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Sofia Anyfantaki, Ricardo Barahona,
Dominic Cucic, Daniel Fricke,
Philipp Hartmann, Christoph Kaufmann,
Elizaveta Lukmanova, Angela Maddaloni

Monetary policy transmission and non-bank financial intermediation

ChaMP

No 391

Challenges for Monetary Policy Transmission in a Changing World (ChaMP) Research Network

This paper is one of five Occasional Papers (OPs; listed further below) summarising the strands of research conducted within the framework of the Challenges for Monetary Policy Transmission in a Changing World (ChaMP) Research Network, which was an initiative of the European System of Central Banks (ESCB) and brought together economists from the European Central Bank (ECB), the national central banks comprising the ESCB, the Bank of England and Norges Bank. Overall, it produced 168 individual papers and four papers on cross-country coordinated research projects.

ChaMP sought to revisit our knowledge of monetary transmission channels in the euro area and other European economies following a series of unprecedented shocks, and amid multiple ongoing structural changes and the extension of the monetary policy toolkit over the last decade and a half, including the 2021-23 inflation episode. The five OPs cover the main priorities of the network's two workstreams (WSs). WS1 focused on monetary transmission via the financial system, with OP No 389 covering transmission mechanisms from banks to non-financial corporations, OP No 390 examining mechanisms to households and OP No 391 looking at transmission via non-bank financial intermediation. Meanwhile, WS2 was dedicated to monetary transmission via the real economy, with OP No 392 summarising the network's research on transmission through input-output linkages among non-financial corporations and production sectors and OP No 393 examining how various structural changes interact with monetary policy transmission.

ChaMP was coordinated by a team chaired by Philipp Hartmann (ECB) and consisting of Diana Bonfim (Banco de Portugal), Margherita Bottero (Banca d'Italia), Emmanuel Dhyne (Nationale Bank van België/Banque Nationale de Belgique) and Maria T. Valderrama (Oesterreichische Nationalbank). This core team was supported by Melina Papoutsi, Gonzalo Paz-Pardo, Jean-David Sigaux, Raquel Gil-Antona, Clara Dolci and Simone de Luca (all ECB), along with seven central bank advisers and eight academic consultants. More information can be found on the ChaMP website.

Occasional Papers related to the ECB's ChaMP Research Network

No 389, "Monetary policy transmission via banks to firms"

No 390, "Monetary policy transmission through the financial system to households"

No 391, "Monetary policy transmission and non-bank financial intermediation"

No 392, "The propagation of shocks across the production network and implications for monetary policy"

No 393, "Monetary policy transmission and structural changes"

Contents

Abstract

The growing importance of non-bank financial intermediaries (NBFIs) also has important implications for the transmission of monetary policy in the euro area. It alters the composition of credit supply and strengthens the role of market-based finance for the corporate sector. In the aggregate, NBFIs tend to amplify the transmission of monetary policy within the financial sector. In particular, intermediaries with uninsured short-term funding amplify monetary transmission to credit. This becomes particularly pronounced during episodes of financial stress, when liquidity pressures and valuation losses can trigger asset sales and spillovers to banks. By contrast, institutions that benefit from stable long-term funding, such as insurers, pension funds and certain specialised finance companies, may attenuate the transmission of monetary policy to credit, although only to a limited extent. The implications for monetary policy transmission arising from NBFIs also extend beyond lending, notably through their portfolio rebalancing effect and collateral dynamics. Finally, the rise of non-bank finance has made monetary transmission more heterogeneous, more state-dependent and more closely intertwined with financial stability.

JEL codes: G2; G23; G28

Keywords: Non-bank intermediation; monetary policy; collateral; investment funds; insurers.

Non-technical summary

The euro area financial system has undergone several major changes over the past two decades. While banks remain the most important financial intermediaries, non-bank financial institutions (NBFIs) – such as investment funds, money market funds, insurers, pension funds and specialised finance companies – have been growing rapidly. As of 2025, they held more than half of all financial assets in the euro area. These changes have affected credit provision to the economy and increased the role of portfolio adjustments among NBFIs in the transmission of monetary policy.

This paper synthesises various findings from the Eurosystem's ChaMP Research Network on how the transmission of monetary policy in the euro area has been affected by the rise of NBFIs. A key message emerging from the analysis is that non-banks are able to amplify financial shocks and that the strength and direction of this amplification depend crucially on their funding structure.

A first finding is that overall, NBFIs tend to amplify the transmission of monetary policy within the financial sector, including through lending to firms and households. Specifically, this arises from their liability funding structure. Many NBFIs are funded through uninsured short-term or market-based liabilities, meaning that their funding costs adjust rapidly when interest rates rise or fall. However, some NBFI types, such as insurers, pension funds and certain specialised finance companies, rely on relatively stable long-term liabilities and can therefore attenuate the impact of short-term rates on financial assets and credit, although this cushioning effect appears to be partial (for example, insurers and pension funds account for only a small share of total credit provision) and uneven.

Second, transmission through NBFIs is highly state-dependent. Notably, amplification becomes stronger during periods of financial stress, when certain types of NBFIs face investor withdrawals and are forced to deleverage. For example, investment funds may liquidate assets and insurers may adjust their portfolios to meet duration needs. Moreover, because NBFIs also lack direct access to central bank liquidity, they may need to rebalance their asset portfolios more abruptly than banks.

Third, the implications of NBFIs for monetary policy transmission extend beyond lending to include portfolio rebalancing and collateral dynamics. As the largest holders of securities in the euro area, NBFIs respond to monetary policy by reallocating their portfolios across asset classes, maturities and risk profiles. At the same time, since banks and non-banks alike rely heavily on securities financing and repo markets, the availability and pricing of collateral are key to the effective implementation of monetary policy. As a result, collateral scarcity can dampen or amplify monetary transmission, depending on institutions' holdings of safe assets and their access to central bank facilities. These developments highlight the importance of collateral frameworks and securities lending facilities in ensuring the smooth transmission of monetary policy.

While this paper mainly documents the evidence on how monetary policy affects NBFIs' balance sheets, less is known about how these effects transmit to aggregate

demand within the economy, including their impact on consumption. The international dimension also matters: global NBFIs transmit foreign monetary policy to the euro area through portfolio flows and valuation channels. Finally, the rise of non-bank finance has made monetary transmission more heterogeneous, more sensitive to market conditions and more closely intertwined with financial stability. Effective monetary policy therefore requires close monitoring of NBFI funding structures, collateral dynamics and linkages with the banking system, supported by ongoing improvements in data and macroprudential tools designed to safeguard the stability of market-based finance.

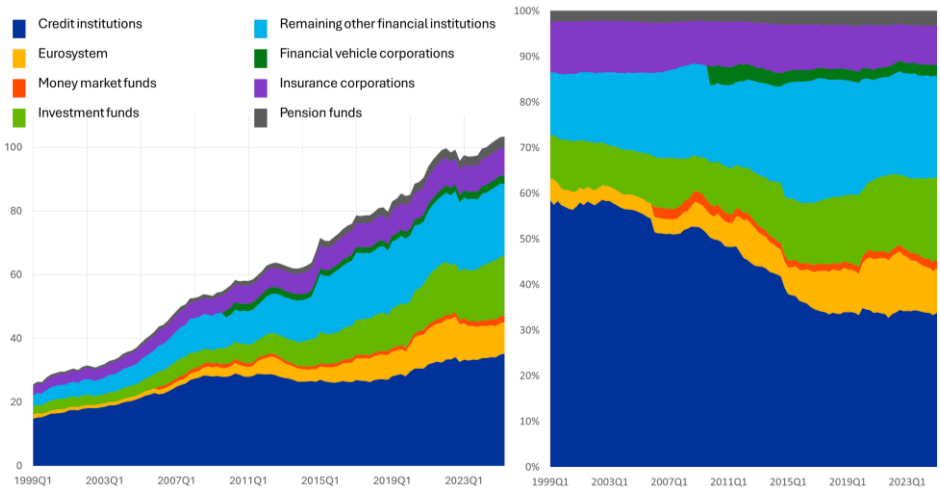
1 Introduction and conceptual framework

Monetary policy in the euro area now operates through a financial system whose structure has changed profoundly over the past two decades. While banks (credit institutions) remain the largest and most significant type of financial intermediary, the relative importance of non-bank financial intermediaries (NBFIs) has been increasing steadily since the early 2000s and gathered pace in the wake of the Global Financial Crisis, albeit with significant differences across countries. The assets of investment funds, insurance corporations, pension funds and other financial intermediaries have grown substantially, increasing their weight within the wider financial system. By the end of 2025, NBFIs collectively accounted for 56% of euro area financial assets (see Chart 1.1).

Chart 1.1

Total assets of the euro area financial sector and shares held by different types of financial intermediary

(total assets in EUR trillion (left panel); percentages (right panel); Q1 1999 to Q2 2025)



Notes: The aggregated (non-consolidated) assets of sub-sectors include financial assets and exclude non-financial assets. The category "Remaining other financial institutions" includes securities and derivatives dealers, financial corporations engaged in lending (such as leasing or factoring companies), specialised financial corporations (including venture capital companies, export/import financing companies and certain central clearing counterparties), financial auxiliaries (including, for example, asset management companies, securities brokers, investment advisers, insurance brokers and exchanges), as well as captive financial institutions and money lenders (including, for example, financial holding companies, funding vehicles of non-financial corporations – e.g. supporting their debt securities issuance – and other entities that channel financial flows within non-financial corporations). Data on money market funds are reported separately from credit institutions only as of Q1 2006. Data on financial vehicle corporations, which are undertakings engaged in securitisation transactions, are reported separately from the category of "Remaining other financial institutions" as of Q4 2009.
Source: ECB.

This structural shift has reshaped the composition of credit provision to the real economy. While bank loans remain the dominant form of external finance for non-financial corporations (NFCs) (see Chart 1.2), reliance on NBFI funding in the form of loans or securities has increased over the last couple of decades. The NBFI sector has become a key holder of market-based corporate funding instruments, such as shares and corporate debt (see Chart 1.3).

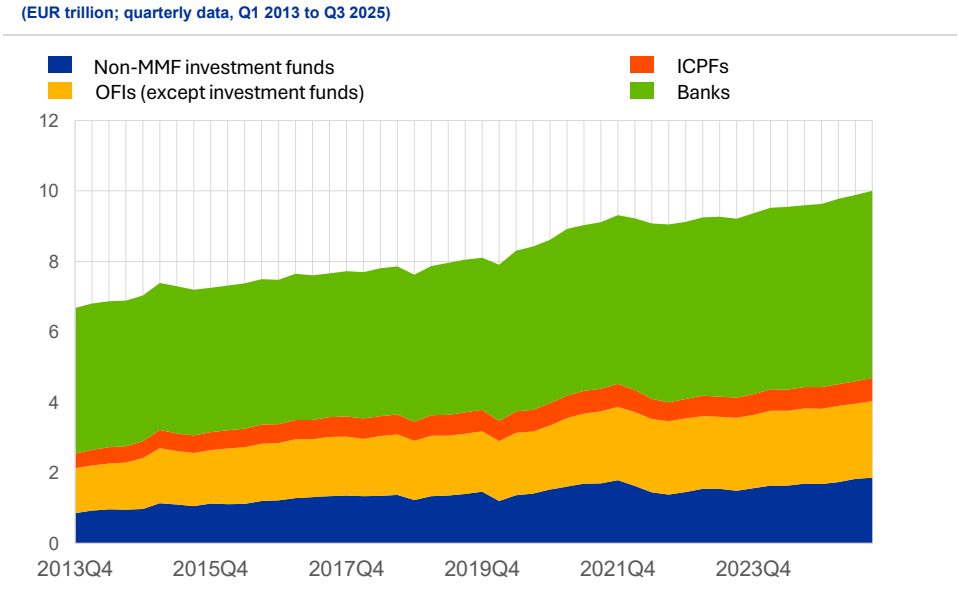
Evidence obtained from studies over the last decade, including during the low interest rate period, the pandemic shock and the sharp tightening cycle post 2022, shows that monetary policy transmission through the financial sector is neither mechanical nor uniform. Instead, it is determined by the balance sheet structures, funding models and interconnectedness of a heterogeneous set of intermediaries. These developments pose a central question for monetary policy: do non-banks tend to cushion monetary and financial shocks, or do they amplify them?

This paper brings together a body of evidence generated within the framework of the ChaMP (Challenges for Monetary Policy Transmission) Research Network, showing how NBFIs shape the transmission of monetary policy. This work builds on certain preliminary studies conducted in the context of the 2021 ECB strategy review (see European Central Bank, 2021), leverages advances in data availability and takes into account the increasing complexity and heterogeneity of the NBFI sector.

The findings of ChaMP suggest that, in aggregate, NBFIs tend to amplify monetary policy transmission within the financial sector, notably through credit supply. However, the picture that emerges from micro-level evidence is more nuanced. Certain types of NBFIs seem to attenuate monetary transmission, sometimes even partly offsetting the effects of standard transmission through banks. NBFIs are a fairly heterogeneous group of financial institutions with different business models, distinct funding structures and regulatory constraints. These differences imply that their responses to monetary policy may diverge significantly from one another and from those of banks.

Chart 1.2

External financing of euro area NFCs by type of financial intermediary



Note: Calculations based on market values.
Sources: Quarterly Sector Accounts (QSA) and ECB calculations.

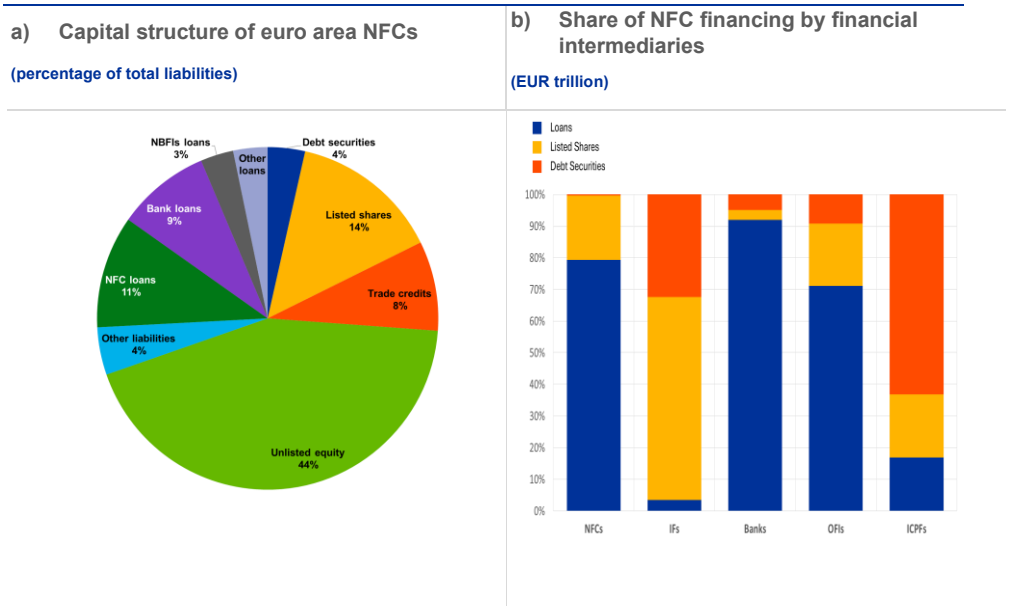
A key message emerging from the analysis is that non-banks are able to amplify financial shocks, and that the strength and direction of this amplification depend

crucially on their funding structure. This analysis is structured around the following three points:

First, the liability funding structure determines whether non-banks ultimately amplify or attenuate monetary policy transmission to credit. Short-term funded non-banks, such as investment funds, money market funds and retail credit firms, typically rely on market-based or short-term wholesale funding. Because their liabilities reprice immediately when policy rates increase, the increase in funding costs induces a stronger pass-through to borrowers and sharper contractions in credit supply. Rather than acting as a "spare tyre" when banks retrench, these intermediaries may have the effect of intensifying the contractionary effects of monetary policy. By contrast, insurers, pension funds and specialised finance providers in certain jurisdictions operate with longer-duration liabilities and their funding costs take longer to adjust. ChaMP research suggests that these long-term funded NBFIs tend to attenuate monetary policy transmission, though this cushioning effect appears to be both uneven and limited in scope. For example, insurers and pension funds remain relatively small lenders.

Chart 1.3

Provision of financing to euro area NFCs as of Q3 2025



Note: Calculations based on market values.
Sources: QSA and ECB calculations.

Second, the transmission of monetary policy through non-banks is state-dependent. Crucially, amplification becomes stronger during periods of financial stress. When market conditions deteriorate, more fragile non-banks face redemption pressures, liquidity constraints become binding and mark-to-market losses may force asset sales and portfolio reallocations. These adjustments can propagate shocks across markets, tighten funding conditions and ultimately feed back into banks that are closely connected to NBFIs, in some cases through lending relationships. Stress originating in the NBFI sector can spill back into the banking system, amplifying credit contractions.

Third, the implications of NBFIs for monetary policy transmission extend beyond lending. Through portfolio rebalancing and collateral dynamics, non-banks shape the transmission of monetary policy. As the largest holders of securities in the euro area, NBFIs respond to monetary policy by reallocating their portfolios across asset classes, maturities and risk profiles. At the same time, because banks and non-banks alike rely heavily on securities financing and repo markets, the availability and pricing of collateral have become central to the effective implementation of monetary policy.

These points are discussed throughout each section of this paper in greater detail. Section 2 examines how credit provision by non-banks influences the transmission of monetary policy. We analyse whether NBFIs amplify or attenuate the impact of monetary changes on credit at the aggregate level; how heterogeneity in funding structures drives substitution and shapes complementarities across lender types; how insurers, as a distinct type of non-bank, transmit policy to housing markets; and how stress conditions generate amplification. Section 3 studies how monetary policy affects NBFI portfolio flows, risk-taking and cross-border spillovers, showing in particular that monetary policy has important effects on both the size and composition of NBFIs' portfolios, and that these effects interact with financial stability. Moreover, the transmission of monetary policy through NBFIs depends on the policy instrument employed, with both conventional short-term interest rate policy and central bank asset purchases affecting the valuation of securities. Section 4 examines how asset purchases, collateral scarcity and repo market dynamics interact with NBFI behaviour to affect monetary transmission. It presents significant new evidence on the impact of large-scale asset purchases on asset scarcity, with important implications for the design of central bank balance sheet policies. Properly functioning repo markets are essential for the effective transmission of monetary policy and the design of central bank collateral frameworks can meaningfully shape market outcomes.

The findings set out in this Occasional Paper are consistent with international evidence documenting amplification mechanisms in market-based finance, the sensitivity of insurers and pension funds to long-term rates, and the cross-border transmission of monetary policy through investment fund flows (see Eren et al., 2020; Aramonte et al., 2021; International Monetary Fund, 2023). Effective calibration of monetary policy therefore requires a thorough understanding of the composition, liability structure and interconnectedness of non-banks, as well as the distribution of lending relationships across borrowers. Amplification through non-banks can reinforce the transmission of monetary policy to aggregate credit, while also producing unintended side effects, particularly during periods of stress.

2 Implications of NBFI lending for the transmission of monetary policy

The growth of NBFIs raises a fundamental question for monetary policymakers: do NBFIs amplify or attenuate interest rate transmission to credit? If NBFIs contract credit supply more aggressively than banks during monetary tightening, they amplify policy effects, making rate increases more contractionary. If, conversely, they contract credit supply less than banks – or even expand lending – then they attenuate policy effects, potentially requiring larger rate adjustments to achieve the same policy objectives.

Classical models of the bank lending channel, following the work of Bernanke and Blinder (1988, 1992) and Kashyap and Stein (1994, 2000), emphasise how monetary tightening constrains bank lending through deposit outflows and balance sheet pressures. As credit provision is steadily shifting towards NBFIs, understanding whether they complement or substitute for bank credit during the policy cycle has become essential for calibrating monetary policy. Non-banks may act as a "spare tyre" for the financial system, effectively stepping in when banks pull back, an idea that dates back to Greenspan (2000).

The 2021 ECB strategy review (see European Central Bank, 2021) already highlighted that monetary transmission increasingly operates through a broader set of intermediaries beyond banks. This section examines how NBFIs shape the credit channel of monetary policy, focusing on amplification versus attenuation, heterogeneity across institution types and state dependence. The non-bank sector is highly heterogeneous, spanning institutions with fundamentally different funding structures: from investment funds and retail credit firms reliant on short-term financing to insurance corporations, pension funds and specialised finance providers with stable long-term funding. These differences matter for monetary policy transmission because they determine how quickly an institution's funding costs adjust when policy rates change. A rate increase that immediately squeezes a short-term funded non-bank lender may leave a long-term funded institution largely unaffected, with direct implications for which borrowers will be shielded from tighter financing conditions and which will face amplified contractionary effects.

The analysis extends beyond direct non-bank lending. Corporate bond markets provide firms with an alternative source of financing when bank credit tightens, and NBFIs shape transmission indirectly by competing with banks for household savings and by providing or receiving wholesale funding that affects banks' lending capacity.

Insurers and other institutional investors are now central players in the transmission of monetary policy, with effects that extend beyond their role as long-term investors. Insurers' long-duration balance sheets make them sensitive to interest rate changes, generating portfolio rebalancing, duration risk-taking and changes in solvency positions. These dynamics spill over to the real economy. When rate increases compress insurers' investment income, property insurers raise prices, thus making

housing less affordable, lowering mortgage applications and strengthening the pass-through to real activity. At the same time, the growing presence of institutional investors in the euro area residential real estate sector adds a further amplification channel.

Monetary tightening triggers significantly larger balance sheet contractions for banks and non-banks alike during periods of high financial stress, with heterogeneous patterns across NBFI types. Investment funds and money market funds are sensitive to liquidity pressures, whereas insurers and pension funds exhibit more muted and sometimes counter-cyclical responses. As euro area banks have increased their reliance on funding from non-banks, stress in this sector can propagate to banks and magnify contractions in credit supply. Overall, non-bank fragility can act as a channel through which monetary and financial shocks are amplified across the financial system.

Section 2.1 reviews aggregate and micro-level evidence on whether non-bank credit provision amplifies or attenuates the effects of interest rate changes. Section 2.2 examines the heterogeneity behind this aggregate picture: which institution types drive amplification or attenuation, which borrowers benefit or bear the burden, and how the composition of a jurisdiction's non-bank sector shapes the transmission of both conventional and unconventional monetary policy. Section 2.3 shows that insurers actively shape the transmission of monetary policy to credit and housing markets. Section 2.4 shows that the amplification of monetary policy through non-banks is state-dependent, becoming significantly stronger when financial conditions deteriorate.

2.1 Aggregate effects: amplification or attenuation?

In aggregate, NBFIs reinforce rather than cushion monetary policy transmission within the financial sector, notably to credit, although the funding composition of the non-bank sector shapes the extent to which individual borrowers are shielded.

Earlier empirical work on non-bank credit and monetary transmission has tended to focus on the United States, leaving the European picture largely uncharted. Existing evidence also focuses on the mortgage market, where non-bank lenders succeeded in expanding their market share as bank regulation tightened (see Buchak et al., 2018) and where shadow banks have partially offset the contraction in bank lending following monetary tightening (see Elliott et al., 2022). One of the main reasons for the scarcity of evidence for Europe is that granular data linking non-bank lending to real outcomes have only recently become available. The ChaMP Research Network addresses this gap with new micro-level and aggregate evidence across multiple euro area countries.

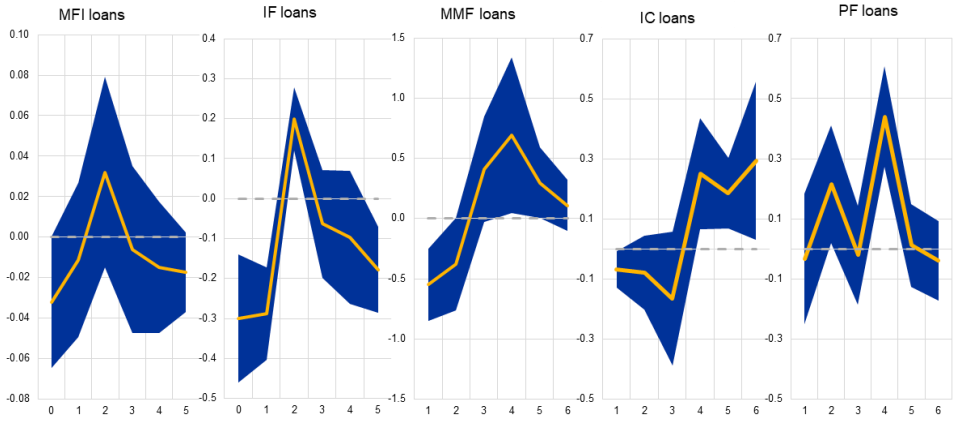
The evidence presented here draws on both aggregate studies (structural models, VARs and sectoral data) and loan-level microdata, treating micro-level estimates as valuable complements to aggregate findings. The scope extends beyond direct non-bank lending to include loan-to-bond substitution and the competitive effects of non-deposit savings products on bank funding, both of which shape the strength of monetary transmission. Existing evidence has consistently shown that a larger NBFI sector does not systematically cushion monetary policy transmission to credit. A meta-analysis of 91 VAR studies across 68 countries by Bajzik et al. (2023) finds that total credit, across banks and non-banks combined, contracts more strongly in

response to interest rate increases than bank credit alone, indicating that non-bank credit does not systematically offset bank credit contraction. Euro area sectoral evidence from Tiza Mimun et al. (2025) reinforces this finding at the institutional level: following a contractionary monetary policy shock, loan stocks contract across both bank and non-bank sectors (see Chart 2.1). Investment funds display an immediate contraction, while insurance corporations and pension funds expand over the medium term. The aggregate picture does not support a systematic spare tyre effect, and contractions across all sectors are amplified when financial stress is high.

Chart 2.1

Impulse responses of loans to a contractionary monetary policy shock, by sector (euro area)

(y-axis: cumulative percentage change; x-axis: quarters after shock)



Notes: The chart shows estimated impulse responses of loan stocks across banks, investment funds, money market funds, insurance corporations and pension funds to a contractionary monetary policy shock of 1 basis point.
Source: Tiza Mimun, A., Fukker, G. and Sydow, M. (2025).

The aggregate pattern is consistent with micro-level evidence on how different NBFI types respond to interest rate changes. The direction of individual institutions' responses is determined primarily by the maturity structure of their funding, otherwise known as the "liability wedge".

Wholesale-funded lenders amplify monetary transmission through stronger pass-through; firms reliant on short-term funded NBFIs face deeper investment contractions.

Short-term funded NBFIs, whose wholesale funding reprices immediately with policy rates, tend to amplify the effects of conventional monetary changes more strongly than banks, in line with the wider picture. Irish loan-level evidence compiled by Goncharenko and Lukmanova (2026), based on the universe of Irish term credit to households and non-financial firms, shows that non-bank lenders that rely on short-term wholesale funding exceed bank pass-through by 17 basis points per 100-basis-point hike; loan volumes contract by 6% and loan counts by 9% relative to banks. The real economy consequences for firms are substantial: firms with a high degree of pre-existing reliance on non-banks reduce fixed assets by 1.6% to 2.0% more per percentage point of tightening than bank-dependent firms, implying that short-term-funded non-bank lenders amplify rather than dampen the transmission of conventional monetary policy.

Euro area sectoral evidence from Tiza Mimun et al. (2025) corroborates this pattern more broadly: investment funds exhibit an immediate contraction in loan stocks

following a tightening episode, consistent with redemption pressures forcing asset adjustments, with the contraction becoming amplified during periods of high financial stress. Additional amplification channels operate through fund outflows and deposit withdrawals: Fecht and Kellers (2026) document that fragility-induced deposit outflows from banks amplify the effects of monetary tightening, while Nicoletti et al. (2025) show that banks' growing reliance on short-term wholesale funding from investment funds makes them vulnerable to liquidity shocks propagated by NBFI stress.

Leasing and specialised finance companies with long-term funding expand credit when short-term rates rise; attenuation benefits borrowers with existing NBFI ties.

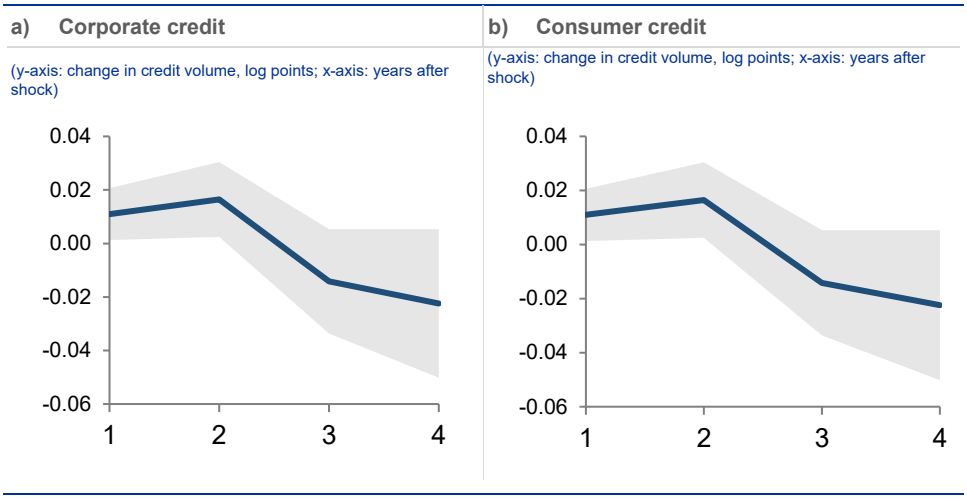
Long-term funded NBFIs, by contrast, tend to attenuate conventional monetary transmission for certain borrowers, although, as described below, this attenuation is not enough to overturn the aggregate result. German credit register evidence from Bednarek et al. (2026) shows that financial service institutions (primarily leasing companies with long-term debt funding) expand lending by approximately 0.35 percent relative to banks following increases in short-term interest rates, equivalent to roughly €18,000 of additional credit per existing nonbank lending relationship, evaluated at the average nonbank exposure of €5.23 million. Danish evidence from Cucic and Gorea (2025) supports the spare tyre hypothesis by tracing the effects from loan-level credit supply through to aggregate real outcomes. At the loan level, the non-bank credit share increases by approximately 5 percentage points following monetary tightening, as specialised finance companies and leasing firms (funded primarily through long-term bond issuance) expand their lending to existing borrowers while banks contract (see Chart 2.2).

Access to long-term funded NBFIs tends to be concentrated among larger firms and higher-income households.

Crucially, this credit-supply effect translates into real outcomes. The analysis is validated by comparing the same borrowers over time and exploiting exogenous monetary shocks identified through Denmark's currency peg. When rates rise, firms with pre-existing non-bank relationships sustain higher investment levels than firms without such relationships, and households able to access non-bank credit maintain higher levels of consumption. The within-borrower comparison absorbs time-invariant differences between non-bank and bank-only borrowers, although, as Chart 2.3 below illustrates, access to non-bank credit is concentrated among larger firms and higher-income households, implying that the attenuation benefits are not uniformly distributed. Aggregating further, Danish industries and municipalities with larger non-bank credit shares exhibit smaller declines in investment and consumption following monetary tightening. This combination of loan-level identification with real effects for both firms and households provides direct evidence that non-bank credit expansion can attenuate the real-economy impact of monetary tightening for borrowers with pre-existing non-bank relationships.

Chart 2.2

Differential credit supply responses by lender type during monetary tightening (Denmark)



Notes: The chart shows the estimated (from local projections) differential cumulative log-point credit supply responses of non-bank lenders relative to banks following a contractionary one-standard deviation monetary policy shock, identified using Denmark's currency peg to the euro. Non-bank expansion reflects lending to existing borrowers (intensive margin).
Source: Cucic and Gorea (2025).

Cushioning depends on the segment of the yield curve affected, operates through the intensive margin and varies across national NBFI structures.

Evidence of attenuation among long-term funded NBFIs in Denmark and Germany is consistent with the aggregate euro area finding of no systemic spare tyre effect, for three reasons. First, attenuation depends on which part of the yield curve is affected by policy relative to the maturity structure of NBFI balance sheets: the same long-term funded institutions that expand during conventional short-rate tightening tend to contract when long-term rates are raised through unconventional monetary policy, because their funding costs finally adjust. This limits their cushioning role to rate movements concentrated at the short end of the yield curve. Second, non-bank credit expansion operates primarily on the intensive margin: lenders expand credit to existing clients rather than forming new relationships, which limits the aggregate reach of attenuation. Borrowers without pre-existing non-bank ties receive no cushioning and experience the full force of bank credit contraction. Third, the Danish and German evidence may reflect NBFI sectors with relatively large shares of long-term funded lenders, whereas the euro area aggregate result (see Tiza Mimun et al., 2025; Bajzik et al., 2023) captures the full diversity of national NBFI compositions, including jurisdictions where run-prone or short-term-funded intermediaries account for a larger share of non-bank balance sheets. Attenuation, while real and economically meaningful for the borrowers it reaches, does not constitute a system-wide offset to monetary tightening.

The direction of NBFI effects can reverse for unconventional policies that operate through long-term interest rates. Bednarek et al. (2026) document that the same German leasing companies that cushion conventional rate hikes reduce their lending relative to banks by 0.36 percentage points when forward guidance raises long-term rates, and by 0.27 percentage points following quantitative tightening shocks. Insurance companies display the opposite pattern: while largely unresponsive to short-rate shocks, they expand credit when increases in long-term rates raise the value of their bond portfolios and improve their net worth. Bandera et al. (2025) find

that the transmission of quantitative easing is amplified when the NBFI sector is larger, as central bank bond purchases raise NBFI asset valuations and induce portfolio rebalancing towards corporate bonds and wholesale bank deposits. These findings imply that the aggregate effect of a given policy instrument depends on the funding and asset structures of the NBFI sector, which differ across jurisdictions.

Bank lending to NBFIs crowds out credit to firms, especially smaller and riskier ones; securities financing demand and balance sheet constraints fuel NBFI borrowing.

Funding linkages between banks and NBFIs create additional channels through which the non-bank sector can shape aggregate credit supply, with the direction of this effect depending on whether NBFIs are net providers or recipients of bank funding. Bandera et al. (2025) model NBFIs as net lenders to banks through wholesale deposits (a pattern observed in the United Kingdom and parts of the euro area), implying that NBFI expansion supports bank lending capacity. Li et al. (2025) point to the key role played by credit relationships. In recent years, the divergence between bank lending to firms and NBFIs has widened, as corporate lending has stagnated while NBFI lending has continued to rise steadily (see Chart 2.3). Using a comprehensive euro area dataset combining supervisory information with both loan-level and firm-level data, the authors document that bank lending to NBFIs crowds out credit to firms. A formal empirical investigation confirms that a one-percentage-point increase in lending to NBFIs is associated with a decline of 0.55 percentage points in corporate lending, as banks reallocate towards safer, short-term lending to NBFIs, typically backed by government securities and used predominantly to support securities financing trades by investment funds. Loan-level analysis confirms that the resulting contraction in credit falls disproportionately on smaller and riskier firms. Two forces underpin the rise in NBFI borrowing: strong demand from securities-investing NBFIs and bank balance sheet constraints that make lending to them comparatively attractive. This crowding-out effect intensified as the tapering of quantitative easing increased NBFI demand for funding to hold government bonds, and it is further amplified by banks' balance sheet constraints.

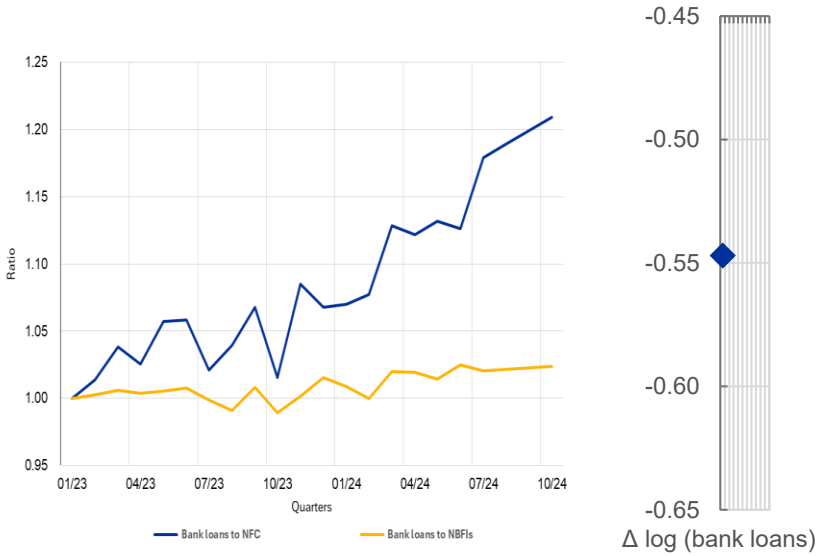
Mutual funds can partially offset this dynamic by acting as selective lenders of last resort for firms to which they have prior exposure (Barahona et al., 2026), although banks retain an informational advantage for distressed borrowers more broadly. Beyond direct lending, non-deposit savings alternatives also shape transmission through the bank funding channel. Basten et al. (2026), using data for Denmark, show that banks whose depositors hold more market-priced savings (stocks, bonds and investment fund shares) must adjust their deposit rates more aggressively to retain funding, making their lending volumes more responsive to policy rate changes; this channel is also observed in euro area data. This implies that the growth of market-based savings alternatives strengthens conventional monetary policy transmission even where NBFIs do not provide credit directly. Deeper and more integrated capital markets, an objective at the core of the savings and investment union, can enhance the effectiveness of monetary policy by making bank funding conditions more sensitive to rate changes, as savings alternatives would be more available to banks' depositors.

In aggregate, NBFIs tend to amplify monetary transmission to credit. In particular, NBFI credit contracts alongside bank credit during monetary tightening, with no systematic spare tyre effect at the sector level. The following section examines how

the funding structure of individual NBFI types determines which borrowers are shielded and which face amplified effects.

Chart 2.3
Interconnections between banks and non-banks

(ratios of banks loans; quarterly data, Q1 2013 to Q3 2025)



Source: AnaCredit, ECB calculations and Li, Ma, Mendicino and Supera (2026).

2.2 Heterogeneity: substitution and complementarities

Within countries, borrower specialisation drives heterogeneity; across countries, funding maturity is the key factor.

The NBFI sector comprises a diverse range of institution types, including leasing companies, insurance corporations, pension funds, investment funds, retail credit firms and specialised finance providers. Their heterogeneous responses to interest rate changes reflect two interacting forces: differences in funding structures across institution types and countries, and differences in borrower specialisation. Evidence for Denmark suggests that non-bank types share similar funding models but serve different borrower segments, suggesting that specialisation rather than funding drives heterogeneous responses within the domestic market. Cross-country evidence, by contrast, points to the funding structure as a key differentiator. The contrast between long-term funded Danish non-banks and short-term funded Irish non-banks demonstrates that funding maturity shapes whether a given NBFI type amplifies or attenuates monetary policy transmission. Beyond institutional lending, corporate bond markets provide an additional margin of adjustment, as firms may substitute between bank loans and bond issuance depending on relative financing conditions.

Funding structure determines whether NBFIs amplify or attenuate monetary transmission to credit; the distribution of pre-existing lending relationships determines who bears the consequences.

Banks fund themselves primarily through deposits, which are conventionally regarded as a stable source of funding. However, as policy rates rise, banks face pressure to increase deposit rates to retain this funding, particularly when depositors have access to market-based savings alternatives (see Drechsler et al., 2017; Basten et al., 2026). Moreover, demand from institutional investors for banks' long-term debt declines as duration-matching requirements become binding. This, in turn, raises banks' marginal funding costs and constrains lending. Danish non-banks, in contrast, finance themselves primarily through long-term debt supplied by investors subject to fewer regulatory constraints on portfolio duration. When policy rates rise, demand from these investors remains relatively stable, allowing non-banks to expand credit precisely when banks become exposed to funding pressure (see Cucic and Gorea, 2025). The Irish case works the other way round: Irish non-banks rely overwhelmingly on short-term wholesale funding that reprices immediately following increases in policy rates, forcing aggressive pass-through to borrowers that exceeds that of banks (see Goncharenko and Lukmanova, 2026).

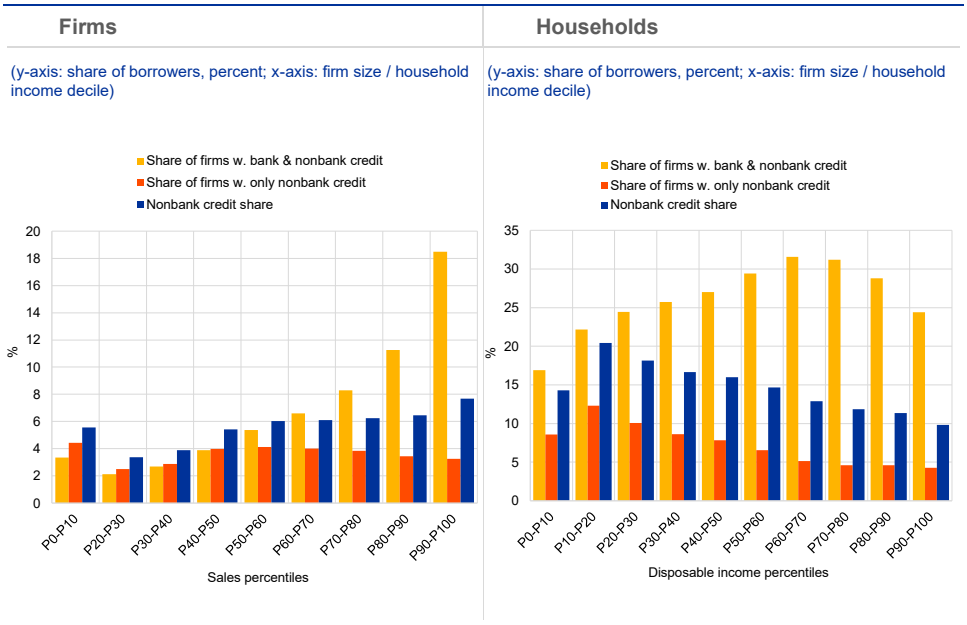
Different NBFI types also respond to different parts of the yield curve, so the aggregate effect of monetary policy ultimately depends on the composition of the NBFI sector. As documented in Section 2.1, leasing companies and insurance corporations in Germany respond to opposing parts of the yield curve, with the former cushioning conventional tightening and the latter expanding when long-term rates are increased (see Bednarek et al., 2026). Tiza Mimun et al. (2025) find similar groupings at the euro area level: investment funds and money market funds respond more similarly to each other than they do to insurance corporations and pension funds, with the former group more sensitive to liquidity pressures and the latter exhibiting more stable, countercyclical behaviour over the medium term. These differences reflect underlying liability structures: funds face potential redemption pressures that can force asset sales, while insurers and pension funds have more stable long-term liabilities. Along similar lines, Gulan and Silvo (2026) show that only the most creditworthy firms are able to substitute between bank loans and corporate bonds following a tightening episode, while weaker firms lose access to credit entirely, suggesting that the benefits of alternative financing channels are concentrated among higher-quality borrowers regardless of the specific non-bank type involved.

The benefits of non-bank credit expansion during monetary tightening are concentrated among borrowers with pre-existing non-bank relationships, which are unevenly distributed across firm size and household income. In Denmark, non-bank corporate credit is provided primarily by specialised finance companies (offering loans and trade financing), wealth managers and venture capital funds, and to a lesser extent by financial leasing firms. Meanwhile, non-bank consumer credit is dominated by leasing companies and consumer credit firms (see Cucic and Gorea, 2025), while mortgage lending remains the preserve of banks and specialised mortgage institutions. As Chart 2.4 illustrates, larger firms and higher-income households are more likely to maintain relationships with both banks and non-banks, meaning that they stand to benefit from non-bank credit expansion during tightening. Smaller, bank-dependent borrowers are unable to readily substitute towards non-bank credit and thus experience the full effects of contraction. The distributional pattern reverses when non-banks amplify tightening: in the Irish loan-level evidence, firms that are

highly reliant on non-banks for their funding bear disproportionate contractionary effects (Goncharenko and Lukmanova, 2026).

Chart 2.4

Distribution of non-bank lending relationships across firm size and household income (Denmark)



Notes: The chart shows the distribution for exclusive non-bank borrowers, and mixed-relationship borrowers, with bank-exclusive borrowers being the omitted residual, across firm size categories and household income deciles in Denmark. Access to non-bank credit increases with firm size and household income.
Source: Cucic and Gorea (2025).

These patterns imply that the distribution of credit relationships before a policy shock determines who will bear the burden and who stands to benefit. In jurisdictions where long-term funded NBFIs are prevalent and larger firms have cultivated non-bank relationships, the effects of monetary tightening will be cushioned for these borrowers, while smaller, bank-dependent firms will experience the full effects of the contraction. In jurisdictions dominated by short-term-funded NBFIs, firms reliant on non-bank credit will face amplified tightening. Li et al. (2025) document a related distributional pattern: when banks in the euro area reallocate credit towards NBFI exposures, the resulting contraction in firm lending falls disproportionately on smaller and riskier borrowers with fewer opportunities to access alternative funding sources. The distributional consequences extend to the types of firms served by different non-banks. Bednarek et al. (2026) show that the rise of non-banks in Germany alters which firms gain access to credit during periods of monetary tightening. Following conventional tightening, when leasing companies expand relative to banks, credit flows towards SME and carbon-intensive firms, partially offsetting the effects of banks withdrawing from these segments. Following policy shocks that induce an increase in long-term rates, the pattern reverses, with credit shifting towards green firms and away from SMEs, as the non-bank types that expand under these conditions serve different borrowers. It remains to be seen whether this compositional shift reflects the lending preferences of the expanding non-bank types or differences in regulatory incentives, such as bank-specific sustainability disclosure or capital requirements that

do not apply equally to non-bank lenders. Taken together, these patterns imply that the distributional incidence of monetary policy changes depends not only on which NBFI types operate in a given jurisdiction, but also on how lending relationships are distributed across borrowers before a policy shock occurs.

Assessing transmission requires an understanding of NBFI composition, funding structures and borrower-relationship patterns, rather than sector-size alone.

For policymakers, the key implication is that monitoring aggregate NBFI sector size provides insufficient information for assessing interest rate transmission. Jurisdictions dominated by long-term-funded NBFIs, such as insurance corporations, pension funds and specialised finance companies, may exhibit attenuated transmission of conventional policy changes affecting short-term rates for connected borrowers, but potentially amplified transmission of policies affecting long-term rates. Jurisdictions in which short-term-funded lenders dominate will tend to experience amplified transmission of conventional tightening, with the burden falling on those firms most reliant on those intermediaries. The direction of bank-NBFI funding flows adds further complexity: NBFIs that provide wholesale funding to banks support credit supply, while bank lending to NBFIs for securities investment can crowd out firm credit. Effective policy calibration requires an understanding not only of the size of the non-bank sector, but also of its composition, funding characteristics and bank-NBFI linkages, as well as the distribution of lending relationships across borrower types.

2.3 Insurance companies and housing markets

Insurers play a distinct role within the NBFI sector owing to their business model, regulatory framework and balance sheet structure, which also determines how they respond to monetary policy.

Among the various NBFI types discussed above, insurance corporations (ICs) warrant separate attention: their liability structure, which is heavily affected by their business model, regulatory framework and duration-matching constraints, gives them a distinct role from other NBFIs and determines how they respond to monetary policy. This subsection examines insurers in greater depth, focusing on how their balance sheet characteristics affect monetary transmission, including through housing markets. First, monetary policy easing can operate through an insurance demand channel, increasing demand for both life and non-life insurance products if households' disposable income and firms' profits increase as a result. This boosts the total amount that insurers collect from policyholders ("premium income") and ultimately expands insurers' investment capacity. The reverse is true under monetary tightening. Second, full mark-to-market accounting under Solvency II means that monetary loosening induces positive valuation effects on assets and liabilities.[1] However, due to the negative duration gap of many ICs, particularly life insurance companies, lower yields exert negative pressure on their capital positions (Koijen and Yogo, 2022). To mitigate these negative effects, insurers may therefore increase their demand for longer-term assets. Third, lower yields reduce investment income, making it harder for insurers to meet guaranteed returns and pushing them towards a search-for-yield behaviour, consistent with the risk-taking channel of monetary policy. This can provide additional easing of financing conditions.

[1] Solvency II is a prudential and risk-based regime that came into effect in the European Economic Area (EEA) in January 2016. It sets out quantitative and qualitative requirements applicable to insurance and reinsurance companies to ensure adequate protection for policyholders and beneficiaries.

ICs play an increasingly important role in financial markets and their relevance for the financing of firms and governments has grown markedly over the past two decades. In the euro area, the sector's total assets have almost doubled since 2008. This expansion has made ICs the second-largest part of the NBFI sector after investment funds. They are key investors in financial markets, especially bond markets. Insurers are the largest domestic private holders of euro area sovereign and non-financial corporate bonds and they also hold a sizeable share of financial corporate bonds, underscoring their close interconnectedness with the financial system.[2] Portfolio choices vary systematically across non-life (property and casualty) insurers, which hold larger shares of equities, and life insurers, which invest more heavily in long-maturity bonds.[3] Looking at trends in the aggregate balance sheet, debt securities remained the largest asset class at the end of 2021 (38% of total assets), their share has been gently declining since 2008. In contrast, holdings of investment fund shares had risen to almost 30% by 2021. The low interest rate environment that prevailed until 2022 induced insurers to seek higher-yielding investments.

Insurers in the euro area actively transmit monetary policy to the wider economy.

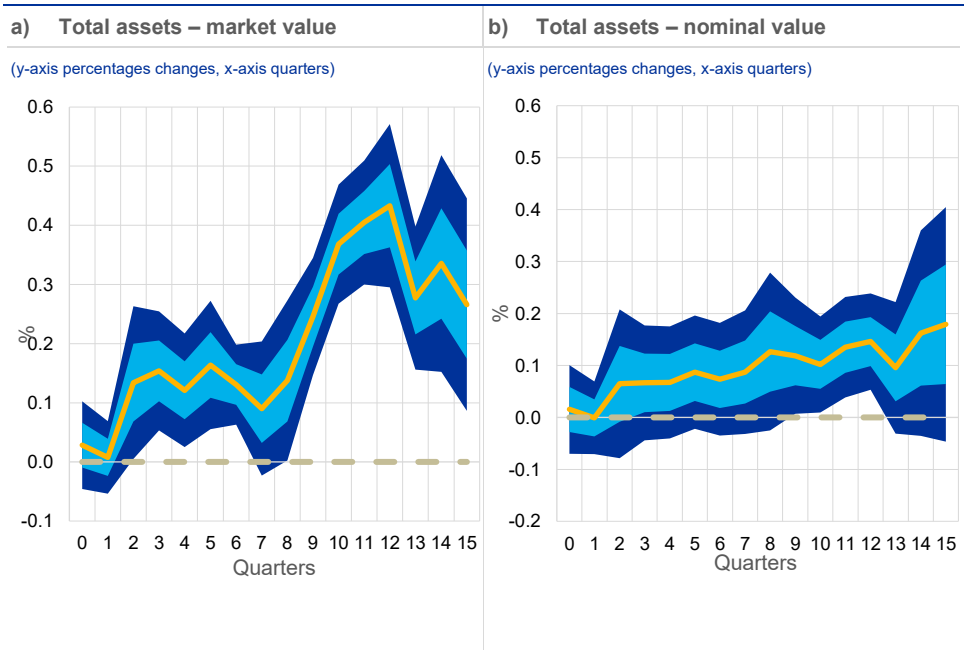
The recent ChaMP findings suggest that insurers in the euro area actively transmit monetary policy to the wider economy. Kaufmann et al. (2024) use aggregate quarterly insurance company balance sheet data for all 19 euro area countries from 2008 to 2021 from the ECB's Insurance Corporation Statistics (ICB) and, until 2016, the Insurance Corporations and Pension Funds Statistics (ICPF), complemented with granular security-level information from the ECB's Securities Holdings Statistics by Sector (SHSS). A local projections analysis reveals that monetary policy shocks significantly affect the size of the insurance sector (see Chart 2.5). A monetary loosening implying a 50-basis-point reduction in yields increases total assets in the insurance sector by 4.5% within a year, equivalent to a market- value increase of nearly €200 billion in assets (equivalent to 1.6% of euro area GDP), consistent with the insurance demand channel. Insurers' technical reserves respond in much the same way as total assets, while holdings of the main asset classes (debt securities, investment fund shares and equities) also increase, indicating greater financial intermediation by ICs following a monetary loosening episode. The results are qualitatively the same following a conventional monetary policy shock (i.e. a decline in short-term rates).

2 Euro area government bonds benefit from an exemption for capital charges, providing further incentives for insurers to invest in sovereign debt.

3 Apicella et al. (2022) analyse whether Italian insurers also acted as market stabilisers during the COVID-19 crisis. The authors show that their ability to play a stabilising role was partly affected by the pandemic outbreak and depended heavily on the type of liabilities they held and on capital considerations. In "normal" times, the higher the share of unit-linked policies to total liabilities, the more closely the insurer's investment decisions resemble those of open-ended funds, which tend to amplify market shocks.

Chart 2.5

Impulse responses of insurance corporations' (ICs') total assets



Notes: Impulse responses to an expansionary high-frequency monetary policy shock inducing a 1-basis-point decrease of the term structure factor. Shaded areas denote 95% (dark blue) and 68% (light blue) confidence intervals. Nominal values calculated to remove valuation effects.
Source: Kaufmann, Leyva and Storz (2024),

At the same time, changes in interest rates may induce significant changes in the portfolio allocation of insurers due to their typically long durations. Kaufmann et al. (2024) find that monetary easing is also associated with an increase in credit and liquidity risk-taking. There is rebalancing both across asset classes – from debt securities towards investment fund shares and riskier stocks – and within asset classes, as the share of lower-rated bonds tends to increase. Corradin et al. (2025) estimate similar effects of the ECB's asset purchases on portfolio allocation among traditional life insurers. The authors analyse the most recent cases of central bank asset purchases of sovereign bonds using granular data from EIOPA Solvency II public insurance statistics. They find evidence of some portfolio rebalancing by the insurance sector towards riskier assets. When the central bank purchases 1% of the amount outstanding of the bonds held in an insurer's portfolio, the insurer rebalances approximately 0.5% of its portfolio towards "alternative" investments such as real estate, mortgages, loans and hedging instruments, which are also typically associated with higher credit and liquidity risk.[4] Duration gap reinforces this shift, while the monetary tightening cycle post 2022 has partly reversed the trend.[5]

Beyond their role as investors, insurers also influence monetary policy transmission through the pricing of non-life insurance products, particularly homeowners insurance. Property insurance is a common prerequisite to obtaining a mortgage and one of the

4 Asset scarcity in specific segments for some sovereign issuers may have also contributed to this result.

5 However, Kirti and Singh (2025) argue that when long-term rates rise, US life insurers may face a trade-off between investing in long-term government bonds and shifting towards riskier but higher-yielding private debt. Li (2025) finds that when long-term rates rise, US life insurers' capital positions strengthen and their risk-bearing capacity increases.

most widespread non-life insurance products. The importance of insurers that sell homeowners insurance ("property insurers") is reflected in the total annual premiums that households pay for homeowners insurance: $170 billion (0.6% of GDP) in the United States and €100 billion (1% of GDP) in the euro area (Corradin et al. 2025). Moreover, property insurance costs account for a significant share of housing costs.[6] As such, mortgage delinquency rates are sensitive to the cost of homeowners insurance (Ge et al., 2025a) and the costs of property insurance are reflected in house prices (Ge et al., 2025b). Research within the ChaMP network provides the first evidence on the transmission of monetary policy through the homeowners insurance market. Damast et al. (2026) use granular data on the entire US homeowners insurance market to show that contractionary monetary policy shocks erode property insurers' investment income, prompting insurers to increase insurance premiums to offset these losses (see Chart 2.6). The baseline estimates imply that a monetary policy surprise of 1 percentage point pushes up insurance prices by 7% to 10%.

Chart 2.6

Monetary policy and insurance prices

(insurance price changes at filing level - y axis, cumulative changes in the 10-year US treasury yield – x axis)

Notes: The figure shows a binned scatter plot of insurance price changes at filing level and the cumulative of monetary policy surprises measured as cumulative changes in the 10-year US Treasury yield in 30-minute windows around FOMC meetings over the preceding six months after absorbing insurer fixed effects.
Source: Damast, Kubitza and Sorensen (2026).

Insurers in the euro area can act as amplifiers of shocks during periods of financial or monetary stress.

Therefore, insurers should not be viewed as passive long-term investors and their duration-matching strategies can further amplify movements in long-term interest rates. Life insurers typically have long-term fixed obligations and, in many cases, these liabilities have a longer maturity profile than that of the fixed income assets held to meet those obligations, implying a duration mismatch. When long-term rates fall, the present value of their liabilities increases more than that of their assets, thus

[6] For example, Keys and Mulder (2024) estimate that premiums for homeowners insurance amount to 20% of mortgage payments (principal and interest) for average US homeowners, and to more than 40% for 10% of homeowners.

widening the duration gap. Closing this gap means adding longer-dated bonds and engaging in a “hunt for duration”. Domanski et al. (2017) argue that in a low-interest environment, this “hunt for duration” may create self-reinforcing feedback loops. Ozdagli and Wang (2019) show that US life insurance companies tilt their portfolios towards higher-yielding bonds when interest rates decline, primarily driven by an increase in duration rather than credit risk. Kaufmann et al. (2024) find that monetary loosening is associated with an increase in insurers’ duration risk-taking. This pattern reverses when tightening increases long-term rates. Micro-level evidence for Germany shows that when long-term rates rise, insurers’ solvency ratios improve, which frees up regulatory capital for new lending (Bednarek et al., 2026). The authors show that ICs have an amplifying effect following forward guidance or quantitative tightening surprises (with lending contracting by 0.36% relative to banks following forward guidance and by 0.27% following quantitative tightening), consistent with the countercyclical behaviour of ICs under market stress (Timmer, 2018). Since a target surprise has little effect on the discount rate applied to insurers’ long-dated assets and liabilities, leaving solvency ratios and regulatory capital unchanged, ICs remain unresponsive to conventional rate hikes.

When exposed to financial frictions, the homeowners insurance sector can amplify the effects of monetary policy on real estate and mortgage markets. A stylised model of insurance intermediation shows that, if insurance supply is subject to financial frictions, contractionary monetary shocks constrain insurers’ balance sheets, increasing the shadow cost of capital and inducing insurers to raise prices (Damast et al., 2026). This effect becomes amplified the more severe the financial frictions are, complementing previous findings on the importance of supply-side frictions in insurance markets (Koijen and Yogo, 2015). The related empirical analysis reveals substantial spillovers from the insurance sector to real estate and mortgage markets. Higher insurance prices reduce housing affordability by pushing up housing costs. They also dampen mortgage applications by constraining households’ borrowing capacity. These amplification effects are more pronounced when insurers exhibit greater sensitivity to interest rate changes: insurers with larger mark-to-market shares and longer durations are significantly more sensitive to monetary policy surprises.[7]

Non-banks play a role in transmitting monetary policy via housing markets.

Non-banks can also shape the transmission of monetary policy through their participation in real estate markets. Institutional investors have become increasingly active in euro area real estate markets. For the first time, Bandoni et al. (2025) provide empirical evidence on the significance of institutional investors in the aggregate dynamics of the euro area housing market using granular transaction-level data from Real Capital Analytics (RCA), provided by Morgan Stanley Capital International (MSCI). This dataset covers purchases of residential assets valued at €10 million or more by non-households. Using a Bayesian vector autoregressive (BVAR) model, the authors show that a shock that increases institutional investors’ appetite to participate in the housing market is associated with a persistent rise in euro area house prices. Household income remains unaffected, implying that the presence of institutional investors affects household affordability. A monetary policy shock corresponding to a

[7] Regulation requires property and casualty insurers to hold stocks and high-yield bonds at market values, whereas investment-grade bonds are held at historical costs. Thus, insurers that invest more in stocks and high-yield bonds are more exposed to market value fluctuations.

one-standard-deviation decline in the euro area shadow rate increases demand among institutional investors and pushes up housing prices. Finally, rising purchases of residential real estate by institutional investors are also associated with an expansion in banks' mortgage lending, suggesting that amplifying feedback loops may also exist between these two parts of the financial system.

Overall, insurers and other institutional investors not only respond to monetary policy, but also actively shape its transmission to credit, housing and real economic activity.

2.4 Stress, liquidity shocks and state-dependent amplification

Financial stress amplifies the effects of monetary policy, although non-banks show heterogeneous responses depending on their own sensitivity to stress.

Financial stress amplifies the transmission of monetary policy through non-banks, although the speed and strength of this process ultimately depend on the type of intermediary. New ChaMP evidence shows that the heterogeneous amplification patterns presented in the previous subsections are also state-dependent, becoming more pronounced when financial conditions tighten. Tiza Mimum et al. (2025) use state-dependent local projections to capture non-linear responses among banks and non-banks to monetary shocks under different levels of financial stress. The authors combine aggregate quarterly balance sheet data compiled by the ECB for euro-area banks and non-banks (investment funds, money market funds, insurance companies and pension funds) with granular security-level holdings data to show that, during periods of heightened financial stress, monetary tightening leads to even larger balance sheet contractions among banks and non-banks alike. At the same, the results show heterogeneous responses among non-banks, reflecting the sensitivity of different NBFI types to market stress. Investment funds and money market funds are sensitive to liquidity constraints, whereas insurance companies and pension funds are less affected by stress amplification, suggesting a more countercyclical behaviour.

Fragilities in the non-bank sector act as fault lines that amplify the transmission of monetary and market shocks to banks.

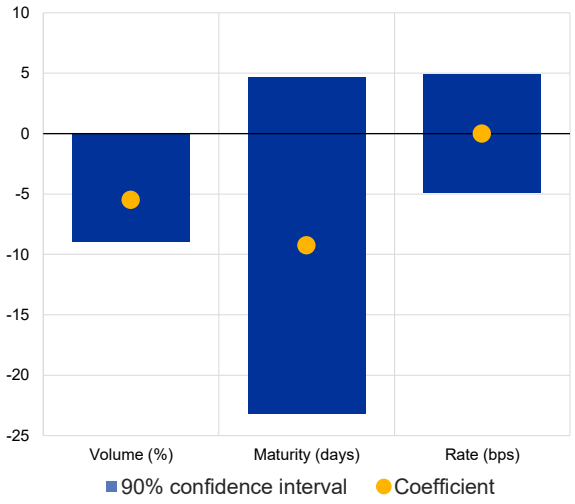
At the same time, fragilities within the non-bank sector may act as fault lines that amplify contractions during periods of financial stress. The importance of non-bank financing for euro area banks has grown significantly, mainly in the form of deposits by investment funds and insurance and pension funds. Given this growing reliance, research within the ChaMP network has shown how funds' own stress (or inherent fragility) can propagate to banks and amplify contractions. Nicoletti et al. (2025) provide evidence of an "indirect" bank lending channel whereby investment funds act as amplifiers of liquidity shocks to banks. The authors use granular data on non-banks' holdings of corporate bonds from the ECB's Securities Holdings Statistics by Sector (SHSS) database, transaction-level information on euro-denominated money market activity from the money market statistical reporting (MMSR), as well as granular loan-level data from the analytical credit register (AnaCredit) of the European System of Central Bank. In the period following the COVID-19 outbreak and up to the announcement of the European Central Bank's pandemic emergency purchase programme (PEPP), investment funds largely withdrew their funding from banks. Affected euro area banks responded by cutting new lending by almost 6% (see Chart 2.7). Importantly, for every 10-percentage-point increase in a bank's pre-shock exposure to short-term funding, new lending fell by a further 5.5%. The role of non-bank fragility is further highlighted by evidence on run-prone fragility. Fecht and

Kellers (2025), using share-class-level data from Morningstar for all open-ended investment funds (OEIFs) domiciled in Germany matched with administrative data from the Deutsche Bundesbank's Investment Funds Statistics, show that a 10-basis-point increase in interest rates induces an additional 0.2 percentage points of outflows from run-prone funds relative to other funds.[8] Fragile funds also withdraw more deposits from banks, thus amplifying the deposit channel of monetary policy. However, this amplification is not uniform, as banks with a large custodian business and substantial retail exposure to fragile funds tend to benefit from deposit inflows.

Chart 2.7

Short-term funding exposure of banks and new lending

(changes, y axis)



Notes: The chart shows the marginal effects estimated via regression of a higher exposure to investment fund deposits on changes in selected outcome variables for loans negotiated over the period running from the declaration of the COVID-19 pandemic (11 March 2020) up to the ECB's intervention (18 March 2020). Figures have been normalised to capture an increase in exposure in the form of a 10-percentage-point increase in funding obtained from investment fund deposits. The outcome variable is new lending measured as log volume. New lending is defined as including both new business loans and off-balance-sheet amounts granted on a daily basis; the difference in maturity of the loans and the rate applied to newly negotiated loans. The regression includes dummies capturing size x industry x country x time fixed effects to identify supply effects. The regression also includes both bank-level (ROE, NPLs, total assets, capital ratios and debt securities) and firm-level controls (turnover and assets) as of end-2019.
Source: Nicoletti, Radiga and Rodriguez d'Ácri (2025).

8 Since the main findings are based on the notion of adverse shocks, the interaction with easing shocks shows no significant results.

3 Implications of NBFI portfolio allocation for the transmission of monetary policy

Non-bank financial intermediaries are now the largest holders of securities in the euro area, although their portfolio structure differs considerably across subsectors, reflecting differences in their exposure to asset classes such as bonds, stocks, investment fund shares and other assets. NBFI types also feature different geographical, credit, liquidity and duration risk profiles, also reflecting differences in regulation and balance sheet structures. Investment funds, the largest NBFI component, span a wide spectrum of mandates – from broad, flexible strategies to highly specialised market segments – while money market funds focus exclusively on short-term and typically higher-rated assets. Insurance corporations and pension funds, by contrast, tend to hold long-duration and typically safer assets to match their long-term liabilities. These structural differences shape how each NBFI type responds to changes in monetary policy and, in turn, how monetary policy is transmitted to financial markets.

Monetary policy has important effects on both the size and the composition of NBFI portfolios, and these effects can interact with financial stability. The ChaMP research reviewed in this section addresses how monetary policy affects investor flows, portfolio rebalancing and risk-taking across NBFIs, as well as potential side effects that could make them more vulnerable to financial shocks. The findings have important policy implications not only for the conduct of monetary policy but also for the design of macroprudential regulation of the financial sector.

A central topic is that monetary policy has strong and heterogeneous effects on investment fund flows, which can interact with the procyclical behaviour and fragile nature of certain investment funds. A key channel here is the flow-performance relationship, whereby monetary policy can, through its effect on asset prices, generate momentum in returns and, as a result, trigger investor flows (see Goldstein et al., 2017; Feroli et al., 2014). Specifically, evidence obtained from ChaMP research highlights that monetary policy tightening leads to outflows that are particularly strong during episodes of financial stress and among more fragile institutions. At the same time, the evidence presented shows how certain monetary policy interventions can be effective in staving off market turmoil. Moreover, these dynamics interact with macroprudential regulation, as NBFI behaviour can influence banks' funding conditions and credit supply.

The transmission of monetary policy through NBFIs depends on the policy instrument chosen, with both conventional short-term interest rate policies and central bank asset purchases affecting the valuation of securities. While changes in short-term interest rates can have broad-based effects, asset purchases have stronger effects on longer-term rates by changing the effective supply and, hence, the prices of the targeted securities. These policy-induced valuation and asset scarcity effects can

induce NBFIs to rebalance their portfolios, consistent with the risk-taking channel of monetary policy (see Borio and Zhu, 2012; Hau and Lai, 2016).

Extensive research carried out within the ChaMP network points to substantial portfolio shifts across NBFI types following monetary easing, as well as asymmetric adjustments during tightening periods. While rebalancing towards riskier assets following a monetary loosening episode is an intended policy consequence, it can also amplify financial stability risks. For example, when liquidity buffers are reduced in exchange for higher-yielding but riskier assets, NBFIs become more vulnerable to sudden funding losses and more exposed to credit risk. The evidence presented shows that transmission depends on the monetary policy instrument and that effects can differ depending on whether policy is eased or tightened. Moreover, as the exposure of NBFIs to international financial markets differs, their portfolios can also be affected by non-domestic monetary policy. ChaMP research also provides several insights in this respect by comparing the responses of NBFI portfolios to domestic and international monetary policy.

Section 3.1 below shows that monetary policy has strong and heterogeneous effects on investment fund flows, which can interact with the procyclical behaviour and fragility of certain funds. Section 3.2 further below examines how monetary policy can also shape the composition of NBFI portfolios.

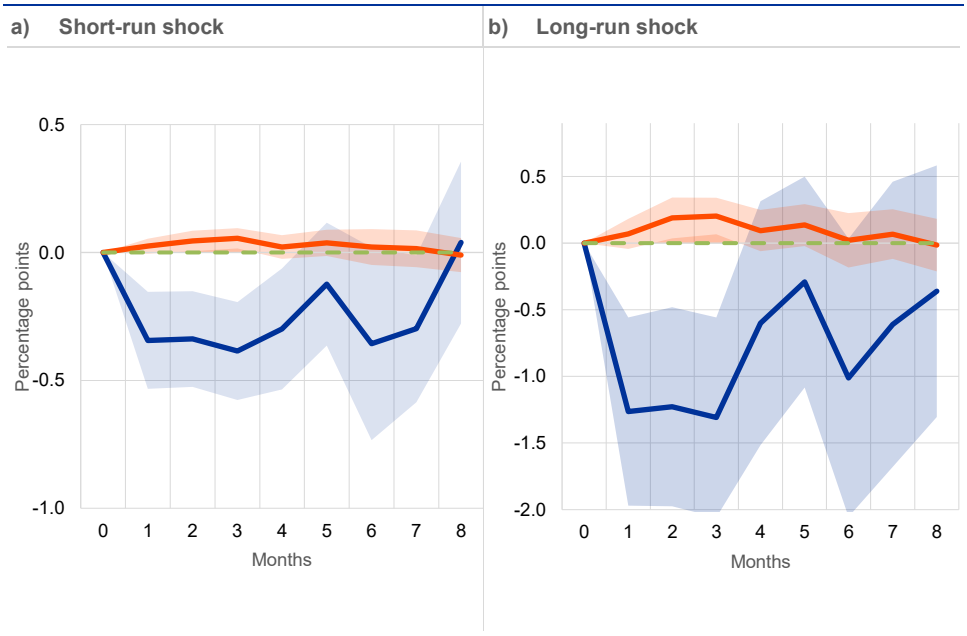
3.1 NBFI portfolio flows and interactions with financial stability

Monetary policy significantly affects investor flows, with stronger reactions in response to monetary policy changes affecting the longer end of the yield curve.

Monetary policy transmission is increasingly influenced by the aggregate portfolio size and flow dynamics of the NBFI sector. For the investment fund segment in particular, monetary policy changes can affect investor purchases and redemptions of fund shares, and large-scale portfolio reallocations or redemption-driven asset sales can amplify price movements, tighten funding conditions and generate spillovers to banks and core funding markets. Novel ChaMP research shows that monetary policy has significant effects on investor flows. Using a Bayesian Structural Vector Autoregression model with aggregate monthly data for bond funds domiciled in the euro area between 2007 and 2023, Giuzio et al. (2021) find that monetary loosening (tightening) triggers sizeable inflows into (outflows from) euro area bond funds. Complementary evidence from Hodula and Malovaná (2025), using monthly supervisory institution-level data for Czech investment funds between 2009 and 2023 and a local projections methodology, shows that these flow responses are driven almost entirely by adjustments in inflows, with outflows remaining largely stable (Chart 3.1). This indicates that monetary policy influences new allocations rather than causing redemptions by investors. Both studies find that flows react more strongly to monetary policy changes that affect the longer end of the yield curve, such as asset purchase programmes, than to conventional short-rate policy changes.

Chart 3.1

Response of fund inflows and outflows to a monetary policy shock



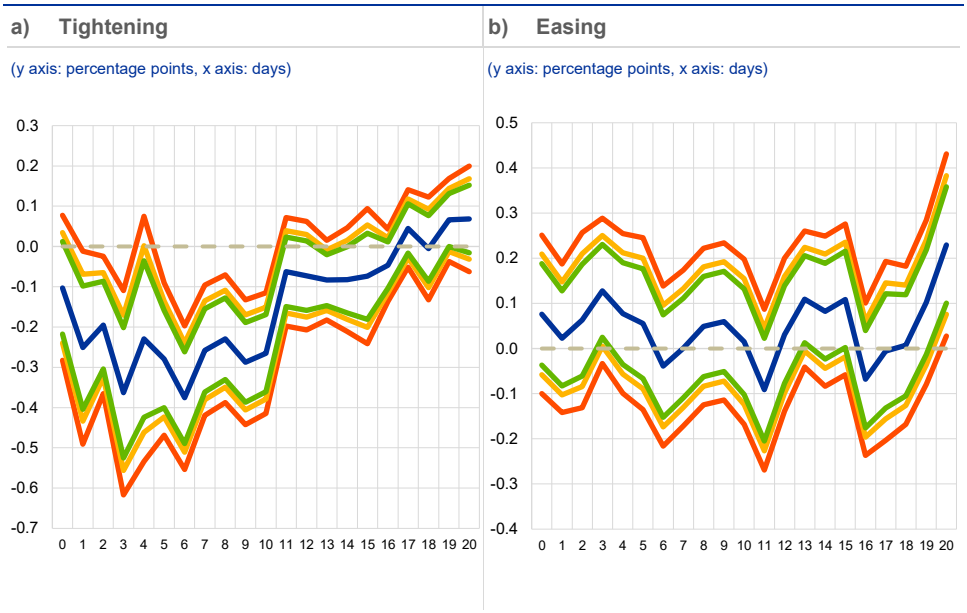
Notes: The figure shows impulse response functions constructed from a local projection model. Solid lines display the coefficients of (non-cumulative) responses of mutual fund flows over the eight months following a 1-pp change in the interest rate differential. The short-run differential is defined as the difference between 3-month interbank rates (PRIBOR 3M – EURIBOR 3M), while the long-run differential is the difference between Czech and euro area 10-year government bond yields. Shaded areas indicate 90% confidence bands. Standard errors are clustered at the fund level.
Source: Hodula and Malovaná (2025).

Financial stress amplifies outflows and systemic liquidity stress under monetary tightening.

Accommodative monetary policy expands NBFI balance sheet capacity and encourages risk-taking, while tightening can trigger procyclical outflows and systemic liquidity pressures – effects that become non-linearly stronger when financial conditions tighten. Monetary policy transmission thus becomes state-dependent, with financial stability risks emerging when liquidity-sensitive NBFIs adjust their portfolios under stress (see Tiza Mimum et al., 2025). The strength of monetary policy transmission through flows also depends on internal fund characteristics. Using share-class-level daily fund data from Morningstar and monthly administrative data for German-domiciled open-ended funds from 2009 to 2022, Fecht and Kellers (2026) show that funds whose investors are more likely to withdraw money following poor performance experience disproportionately larger outflows after monetary tightening. The authors also highlight a pronounced asymmetry: tightening generates amplified contraction under stress, particularly where mandates are rigid, while easing gradually builds up risk exposures. Importantly, policy tightening is the dominant driver of flow adjustments for fragile funds, whereas the response to easing shocks is symmetric across fund types (see Chart 3.2). Flow fragility within NBFIs can also transmit stress directly to banks. During the March 2020 “dash for cash” episode, investment funds facing large-scale redemptions withdrew their wholesale deposits from banks to meet liquidity needs, thereby tightening bank funding conditions precisely when financing conditions were already tightening (Nicoletti et al., 2025).

Chart 3.2

Flow reaction of run-prone funds to monetary policy surprises

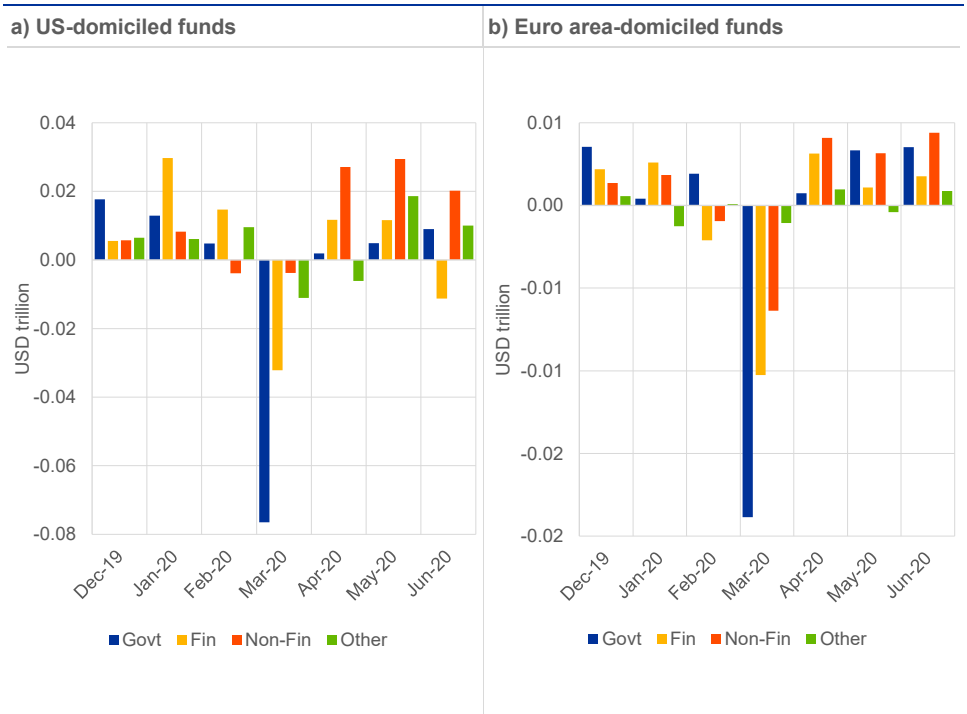


Notes: The figure shows local projection coefficient estimates (blue line). The green, yellow and red lines denote 90%, 95% and 99% confidence intervals, respectively.
Source: Fecht and Kellers (2026).

Outflows from the investment fund sector can trigger asset sales and exacerbate financial stress, even in safe and liquid markets. ChaMP research by Delikouras et al. (2025) shows that during the COVID-19 liquidity shock, euro area bond funds liquidated assets across the rating spectrum to maintain mandated risk profiles, transmitting liquidity stress broadly across markets. Using security-level holdings data for US and euro area bond funds and employing a difference-in-differences approach, the analysis shows that because investment mandates require funds to preserve specific risk-balance ratios, redemptions involve broadly proportional sales across asset classes. Even high-quality assets may therefore be sold alongside lower-rated holdings to maintain portfolio weights (Chart 3.3); see also Ma et al. (2022). While such rebalancing occurs across jurisdictions, this effect is particularly pronounced in the euro area, where the limited supply of safe assets can lead to more indiscriminate asset sales.

Chart 3.3

Changes in aggregate bond holdings by issuing sector around March 2020



Source: Delikouras, S., Malliaropulos, D., Migiakis, P. and Kontinopoulos, A. (2025).

During stress episodes, unconventional asset purchase programmes can act as critical backstops. Nicoletti et al. (2025) show that the Pandemic Emergency Purchase Programme (PEPP) stabilised bond prices, supported fund performance and mitigated fire-sale dynamics. By preventing forced asset liquidations and stabilising wholesale bank deposit funding, such interventions helped restore impaired credit transmission channels. These findings are consistent with Breckenfelder and Hoerova (2023), who show that monetary policy instruments, including asset purchases, can be effective in mitigating investment fund runs, even for funds without access to lender-of-last-resort facilities.

The interaction between monetary and macroprudential policy further shapes the outcomes of monetary policy actions. New evidence obtained from ChaMP research uses state-dependent local projections across six euro area countries to show that joint tightening tends to contract NBFI assets in bank-centric financial systems, but may cause such assets to expand in global financial hubs as capital is rerouted through cross-border networks (see Hodula and Tiza Mimun, 2025).

Therefore, monetary policy transmission is becoming increasingly dependent on the behaviour of liquidity-sensitive NBFIs, particularly during periods of financial stress. Liquidity fragilities within segments of the NBFI sector can amplify tightening shocks, transmit stress to banks and constrain credit supply. At the same time, easing cycles may expand intermediation capacity while gradually building up risk exposures. These findings underscore the need to closely monitor NBFI liquidity structures, account for heterogeneity across institutions and jurisdictions, and ensure that monetary and

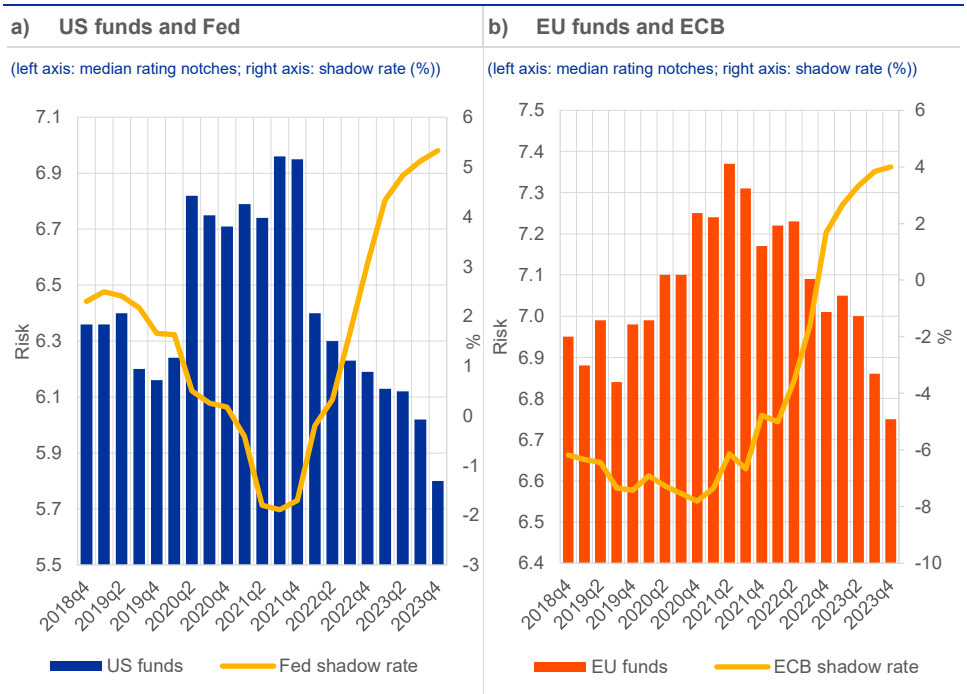
macroprudential policies remain aligned to preserve the effectiveness of monetary policy transmission and financial stability.

3.2 Portfolio rebalancing within the NBFI sector

Expansionary monetary policy can increase risk-taking among NBFIs, prompting portfolio allocation to riskier and longer-dated assets.

Monetary policy has a direct and systematic effect on the portfolio composition of NBFIs, with expansionary monetary policy shifting NBFI allocations towards riskier and longer-dated assets. ChaMP research provides clear evidence of this risk-taking channel. Anyfantaki et al. (2026), using security-level data for euro area and US-domiciled bond funds, show that expansionary monetary policy can increase risk-taking among NBFI entities, as they systematically rebalance their portfolios towards lower-rated and longer-duration assets. The authors document that both conventional and unconventional monetary easing lead funds to rebalance towards riskier bond portfolios, with the effects being stronger for active, smaller and leveraged funds. This pattern is already visible in aggregate data, which show that the average ratings of funds' bond portfolios become riskier as policy rates decrease (see Chart 3.4). Corell et al. (2026) corroborate these findings in the context of the ECB's corporate sector purchase programme (CSPP), showing that the CSPP announcement compressed spreads on eligible bonds by around 28 basis points relative to ineligible bonds, triggering broad-based rebalancing by NBFIs towards ECB-eligible assets.

Chart 3.4
Investment fund risk-taking and shadow rates

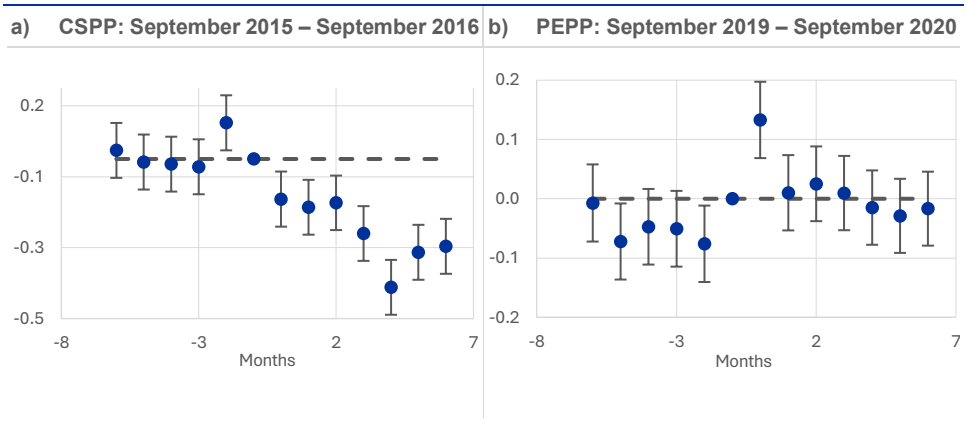


Notes: Panel a) shows the median weighted-average credit rating of US bond funds (blue bars) alongside the Fed's shadow rate (yellow line) from Wu & Xia (2016). Panel b) presents the same for euro area bond funds (orange bars) and the ECB's shadow rate. The sample period is 2018:Q1 to 2023:Q4.
Source: Anyfantaki, S., Giannakidis, C., Malliaropulos, D., Migiakis, P. and Petroulakis, F. (2026).

Asset purchase programmes introduce an additional rebalancing channel through the convenience yield of eligible assets. When the ECB designates specific assets for purchase, financial intermediaries assign additional value to these securities beyond their cash flow fundamentals, reflecting the non-pecuniary services they provide: their use as high-quality collateral, their contribution to regulatory capital relief under frameworks such as Solvency II, their role in duration-matching, and their enhanced market liquidity. Corell et al. (2026) break down this convenience yield into four components and find that regulatory capital value and duration services together account for most of the premium throughout most of the sample period. As a result, eligible bonds commanded significantly lower yields than comparable ineligible bonds following both CSPP and PEPP announcements (see Chart 3.5). Focusing on the ECB's purchases of sovereign bonds, ChaMP research by Boermans et al. (2025) shows that the willingness to sell bonds to the Eurosystem depends on the type of investor. Banks, investment funds and non-euro area global investors provided most of the bonds, while the sovereign bond holdings of preferred habitat investors, such as insurance companies and pension funds, were less elastic to Eurosystem purchases.

Chart 3.5

Difference-in-difference coefficients around asset purchase programme announcements



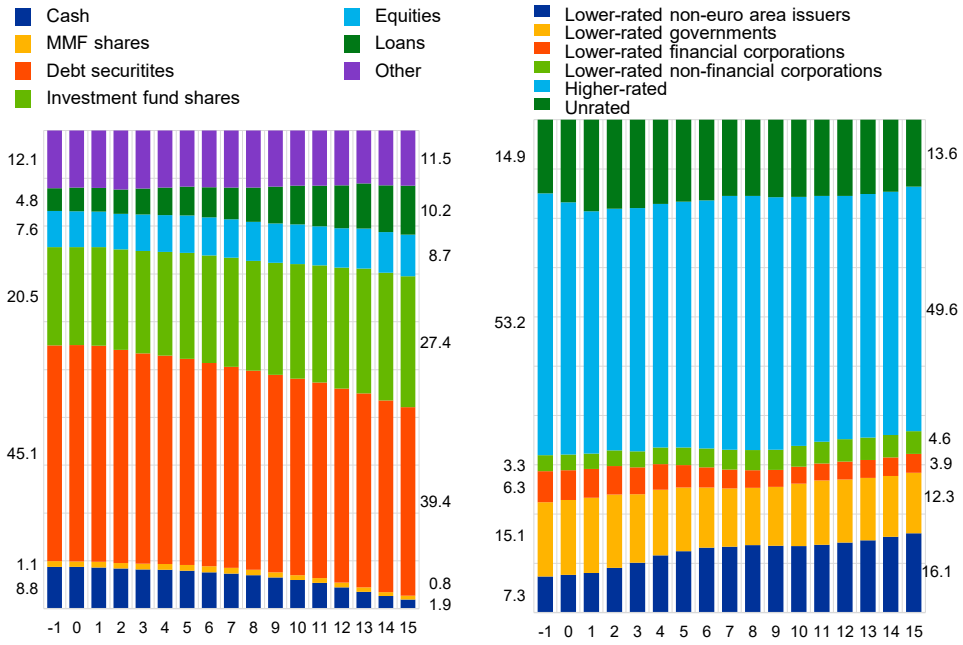
Notes: Panel a) shows monthly point estimates around the CSPP announcement from September 2015 to September 2016, while panel b) shows point estimates around the PEPP announcement from September 2019 to September 2020. The dependent variable is credit spreads.
Source: Corell, F., Mota, L., Holm Hadulla, F., Leombroni, M. and Papoutsi, M. (2026).

Insurance corporations display a similar pattern of portfolio rebalancing in response to monetary easing. Kaufmann et al. (2024), using country-sector-level data for all 19 euro area countries from 2010 to 2019, complemented by granular security-level information from the ECB's Securities Holdings Statistics (see also Section 2.3), show that monetary loosening has a significant impact on both sector size and portfolio composition. Consistent with the risk-taking channel of monetary policy, insurers rebalance away from debt securities and towards investment fund shares and equities, while markedly reducing their cash holdings, pointing to elevated liquidity risk-taking. Within their bond portfolios, insurers increase credit risk by shifting towards lower-rated bonds, extend duration, and raise their international exposure in search of yield (see Chart 3.6). Their findings are based on the effect of monetary policy surprises on the entirety of the yield curve, suggesting that these rebalancing effects can result from both conventional and unconventional monetary policy.

Chart 3.6

Balance sheet response of insurance corporations to monetary policy loosening

(left: percentages of total assets; right: percentages of bond portfolio)



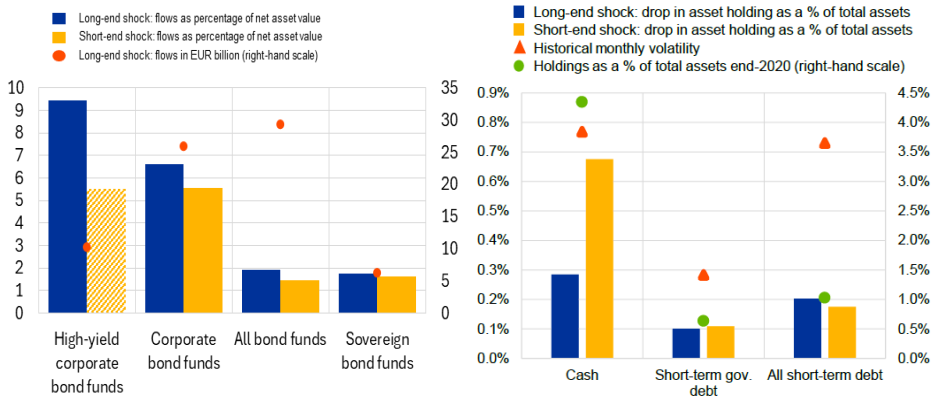
Notes: The chart provides a graphical representation of the projected evolution of insurance corporations' balance sheet composition as a percentage of total assets (left panel) and of the bond portfolio (right panel), following an expansionary high-frequency monetary policy shock inducing a 10-basis-point decrease in the term structure factor, normalised to the 5-year Bund rate and hence reflecting changes in unconventional monetary policy instruments. The x-axis shows quarters after the shock. The bar denoted "-1" represents the sample average for each item.
Source: Kaufmann, C., Leyva, J. and Storz, M. (2024).

The risk-taking channel of monetary policy in NBFIs also operates through "search-for-yield" behaviour among end investors. Giuzio et al. (2021) use a Bayesian Structural Vector Autoregression framework applied to euro area bond funds from 2007 to 2023 to show that monetary easing operates in two ways. First, investors redirect flows towards riskier fund types, with inflows being the strongest for high-yield and corporate bond funds relative to sovereign bond funds. These effects are particularly pronounced in the case of monetary policy shocks to the long end of the yield curve, such as asset purchase programmes, compared with conventional short-end interest rate shocks. Second, fund managers simultaneously shift their portfolios away from low-yielding liquid assets such as cash and short-term government debt in favour of higher-yielding alternatives (see Chart 3.7). Over time, this may generate a build-up of liquidity risk within the fund sector, reducing resilience to large outflows in the event of a sudden shock or unexpected policy reversal. Fecht and Kellers (2026) find that during a tightening period, fragile funds – those prone to panic-induced redemptions – run down cash buffers more aggressively in response to withdrawals, amplifying the transmission of monetary tightening and highlighting the systemic relevance of fund-level liquidity mismatches. In this context, ChaMP research contributes to the literature on fund liquidity management, which explores whether funds hoard cash or use it to accommodate outflows (see, for example, Morris et al., 2017; Chernenko and Sunderam, 2016).

Chart 3.7

Investor flows and fund liquid asset holding responses to long- and short-end monetary policy shocks

(percentages and EUR billion)



Notes: The bars are based on the impulse responses in the first month after the shock in the left panel and on the maximum response within the first year in the right panel, normalised to a monetary loosening of 25 basis points. The shaded area indicates statistical insignificance. In the right panel, red triangles (green dots) indicate historical monthly volatility (asset holdings in December 2020) as a percentage of total assets. For ease of comparison, the bars show the drop in liquid asset holdings.
Source: Giuzio, M., Kaufmann, C., Ryan, E. and Cappiello, L. (2021).

NBFI transmission of monetary policy extends beyond financial markets, with real effects on credit and housing markets, as well as cross-border spillovers evident across jurisdictions, underscoring the important role of NBFI portfolio dynamics in the transmission of monetary policy.

Portfolio rebalancing by NBFIs in response to monetary easing also generates measurable real economic effects through multiple transmission channels. ChaMP research by Krause and Mazidi (2026) identifies a powerful indirect channel through covered bond markets: spreads compress as insurers and pension funds increase their demand for covered mortgage bonds following an ECB quantitative easing shock, thereby reducing the funding costs of issuing banks. Under the matched-funding principle that governs covered bond markets in several European jurisdictions, this compression leads directly to lower mortgage rates and an expansion of credit supply to households. Beyond this indirect channel, the direct acquisition of real assets by NBFIs also exerts upward pressure on property valuations, reinforcing the overall transmission of monetary accommodation to the real economy.

These portfolio rebalancing adjustments triggered by monetary policy are not confined to the jurisdiction in which they originate. NBFIs also transmit foreign monetary policy shocks through cross-border asset allocation.[9] Hodula and Malovaná (2025) examine this mechanism from the perspective of a small open economy and find that ECB monetary policy shocks have larger and more persistent effects on Czech mutual fund flows than equivalent domestic policy actions, despite the small share of foreign investors (2-4%) present in the Czech mutual fund sector. Anyfantaki et al. (2026) similarly document cross-border monetary policy spillovers: euro area bond funds increase their exposure to riskier bonds in response to US monetary easing. Krause and Mazidi (2026) further show that Danish insurance corporations and pension funds

9 Monetary policy also affects currency markets. ChaMP research shows that the impact is much stronger when monetary policy actions come as a surprise to investors (Bricongne and Marolleau, 2025).

increase their exposure to non-euro area bonds in response to ECB loosening, consistent with an international risk-taking channel.

Overall, the evidence reviewed in this section shows that monetary policy systematically shapes the portfolio composition of NBFIs. During periods of expansive monetary policy, NBFIs, including investment funds, insurance corporations and pension funds, shift away from safe, liquid and short-duration assets and rotate into riskier, lower-rated and longer-dated instruments. During tightening episodes, fragile funds in particular face disproportionate outflows and may be compelled to sell assets, amplifying the tightening of financial conditions. This observation supports the implementation of policies aimed at limiting risk-taking by NBFIs ex ante.

The transmission of monetary policy through NBFIs extends beyond financial markets, with real effects on credit and housing markets and cross-border spillovers evident across jurisdictions, underscoring the important role of NBFI portfolio dynamics in the transmission of monetary policy.

4 Collateral availability and monetary policy

Collateral plays a central role in modern bank funding and monetary policy implementation. In the euro area's fixed-rate full-allotment framework, banks' access to central bank liquidity is constrained primarily by the availability of eligible collateral rather than by its price (Deutsche Bundesbank, 2025). At the same time, money markets have responded to regulatory changes following the global financial crisis of 2008-09 by shifting structurally from unsecured to secured transactions, with repo markets becoming the dominant segment (see Schnabel, 2020).[10] Together, these developments have substantially increased the importance of collateral availability, pricing and reuse for the smooth functioning of the financial system.

The 2021 ECB strategy review (see European Central Bank, 2021) pointed to the importance of collateral availability and well-functioning repo markets for effective monetary policy implementation. This section explores how collateral availability and repo market functioning influence monetary policy transmission, and how NBFIs contribute to collateral scarcity and market dynamics. Section 4.1 focuses on the importance of repo markets and the role of large-scale central bank asset purchases on these markets. Section 4.2 highlights the relevance of NBFIs in repo markets, while also illustrating the interaction between monetary policy and financial stability.

4.1 Collateral availability, repo markets and monetary policy

By removing large quantities of sovereign bonds from private sector balance sheets, asset purchases reduced the free float of European safe assets and contributed to collateral scarcity in repo markets.

Repo markets play an important role in the transmission of monetary policy, and the existing literature often underscores the side effects of asset purchase programmes on the repo market. In the euro area, large-scale central bank asset purchases had the effect of removing large quantities of sovereign bonds from private sector balance sheets. This led to a reduction in the free float of European safe assets and contributed to collateral scarcity in repo markets. Empirically, specialness manifests itself in repo rates substantially below riskless interest rates (Duffie, 1996). Chart 4.1 below shows that scarcity was reflected in lower repo rates and increased specialness for individual securities (see Arrata et al., 2020; Corradin and Maddaloni, 2020; Pelizzon et al., 2025).

In line with these patterns, research within the ChaMP network provides new evidence on the impact of large-scale asset purchases on asset scarcity, with important implications for the design of balance sheet policies. Aguilar and Vela (2026) use granular transaction-level data to show that since mid-2020 there has been greater repo rate dispersion across collateral types and jurisdictions. Forti Grazzini and Soares (2026) show that this rate dispersion reflects a systematic country-level

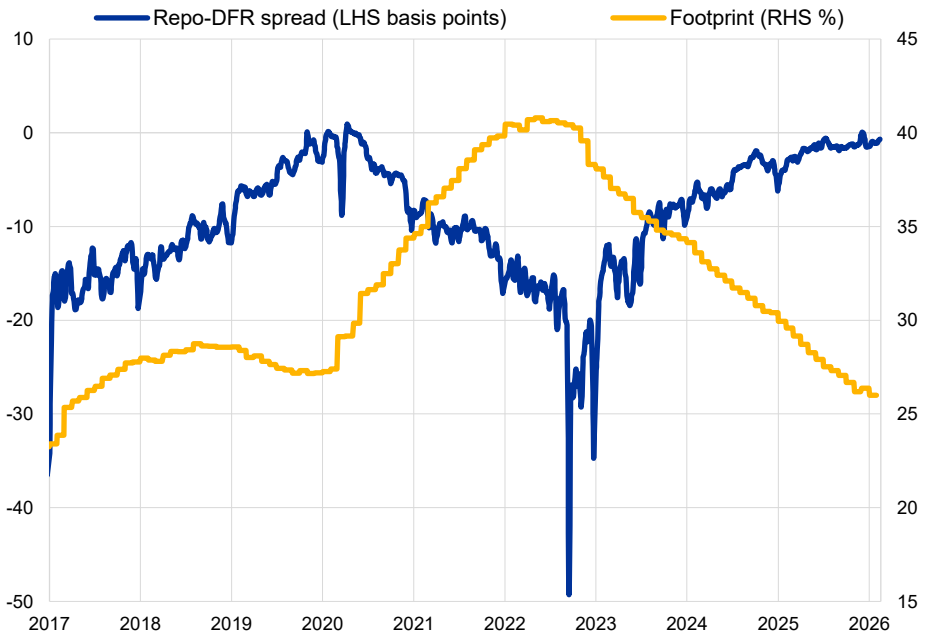
[10] Relatedly, ChaMP research by Degryse et al. (2025) documents that around 70% of aggregate bank lending to non-financial companies in the euro area is collateralized, with real estate and financial assets being the most pledged.

component associated with credit risk that increased as policy rates moved back into positive territory. At the same time, Grasso and Poinelli (2025), using a newly constructed, confidential bond-level dataset, document that the Eurosystem's footprint on repo rates would have been even more pronounced had it not made use of its flexibility in implementing asset purchases during the most recent asset purchase programmes. By leveraging confidential transaction-level data on the ECB's Securities Lending Facilities for the first time, they further validate the effectiveness of such facilities in addressing repo market scarcity. Similarly, Greppmair and Jank (2026) show that the Eurosystem's securities lending facilities helped alleviate collateral scarcity and enhanced market quality in cash and repo markets.

Chart 4.1

Repo rate and the Eurosystem market footprint

(LHS: basis points; RHS: % eligible assets)



Notes: Footprint measured as the share of the Eurosystem's euro area government bond holdings and mobilised collateral relative to the nominal amount outstanding. Outright holdings are euro area government bonds held by the Eurosystem via purchase programmes, adjusted for euro area government bonds lent back via the Securities Lending against Cash programme. Mobilised collateral includes euro area government bonds mobilised as collateral for open market operations. The chart displays weekly data, excluding month-ends and the period between 23 December and 6 January. See slide 6 for a description of the characteristics of RepoSTR. Latest observation: 4 November 2024.
Sources: MMSR and ECB/DG-Market Operations calculations.

Collateral scarcity can have a dampening effect on the transmission of monetary policy for some banks, since specialness can affect bank lending through their securities holdings. Institutions with larger pre-existing holdings of safe assets benefit more from declining secured funding costs and, in turn, expand credit supply more strongly, shaping the transmission of monetary policy through balance sheet channels (Paludkiewicz, 2019). Research within the ChaMP network provides extensive evidence in this respect. Tischer (2021) proposes a novel exogenous measure of banks' exposure to asset scarcity and finds that banks with higher exposure exhibit higher loan growth, but only when they are active in the repo market. Schneider (2026) additionally documents that banks pass on their low repo funding costs, induced by

collateral scarcity, to customers via lower loan and deposit rates. Forti Grazzini and Soares (2026) show that the country-level premium priced into the money market acts as a cost-push shock to banks, and is associated with higher rates and lower lending volumes to firms.

4.2 Repo markets, NBFIs and financial stability

NBFIs play an important role in repo markets through arbitrage and short-selling strategies that can intensify demand for specific securities.

Collateral scarcity is also relevant when NBFIs act as counterparties in secured transactions. For one, NBFI activities in repo markets can have procyclical price effects. NBFIs play an important role in these markets through arbitrage and short-selling strategies that can intensify demand for specific securities. This, in turn, can affect specialness premia and produce systematic differences between interbank and non-bank repo rates, especially when policy rate expectations change, resulting in NBFIs receiving lower rates on average (see Aguilar and Vela, 2026).

Chart 4.2 shows that, on average, NBFIs face significantly worse repo prices than banks. Of course, part of this difference is down to the fact that banks have access to the Eurosystem's standing facilities, in particular the deposit facility, which serves as the effective floor for interbank money market transactions. Along similar lines, Pelizzon et al. (2026) find that non-euro area hedge funds strongly contributed to the elevated specialness premia in Bund markets in 2022 as they borrowed Bunds to finance cash market activities amid widespread mispricing.[11] Importantly, recent experiences in the United States indicate that – even in the absence of safe asset scarcity – the size of the central bank balance sheet can affect market stability: a shrinking Fed balance sheet can unsettle the Treasury and repo markets, with significant implications for interest rate control and financial stability (see Copeland et al., 2025; d'Avernas et al., 2025). Some of these implications seem to arise from the specificities of the US repo market structure and regulations affecting market participants. At the same time, understanding how these dynamics play out in the euro area is of paramount importance, given its own institutional specificities and the growing role of NBFIs. Lastly, and looking beyond money markets, safe asset scarcity also matters for asset pricing via convenience yields. Corell et al. (2026) provide evidence for the euro area showing that, while regulatory-driven convenience yields dominated in the low interest rate environment, the liquidity and collateral component of convenience yields became more important during the onset of monetary tightening in 2022.

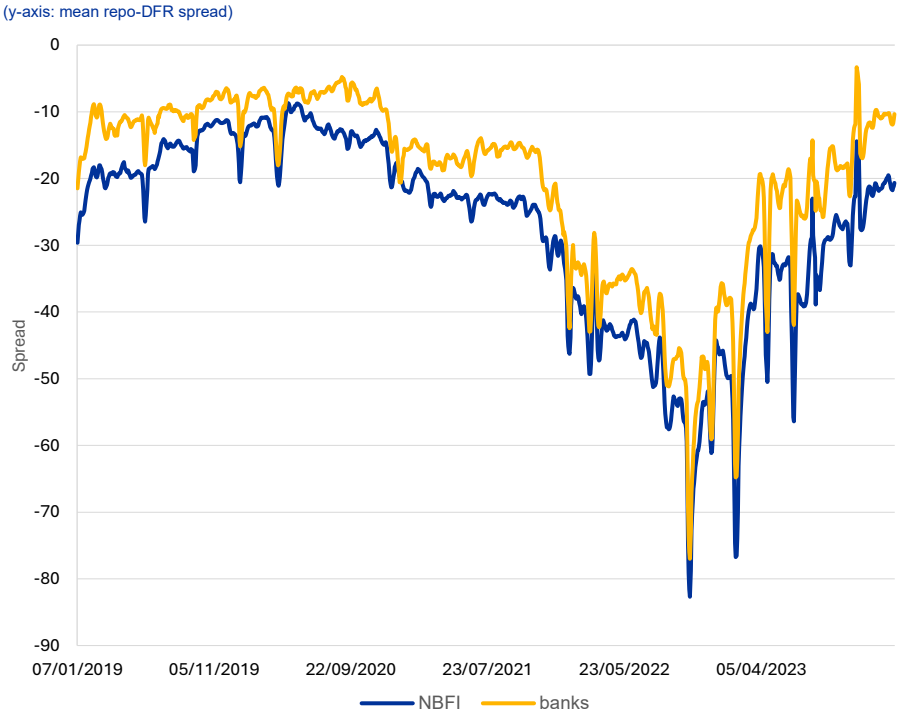
Well-functioning repo markets are essential for the effective transmission of monetary policy, and the design of central bank collateral frameworks can shape market outcomes. Research from the ChaMP network by Greppmair et al. (2025) documents that easing collateral constraints – such as broadening eligibility to include additional non-marketable assets – can release high-quality collateral, thus allowing it to be used in private repo markets and improve market functioning. Collateral scarcity and the functioning of money markets are also tightly linked to financial stability. Collateral serves as the backbone of short-term liquidity provision and balance sheet capacity.

[11] The stability of a trading relationship can significantly shape the terms of trade in a repo transaction (see, for example, Han et al., 2022) and amplify differences among NBFIs.

When high-quality collateral becomes scarce or its perceived quality deteriorates, repo markets can amplify stress through rising haircuts and declining funding liquidity. The global financial crisis of 2007-2009 was triggered by a run on the markets for liquidity, primarily the repo market, in which concerns over the collateral values of assets and market liquidity triggered sharp increases in haircuts, forcing deleveraging and threatening system-wide insolvency (see Gorton and Metrick, 2012). Hence, collateral is not merely a passive buffer but an active state variable: once lenders become reluctant to accept or finance certain collateral, funding conditions can tighten abruptly and propagate across institutions.

Chart 4.2

Repo-DFR spread for German collateral



Notes: The figure shows the unconditional spread for NBFIs and banks, measured as the mean repo-DFR spread based on German collateral and derived from transaction-level estimates using a 5-day moving average.
Source: Aguilar and Vela (2026).

Differences in the pricing of collateral between private markets and central banks can also contribute to systemic risk-taking when banks have incentives to increase their holdings of lower-quality collateral. Jasova et al. (2024) document that lender-of-last-resort policies incentivised euro area banks to increase their pledging and holdings of higher haircut-gap bonds, particularly those issued by systemically important banks. As such, central banks' collateral policies may unintentionally increase systemic interconnectedness in the banking system. These dynamics are also relevant given the growing role of NBFIs and the growing importance of relatively price-sensitive intermediaries (such as investment funds), as well as the closer interconnectedness between NBFIs and banks. The March 2020 "dash for cash" episode showed that mutual fund outflows and fire sale pressures can destabilise even highly liquid bond markets, while repo funding from banks to funds can contract sharply at times of peak stress. Central bank interventions (asset purchases and

liquidity provision to banks) supported financial stability and helped stabilise the system indirectly by improving fund performance and restoring repo lending through banks acting as intermediaries (Breckenfelder and Hoerova, 2025). Collateral scarcity and disruptions in secured funding markets can generate non-linear liquidity spirals, linking monetary policy implementation, NBFI fragility and systemic risk.

Collateral provides a powerful channel linking monetary policy and financial stability through the intermediation of banks and NBFIs alike. The main policy implication is that balance sheet policies (e.g. large-scale asset purchases and collateral frameworks) shape the effective supply of safe collateral available to the private sector. When this supply becomes scarce or unevenly distributed, it can distort repo pricing, amplify heterogeneity across banks and NBFIs, and create unintended side effects. Collateral availability should therefore be viewed as a policy-relevant state variable.

5 Conclusions

This Occasional Paper has synthesised the empirical evidence generated by the Eurosystem's ChaMP Research Network on how the growing role of non-banks affects the transmission of monetary policy. The findings reveal a system in which monetary policy is filtered through diverse non-bank intermediaries with heterogeneous balance sheet structures, funding models and regulatory constraints. These characteristics make transmission more complex, more sensitive to market conditions, and more closely intertwined with financial stability.

A first conclusion is that the expansion of the NBFI sector has not weakened the overall strength of monetary transmission. In aggregate, NBFIs tend to amplify monetary policy transmission within the financial sector, in particular to credit. Short-term funded intermediaries, such as investment funds, money market funds and retail credit firms, tend to amplify contractionary effects, as their funding costs reprice immediately and redemption pressures force asset sales. Long-term funded institutions, including insurers, pension funds and some specialised finance companies, can attenuate the impact of short-term rate hikes for borrowers with pre-existing relationships, although this cushioning is partial and unevenly distributed. Regulatory frameworks also play an important role in how these effects are distributed across sectors. When banks face tighter capital, liquidity or leverage requirements, lending may migrate towards NBFIs, thus changing the channels through which policy affects financing conditions. At the same time, the absence of a direct central bank backstop for NBFIs, combined with their smaller size and lower degree of interconnectedness at the individual level, implies that they often need to adjust their balance sheets more rapidly in response to shocks. This structural asymmetry helps to explain why NBFIs react more procyclically than banks and why amplification is particularly pronounced during periods of stress.

A second conclusion is that monetary transmission through NBFIs is highly state-dependent and interacts closely with financial stability. During periods of financial stress, amplification mechanisms become more pronounced. Fragile investment funds facing outflows may liquidate assets, transmit liquidity shocks to banks through deposit withdrawals, and intensify price pressures in other markets. Insurers and pension funds, while more stable in normal times, can amplify movements in long-term rates, especially when they need to prioritise duration-matching. The absence of direct access to central bank liquidity facilities may reinforce these dynamics, as NBFIs must turn instead to market-based funding and may be forced into rapid deleveraging precisely when markets are least able to absorb it. These patterns go to show that the strength of transmission depends not only on balance sheet structures but also on prevailing market conditions.

A third conclusion is that collateral availability has become a key state variable for monetary policy implementation. Large-scale asset purchases have altered the supply of high-quality collateral, affecting repo market functioning, secured funding costs and the balance sheet capacity of banks and non-banks alike. Collateral scarcity can

dampen or amplify monetary transmission, depending on institutions' holdings of safe assets and their access to central bank facilities. At the same time, the growing role of NBFIs in repo markets means that their behaviour increasingly influences the pricing and distribution of collateral. These developments highlight the importance of collateral frameworks and securities lending facilities in ensuring the smooth transmission of monetary policy.

While the analysis in this paper mainly documents how monetary policy influences NBFI's assets and liabilities, there is still only limited research on how these effects transmit to aggregate demand in the economy, for example through their impact on consumption. The credit channel of monetary policy affects aggregate demand through investment among firms and consumption among households. Many NBFIs primarily lend to, or invest in, large publicly listed firms that face fewer financing constraints and may use additional funding for refinancing or equity payouts rather than new investments. Early evidence from outside the euro area suggests that monetary easing transmitted through NBFIs can increase leveraged payouts without stimulating investment, and that changes in the maturity structure of corporate debt may make firms more or less sensitive to policy shocks. Moreover, general equilibrium effects are not widely taken into account in the analysis.

Finally, the evidence reviewed in this paper resonates with existing international evidence and with the growing body of literature on cross-border spillovers. Given the global footprint of many NBFIs, foreign monetary policy can influence euro area financing conditions through portfolio flows and valuation channels. This international dimension reinforces the need to monitor cross-border exposures and global liquidity conditions.

Overall, the evidence presented in this paper shows that monetary policy in the euro area now operates through a financial system in which the composition, funding structures and interconnectedness of NBFIs matter for both transmission and financial stability. These findings complement and deepen the analysis initiated in the 2021 ECB strategy review (see European Central Bank, 2021) and further developed in the 2025 Monetary Policy Assessment (see European Central Bank, 2025) which emphasised the need to monitor the growing role of NBFIs in monetary policy transmission. Effective policy calibration therefore calls for close monitoring of NBFI liquidity structures, collateral conditions and bank-NBFI linkages, as well as continued progress in data availability and macroprudential tools tailored to market-based finance.

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Sofia Anyfantaki
European Central Bank, Frankfurt am Main, Germany; email: sofia.anyfantaki@ecb.europa.eu

Ricardo Barahona
Banco de España, Madrid, Spain; email: ricardo.barahona@bde.es

Dominic Cucic
Danmarks Nationalbank, Copenhagen, Denmark; email: dc@nationalbanken.dk

Daniel Fricke
Deutsche Bundesbank, Frankfurt am Main, Germany; email: daniel.fricke@bundesbank.de

Philipp Hartmann
European Central Bank, Frankfurt am Main, Germany; email: philipp.hartmann@ecb.europa.eu

Christoph Kaufmann
European Central Bank, Frankfurt am Main, Germany; email: christoph.kaufmann@ecb.europa.eu

Elizaveta Lukmanova
Central Bank of Ireland, Dublin, Ireland; email: elizaveta.lukmanova@centralbank.ie

Angela Maddaloni
European Central Bank, Frankfurt am Main, Germany; email: angela.maddaloni@ecb.europa.eu

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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