in private credit funds − the main conduits through which private credit is intermediated.[173] The same investors may also be exposed to the public debt of the same or similar borrowers, creating a potential contagion channel across asset classes. Banks interact with the private credit ecosystem by lending to three different sets of players: (i) private credit investors, (ii) private credit funds, and (iii) portfolio companies (directly). This

[171] Euro area private debt alternative investment funds are reported to have an average leverage of 40% and US private credit funds leverage of around 30%; see "EU Non-bank Financial Intermediation Risk Monitor 2024", ESRB, No 9, June 2024, and Matvos, G., Piskorski, T. and Seru, A., "Private credit, balance sheets and financial stability", *NBER Working Paper Series*, No 34991, National Bureau of Economic Research, 2026.

[172] Based on PitchBook data, dry powder in global institutional private credit funds amounted to €507.7 billion in the third quarter of 2025, compared with €1,131.0 billion in net asset value (i.e. deployed capital).

[173] Based on PitchBook data showing commitments to global private credit funds (funds pursuing direct lending and mezzanine strategies, and related debt strategies), insurance corporations and pension funds accounted for 70% of private credit fund investments between January 2017 and May 2026. Insurance corporations are also the main investors in private credit funds from the euro area, accounting for 41% of commitments from euro area entities to global private credit funds over the same period.

provision of leverage creates several channels through which stress in private credit markets could be transmitted to the banking sector.[174]

Euro area banks, insurance corporations and pension funds appear to have limited exposures to private credit in aggregate, but the exposures are concentrated in a few large players. Of these entities, insurance corporations are the most exposed to private credit (**Chart D.4**, panel a). The private credit exposures of insurance corporations and pension funds are estimated at roughly €211 billion and €52 billion respectively, or around 2.3% and 1.4% of total assets, with considerable heterogeneity across countries and significantly higher exposures in Germany, France and Netherlands.[175] In the United States, private equity firms have increasingly been acquiring life insurers, resulting in an increase in such insurers' holdings of private market assets.[176] In the euro area, this activity appears to be more limited, despite showing an upward trend.[177] ECB supervisory data estimate that euro area banks' exposures to private credit worldwide total €62.5 billion, which is 0.2% of total assets or 2.5% of total equity.[178] In the case of both banks and insurance corporations, exposures are, however, highly concentrated in a small number of large institutions.

4 Scenario analysis of a simulated shock to global private credit and a comparison with the US subprime mortgage market in 2006

A simulated severe shock to global private credit markets suggests that direct losses would be limited for euro area institutions, but broader spillovers could be larger. The scenario simulates a sharp increase in defaults on loans originated in private credit markets across sectors, together with a particularly severe shock to the software sector (**Chart D.4**, panel b). Such a shock could interact with potentially higher borrowing costs for firms, given current geopolitical uncertainties around oil prices and the path of future interest rates. To isolate different channels, the

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174 Additionally, banks and private credit funds are linked through synthetic risk transfers, in which private credit funds may act as protection providers, creating a further channel of interconnection. While important, these transfers are outside the scope of this special feature.

175 The European Insurance and Occupational Pensions Authority (EIOPA) is the main provider of exposure data for insurance corporations and pension funds. In its December 2025 Financial Stability Report, EIOPA defines private credit as comprising "corporate bonds that are non-listed or non-tradable, mortgages and loans, structured notes subject to credit risk, and collateralised securities subject to credit risk", which is broader than the definition used in this special feature. As at year-end 2024, EIOPA reports 5.1% of exposures for insurance corporations and 4.4% of exposures for pension funds as a share of total assets. These figures were adjusted to 2.3% and 1.4% respectively using granular data to match the definition of private credit used in this special feature, largely by excluding mortgages (due to their lower credit risk) and non-euro area countries in aggregations.

176 See Garavito, F., Lewrick, U., Stastny, T. and Todorov, K., "Shifting landscapes: life insurance and financial stability", *BIS Quarterly Review*, Bank for International Settlements, 16 September 2024.

177 Between 2014 and 2024 there were 37 acquisitions of control of insurance undertakings by private equity firms across 14 EU Member States, representing roughly €270 billion in balance sheet assets; see "Impact assessment on the consultation on supervisory statement on the authorisation and ongoing supervision of (re-)insurance undertakings related to private equity", EIOPA, 27 January 2026. In comparison, private equity-owned US insurers held over $700 billion in invested assets at year-end 2024; see "Private Equity-Owned U.S. Insurer Investments Increased at Year-End 2024", *Capital Markets Special Report*, National Association of Insurance Commissions, August 2025.

178 Private credit exposures are based on a sample of 12 euro area banks' private credit exposures as of 2024, considering only drawn amounts.

illustrative exercise presents three stages: (i) direct private credit losses, (ii) additional losses from loans to software firms in correlated leveraged debt markets, and (iii) broader second-round market revaluations. First, private credit losses are considered in isolation, as depicted by the red bars in the chart. Then defaults in the software sector in high-yield bonds and leveraged loans are added due to their comparable risk profile (yellow bars). The final stage is adverse second-round valuation effects in public markets (blue bars). As a tail-risk assumption, these valuation effects reflect strong declines in high-yield bond prices and in the prices of traded private credit funds. The declines stem from outflows from high-yield bond funds and semi-open private credit vehicles, together with falling equity markets after a reversal in sentiment.

While the direct impact on banks is small, it is larger for insurance corporations and pension funds. Banks' losses from private credit remain contained in all three stages – not exceeding 1.3% of total equity – due to the seniority of banks' loans to private credit funds and the relatively small size of their exposures. While banks' exposures to leveraged loans are high, losses from associated exposures to the software sector or from broader market revaluations remain small in aggregate. Insurance corporations face the largest impact in absolute terms, stemming from their larger and less senior exposures to private credit and, when considering broader market revaluations, from their equity holdings in particular.[179] Pension funds are the most heavily affected by aggregate losses from all three stages in terms of total assets. This is largely driven by their equity holdings when broader market revaluations are taken into consideration. In summary, in this exercise by far the largest impact comes from the third stage: the assumed second-round valuation losses.[180] Under the assumptions used, direct losses from a shock to private credit loan portfolios appear manageable, while adverse market reactions in response to the shock could create sizeable valuation losses. Insurance corporations and pension funds are generally well positioned to weather such valuation losses because they have long investment horizons and hold liabilities that are not subject to immediate run risk.

[179] Under Solvency II, assets and liabilities are measured at market value. This has two key effects for the scenario analysis. First, market shocks are applied to the full portfolio of assets held by insurers. Second, the decline in asset values following market shocks is not entirely transmitted to insurers' capital positions, as the investment risk is borne by policyholders in the case of standard unit-linked and index-linked contracts, as well as products with profit participation.

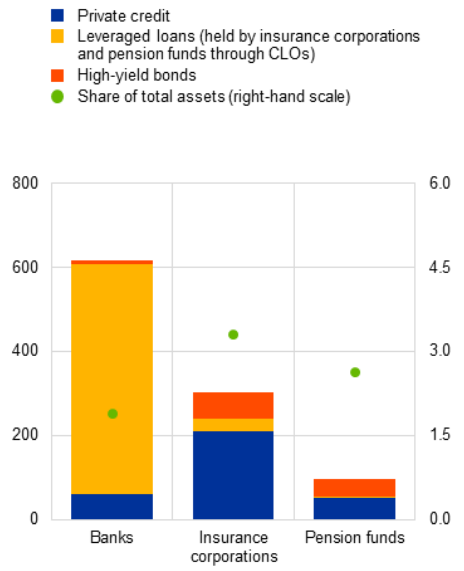
[180] Exposure data used in this special feature are estimates and scenario analyses resting on several assumptions, even if great care was taken to corroborate data and results through academic findings, alternative data sources and market intelligence. Prices in other asset classes that are not considered in the scenario analyses, like investment-grade bonds, are assumed to stay constant.

Chart D.4

Exposures to private credit and leveraged debt markets are limited in aggregate, but a shock to private credit markets could spill over and cause wider valuation losses

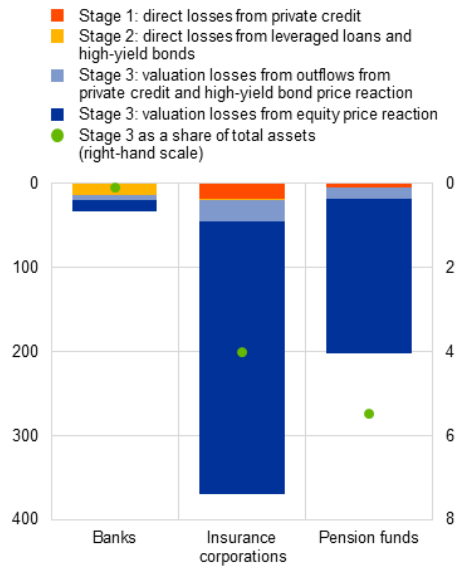
a) Direct exposures of euro area entities to private credit and leveraged debt markets

(2025; € billions, percentages of total assets)



b) Simulated losses for euro area financial entities from broad defaults in private credit and a severe shock in the software sector

(2025; € billions, percentages of total assets)



Sources: ECB (ICB, PFBR, SHS, supervisory data), EIOPA and ECB calculations.
Notes: Panel a: banks' private credit is based on ECB supervisory data, as published in the Financial Stability Board's Report on vulnerabilities in private credit, estimating 12 euro area banks' private credit fund exposures as of 2024, considering only drawn amounts. Banks' leveraged loan exposures (including holdings of non-investment-grade collateralised loan obligations (CLOs)) are based on unpublished supervisory data surveying 47 banks as of Q4 2025. High-yield bond holdings are based on securities holdings statistics for Q4 2025, covering tradable corporate bonds rated lower than BBB, where the rating is defined as the worse of the instrument-level and issuer-level ratings. The private credit exposures of insurance corporations and pension funds are based on EIOPA's December 2025 Financial Stability Report. Real estate-related exposures (including mortgages), policy loans and collateralised securities are excluded. Private credit is proxied by non-listed corporate debt, loans and selected structured credit instruments (including look-through data), adjusted for intragroup holdings. Insurance corporations' and pension funds' CLOs are shown under "leveraged loans". These exposures are based on EIOPA data reporting "collateralised securities – credit risk" and are assumed to be CLOs holding leveraged loans. Unlike for banks, a split by rating is not available. Q4 2024 exposures are projected to Q2 2025 using reported growth rates and asset changes. ECB and EIOPA data follow different methodological and reporting frameworks, which may lead to differences in aggregates such as total assets and in the entities covered. Panel b: the scenario simulates a sharp increase in defaults across sectors in global private credit markets and a particularly severe shock in the software sector. In stage 1, private credit in isolation is shocked; in stage 2, software loans in leveraged loans and high-yield bonds are shocked; finally, in stage 3, an adverse market reaction to the initial shock in private credit is simulated by a 30% decline in equity prices plus strong outflows from high-yield bond funds and open-ended private credit funds, leading to a change of 25% in the valuation of high-yield bonds. Default rates of 10% at 50% loss given default (LGD) are applied to general direct exposures to private credit, and of 30% at 80% LGD to software exposures in private credit, leveraged loans and high-yield bonds. The seniority of bank lending to private credit funds is taken into account, and equity losses for banks are calculated according to the 2025 bank stress test market risk methodology published by the European Banking Authority, adjusted to match the equity market shock size in this analysis. Equity exposures of insurance corporations may include listed shares of subsidiaries and participations and are thus upper-bound estimates. Insurance corporations' and pension funds' listed equity and high-yield bond exposures held through investment funds are accounted for by combining the sectors' fund holdings with funds' exposures to listed equities and high-yield bonds, based on the method set out in Baudino et al.*
*) See Baudino, P.A., Metzler, J., Storz, M. and Wagner, F., "The role of household investors in market downturns", *Financial Stability Review*, ECB, November 2025.

Private credit differs from the pre-crisis US subprime mortgage market, but its possible role in AI-related funding should be closely monitored. The US private credit market totalled around USD 1.4 trillion as at the end of 2024, representing 4.7% of US GDP. In nominal terms, this is roughly equal in size to the pre-crisis subprime mortgage segment of USD 1.5 trillion in 2006. The latter, however, represented nearly twice as big a share of the economy as a whole, accounting for 10.9% of GDP. Unlike subprime lending, leverage in private credit is low, and most funding is long term and not subject to run risk. Euro area bank exposures to private credit are currently also significantly smaller than their exposures to US subprime

markets have been in the past and involve mostly senior lending. This means that the euro area banking sector is unlikely to suffer material losses from its private credit exposure, also because banks currently have higher levels of regulatory capital and ample liquidity buffers. Private credit could, however, become an important source of funding for AI data centres and AI-related firms.[181] In this case, private credit markets – and hence euro area exposures – could quickly grow much larger. At the same time, expected productivity gains and future earnings from AI investments remain highly uncertain and could disappoint. If exposures grew rapidly and expected AI-related cash flows disappointed, private credit could become a more material source of credit risk and a potential amplifier of stress for euro area financial institutions.

5 Outlook and policy considerations

Private credit in isolation is unlikely to threaten financial stability in the euro area at present, but data gaps hinder a full risk assessment, and its opacity, its concentration and the potential for spillovers remain concerns. A sudden reversal in market sentiment could see financial stress spill over to broader markets and cause sizeable valuation losses. This could be reinforced by the opacity of private credit markets and investors could react strongly. Uncertainty about the size and concentration of exposures at the institution level, coupled with incomplete information about the underlying credit quality, could weigh on risk sentiment. This might also have an impact on asset classes outside private credit markets. Private credit may be more exposed to downturns in riskier companies and to sector-specific shocks, including AI-related disruption in software and disappointment around the returns on AI investment. The growth of private markets and interconnections with traditional financial entities need to be monitored continuously, as financial stability risks might increase. A watchful eye should also be kept on the expansion of private markets into retail-oriented structures, as these could be associated with higher liquidity mismatches.

Private credit markets can help to advance the EU's savings and investments union (SIU) agenda. By matching the financing needs of riskier firms with the risk-bearing capacity of long-term investors, private markets perform an important intermediation function. Together with private equity, they channel funding to productive and innovative firms.[182] They may thereby facilitate the development and adoption of new technologies, diversify the financing of euro area corporates and support economic growth, in line with the SIU agenda.[183] To realise these benefits, however, risks and vulnerabilities in private markets will need to be contained, particularly in the private fund sector. A balanced approach would combine progress

[181] Market intelligence suggests that up to 30% of the USD 3 trillion that AI data centre buildouts are expected to need over the next few years could come from private credit.

[182] See Cera, K., Ferrante, A. and Schwartz Blicke, O., "Private markets: risks and benefits from financial diversification in the euro area", *Financial Stability Review*, ECB, May 2025.

[183] See Section 2.6 of "Financial Integration and Structure in the Euro Area", ECB, 2026.

on the SIU agenda with safeguards that preserve investor confidence and contain vulnerabilities in deeper capital markets.

Risks related to opacity and liquidity mismatches need to be addressed to ensure that private credit remains a stable and reliable source of funding. Addressing data gaps in private credit is essential for effective risk assessment by authorities and sound risk management by market participants.[184] This requires enhanced data collection and improved sharing of existing data across the EU. Given the strong cross-border dimension of private credit, further efforts are needed at the global level to develop consistent definitions and taxonomies that enhance cross-jurisdictional comparability and to close data gaps based on these defined taxonomies. In addition, it would be useful to assess the extent to which existing recommendations by the Financial Stability Board, such as those on liquidity mismatches in open-ended funds and leverage in the non-bank financial intermediation sector, apply to private credit funds, as previous work has not focused on this segment. At the EU level, several frameworks apply to private credit funds, including leverage limits for loan origination funds under the Alternative Investment Fund Managers Directive (AIFMD)[185] and liquidity rules under the European Long-Term Investment Funds (ELTIF) Regulation.[186] However, not all private credit activities are captured by these frameworks, and additional safeguards may be needed where material financial-stability or investor-protection gaps are identified. Moreover, supervisors should continue, within existing mandates and frameworks, to identify risks from private credit and support investor confidence in private markets. For example, the recent revision of Solvency II strengthens the framework for insurance corporations by enabling supervisors to incorporate macroeconomic and macroprudential considerations into risk assessments.[187] From a banking supervision perspective, this includes following up on supervisory expectations, continuing data collection efforts and closely monitoring the most exposed institutions.[188]

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184 See the FSC high level task force on NBFI, "Strengthening the macroprudential lens in the regulation of non-bank financial intermediation", ECB, May 2026.

185 Directive 2011/61/EU of the European Parliament and of the Council of 8 June 2011 on Alternative Investment Fund Managers and amending Directives 2003/41/EC and 2009/65/EC and Regulations (EC) No 1060/2009 and (EU) No 1095/2010 (OJ L 174, 1.7.2011, p. 1).

186 Regulation (EU) 2015/760 of the European Parliament and of the Council of 29 April 2015 on European long-term investment funds (OJ L 123, 19.5.2015, p. 98); Regulation (EU) 2023/606 of the European Parliament and of the Council of 15 March 2023 amending Regulation (EU) 2015/760 as regards the requirements pertaining to the investment policies and operating conditions of European long-term investment funds and the scope of eligible investment assets, the portfolio composition and diversification requirements and the borrowing of cash and other fund rules (OJ L 80, 20.3.2023, p. 1).

187 See "Final Report on draft RTS on macroprudential analyses in ORSA and PPP", EIOPA, 17 November 2025 and Directive (EU) 2025/2 of the European Parliament and of the Council of 27 November 2024 amending Directive 2009/138/EC as regards proportionality, quality of supervision, reporting, long-term guarantee measures, macro-prudential tools, sustainability risks and group and cross-border supervision, and amending Directives 2002/87/EC and 2013/34/EU (OJ L, 2025/2, 8.1.2025).

188 See Galbarz, M.-C. et al., "Complex exposure to private equity and credit funds require sophisticated risk management", *Supervision Newsletter*, ECB, 13 November 2024, and Buch, C., "Hidden leverage and blind spots: addressing banks' exposures to private market funds", *The Supervision Blog*, ECB, 3 June 2025.

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 Macroprudential 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 20 May 2026.

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With additional contributions from Carlos Miguel Aguiar da Glória, Paolo Alberto Baudino, Federica Bosio, Ties Busschers, Maria Leonor Carrilho Puga, Matilda Gjirja, Maciej Grodzicki, Julija Jakovicka, Domenic Kellner, Francesca Lenoci, Riccardo Meli, Daniele Miceli, Philippe Molitor, Cristian Perales, Mara Pirovano, Guido Thomas Maria Pistorius, Chiara Scommegna, Jens Tapking, Pär Torstensson, Marcello Tumino, Christian Weistroffer, Regine Wölfinger, Stefan Wredenborg and Balázs Zsámboki.

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PDF ISSN 1830-2025, QB-01-26-127-EN-N
HTML ISSN 1830-2025, QB-01-26-127-EN-Q