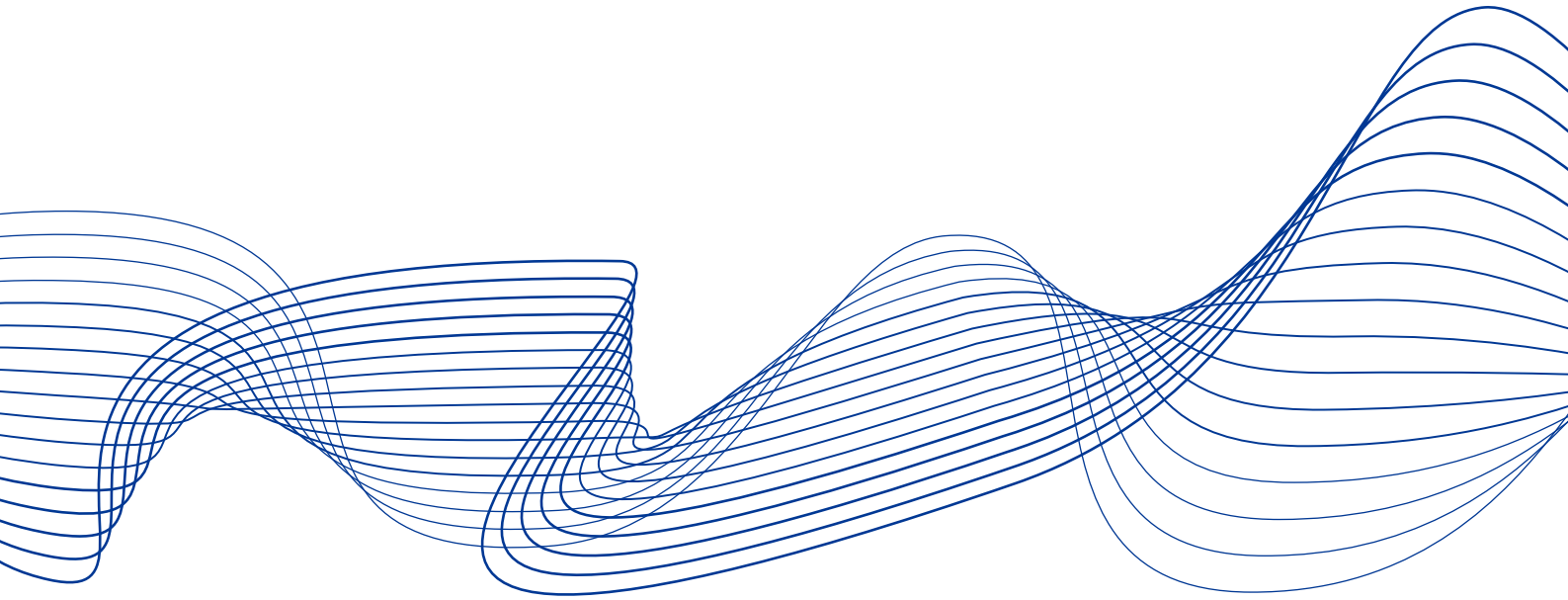
NBFI Monitor

No 7 / July 2022

EU Non-bank Financial
Intermediation Risk Monitor 2022



ESRB
European Systemic Risk Board
European System of Financial Supervision

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Executive summary

The NBFI Monitor 2022 discusses the main developments related to investment funds and so-called other financial institutions (OFIs) in 2021 and provides an initial overview of the developments triggered by the war in Ukraine. Total assets of EU investment funds and OFIs grew by approximately 9% in 2021. This reflected rising valuations across asset classes and inflows on the back of a faster-than-expected economic recovery, with EU GDP growing by 5.3% for the year. Having almost doubled over the past decade, debt financing provided by investment funds and OFIs accounted for 21% of the external debt funding of euro area non-financial corporates at the end of 2021. Russia's invasion of Ukraine in early 2022 post-dates the review period of the report. However, reflecting the profound change in the macroeconomic outlook, this edition provides some initial considerations of the war's impact on investment funds and OFIs.

The report considers structural and cyclical risks that investment funds and OFIs are exposed to. This year's edition emphasises three of them (Figure 1). First, stretched asset valuations amid rising market interest rates increase the risk of a disorderly market correction which could lead to losses and increased investor outflows. When faced with substantial redemption requests, investment funds holding less liquid assets could suffer liquidity strains. Second, after a break during the acute stress observed in the first half of 2020, the rise in liquidity and credit risks resumed, with bond fund portfolio holdings further exposed to lower-rated and less liquid fixed income securities. Finally, vulnerabilities associated with excessive use of leverage, as well as interconnectedness within the monitoring universe and with other parts of the financial system, could possibly lead to contagion and magnify shocks to financial stability.

To support the identification of risk, the NBFI Monitor 2022 includes three special features. These special features report on exercises carried out to complement the main monitoring sections and provide a deep dive into specific risks and vulnerabilities of investment funds and OFIs.

- Leverage. The first special feature investigates how Archegos – a US family office pursuing hedge fund strategies – used derivatives to obtain high levels of leverage. Using supervisory data from the European Market Infrastructure Regulation (EMIR), Archegos positions with EU counterparties are tracked to show that high leverage and high concentration risks were already visible in early 2021, a few weeks before the collapse of the firm. While the analysis shows how EMIR data could be used for risk monitoring, deficiencies in the data still need to be addressed. Further progress on data management, including the merging of different regulatory datasets is also required to allow for a more comprehensive risk assessment.

- A disorderly bond market correction could lead to the materialisation of liquidity risk. The second special feature estimates the mark-to-market valuation impact of a sudden rise in market interest rates of 100 basis points, using a sample of the largest EU bond funds. An increase in interest rates would lead to mark-to-market losses on the bond portfolio of funds (around 4% of net asset value, NAV), although the impact on individual funds varies widely. For some funds, the impact is mitigated by the use of interest rate derivatives (IRDs) to hedge this risk, while for others, derivatives increase exposure to interest rate risks, thereby magnifying potential losses. Large losses could lead to increased redemptions and result in

amplification effects, as asset fire sales could further exacerbate the initial shock to bond prices.

- Interconnectedness. The third special feature examines the specific characteristics of alternative investment funds (AIFs) held by insurance companies. Insurance companies are among the most important investors in AIFs, and such linkages within the non-bank financial system could contribute to the propagation of risk. Risks related to liquidity mismatch and leverage are similar across AIFs, irrespective of whether insurance companies hold a large proportion of funds' assets. While linkages with insurers do not increase the level of risk for AIFs, a more in-depth analysis – which is currently not possible due to data constraints – could shed more light on the financial stability implications of interconnectedness between the two sectors.

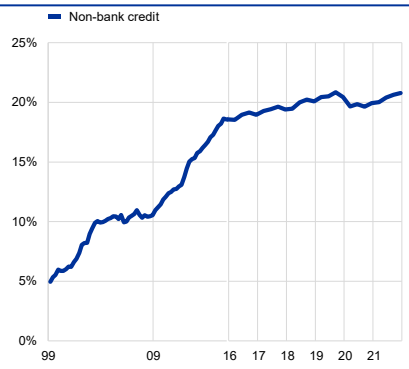
The monitoring universe of the report includes all investment funds and OFIs. Thus, banks, insurance companies, pension funds and central counterparties (CCPs) are not covered. As investment funds and OFIs participate in a range of financial markets, including derivatives, security financing and securitisation, entity-based monitoring is complemented by activity-based monitoring to provide a holistic assessment of financial stability risks.

Figure 1

Summary of main trends and risks in non-bank financial intermediation

Provision of credit has increased further

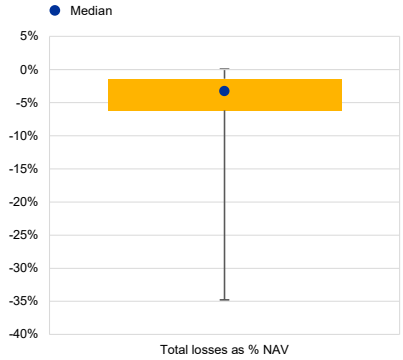
- In size, reflecting valuations and inflows
- In funding to NFCs



Non-bank credit as a percentage of NFC credit from financial institutions
Source: ECB.

Risks of disorderly correction

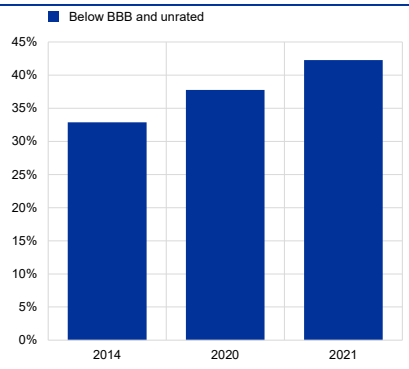
- Abrupt shift in risk appetite and/or monetary policy expectations could lead to losses and materialisation of liquidity risk



Bond fund valuation losses for a 100 basis point interest rate shock
Sources: EMIR, Refinitiv Lipper, Bloomberg, ESRB.

Credit and liquidity risks remain high

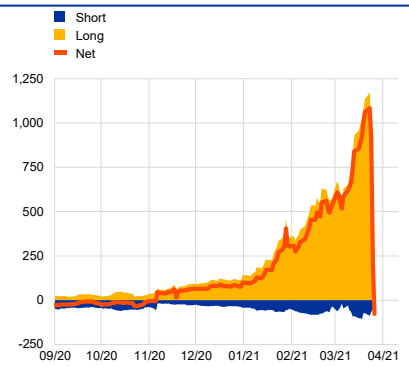
- Liquidity transformation and rise in credit exposures by investment funds pose risks of (abrupt) losses to investors and markets



Share of below BBB and unrated bonds in bond fund portfolio
Sources: Thomson Reuters Lipper, ESMA and Standard & Poor's.

Structural vulnerabilities could magnify shocks

- Use of leverage
- Interconnectedness between non-bank financial intermediaries



Value of Archegos equity swaps rebased at 100 = 31 December 2020
Sources: EMIR, ESMA.

Source: ESRB.

1 Overview

The NBFI Monitor 2022 discusses the main developments related to investment funds and OFIs in 2021, along with the systemic risks and vulnerabilities to which the sector is exposed. The report covers all investment funds and OFIs, while excluding banks, insurance companies, pension funds and CCPs. As investment funds and OFIs participate in a range of financial markets, including derivatives, security financing and securitisation, entity-based monitoring is complemented by activity-based monitoring to provide a holistic assessment of financial stability risks. Despite the ongoing coronavirus (COVID-19) pandemic, an economic recovery amid benign financial conditions[1] during the review period fostered financial market growth and the expansion of the monitoring universe. A continued rise in valuations, reflected by increasing equity market indices and falling corporate bond spreads[2], and inflows from investors indicated a further strengthening of risk appetite among market participants (Chart A-4).

This year's edition of the report includes an initial overview of developments triggered by the Russian invasion of Ukraine at the end of February 2022. The direct effects of the war were small, as holdings of Russian assets by European investment funds and OFIs were small and there were few direct connections with Russian entities (Box 1). The indirect effects are more difficult to trace and might take time to materialise. Next year's NBFI Monitor will consider developments during 2022 in more detail.

Box 1

The invasion of Ukraine by Russia – initial overview of the impact on non-bank financial intermediation

The invasion of Ukraine by Russia at the end of February 2022, and the sanctions introduced in response, caused disruptions to the real economy and financial markets. This had immediate direct and indirect immediate effects on investment funds and OFIs. Beyond that, investment funds and OFIs are also vulnerable to second-round effects.

Direct impact: small but concentrated in a few institutions

At the end of 2021 investment funds and OFIs' direct holdings from Russian issuers amounted to less than €45 billion and consisted primarily of listed shares (Chart A). They subsequently dropped to less than €10 billion at the end of March 2022, reflecting a decline in prices.

1 The daily average of the Bloomberg Euro Area Financial Conditions Index reached 0.55 in 2021, compared with -0.35 in 2020. The index tracks the overall level of financial stress in euro area money, bond and equity markets. A positive value indicates accommodative financial conditions, while a negative value indicates tighter financial conditions.

2 The EURO STOXX index rose by 20.4% in 2021, while the S&P500 fell by 26.9%. Euro area corporate bond spreads fell both for investment grade and high yield instruments by 141 basis points and 34 basis points, respectively.

Chart A

Holdings of Russian assets by euro area investment funds and OFIs

(left-hand scale: EUR billions; right-hand scale: percentages of total assets)

Sources: SHS, SFTR and ESRB calculations.

For both investment funds and OFIs exposure to foreign currency derivatives related to the rouble increased in the first two months of 2022 and subsequently dropped to €10 billion and €22 billion, respectively, in April 2022. While investment funds had no outstanding derivative transactions with Russian counterparties, OFIs went from €43 billion in outstanding transactions in December 2021 to €27 billion in April 2022 (Chart B). Combined gross notional exposures on Russia sovereign credit default swaps (CDSs) amounted to €2.2 billion at the end of April 2022. These were split into €0.79 billion for OFIs (mainly broker-dealers) and €1.4 billion for investment funds. OFIs had balanced exposures, with net exposures amounting to less than €200 million. By contrast, investment funds tended to have directional exposures: net exposures were negative at around -€0.5 billion, implying that some funds were selling CDSs on Russia, thereby increasing their exposure to sovereign credit risk (Chart C).

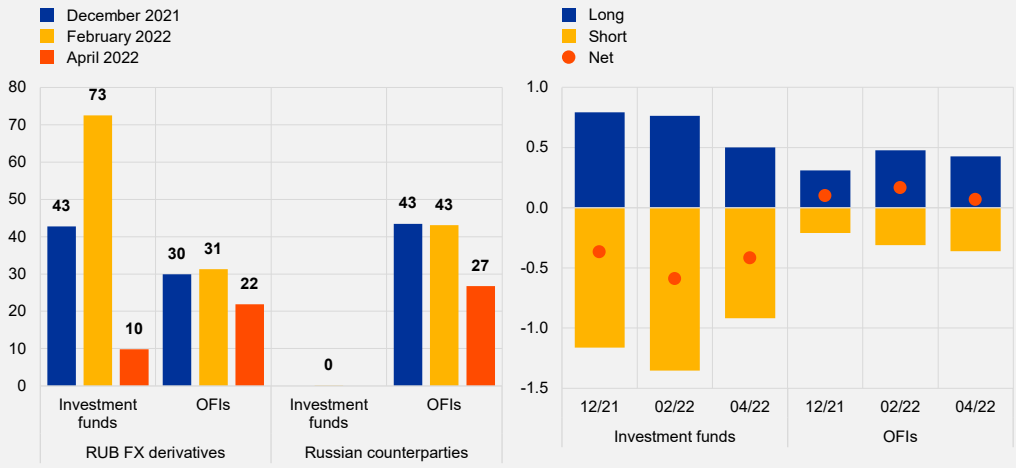
The invasion of Ukraine has so far not triggered long-lasting or large-scale outflows from broader euro area fund categories, especially compared with the flow patterns observed at the start of the COVID-19 pandemic in 2020.[3] However, sanctions on Russian entities, a ban on transactions carried out by foreign investors on the Moscow Exchange and the exclusion of Russian instruments from many benchmark indices have resulted in valuation challenges for funds holding Russian assets. As of 7 April 2022, 123 EU funds – including exchange-traded funds (ETFs) and one money market fund (MMF) with net assets amounting to €13.5 billion – suspended redemptions, as managers were unable to determine the fair value of the portfolio. In some cases, investment funds set up side pockets to separate Russian instruments from the portfolio and thus mitigate liquidity risk.

[3] See Section 4.2, **Financial Stability Review**, ECB, May 2022.

Charts B and C

Exposures of EU investment funds and OFIs to derivatives (left panel) and CDSs on Russian reference entities (right panel)

(EUR billions)



Sources: EMIR and ESRB calculations.

Indirect impact: high levels of volatility and price increases in commodity markets resulted in large margin calls for cleared derivatives, which could potentially lead to the materialisation of liquidity risks

Russia and Ukraine's roles in global commodity supply led to rapid commodity price increases and to high volatility in related derivatives. In early March, prices on energy commodities such as oil and natural gas soared. As prices rose, counterparties with short positions had to post variation margins to cover mark-to-market losses. On top of this, due to elevated volatility, all counterparties had to post additional initial margins, especially on centrally cleared contracts, to cover potential future losses from market moves in the event of counterparty default. Clearing members passed on the increase in margins posted to CCPs to their clients. This was particularly challenging for energy producers, which use the derivative markets for hedging, as they faced large liquidity demands during this period.

The rise in prices and volatility also affected other commodities, including metals. On the London Metal Exchange (LME), nickel prices surged after a market member started reducing its substantial short positions on both exchange-traded and over-the-counter (OTC) nickel derivatives (by buying nickel futures). After the surge in nickel prices, the LME suspended nickel trading for five days on 8 March, and cancelled trades already concluded on that day, a decision subject to regulatory scrutiny and legal disputes.[4] During the market closure, positions and prices on the LME were not updated and there were no margin calls. The nickel event underlines that large, concentrated positions unknown to market participants and regulators – such as in the Archegos case – and a

[4] See **Joint statement from UK Financial Regulation Authorities on London Metal Exchange and LME Clear**.

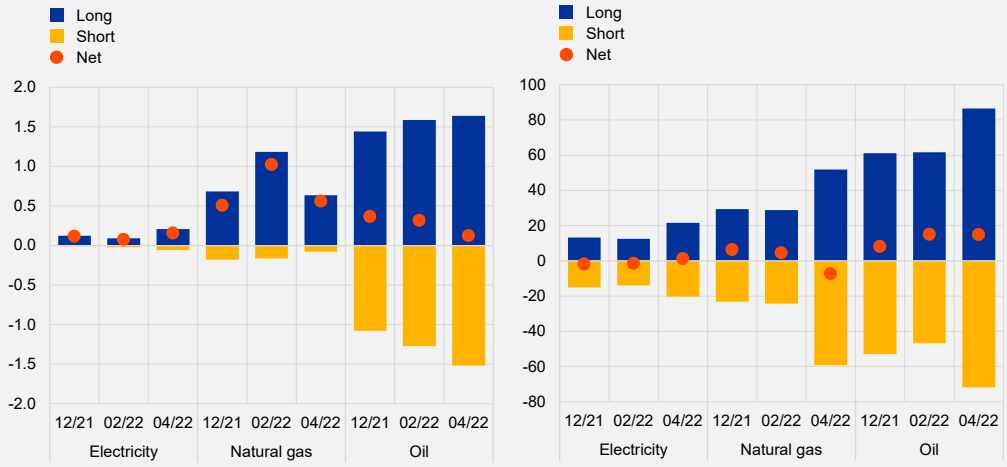
lack of robust circuit breakers can trigger procyclical effects and the disorderly functioning of markets.

Exposures of investment funds to energy derivatives are small (less than €3 billion in notional values in April 2022) and are mostly concentrated in hedge funds and commodity funds. Investment funds have long aggregate positions in electricity, natural gas and oil derivatives, with most directional exposures in natural gas derivatives (Chart D). In the OFI sector, derivatives dealers have relatively large but balanced exposures to energy derivatives, while commodity traders have smaller but directional exposures. OFIs' aggregate net position in natural gas derivatives went from €6.3 billion in December 2021 to -€7.4 billion in April 2022, while in oil derivatives it increased from €8.1 billion to €14.7 billion, signalling a change in the strategy of many commodity traders (Chart E). AIFs' exposures to physical commodities amounted to €3.1 billion at the end of 2021 and accounted for 0.04% of net exposures.

Charts D and E

Exposure to energy derivatives of investment funds (left panel) and OFIs (right panel)

(EUR billions)



Sources: EMIR and ESRB calculations.

Second-round effects: rising market interest rates and lower economic growth could pose risks over the medium term

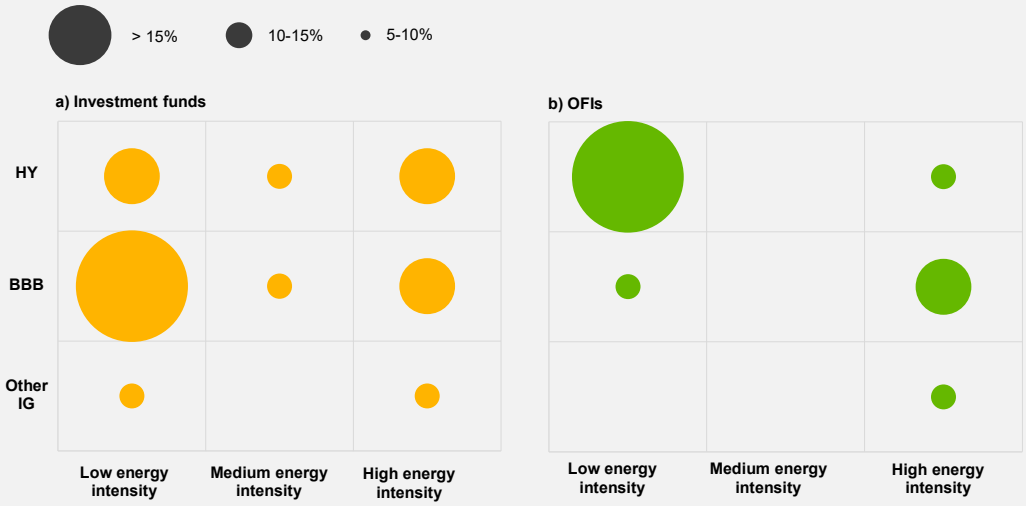
Overall, the war exposed investment funds and OFIs to a high degree of uncertainty and possible second-round effects, not least given their complex linkages to the macroeconomic environment and interconnections in the financial system. While inflation had already started to increase in the second half of 2021, it accelerated after the start of the war and led to a tightening of financial conditions. Higher interest rates could trigger the materialisation of losses from high-duration holdings of bond funds. Beyond inflation, a worsened economic outlook could lead to a deterioration of credit risk. Euro area investment funds and OFIs invested a large share of their non-financial corporation (NFC) bond portfolios in corporates from energy-intensive sectors with lower credit quality. Such portfolio holdings increase the credit risk resulting from rising energy

prices (Chart F). [5] A sensitivity analysis suggests that a downgrade of all BBB-rated bonds issued by corporates from energy-intensive to high-yield sectors could lead to losses of close to 8% for investment funds and close to 4% for OFIs in their NFC bond portfolios.[6] Amid low liquidity buffers in some bond fund categories, losses from duration or credit exposures could trigger outflows and lead to forced sales, which could further amplify negative market dynamics (see Section 3.1.1).

Chart F

Holdings of non-financial corporate debt by credit risk and sector energy intensity

(Q4 2021, percentages of total NFC bond portfolio)



Sources: OECD, ECB (securities holding statistics) and ECB calculations.
*Notes: Broad NFC sectors by relative usage of energy input are derived from OECD input-output tables in 2019 (methodology based on box entitled "**Natural gas dependence and risks to euro area activity**", Economic Bulletin, Issue 1, ECB, 2022). Firms in sectors above the 75th percentile of the energy intensity ratio are regarded as high-energy consumers, and firms in sectors below the 25th percentile are considered low-energy consumers. The chart excludes all bonds without available ratings. See also Section 4.1, **Financial Stability Review**, ECB, May 2022.*

1.1 Developments in main aggregates

Although the COVID-19 pandemic continued to determine financial sector developments in 2021, vaccination progress and authorities' responses facilitated a faster-than-expected recovery in economy activity and financial markets. Despite the challenges posed by the COVID-19 crisis, EU economic activity recovered substantially in 2021, with real GDP growing by 5.3% according to Eurostat. After price and liquidity dislocation occurred in several markets during 2020, financial market conditions improved in 2021, thanks in part to ongoing policy support.

5 Overall, the impact from rising energy prices will vary depending on the portfolio allocations within these broad sectors and the extent to which companies can pass on higher energy prices to their customers.

6 Based on the average difference between the yield to maturity of HY and BBB-rated corporate bonds and the average duration of these holdings.

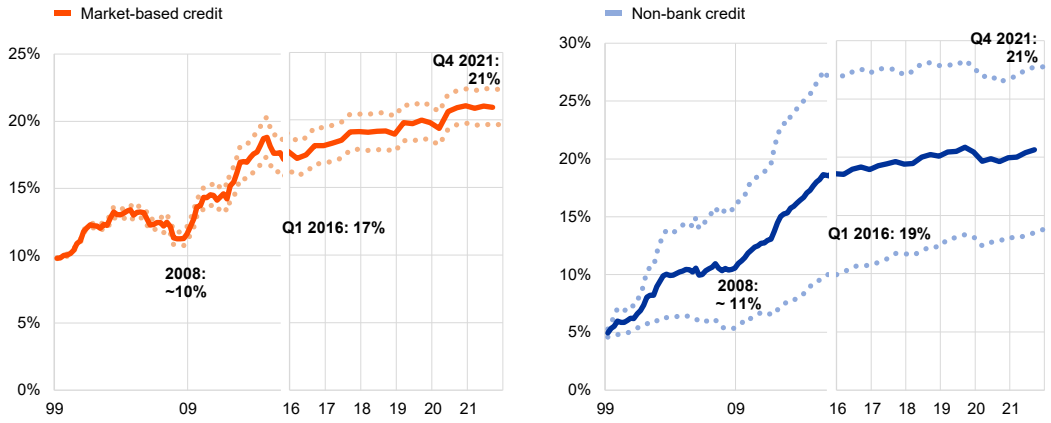
However, underlying vulnerabilities related to high levels of private and public sector indebtedness and the economic outlook remain subject to uncertainty looking forward.

The share of credit that euro area NFCs obtain from the institutions which constitute the monitoring universe and financial markets has grown strongly since the global financial crisis. Market-based credit – i.e. intermediated via markets in the form of debt securities and non-retained securitised loans (irrespective of the type of institution that provides financing) as opposed to loans typically originated by banks – now accounts for 21% of total external credit to NFCs (instrument-based measure, Chart 1). Non-bank credit, where the ultimate lenders are investment funds and OFIs (irrespective of the mode of financing provided in the form of loans or debt securities), makes up around 21% of total credit to NFCs from financial institutions (entity-based measure, Chart 2). Both measures have roughly doubled over the last decade but were little changed in 2021.[7]

Charts 1 and 2

Market-based (left panel) and non-bank credit (right panel) to euro area NFCs

(percentages of NFC credit from financial institutions)



Sources: ECB (euro area accounts, balance sheet item statistics, financial vehicle corporation statistics) and ECB calculations.
*Notes: Market-based credit reflects the share of market-based debt finance (debt securities and non-retained securitised loans) relative to the total external debt of euro area NFCs, irrespective of which sector provided the credit. Non-bank credit reflects the relative share of the investment funds and OFIs in providing debt financing to euro area NFCs compared with credit provided by all financial institutions (the non-bank financial sector and banks), irrespective of whether that financing is provided in the form of loans or debt securities. The solid line reflects an average of the dotted lines, which include (dotted line at the top) or exclude (dotted line at the bottom) loans granted by a residual of OFIs. The methodology is the same as described in Box 2, "**Financial Integration and Structure in the Euro Area**", ECB, April 2022, but insurance corporations and pension funds are excluded.*

From a flow perspective, net finance raised by euro area NFCs declined in 2021 compared with 2020, but the issuance of listed shares surged. Financing obtained through direct bank loans and debt securities issuance decreased in 2021, having risen sharply in 2020 as a result of precautionary funding in the context of the pandemic (Chart A-1). By contrast, funding raised through listed shares grew in 2021, reflecting high equity valuations.

[7] See Box 2, "**Financial Integration and Structure in the Euro Area**", ECB, April 2022.

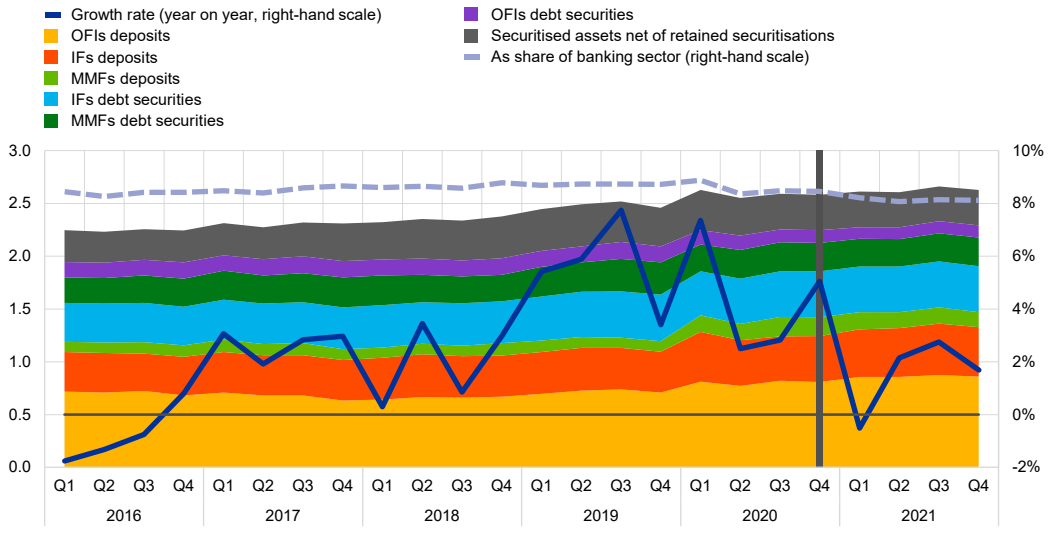
The size of the monitoring universe increased across most sub-sectors in 2021. As the economy recovered and asset prices increased, total assets of EU (euro area) investment funds and OFIs amounted to €42.6 trillion (€40.4 trillion) at the end of 2021, compared with €39.0 trillion (€37.0 trillion) at the end of 2020 (Chart A-2). This mainly reflected an increase in investment funds' assets under management (AuM). Assets in investment funds rebounded throughout 2021, supported first by strong valuation gains during this period (Chart A-4.1) and by inflows. Among funds domiciled in the euro area, net assets of equity funds grew most markedly during 2021, with 70% of this growth attributable to valuation gains. The EU OFI sector was larger than the investment fund sector, but in 2021 grew on a much smaller scale (Chart A-4.2). Overall, the monitoring universe of the report accounted for 38% of the assets of the European financial sector (Charts A-3.1 and A-3.2).

Investment funds and OFIs remain an important source of funding for the banking sector. Debt and equity instruments issued by investment funds and OFIs, together with loans provided to them accounted for more than 7% of credit institutions' assets in 2021 (Chart A-9). Meanwhile, deposits from investment funds and OFIs accounted for approximately 6% of bank liabilities (Chart A-10). Wholesale funding provided by investment funds and OFIs to the banking sector increased by 1.7% and reached €2.6 trillion (Chart 3). Much of the change in funding was attributable to growth in deposits by non-MMF investment funds and OFIs. Interconnectedness between the banking sector and the monitoring universe of the report is beneficial for the economy, but it can also exacerbate shocks in the event of a crisis. Linkages between sectors can also take the form of ownership ties, as most of the largest 25 asset management companies operating in the EU are owned by banks (Chart A-18).

Chart 3 (A-8 in the statistical overview)

Wholesale funding provided by euro area investment funds and OFIs to the euro area banking sector

(left-hand scale: EUR trillions; right-hand scale: percentages)



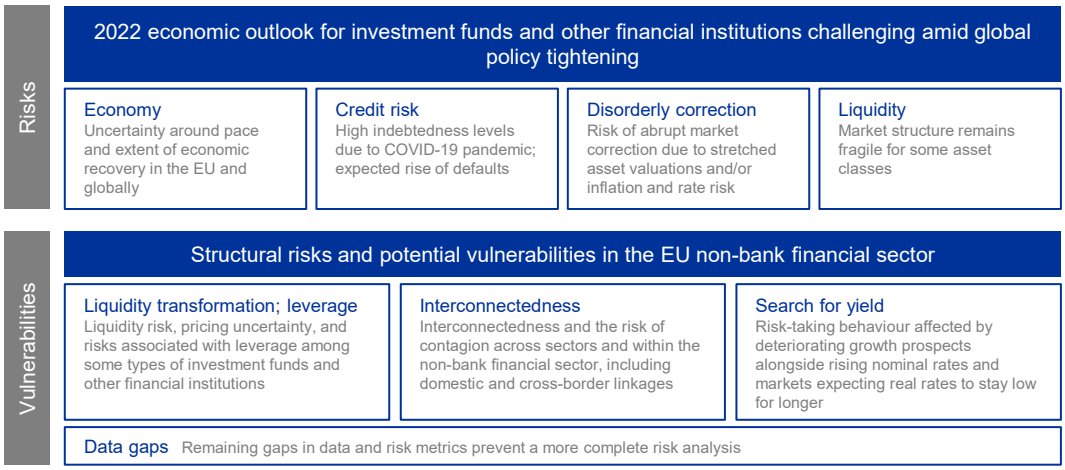
Sources: ECB and ESMA calculations.
Notes: The wholesale funding measure is the sum of: MFI funding arising from securitisation; IF, MMF and OFI deposits at euro area MFIs; and IF, MMF and OFI holdings of debt securities issued by euro area MFIs. "OFIs" reflects the difference between the total financial sector and the known sub-sectors in the statistical financial accounts (i.e. assets from the banking sector, insurance companies, pension funds, FVCs, IFs and MMFs).

1.2 Overview of risks and vulnerabilities

The growth of investment funds and OFIs contributes to increased diversification of funding sources for NFCs and risk-sharing across the financial system, but it can also result in new risks and vulnerabilities. Risks related to uncertainty about the economic environment, overindebtedness and fragile liquidity in some parts of the financial market, as well as risks stemming from increased risk-taking and interconnectedness, persisted in 2021. This year's edition also considers the risks of a disorderly market correction and low levels of real interest rates (Figure 2).

Figure 2

Risks and potential vulnerabilities in EU non-bank financial intermediation



Source: ESRB.

Alongside these vulnerabilities, problems related to data – gaps, poor quality and availability – still prevent a more comprehensive risk assessment in some parts of the monitoring universe. In the investment fund sector, the lack of a harmonised reporting framework for undertakings for collective investment in transferable securities (UCITS) makes the assessment of risks challenging, although there have been proposals by the European Commission to close this gap[8]. In the AIF sector, there is little visibility on the use of leverage by private equity (PE) funds, since they do not report exposures at the portfolio company level. Different reporting frequencies for AIFs as well as the long time lag between collection and provision of the data further complicate the monitoring of risks. Regarding OFIs, little is known about captive financial institutions (CFIs), and important gaps remain around OFI residuals. Data on short-term funding markets in which MMFs operate continue to be scarce, especially regarding secondary market activity (see Box 2). Despite substantial progress, incomplete and incorrect reporting under the Alternative Investment Fund Managers Directive (AIFMD), EMIR and Securities Financing Transactions Regulation (SFTR) hampers risk monitoring. Though data quality continues to improve, there is still scope for

[8] See **Proposal for a Directive of the European Parliament and of the Council amending Directives 2011/61/EU and 2009/65/EC as regards delegation arrangements, liquidity risk management, supervisory reporting, provision of depositary and custody services and loan origination by alternative investment funds**, 25 November 2021, COM/2021/721 final, 2021/0376 (COD).

enhancements to better capture the vulnerabilities of investment funds and OFIs and to inform macroprudential policy decisions. Risk monitoring would also benefit from enhanced and reciprocal data-sharing arrangements between all institutions with a financial stability mandate.

Box 2

ESRB Occasional Paper on the European market for short-term debt securities

Short-term debt securities represent the primary underlying assets for money market funds (MMFs), some of which had to withstand considerable redemption pressure during the COVID-19 market turmoil. At that time, against the backdrop of a worsening global pandemic and growing cash needs among economic agents, the market for short-term debt instruments in the EU faced a sudden and unexpected freeze. Following an unprecedented extension of central bank asset purchases in the corporate commercial paper (CP) market segment, the market slowly resumed activity in early April 2020. In the process of developing its MMF-focused policy recommendations to the European Commission, the General Board of the European Systemic Risk Board (ESRB) asked for further analysis along two dimensions – a deeper analysis of investors' motivations to redeem from MMFs and a study of MMFs' underlying assets – to ensure that MMFs are considered within the broader short-term funding ecosystem.

The upcoming ESRB Occasional Paper takes stock of the information and data sources publicly available on the market for short-term debt instruments in Europe.[9] It seeks to (i) clarify the concepts and terminologies used for the various instruments, (ii) shed light on data gaps and overlaps in coverage by existing data providers, and (iii) identify unaddressed vulnerabilities in this segment. The study highlights the fragmented nature of the short-term debt market, with two main trade names: NEU CP (Negotiable European Commercial Paper) in France and Euro CP mainly in the United Kingdom, cohabiting with other smaller domestic CP and certificate of deposit (CD) markets and even more fragmented sovereign treasury bills markets. Collectively, these instruments are commonly referred to as money market instruments (MMIs).

The degree of transparency and oversight varies widely across instrument types. MMIs are not necessarily considered transferable securities depending on whether instruments are admitted to trading on a trading venue. This implies that transactions do not need to be reported to market regulators in line with the Markets in Financial Instruments Directive II (MiFID II). Additionally, MMIs are explicitly excluded from the scope of the Prospectus Regulation, and their issuance programmes are therefore not supervised by market authorities. In the case of the NEU CP segment, French law assigns clear supervisory powers to the Banque de France, which collects and publishes a large amount of data on the primary market, contributing to its transparency. By contrast, there is much uncertainty as to which authority (if any) is in charge of the oversight of Euro CP, and public data sources do not provide a consolidated and consistent picture of the market segment. STEP (Short-Term European Paper), a label set up by European business associations, provides for some compulsory data disclosure to the ECB. However, it does not distinguish NEU CP from Euro CP or from other domestic CP and CDs, while covering these market segments only

[9] For a preliminary version of this paper, see Darpeix, P-E., "**The market for short-term debt securities in Europe: What we know and what we do not know**", *Risk and Trend Mappings*, working paper series, Autorité des marchés financiers (AMF):, March 2022.

partially. As various data sources have incomplete albeit partially overlapping scopes, it is difficult to obtain a comprehensive and consolidated overview of the short-term debt market across its segments.

The study offers an initial assessment of the overall size of the short-term debt securities market. Calculations based on the Centralised Securities Database (CSDB) provide a first comprehensive and consolidated estimate of the outstanding amount corresponding to short-term debt instruments in Europe: more than €2.2 trillion as of the end of 2020 (Chart A). The analysis provides breakdowns by issuer and instrument types, alongside currencies (despite limitations concerning the accuracy of security type indications and a lack of proper identification of NEU CP). The very high and stable amounts outstanding suggest a substantial degree of rollover activity, hinting at likely maturity and liquidity transformation by the issuers.

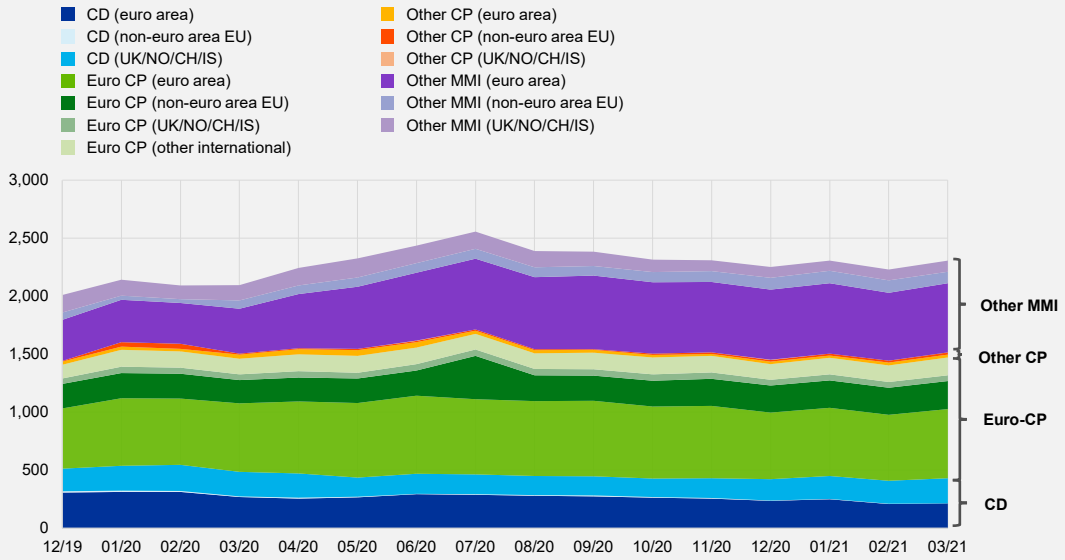
Beyond the amounts outstanding, there is very little consistent information that could help shed light on market functioning. Public information on MMIs' secondary market activity is scarce, preventing any assessment of liquidity, for example through quoted bids and offers, transacted prices and volumes. Issuer programmes' short-term credit ratings (if any) are not easily accessible, eligibility for central bank interventions is not always straightforward, and quantitative information on the role of brokers in the intermediation process as well as on their balance sheet capacity is scarce.

The paper concludes that more work is needed to gain a better understanding of the short-term funding ecosystem, a necessary step to improve its regulation, oversight and functioning. Enhanced transparency, standardisation and disclosure of transactions would allow further insights to be obtained on the functioning of the market and its weaknesses. This in turn would enable policy proposals to be considered in order to ensure that it operates more effectively, especially in times of stress.

Chart A

European short-term debt securities market

(EUR billions)



Source: CSDB.

Notes: The market for short-term debt instruments in Europe is broken down along several dimensions. First, it distinguishes the four main types of instruments identified in the CSDB (CDs/Euro CP/Other CP/Other MMIs). It also distinguishes the domicile of the issuer: euro area, EU outside of the euro area (non-euro area EU), other western European countries (United Kingdom, Norway, Switzerland, Iceland), and for Euro CP, other international issuers.

1.2.1 Cyclical risks

Economy

Uncertainty around the pace of economic recovery could affect economic activity. While in the first half of 2021 the EU economy started to recover from stress related to the pandemic, in the second half of the year supply chain disruptions continued and energy prices increased, adding to inflationary pressures. These accelerated after the review period, as a result of Russia's invasion of Ukraine. A faster-than-expected recovery in economic activity is therefore at risk of being derailed, as the tightening of financial conditions could possibly impair the real economy.

Credit risk

High private and public sector indebtedness in the wake of COVID-19 could trigger defaults. Debt levels substantially increased due to the pandemic and the related policy support. While default rates remained low, uncertainty around economic activity could lead to liquidity strains and insolvencies of issuers and increase credit risks for creditors. A combination of monetary policy

tightening, a slowdown in economic growth and new public spending induced by the geopolitical developments could raise sovereign debt sustainability concerns. The share of debt securities held by EU bond funds with a credit rating below investment grade reached 29% in 2021 (Chart 4).

Disorderly market correction

The substantial increase in asset valuations observed in 2021 raises the risk of a disorderly market correction. Financial markets and especially equity markets were buoyant in 2021, resulting in a sharp rise in the NAV of investment funds. Increased deviations in returns from historical averages and price misalignments relative to fundamentals point to a heightened risk of a disorderly market correction.[10] Some market corrections have already taken place during the first half of 2022, albeit in an orderly manner. Deteriorating growth prospects alongside a tightening of financial conditions could exert further downward pressure on asset valuations.

A disorderly market correction could trigger procyclical effects, especially for investment funds. If equity and fixed income valuations were to suddenly drop, investment funds would experience mark-to-market losses, which could be followed by investor redemptions. Such outflows could in turn lead funds to sell assets, putting further downward pressure on asset prices. Price and liquidity effects could be amplified by the use of leverage, as losses would be magnified, and funds could face further liquidity pressures stemming from variation margins on derivatives exposures.

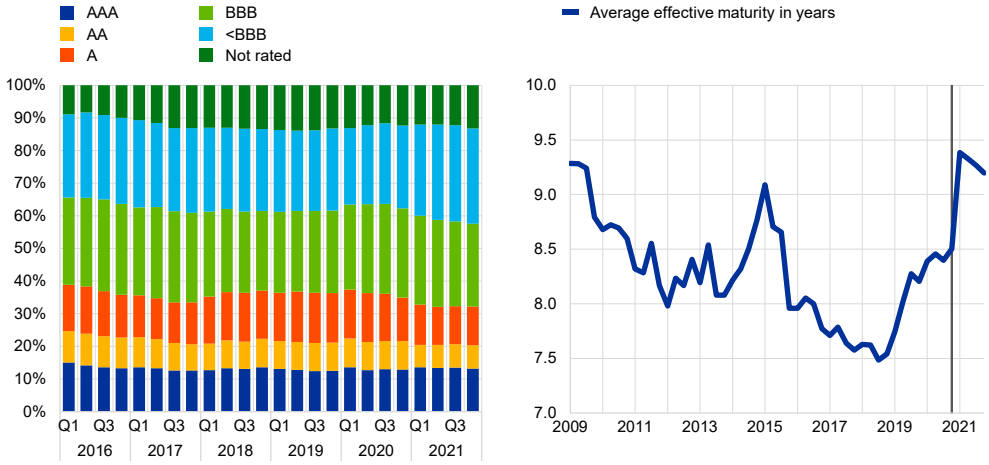
A further large increase in market interest rates would have a major impact on bond funds, especially if this risk is not hedged. Inflationary pressures, stemming from supply chain disruptions, pent-up demand, and a rise in commodity prices associated with geopolitical tensions, lead to expectations of monetary policy normalisation, and in turn to an increase in market rates during the first half of 2022. Bond funds increased the maturity of their portfolios in 2021, reflecting the rise in long-term issuance by entities (Chart 5). As bonds of longer maturity tend to be more sensitive to changes in interest rates, further rise in rates could lead to material mark-to-market losses on funds' bond portfolios. It could also amplify liquidity risks if bond funds use derivatives to increase their exposure to interest rate risk (see special feature on bond funds and interest rate risk).

[10] See **Global Financial Stability Report**, IMF, October 2021, and **Financial Stability Review**, ECB, November 2021.

Charts 4 and 5 (A-21 and A-22 in the statistical overview)

EU bond funds: average rating of fund holdings (left panel) and weighted average effective maturity of assets (right panel)

(Chart 4: share of total assets; Chart 5: years)



Sources: Thomson Reuters Lipper, Standard & Poor's and ESMA.

Liquidity

Market liquidity improved in 2021, but the market structure remains fragile. While liquidity indicators such as bid-ask spreads and market depth point to benign liquidity conditions, in times of stress they can deteriorate quickly. Brittle liquidity provision relates to the move from a dealer warehousing model (where banks use their balance sheets to provide liquidity) to a broker-based model (where intermediaries mainly act as pass-through vehicles). In addition, due to improvements in trading technology (e.g. algorithmic trading) and the development of electronic markets, liquidity conditions can change more rapidly, as liquidity providers can quickly withdraw from the market. Lower market liquidity in stress conditions could put further pressure on investment funds and OFIs performing liquidity transformation.

1.2.2 Structural risks

Liquidity transformation and leverage

Investment funds continue to perform a high level of liquidity and maturity transformation. The share of liquid assets in funds' portfolios has continued to decline, as funds have increased their holdings of longer-dated, higher-credit-risk and lower-liquidity instruments. Such trends reflect the further risk-taking and search for yield by investment funds and OFIs.

The use of financial leverage remains low at an aggregate level, but synthetic leverage using derivatives remains a key concern. While most funds do not rely substantially on financial leverage, hedge funds and real estate (RE) funds are more dependent on direct borrowing from financial institutions. Derivatives can be used to increase exposures ("synthetic leverage") and could amplify risks to the financial system. The collapse of Archegos in 2021 showed how risks around leverage and concentration can crystallise and lead to substantial losses for counterparties (see special feature on Archegos and synthetic leverage).

Interconnectedness

Interconnectedness within the monitoring universe continued to increase on the asset side. Investment funds' exposures to OFIs and non-MMF investment funds grew by more than 20% and accounted for close to 50% of all funds' exposures in 2021 (Chart A-19). By contrast, exposures to monetary financial institutions, as well as insurance companies and pension funds remained stable at 11% and 1% of total exposures, respectively (Chart A-20).

Investment funds are predominantly held by other non-bank financial institutions and non-residents. Insurance and pension funds are the largest domestic investors in euro area non-MMF funds, at around 25%, followed by households at 19% and investment funds (which invest in other funds) at 16% (Chart 6). Investors outside of the euro area account for the largest holdings, at 31% of non-MMF funds' and 62% of MMFs' shares (Chart 7). Therefore, shocks to the investment fund sector could affect other non-bank financial institutions and have cross-border implications (see special feature on risks related to insurance holdings of AIFs).

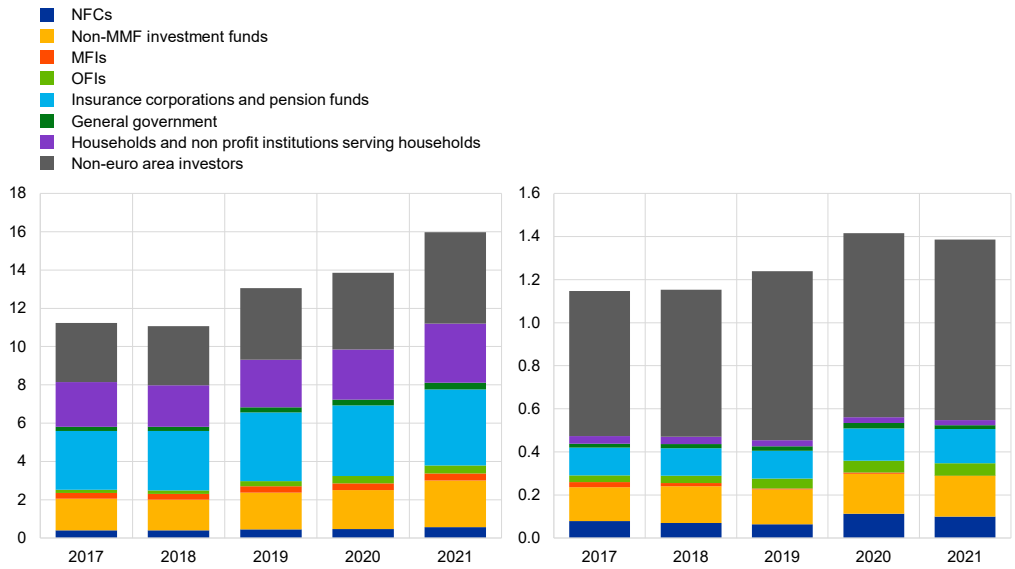
Search for yield

The changing rate environment and lower growth prospects could affect incentives to search for yield. The low rate environment has in the past provided incentives for investment funds and OFIs to increase their holdings of riskier assets (characterised by higher credit and/or liquidity risk) to improve their nominal returns. The shift to a lower-growth, higher-inflation environment has materially changed the risk outlook. Rising interest rates and lower growth prospects could reduce risk appetite among investment funds and OFIs. However, incentives to search for yield might yet continue to play a role, as markets expect inflation-adjusted rates to stay low for longer.

Charts 6 and 7

Investors in euro area non-MMF investment funds (left panel) and MMFs (right panel)

(EUR trillions)



Source: ECB QSA.

1.3 Engagement in certain risky activities

The monitoring framework considers how investment funds and OFIs are involved in certain risky activities and how these activities might have an impact on financial stability. Table 1 provides an overview of such risky activities carried out by the entities considered in this report, including liquidity and maturity transformation, leverage, interconnectedness with the banking system and credit intermediation. The level of engagement in these activities does not necessarily translate into a measure of risk. The assessment of the level of engagement in Table 1 is informed by descriptive statistics and market intelligence but is ultimately judgement-based. It is reviewed and updated on an annual basis and incorporates improved data availability and regulatory developments. A more detailed entity-based analysis is presented in Section 3, while activity-based monitoring is covered in Section 4.

The assessment has not changed this year, since the level of engagement is considered equivalent to that observed in 2020. Hedge funds, financial vehicle corporations (FVCs) as well as security and derivative dealers (SDDs)[11] have a pronounced engagement in the risky activities considered in this report. The engagement of equity funds and mixed funds (investing in equity and bonds) is low on average, and hence these funds are not further discussed in Section 3. Bond funds, private debt (PD) funds and MMFs, as well as special-purpose entities (SPEs) and financial corporations engaged in lending (FCLs), have a medium engagement. PE funds and ETFs have a

[11] Following regulatory changes, "systemic" SDDs are now considered credit institutions and are subject to prudential requirements (see section on recent developments in the EU policy framework).

low engagement. The assessment does not take into account recent policy measures related to the entity types in the table, as the effects of these measures still need to be assessed.

Table 1

Mapping of activities to entity types

	Investment funds												Other financial institutions			
	MMFs			Bond funds												
	CNAV	VNAV	LVNAV	Corporate	Sovereign	Mixed funds	Equity funds	Hedge funds	Real estate funds	ETFs	Private equity funds[4]	Private debt funds	FVCs	SPEs	SDDs	FCLs
Market size																
EA AuM (EUR trillion)	0.2	0.6	0.7	4.2		4.1	5.8	0.6	1.2	1.5	0.6	n.a	2.2	n.a	n.a	0.6
Annual growth (%)	11	1.0	3.0	4.0		15	31	21	12	41	35	n.a	5.3	n.a	n.a	7.9
Summary assessment																
Engagement	●	●	●	●	●	◉	○	●	●	◉	◉	●	●	●	●	●
Risk transformation activities																
Credit intermediation	●	●	●	●	●	◉	○	◉	○	○	●	●	●	●	○	●
Maturity transformation	●	●	●	●	●	●	○	●	●	◉	○	○	◉	●	●	◉
Liquidity transformation	●	●	●	●	◉	◉	○	◉	●	◉	○	○	●	●	●	◉
Leverage[2]	○	○	○	◉	◉	◉	○	●	●	○	●	●	●	●	●	●
Market activities[1]																
SFTs	●	●	●	●	●	●	◉	●	○	◉	○	○	○	○	◉	○
Derivatives	◉	◉	◉	◉	◉	◉	◉	●	◉	◉	○	●	●	◉	●	○
Reuse of collateral	◉	◉	◉	◉	◉	◉	◉	●	◉	◉	○	◉	●	◉	◉	○
Interconnectedness																
Interconnectedness[3]	●	●	●	○	○	○	○	◉	●	●	○	○	●	●	○	◉

Source: ESRB.

Notes: The table summarises the assessment of engagement, where the colours of the circles reflect the intensity of the possible institutional engagement in the relevant areas of activity, according to the coding specified in the notes below. The colouring is judgement-based and informed by market intelligence and quantitative evidence. Owing to data limitations and a lack of consistent data, the assessment does not distinguish between consolidated and non-consolidated entities. The geographical coverage of the table refers to entities domiciled in the EU. MMFs stand for money market funds, CNAV for constant net asset value, VNAV for variable net asset value, LVNAV for low-volatility net asset value, FVCs for financial vehicle corporations (non-retained securitisations), SPEs for special purpose entities, SDDs for security and derivative dealers, FCLs for financial corporations engaged in lending.

1) Market activities through which risk transformation can be undertaken by investment funds and OFIs can take various forms. The list focuses on those market activities deemed to be most susceptible to risks.

2) Leverage refers to financial leverage and not to leverage that is created synthetically through the use of derivatives.

3) Direct and indirect interconnectedness with the banking system based on asset and liability data and staff assessment.

4) While credit intermediation and leverage at the fund level may be low, private equity funds can facilitate credit and leverage in the financial system by engaging in leveraged buyout transactions.

Colour coding: ●=pronounced engagement; ◉=medium engagement; ◉=low engagement; ○=unlikely or insignificant engagement.

1.4 Recent developments in the EU policy framework

In November 2021 the European Commission adopted a package of measures to ensure that investors have better access to company and trading data, as announced in the capital markets union 2020 action plan[12] **to boost European capital markets.** The main aim of this package is to improve companies' access to funding, broaden investment opportunities for retail investors and better integrate capital markets. The package includes four legislative proposals. The first proposal, the European Single Access Point (ESAP), intends to offer public financial and sustainability-related information about EU companies and EU investment products. This should give companies more visibility over investors and open up more sources of financing. The second proposal is to amend the European Long-Term Investment Funds Regulation to encourage long-term investment, including by retail investors. Specifically, it aims to remove the minimum €10,000 investment threshold while ensuring strong investor protection. The third proposal is to amend the Markets in Financial Instruments Regulation (MiFIR) to ensure more transparency on capital markets. This aims to introduce a "European consolidated tape", which will give investors easier access to near real-time trading data for stocks, bonds and derivatives across all trading venues in the EU. The last proposal is to amend the AIFMD and UCITS Directive.[13]

If adopted, the proposed amendments to the AIFMD and UCITS Directive would improve the policy framework and the monitoring of financial stability risks that might be building up in the investment fund sector. The key proposed changes are (i) the introduction of requirements for managers of loan-originating AIFs, (ii) the harmonisation of rules on the use of liquidity management tools (LMTs), and (iii) the introduction of a reporting framework under the UCITS Directive. In terms of loan origination, the proposal aims to ensure that AIF managers have the necessary organisational arrangements in place and the resources for this type of activity. In this way and by putting forward concentration limits for loan-originating AIFs, the proposal aims to reduce the risk of excessive credit creation. Regarding liquidity risks, the European Commission proposes a range of LMTs for open-ended funds that should be available across the EU. The proposal foresees that, in addition to being able to suspend redemptions, AIF managers and UCITS management companies have at least one other LMT in place to help them address redemption pressures in stressed market conditions, namely notice periods, redemption gates or redemption fees. Finally, the proposal intends to introduce harmonised reporting obligations for UCITS and UCITS management companies, which should allow for a more comprehensive risk analysis and monitoring. In addition, the proposal aims to improve efficiency in the reporting framework for asset managers. To this end, it envisages tasking the European Securities and Markets Authority (ESMA), in cooperation with the ECB, to draft a report focusing on the possibility of reducing areas of duplication and inconsistency in reporting frameworks, alongside the standardisation and efficient sharing and use of data already reported at EU or national level.

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12 See **capital markets union 2020 action plan: A capital markets union for people and businesses**, European Commission, 2020.

13 **Proposal for a Directive of the European Parliament and of the Council amending Directives 2011/61/EU and 2009/65/EC as regards delegation arrangements, liquidity risk management, supervisory reporting, provision of depositary and custody services and loan origination by alternative investment funds**, 25 November 2021, COM/2021/721 final, 2021/0376 (COD).

In June 2021 ESMA published guidelines on Article 25 of the AIFMD concerning leverage-related systemic risk in AIFs.[14] The guidelines relate to the assessment of leverage-related systemic risk by national competent authorities (NCAs) and ESMA. They aim to ensure that NCAs adopt a consistent approach when assessing whether the conditions for imposing leverage-related measures on individual AIFs or groups of AIFs are met. The guidelines foresee the regular monitoring of systemic risk in AIFs at least once a year.

The ESRB issued a recommendation in December 2021 with the aim of addressing persistent vulnerabilities in MMFs.[15] The recommendation reflects the spirit of the ESRB's 2012 recommendation[16], which aimed to mitigate the risks posed by EU-based MMFs to financial stability resulting from their bank-like features and their susceptibility to investor runs. As no single measure can address all of the systemic vulnerabilities of MMFs, the recommendation proposes a package of four measures to reduce the build-up of systemic risk in the sector. The aims of these measures are as follows. Recommendation A aims to reduce the threshold effects embedded in regulatory requirements that could provide first-mover advantages and provoke runs. It proposes that low-value net asset value (LVNAV) MMFs have a fluctuating NAV to ensure that investors redeem their units at a value that reflects the market valuation of the underlying assets, alongside the removal of regulatory trigger effects (using liquidity fees and redemption gates) when MMFs breach liquidity requirements. Recommendation B aims to reduce liquidity transformation. It calls for higher liquidity requirements for variable net asset value (VNAV) and low-value net asset value (LVNAV) MMFs, mandatory public debt holdings, as well as the encouragement of MMFs to use liquidity buffers to fulfil redemptions. Recommendation C aims to impose redemption costs on redeeming investors. It proposes that all MMFs have at least one LMT available that passes trading costs on to departing and incoming investors. Recommendation D aims to enhance monitoring and stress-testing frameworks in order to provide national and EU bodies with better information to help identify the systemic weaknesses of MMFs. The ESRB recommendation was intended as input into the European Commission's review of the Money Market Fund Regulation (MMFR). In designing the recommendation, the ESRB was mindful of policy discussions at international level, including consultations by ESMA[17] and proposals by the Financial Stability Board (FSB)[18].

Following regulatory changes, some SDDs are now classified as credit institutions and are hence subject to the same prudential requirements as banks. In June 2021 the new Investment Firm Regulation (IFR) and Investment Firm Directive (IFD) as well as amendments to the Capital Requirements Regulation (CRR)[19] entered into force. This new framework governs the prudential requirements of investment firms and their prudential supervision. This includes the introduction of a new categorisation of investment firms: (i) systemic and "bank-like" investment firms, which will be classified as non-monetary financial institution (non-MFI) credit institutions and

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14 See "**Guidelines on Article 25 of Directive 2011/61/EU – Final Report**", ESMA, 17 December 2020.

15 **Recommendation of the European Systemic Risk Board of 2 December 2021 on reform of money market funds (ESRB/2021/9)**.

16 **Recommendation of the European Systemic Risk Board of 20 December 2012 on money market funds (ESRB/2012/1)**.

17 See "**EU Money Market Fund Regulation – legislative review**", Consultation Report, ESMA, March 2021.

18 See "**Policy Proposals to Enhance Money Market Fund Resilience**", FSB, October 2021.

19 **Regulation (EU) 2019/2033 of the European Parliament and of the Council of 27 November 2019 on the prudential requirements of investment firms and amending Regulations (EU) No 1093/2010, (EU) No 575/2013, (EU) No 600/2014 and (EU) No 806/2014**.

to which the full CRR/CRD requirements should be applied; (ii) other ("non-systemic") investment firms with a more proportionate set of prudential requirements as set out in the IFR; and (iii) smaller firms with "non-interconnected" services. Moreover, for systemic investment firms, an additional distinction is applied between those subject to CRR/CRD requirements while still being authorised as investment firms and those that are required to be authorised as fully fledged credit institutions. These regulatory changes will have some effect on the 2021 data, which will be available in the second half of 2022. Consequently, it will be important to assess which SDDs are still part of the monitoring universe and how they contribute to systemic risk.[20] The new regulatory framework aligns capital requirements for investment firms with the size and nature of their activity, as well as with the risk they are exposed to. This may affect the future risk assessment. In addition, the systemic and "bank-like" investment firms that will be required to be authorised as credit institutions under the CRR/CRD, will become subject to direct supervision by the ECB. This should further reduce the risk of fragmentation and inconsistencies across member jurisdictions.

Following on from the 2018 FinTech action plan[21] from the European Commission, the Regulation on European crowdfunding service providers[22] entered into force in November 2021, with a one-year transition period for platforms currently operating under national rules. The Regulation, which lays down uniform rules for the provision of investment-based and lending-based crowdfunding services related to business financing in the EU, allows platforms to apply for an EU passport based on a single set of rules, which makes it easier for them to scale up and operate across borders.

In February 2021, the European Commission requested technical advice from the European Supervisory Authorities (ESAs) on other digital finance, with a view to assessing remaining gaps and drawbacks in the existing EU regulatory and supervisory framework.[23] As part of the call for advice, the European Banking Authority (EBA) was specifically asked to carry out an analysis of non-bank lending, i.e. lending provided by financial intermediaries outside the EU financial services regulatory perimeter, with the aim of identifying the relevant risks and the extent to which these activities are not covered by EU legislation. In particular, the EBA was requested to advise on the potential need to adjust the EU regulatory perimeter through the development and proposal of appropriate policy options. The analysis of the regulatory regimes currently in place – based on a survey conducted among NCAs as well as other EBA and joint ESA reports – shows that non-bank lending remains largely unharmonised, as there are a variety of approaches among the regulatory regimes for non-bank lending across the EU.[24]

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20 Where SDDs are in a group with a credit institution, they must be consolidated pursuant to Article 18(1) of the CRR.

21 **FinTech Action plan: For a more competitive and innovative European financial sector**, European Commission, 2018.

22 **Regulation (EU) 2020/1503 of the European Parliament and of the Council of 7 October 2020 on European crowdfunding service providers for business**.

23 In September 2020 the European Commission adopted a **digital finance package** comprising a range of measures with a view to facilitate the growth of digital finance in the EU, including three proposed regulations for digital operational resilience (DORA), markets in crypto-assets (MiCA) and a pilot regime for DLT market infrastructures (DLT pilot).

24 See "**Final Report on response to the nonbank lending request from the CfA on digital finance**", EBA, April 2022.

In July 2021 the EBA launched a public consultation on Regulatory Technical Standards (RTS)[25] to set out several criteria for identifying shadow banking entities and reporting large exposures. The approach taken in these RTS follows that of the EBA guidelines, which were published with the objective of setting specific large exposure limits to shadow banking entities under Pillar 2 in view of the risks that such entities pose to the financial system. Entities already subject to an appropriate and sufficiently robust prudential framework are excluded from the scope. In particular, those entities that carry out banking activities or services and have been authorised and are supervised in accordance with their regulatory framework or are exempted or excluded from the application of the respective legal acts, notably the CRR, the CRD, the EMIR and Solvency II, are not considered as shadow banking entities. Conversely, all other entities providing banking activities and services are considered shadow banking entities. However, specific rules apply to certain collective investment undertakings: MMFs, AIFs that employ leverage on a substantial basis and AIFs that grant loans or purchase third parties' lending exposures fall within the scope of shadow banking entities. All other AIFs as well as non-MMF UCITS do not fall within the scope of shadow banking entities. Finally, in the case of entities established in a third country, the draft RTS differentiate between institutions and other entities, with institutions identified as non-shadow banking entities when they are authorised and supervised by a supervisory authority that applies banking regulation and supervision based on at least the Basel core principles for effective banking supervision; and other entities when they are subject to a regulatory regime recognised as equivalent to the one applied in the EU.

[25] See "**Draft Regulatory Technical Standards on criteria for the identification of shadow banking entities under Article 394(4) of Regulation (EU) No 575/2013**", EBA, July 2021 and "**Final Report. Draft Regulatory Technical Standards on criteria for the identification of shadow banking entities under Article 394(4) of Regulation (EU) No 575/2013**", EBA, May 2022.

2 Special features

This year's edition of the NBFI Monitor includes special features on three risks and vulnerabilities relevant for financial stability: synthetic leverage, the impact of a disorderly market correction and interconnectedness between insurance companies and AIFs. The first special feature provides a post-mortem analysis of the collapse of Archegos using EMIR data. It shows how leverage and concentration risks on derivatives markets can be monitored using regulatory data. The second special feature estimates the impact of an unexpected rise in interest rates on the largest EU bond funds by combining portfolio and derivatives exposures. A few funds use IRDs to increase their exposure to interest rate risks, thereby magnifying potential losses. Large losses could lead to increased redemptions and result in amplification effects, as asset fire sales could further exacerbate the initial shock to bond prices. The third special feature explores the characteristics of AIFs that are mainly held by insurers and considers whether linkages between the two sectors could contribute to the propagation of risks for AIFs.

2.1 Archegos and synthetic leverage

This special feature uses Archegos as a case study to provide further insights on leverage and concentration risks among non-banks. In March 2021 Archegos Capital Management, a US family office, defaulted on margin calls from several derivatives counterparties. Following the default, dealer banks liquidated their derivatives positions, including through sales of underlying stocks, resulting in losses of more than USD 10 billion for counterparty banks (Chart 8). Although the entity was not European and most losses were incurred by non-EU banks, this event is relevant because it shows how synthetic exposures through derivatives can be used by non-banks to obtain very high levels of leverage. The analysis indicates how EMIR data could be used for systemic risk monitoring and that further progress on data management is required to allow for a more comprehensive risk assessment.

Archegos used derivatives to obtain large exposures and leverage. Over the years, Archegos pursued an investment strategy focused on long positions in a few stocks, usually in the technology sector. Instead of purchasing stocks to gain exposures to the securities, Archegos used equity swaps that were sold by several banking institutions, replicating similar exposures across a range of counterparties.[26] These contracts allowed the firm to obtain leverage through synthetic prime brokerage[27]. In the event that banks hedge the swaps by purchasing the underlying stock, the amount of capital the banks need to hold against the position is substantially reduced. Hedging can potentially also influence the underlying price if the quantity of shares collectively purchased by the

[26] For further details, see also Bouveret A. and Haferkorn, M., "**Leverage and derivatives – the case of Archegos**", TRV Risk Analysis, ESMA, May 2022, and "**Lessons learned from the collapse of Archegos: policy and financial stability implications**", *Notes on Financial Stability and Supervision*, Bank of Italy, October 2021.

[27] Synthetic prime brokerage can be defined as "the use of derivatives such as swaps to obtain exposure to an asset, in place of traditional cash/security lending". See "**Hedge funds and their prime brokers: developments since the financial crisis**", Quarterly Bulletin 2017Q4, Bank of England, 2017.

banks is large with respect to the total issuance. The use of leverage magnifies profit and losses based on the performance of the underlying stocks.

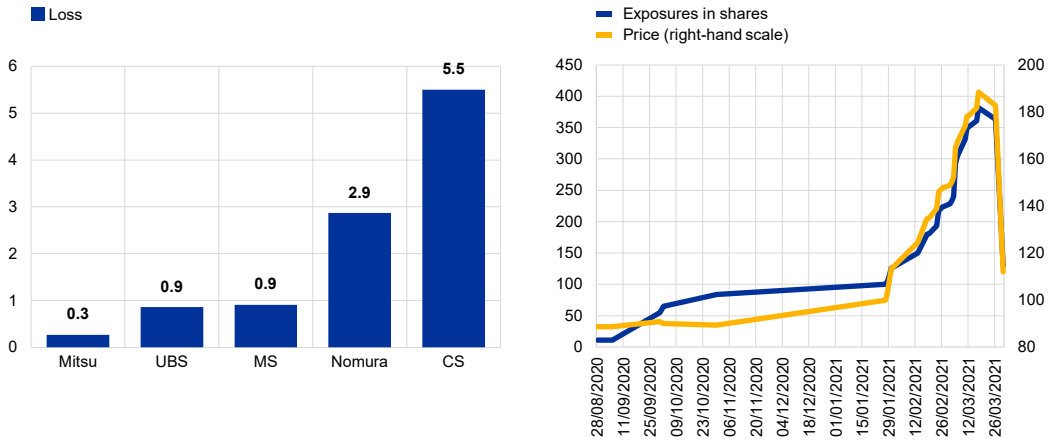
EMIR data on derivatives provide detailed information on Archegos' trades with EU counterparties, even though Archegos was a US entity. These also include data reported by UK counterparties until the end of 2020. As long as Archegos was using an EU counterparty (or a UK counterparty until 2020), this counterparty had to report the derivative transaction under the EMIR.

Data show that Archegos substantially increased its exposures between the end of 2020 and March 2021. Between January and the end of 2020 Archegos increased its exposures to total return swaps (TRSs), with notional amounts for some contracts surging over that period. Since most of the reported activity was done through UK banks, Archegos' reported contracts dropped mechanically in early 2021, when UK entities ceased to report under the EMIR. However, EEA30 data shows a steep increase in exposures in February and March, with notional exposures increasing by more than 460% between mid-January and mid-March. EMIR data also indicate that Archegos had highly concentrated long positions in a few technology stocks such as stock A (Chart 9), in line with publicly reported information.[28]

Charts 8 and 9

Direct losses related to Archegos as of April 2021 (left panel) and Archegos exposures to stock A via equity swaps with EEA30 counterparties and equity price of stock A (right panel)

(Chart 8: USD billions, Chart 9: values rebased at 100 = 27 January 2021)



Sources: Company disclosures, EMIR, Refinitiv Datastream and ESMA.
Note: In Chart 8, Mitsu stands for Mitsubishi UFG, MS for Morgan Stanley and CS for Credit Suisse.

A sharp drop in the stock prices of firms Archegos was synthetically exposed to along with high leverage precipitated its collapse. On 22 March, the price of stock A declined by 6.7% and kept declining throughout the week, as did other stocks Archegos was highly exposed to (Charts 10 and 11). The large decline in stock prices led to an abrupt change in the value of Archegos swaps

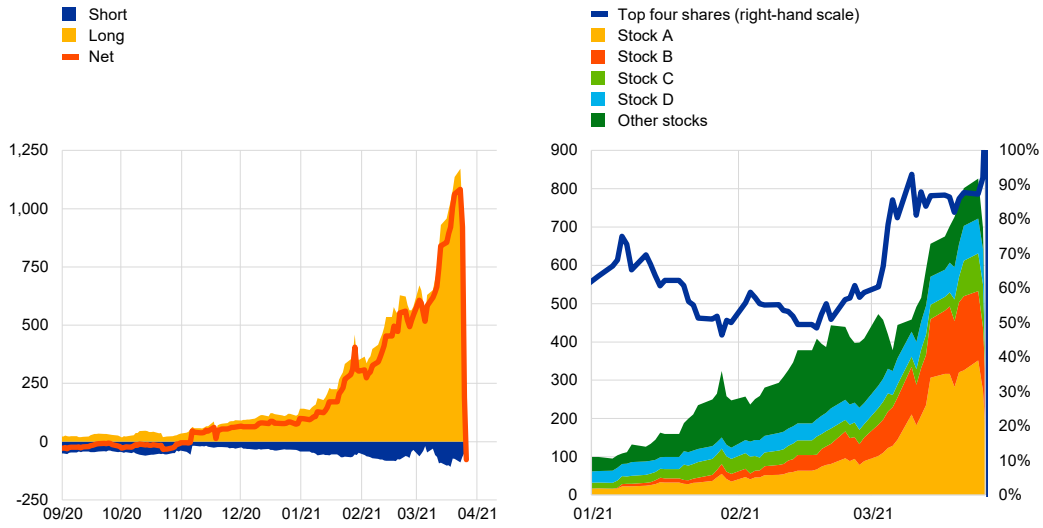
[28] See "**Report on Archegos Capital Management, Credit Suisse Group Special Committee of the Board of Directors**", Credit Suisse, July 2021.

and to large variation margins being requested by counterparties[29]. When Archegos defaulted, the dealer counterparties had to liquidate their underlying long positions in the stocks, since the banks were no longer hedged. Because Archegos' market footprint was substantial in those stocks – with the firm synthetically owning more than 20% of the shares of some companies – large sales by dealers aggravated the decline in prices, leading to substantial losses for some of the dealers, especially those who were slower to liquidate their positions. On 26 March the price of stock A dropped by more than 27%, reflecting the liquidation of positions by Archegos' counterparties.

Charts 10 and 11

Mark-to-market value of Archegos' TRSs (left panel) and long exposures (right panel)

(values rebased at 100 = 31 December 2020)



Sources: EMIR and, ESMA.
Note: Data for EEA30 countries.

The extent of the losses borne by counterparty banks indicates deficiencies in the risk management framework. Archegos was able to build large and concentrated positions without being made to fulfil appropriate margin requirements by some of its counterparties. If initial and variation margins posted by Archegos had been higher, counterparties would have been able to better cover some of their losses related to the liquidation of securities with the margins posted by Archegos[30]. In addition, given the market footprint of Archegos in some underlying stocks, concentration add-ons – additional initial margins required to account for liquidation costs of concentrated positions compared with the market absorbing capacity – could have reduced the ultimate risks borne by the counterparties. However, such concentration add-ons would have failed

[29] The valuation of swaps is updated at least on a daily basis in EMIR reporting.

[30] In some cases, margins were calculated using a static approach where the initial margins were based on the notional value of the swap at inception and remained constant over the life of the swap, irrespective of increases in the notional value. See "**Report on Archegos Capital Management, Credit Suisse Group Special Committee of the Board of Directors**", Credit Suisse, July 2021.

to capture the risk fully unless counterparties had known about the similar positions Archegos held with other banks.

While Archegos was legally a family office, it implemented hedge fund-like strategies without being subject to the regulatory and reporting requirements at entity level that apply to hedge funds. If reporting requirements at entity level had been in place, regulators might have had the ability to identify risks related to Archegos, including high leverage and concentrated exposures. US family offices are typically exempt from the regulatory requirements that apply to funds. Further transparency for regulators on exposures and strategies implemented by family offices could help reduce data gaps. This extends beyond family offices, with other institutions such as endowments and sovereign wealth funds also currently not subject to any reporting requirements at entity level. In the EU, family offices are also generally exempted from entity-level reporting requirements under AIFMD. However, at activity-level, family offices are subject to transaction-level reporting under the EMIR for derivatives and under the SFTR for securities lending, repo, buy-sell back and margin lending transactions.

OTC derivatives trades – such as TRSs and equity swaps – which are not centrally cleared by CCPs are subject to initial margin requirements. The requirements are subject to a phase-in period. Counterparties with a gross notional exposure above USD 50 billion have been subject to these rules since September 2021, and the requirements will apply to entities with a gross notional exposure above USD 8 billion from September 2022. Under the standardised schedule approach, TRSs on equity are subject to an initial margin of 15%[31], which would still allow counterparties to have a leverage – defined as the ratio of exposure to initial margin – of more than 6.[32]

Beyond reporting at entity level, the lack of reporting on certain transactions in the United States, such as TRSs on a single equity, makes the assessment of risks challenging for regulators. By contrast, under the EMIR, all derivatives trades, irrespective of the nature of the instrument, have to be reported to trade repositories, making the information available to regulators and supervisors. In May 2021 the Securities and Exchange Commission (SEC) announced that reporting requirements for security-based swaps would enter into force on 8 November 2021.[33] In addition, the SEC issued a proposal[34] that would require market participants to disclose positions on security-based swaps publicly when those positions exceed a given threshold (USD 300 million in gross notional amount, or 5% of the equity of the company).

Following the events of March 2021, regulatory authorities have taken a number of measures to mitigate risks related to the use of leverage by the non-bank financial sector. In the United States, the SEC recently made a series of proposals to address some of the gaps identified in the wake of the Archegos default. In addition to reporting and disclosure requirements

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31 See "**Margin requirements for non-centrally cleared derivatives**", Basel Committee on Banking Supervision and Board of the International Organization of Securities Commission, 2015.

32 Counterparties could also rely on an approved internal models – such as the ISDA standard initial margin model (see "**ISDA SIMM® methodology version 2.4**", International Swaps and Derivatives Association, 2021) – rather than the standardised schedule. The ISDA model also includes an add-on related to concentration (see Khwaja, A., "**Archegos, trade repositories and initial margin**", Clarus blog, 11 May 2021).

33 See "**SEC Approves Registration of First Security-Based Swap Data Repository; Sets the First Compliance Date for Regulation SBSR**", Securities and Exchange Commission press release, 7 May 2021.

34 See "**SBS Fraud & Manipulation; CCO Independence; Position Reporting**", Securities and Exchange Commission fact sheet, 15 December 2021.

related to swaps, the SEC has recently proposed that in the event of extraordinary losses, large redemptions or margin events, large hedge fund advisers should report certain specific information to the SEC within one business day.[35] At international level, the FSB and the International Organisation of Securities Commissions (IOSCO) have launched work aimed at improving risk monitoring using trade repository data and analysing the use of leverage by the non-bank financial sector.[36] In the EU, ESMA and NCAs have been working on leverage limits in relation to Article 25 of the AIFMD. As detailed in the guidelines on Article 25[37], NCAs must regularly assess the extent to which the use of leverage by AIFs could contribute to the build-up of systemic risk. While NCAs should base their risk assessment on AIFMD data, the guidelines acknowledge that for some of the indicators they should also use the best available data, including national supervisory data and/or third-party data where appropriate. To allow for a more comprehensive risk assessment, further progress on data management, including the merging of different regulatory datasets (e.g. AIFMD, SFTR, EMIR), is also required.

2.2 Bond funds and interest rate risk

This special feature discusses the risk of a disorderly market correction in fixed income markets, leading to the materialisation of liquidity risk for bond funds. By combining data on bond holdings and derivatives exposures, the special feature estimates the losses caused by a rise in market interest rates for the largest EU bond funds. Valuation losses could trigger investor outflows and lead to amplification effects, as asset fire sales could further exacerbate the initial shock to bond prices. The analysis also provides some insights into the use of IRDs by the largest EU bond funds.

Over the last few years, EU bond funds have shifted their portfolios towards longer-dated securities, thereby increasing their exposure to interest rate risk. Against a backdrop of low interest rates, EU bond funds increased the weighted average maturity of their assets from 7.5 years in 2018 to 9.2 years in 2021 (Chart A-22). Securities of longer maturities usually carry a term premium that enables bond funds to partly offset falling (or low) interest rates. At the same time, prices of longer-term bonds are typically more sensitive to changes in interest rates, as measured by the duration of a security. The duration quantifies the sensitivity of a bond price due to a change in bond yields and therefore measures the interest rate risk of a portfolio.[38]

Bond funds with a high exposure to interest rate risk could suffer steep valuation losses if market interest rates rose abruptly, as bond prices would fall. A sharp increase in interest rates would lower the prices of fixed rate bonds, resulting in mark-to-market losses for funds. In addition, funds using IRDs to increase their exposure to interest rate risk would face margin calls on their derivative positions. Valuation losses could trigger investor outflows, requiring bond fund managers to sell securities already subject to downward pressure on prices due to rising yields.

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35 See "**Proposed Amendments to Form PF**", Securities and Exchange Commission fact sheet, 2022.

36 See Alder, A., "**A global perspective on derivatives regulation**", keynote address at the ISDA Annual General Meeting 2021, 10 May 2021, and "**Promoting Global Financial Stability**", 2021 FSB Annual Report.

37 See "**Guidelines on Article 25 of Directive 2011/61/EU – Final Report**", ESMA, 17 December 2020.

38 For time series on (expected losses from) funds' portfolio duration, see **Financial Stability Review**, ECB, November 2021, Chart 4.2 b, and **Revue de stabilité financière**, BCL, 2021, Graphique 3.52.

Bond funds with low share of liquid holdings would be particularly vulnerable to valuation losses since liquidity mismatches typically create a first-mover incentive for investors to redeem ahead of others. Low liquidity buffers might also force funds to sell assets that are less liquid, thereby possibly creating a negative feedback loop between asset valuations and redemptions, that could amplify market downturns.

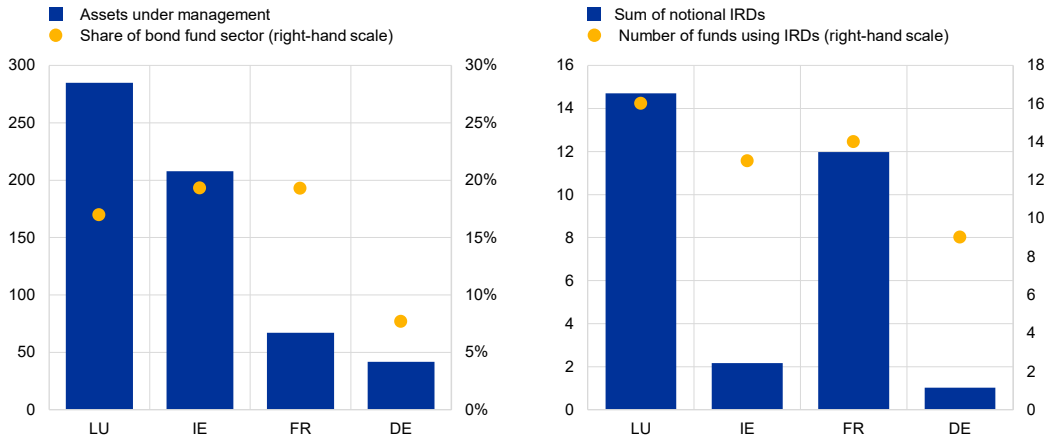
To gain a comprehensive view of bond funds' exposure to interest rate risk, information on their securities holdings needs to be complemented with data on their use of derivatives. IRDs can be used to hedge interest rate risk or to increase exposure. For instance, bond funds holding fixed rate debt securities can hedge their interest rate risk by entering into an interest rate swap (IRS) agreement where the funds pay a fixed rate and receive a floating rate, effectively protecting the funds against moves in interest rates. Conversely, bond funds can further increase their sensitivity to interest rate changes by paying a floating rate and receiving a fixed rate in an IRS agreement. In this case, the derivatives exposures may exacerbate potential vulnerabilities emanating from longer-dated securities, if interest rates were to rise.

The impact of an interest rate shock applied across the yield curves was estimated for a sample of 200 bond funds with around €600 billion in total assets (Chart 12). The sample includes the 50 largest bond funds from each of the top four EU jurisdictions: Luxembourg, Ireland, Germany and France (Chart A-13).[39] Most funds invest primarily in fixed income instruments, and some also use IRDs to hedge or take on additional interest rate risk. Overall, 52 bond funds use IRDs with a gross notional exposure of close to €30 billion (14% of total assets of bond funds using IRDs and 5% of all bond funds, Chart 13).

Charts 12 and 13

Bond funds in the sample: size (left panel) and the use of IRDs (right panel)

(Chart 12: EUR billions (left-hand scale) and percentages (right-hand scale); Chart 13: EUR billions (left-hand scale))



Sources: EMIR, Refinitiv Lipper, Bloomberg and ESRB calculations.

[39] The sample included the 50 largest bond funds, both short-term and long-term, for which the following criteria were met: (i) information on the legal entity identifier (LEI) was available, and (ii) the duration provided in commercial data sources was based on more than 90% of the fund's holdings.

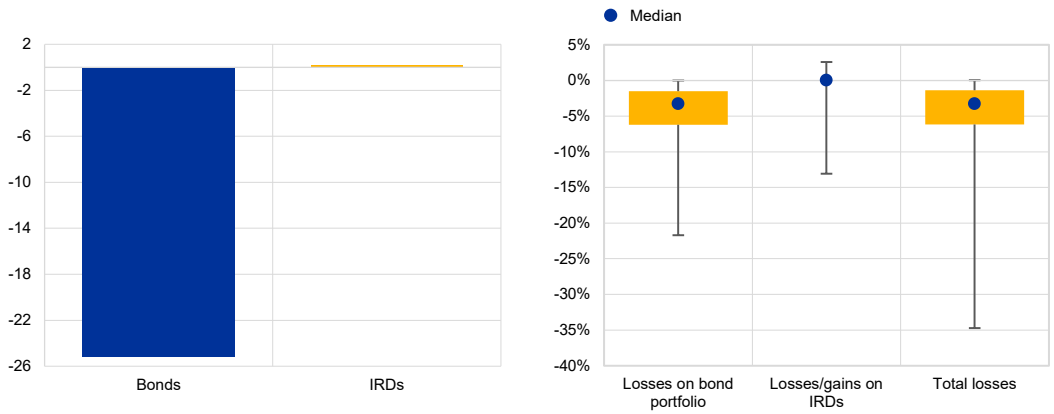
Overall, a parallel shift of 100 basis points across the yield curves would result in valuation losses of around 4% of NAV, although the impact varies widely by fund. On aggregate, a rise of 100 basis points in USD, EUR and GBP interest rates would yield around €25 billion in mark-to-market losses on the bond portfolio and a net profit of around €210 million on IRDs (Chart 14). The small positive gain from IRDs stems from the small size of IRDs held by funds in our sample (only 52 funds out of 200) and the fact that most funds use IRDs to hedge their interest rate risk, resulting in mark-to-market gains on derivatives that would partially compensate losses on bond portfolios. Still, for one fund, the bond losses would be amplified by derivatives: losses on IRDs positions would be higher than 10% of NAV, resulting in overall losses of 35% of total assets (Chart 15).

Losses from an initial interest rate shock could trigger outflows with potential non-linear and second-round effects. The losses on the bond portfolio range from 0% up to 22% of total assets, with more than one-third of funds facing losses higher than 5% of total assets and around 20% of funds facing losses above 7% of total assets. Such a decline in the value of bond funds could lead to outflows, since based on the flow return relationship, investors tend to redeem underperforming funds. Should funds need to sell less liquid assets to accommodate these outflows amid low liquid holdings, a negative spiral of losses and further outflows could begin, amplifying the negative market dynamics.

Charts 14 and 15

Losses as a result of 100 basis point interest rate hike: total (left panel) and distribution (right panel)

(Chart 14: EUR billions; Chart 15: percentages of NAV)



Sources: EMIR, Refinitiv Lipper, Bloomberg and ESRB calculations.

2.3 Interlinkages between AIFs and the insurance sector

This special feature considers whether linkages between insurers and AIFs could contribute to the propagation of risks for the latter. At the end of 2021 insurers were the second most

important investors in AIFs, owning 17% (Chart 16)[40]. In Germany, the largest AIF domicile, insurance ownership was particularly pronounced, with insurers holding 30% of the AIF sector. Moreover, insurers' investments in AIFs domiciled in Germany accounted for 56% of their total AIF holdings. In France, the share of insurers in the AIF investor base was also above the EU average. At the same time, investment funds accounted for 34% of insurers' total assets at the end of 2021, the single largest exposure (Chart 17).This special feature considers these interlinkages from the perspective of what they might imply for liquidity and leverage risk in AIFs. Any risks such interlinkages might pose for the insurance sector are outside the scope of the analysis.

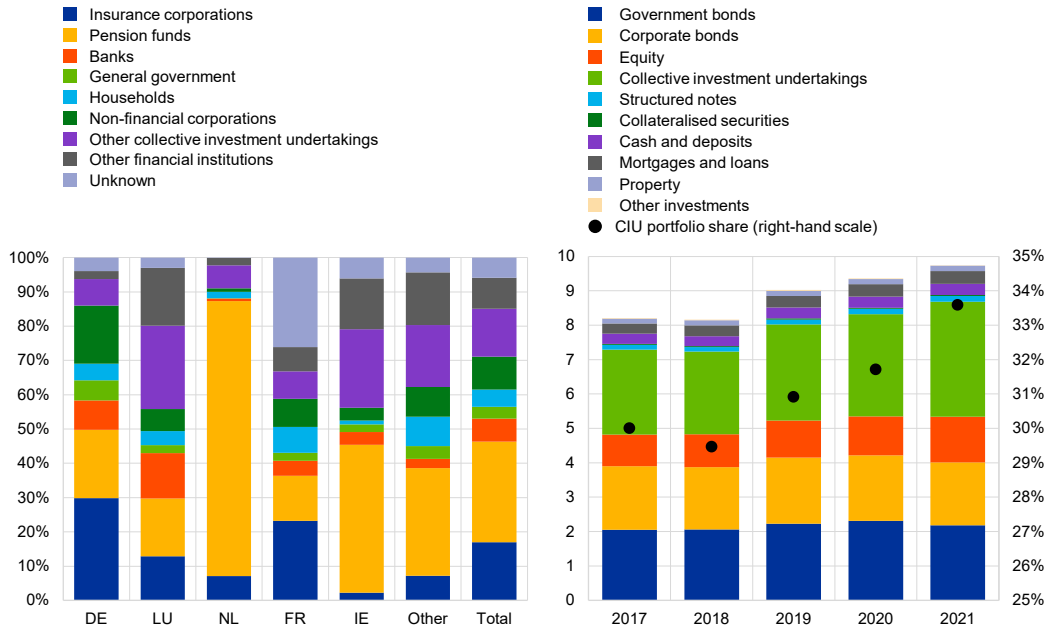
There are a number of reasons why insurers invest through investment funds rather than through direct investments. Smaller insurers in particular may be able to obtain greater portfolio diversification at lower cost, while benefiting from the expertise and economies of scale investment funds can offer. In some jurisdictions, there are also tax advantages and supervisory and accounting incentives. For example, the national investment fund regulation in Germany and Austria – where insurers hold a large proportion of AIF shares – provides for the option of investing in dedicated mandates with few other investors, as well as more flexible investment rules and reporting requirements. These so-called Spezialfonds also offer tax advantages on capital gains and the possibility for life insurers to build up reserves within the funds by steering funds' distributions to these insurers. These reserves can later be used by life insurers, for instance, to fund payments to policyholders when asset returns are low.

[40] Holdings of collective investment undertakings by life insurers are larger than by non-life insurers. Insurers' investments in non-UCITS funds are concentrated in non-unit linked portfolios. See "**Financial Stability Report July 2020**", EIOPA, 2020.

Charts 16 and 17

AIF investors (left panel) and investments held by insurers (right panel)

(Chart 16: percentages, split by AIF domicile; Chart 17: EUR trillions (left-hand scale) and percentages (right-hand scale))



Sources: EIOPA Solvency II reporting, AIFMD and ESRB calculations.
Note: In Chart 16, the observation is for the fourth quarter of 2021, except for the Irish market, where third quarter data was used as an approximation.

For a more granular analysis of insurance companies' investments via AIFs, a sample of funds mainly held by insurers, i.e. those in which insurers hold at least 50% of the NAV, was investigated. The sample consists of 2,989 funds with assets amounting to €1.5 trillion (18% of the total AIF sector assets). The selected group of AIFs included 2,010 funds where insurers were the only investor group (15% of the total AIF sector assets). The volume-weighted majority of AIFs mainly held by insurers, including single-ownership AIFs, were domiciled in Germany. Several characteristics of AIFs mainly held by insurers were compared with the remaining part of the AIF sector.

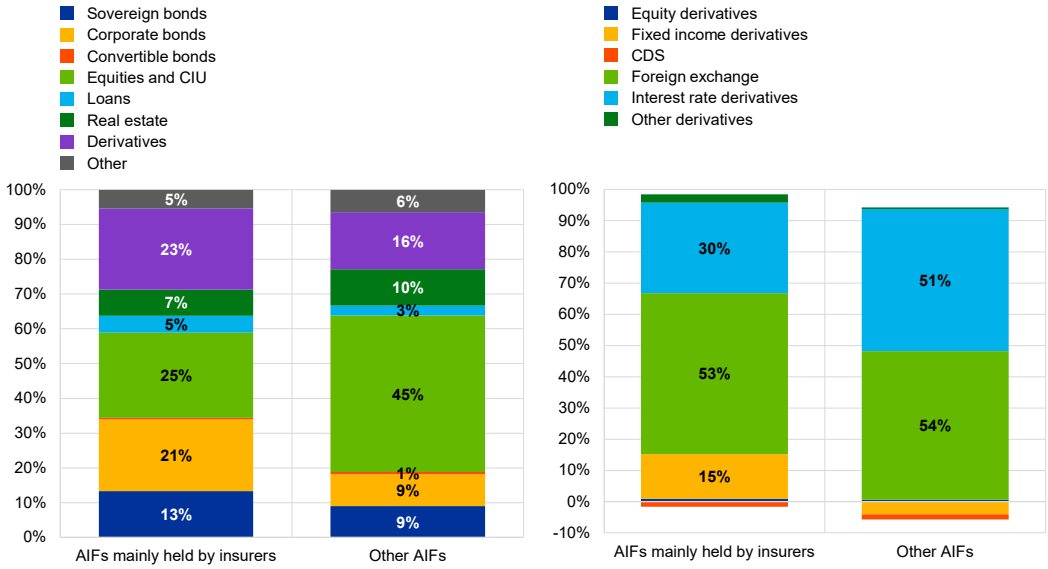
AIFs held by insurers tend to focus their investments on different asset classes from other AIFs and account for a large share of AIF sector investments in certain instruments. In line with insurers' overall conservative investment strategies focusing on fixed income assets, AIFs mainly held by insurers invest more in sovereign and corporate bonds than other AIFs (Chart 18). While AIFs mainly held by insurers account for 18% of the total AIF sector, they hold a much larger proportion of the aforementioned asset classes, accounting for 33% of total AIF investments in corporate bonds and 25% of total AIF investments in sovereign bonds. Similarly, they represent 28% and 24% of total AIF investments in loans and derivatives, respectively. AIFs mainly held by insurers are mostly exposed to foreign exchange derivatives used for hedging purposes (i.e. the currency hedging of different share classes), while other AIFs are more exposed to IRDs (Chart 19). Compared with other AIFs, AIFs mainly held by insurers invest a much larger proportion of

their assets in fixed income derivatives, allowing them to obtain a synthetic exposure to fixed income securities.

Charts 18 and 19

Net exposures of AIFs to different asset classes (left panel) and derivatives (right panel)

(percentages of exposure)



Sources: AIFMD and ESRB calculations.
Notes: AIFs mainly held by insurers denote AIFs in which insurance companies hold at least 50% of the NAV. The observation is for the fourth quarter of 2021, except for the Irish market, where third quarter data was used as an approximation. For calculation of the exposure, derivative positions are converted into an equivalent position in the underlying assets as prescribed in Article 10 and Annex II of the implementing Regulation No. 231/2013 of 19 December 2012 supplementing Directive 2011/61/EU of the European Parliament and of the Council with regard to exemptions, general operating conditions, depositaries, leverage, transparency and supervision.

Risks related to liquidity and leverage are broadly similar across AIFs, irrespective of their investor base. Liquidity transformation measured as the share of less liquid assets in AIFs' total assets amounted to 57% for AIFs mainly held by insurers, compared with 40% for other AIFs.[41] When both portfolio and investor liquidity are factored in, the liquidity shortage (see Box 5) for AIFs mainly held by insurers is slightly lower (Chart 20). Adjusted leverage was also lower for AIFs mainly held by insurers in previous years (Chart 21). After an increase in the second quarter of 2021 caused by the temporary rise in assets of AIFs mainly held by insurers, adjusted leverage is only slightly lower than for other AIFs at the end of 2021.

While linkages with insurers do not increase the level of risk for AIFs, a more in-depth analysis – which is currently not possible due to data constraints – could shed more light on the financial stability implications of interconnectedness between the two sectors. A study of redemption patterns, particularly in times of stress, could provide further insights on how insurers

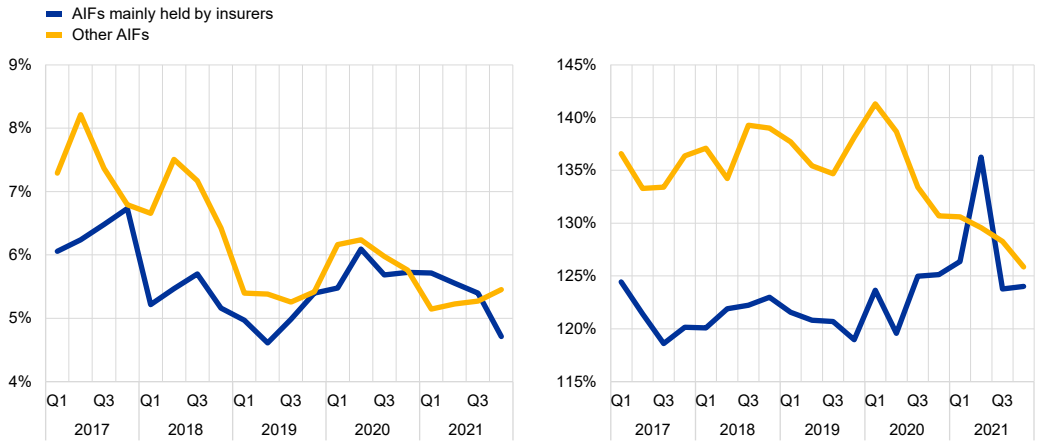
[41] Similarly to the measure presented in Chart A-14 in the statistical overview, the less liquid assets used to compute this measure exclude cash and cash equivalents, sovereign bonds, debt securities issued by financial institutions, equity and shares in collective investment undertakings.

with a large share of the investor base influence the liquidity risk of investment funds. Insurers, especially life insurers, typically have long-term investment horizons matching their long-term liabilities; hence they should be able to endure short-term price movements and absorb market shocks. As institutional investors, insurers could, however, be more responsive to market events compared with individual investors. In times of stress, more responsive investors may redeem fund units ahead of others.[42] To better understand the dynamics of interconnectedness between investment funds and insurance companies, the analysis should also be extended to UCITS funds, as well as including information on investment funds held by unit-linked and non-unit-linked insurers to distinguish between insurers' investment strategies and those of their policyholders.[43]

Charts 20 and 21

AIFs' one-week liquidity shortage (left panel) and adjusted leverage (right panel)

(percentages of NAV)



Sources: AIFMD and ESRB calculations.
Notes: AIFs mainly held by insurers denote AIFs in which insurance companies hold at least 50% of the NAV. Liquidity shortage shows the difference between the liquidity provided to investors and the portfolio liquidity. Adjusted leverage excludes FX and IRD exposures. See Box 5 for further details. The latest observation is for the fourth quarter of 2021, except for the Irish market, where third quarter data was used as an approximation.

42 See Fecht, F. and Wedow, M., "**The dark and the bright side of liquidity risks: Evidence from open-end real estate funds in Germany**", *Journal of Financial Intermediation*, Vol. 23, Issue 3, 2014, pp. 376-399.

43 See Chrétien, É, Darpeix, P-E., Gallet, S., Grillet-Aubert, L., Lalanne, G., Malessan, A., Novakovic, M., Salakhova, D., Samegni-Kepgnou, B. and Vansteenberghe, É., "**Exposures through common portfolio and contagion via bilateral cross-holdings among funds, banks and insurance companies**, Haut Conseil de Stabilité Financière, 2020; Darpeix, P-E and Mosson, N., "**Identification of funds marketed through life insurance or used by insurers as investment vehicles: new data collected and preliminary analysis in relation to liquidity management tools**", Autorité des Marchés Financiers, June 2021; Fricke, D., Jank, S. and Wilke, H., "Who creates and who bears externalities in mutual funds?", *Deutsche Bundesbank Discussion Paper*, forthcoming.

3 Entity-based monitoring

The ESRB's entity-based monitoring covers investment funds and OFIs. Thus, the monitoring universe for entity-based monitoring excludes, for example, banks, insurance corporations and pension funds, as well as CCPs with a banking licence.[44] In Section 1, Table 1 provides an overview of key entities included in the monitoring universe and summarises their engagement in certain activities that pose or potentially propagate structural financial stability risk. The subsequent sections explore this assessment in more detail. In the statistical overview of the report, Table A-1 also provides a more detailed overview of OFIs according to the European System of National and Regional Accounts (ESA).[45]

3.1 Investment funds

3.1.1 Bond funds

Bond funds main risks

Abrupt increase in interest rates	Valuation losses on assets with high durations constitute the main short-term risk.
Liquidity transformation	Low liquidity buffers of certain bond funds may create a first-mover advantage for investors and – when funds are faced with unexpected outflows – create the danger of forced asset sales, which could exacerbate adverse market dynamics.
Credit risk	Increased holdings of lower-rated securities could entail losses over the medium-term.

Bond funds perform credit intermediation by allocating money received from investors to borrowers that issue debt securities (Chart A-17). The debt securities held by bond funds are typically of long maturities and can vary considerably in terms of their underlying credit risk, ranging from well-rated government bonds to high-yield corporate bonds. In combination with the fact that almost all bond funds are open-ended, their engagement in maturity transformation is high, while their engagement in liquidity transformation depends on the specific bond fund types (Table 1, Charts A-14 and A-15). Through holdings of corporate debt securities, bond funds may also be exposed to the same firms as the banking and insurance sectors. Therefore, stress in the bond market could affect several types of financial institutions simultaneously.

Net assets of EU bond funds continued to grow throughout 2021 due to sustained inflows, though at a much lower rate than equity and mixed funds. Net assets of EU bond funds grew by €158 billion or 4.2% relative to 2020, lagging far behind equity funds (+29.1%) and mixed funds (+14.6%), which benefited from buoyant stock markets (Chart A-11). Euro area bond funds suffered from valuation losses of €35 billion (0.9% of net assets) in the first quarter of 2021 amid a rise in global interest rates (Chart A-5). At the same time, net inflows remained very stable during the first

44 Assets under management by CCPs are partially included in the monitoring universe as OFIs unless the CCPs have a banking licence, in which case they are included within MFI statistics.

45 For more information, see **ESA 2010**.

three quarters of 2021, averaging €64 billion per quarter and turning slightly negative in the fourth quarter of 2021.

Credit intermediation as well as liquidity and maturity transformation performed by EU bond funds remained broadly unchanged in 2021. The shares of credit assets and long-term assets in relation to total assets remained largely stable at 83% and 80%, respectively (Charts A-15 and A-17). Liquidity transformation by EU bond funds, measured as the proportion of less liquid assets to total assets, increased slightly from 40% to 42% (Chart A-14).

Over the medium term, EU bond funds may be exposed to the materialisation of credit risk, as they increased their holdings of lower-rated bonds in 2021. The share of debt securities held by EU bond funds with a credit rating below investment grade rose from 25% in 2020 to 29% in 2021 (Chart A-21). This is partly attributable to the fact that euro area investment funds absorbed a large share of the high issuance of BBB and high-yield bonds by euro area NFCs in the first two quarters of 2021.[46] In the short term, the materialisation of credit risk appears less likely due to the ongoing economic recovery and remaining public sector support measures. However, over the medium term, economic and financial conditions may become less favourable and trigger defaults in the NFC sector that could affect EU bond funds.

3.1.2 Money market funds

Money market funds main risks

Liquidity transformation	MMFs offer daily liquidity to investors while investing in short-term debt securities that are not reliably liquid.
Interconnectedness	Funding source for banks, cross-border activity.

MMFs' assets reached €1,480 billion by the end of 2021. MMFs experienced inflows in 2021, especially in the last quarter, as investors awaited redeployment of their funds and increased their allocations to cash-like instruments at the end of the year (Chart A-23).

Exposure to interest rate risk remained stable in 2021. After a sharp fall in the first half of 2020, as MMFs reduced their exposure to maturity risk by increasing their short-term liquid assets, the maturity of MMF portfolios remained relatively unchanged in 2021 (Chart A-24).

MMFs' liquid assets remain substantially above pre-COVID levels, despite a decline in 2021. After peaking at the end of 2020, MMFs' liquid assets declined throughout the year, as managers reallocated their portfolios towards higher-yielding assets against a backdrop of low volatility. As of December 2021 liquid assets were around 5 percentage points above the levels observed before the COVID-19 crisis (Chart A-25).

[46] See **Financial Stability Review**, ECB, November 2021, Chart 4.4 b.

3.1.3 Real estate funds

Real estate funds main risks	
Liquidity transformation	Open-ended real estate funds invest in illiquid assets while offering redeemability to investors.
Leverage	Funds can use borrowings to increase their exposure to the real estate sector.

EU RE funds grew further in 2021. AuM increased by 11.2% to €1.2 trillion between the end of 2020 and 2021, with strong growth in Germany and Luxembourg. The heterogenous growth distribution reinforced the geographical concentration of RE funds, which are mainly registered in a small number of countries in the EU (Chart A-26): funds in the five largest domiciles (France, Germany, Italy, Luxembourg and the Netherlands) account for approximately 92% of the sector's AuM in the euro area.

The growth of euro area funds mainly reflected the increase in real estate valuation, but net inflows amounting to €16 billion also contributed. The first three quarters of 2021 were marked by a steady net inflow, which reversed in the fourth quarter with an outflow of approximately €6.8 billion (Chart A-5). In an environment of various lockdowns and other preventative measures in the context of the ongoing COVID-19 pandemic, the growth of this fund segment was remarkable. The share of RE funds in the total fund sector remained stable at 8.5% at the end of 2021 (Chart A-11).

Liquidity transformation by open-ended RE funds decreased in 2021. The share of total assets minus liquid assets declined from 65% to 56% between 2020 and 2021 (Chart A-14). This was mainly driven by a substantial portfolio shift towards equities, whose share of RE fund assets increased by 7.3 percentage points. However, RE funds remain exposed to liquidity risk: real estate is a highly illiquid asset class, often requiring several months for a transaction to be completed. In contrast to closed-ended funds, open-ended RE funds may offer redemptions at higher frequencies than assets can be liquidated, which can expose them to liquidity risks. Granular data reported under the AIFMD reveal that, on average, one-third of open-ended RE fund shares are redeemable at shorter notice than assets can be liquidated. The degree of liquidity transformation also depends on the redeemability of fund shares and redemption frequencies, which vary across jurisdictions, also reflecting the diversity in domestic regulatory frameworks. Redemption gates and other LMTs available to fund managers may further mitigate the risk of large and abrupt outflows or risks stemming from valuation uncertainties.

Financial leverage remained stable throughout 2021 at levels above other fund types (Chart A-16). The gradual decline in the financial leverage of RE funds over the past decade diminished in 2021, as leverage stabilised at around 12.3% of total assets. Adjusted leverage – a measure of synthetic leverage that also considers derivatives – also slightly decreased (see Box 5). However, there is a large dispersion in leverage usage among RE funds. One approach to address the risk stemming from highly leveraged RE funds is the imposition of leverage limits (see Box 3).

Box 3

Macroprudential tools for Irish real estate funds

As in many countries, real estate funds have become a key participant in Irish commercial real estate (CRE) markets since the global financial crisis. At the end of 2020 holdings of Irish property assets in real estate funds were valued at €23 billion, or 43% of the estimated total value of Irish "invested" CRE (€53 billion). While these developments have increased the proportion of equity finance and provided diversification benefits, in some cases they have the potential to raise new macro-financial vulnerabilities beyond those arising in classical financing arrangements.

As a first step towards applying a nascent macroprudential framework for investment funds at a domestic level, in November 2021 the Central Bank of Ireland (CBI) issued a consultation paper proposing the introduction of a set of macroprudential measures for Irish real estate funds. [47] In 2019 the CBI undertook an extensive data collection exercise on Irish real estate funds to help identify systemic vulnerabilities. Based on the results of this survey, the CBI identified two areas of vulnerability: leverage and liquidity mismatch.[48] In response, the CBI proposed two new macroprudential policy measures: the introduction of leverage limits and guidance around notification periods for funds investing 50% or more of their assets directly or indirectly in Irish property.

Together, these measures aim to safeguard the resilience of the Irish real estate fund sector, so that this form of financial intermediation is better able to absorb – rather than amplify – adverse shocks to the Irish CRE market. The leverage limit will be imposed through the Irish transposition of Article 25 of the AIFMD, in line with European Securities and Markets Authority guidelines. This will be the first time that Article 25 has been triggered in Ireland (and possibly in the EU). The limit is expected to reduce leverage levels to more closely align with real estate funds in other European jurisdictions[49]. The CBI has also proposed to provide additional guidance with respect to how Irish real estate funds ensure consistency between their investment strategy, liquidity profile and redemption policy, consistent with Article 16 of the AIFMD. This will help reduce the degree of variation that has been observed in real estate funds' redemption terms and that cannot be explained by the liquidity of the underlying assets, and will thereby reduce instances of liquidity mismatch.

47 See **Central Bank of Ireland: Consultation Paper 145**, November 2021.

48 For further details, see Daly, P., Moloney, K. and Myers, S., "**Property funds and the Irish commercial real estate market**", *Financial Stability Notes*, Vol. 20, No 1, Central Bank of Ireland, February 2021.

49 Other EU jurisdictions have set up leverage limits for RE funds; see ESRB **EU Non-bank Financial Intermediation Risk Monitor 2021**, August, 2021, for details.

3.1.4 Exchange-traded funds

Exchange-traded funds main risks

Price distortion	Because of their passive investment strategies, ETFs can cause distortions in the prices of securities included in the indices they track. A subsequent market correction could lead to financial instability, including fire sales in the event of overvaluation.
Liquidity risk	Liquidity in ETFs' underlying assets could drop again in stress periods, impairing the capacity of ETFs to properly value their assets and generate large NAV discounts, which could affect the pricing of underlying assets.
Interconnectedness	The use of derivatives and engagement in securities financing transactions by some ETFs could raise counterparty risk. The failure of counterparties could undermine the capacity of ETF issuers to realise their promised investment strategy.

ETFs generally track the performance of an underlying index or basket of assets and perform liquidity transformation, especially if they invest in less liquid market segments. Most ETFs are managed passively and track equity or fixed income market indices. ETFs combine many of the operational aspects of an open-ended investment fund with those of equities traded on an exchange. Their dealing arrangements have a creation and redemption mechanism in primary markets like in open-ended investment funds, with arrangements which allow trading in secondary markets. The primary market includes authorised participants (APs), such as banks and proprietary trading firms, which are designated by the ETF issuer. APs may trade in ETFs but have no legal obligation to create or redeem shares. APs can adjust the supply of ETF shares in the secondary market when there is an imbalance of orders to buy or sell ETF shares that cannot be met through the secondary market. On secondary markets, participants can trade ETFs intraday and also buy them on margin and sell them short, similar to equities. These features make them popular with market participants who consider them efficient and flexible instruments for trading and hedging purposes.

Amid accelerated growth driven by both record high inflows and valuation effects, ETFs reached their highest ever share of 8.2% of total euro area investment fund assets in 2021 (Charts A-27 and A-27.1). ETF assets increased by 41% year-on-year and reached a new high of €1.45 trillion at the end of 2021. As a result, ETFs' share of total investment fund assets rose by 1.4 percentage points compared with the end of 2020, their biggest year-on-year increase on record. The growth can be attributed almost equally to flows and valuation effects. Monthly flows were rather stable at an average of €16.2 billion, while valuation effects (which include all changes other than flows, such as reclassifications) fluctuated in line with market developments. Equity ETFs experienced the strongest growth and remained the largest ETF type, accounting for a slightly increased share of 67%, followed by debt security ETFs, which held approximately 23% of total ETF assets. Around 84% of ETFs based on AuM use full or partial physical replication, and 14% use synthetic replication, meaning they rely on derivatives such as TRSs to mirror the performance of their benchmark instead of holding the actual securities.

ETFs continue to become increasingly popular and follow current investment trends. According to Refinitiv Lipper, 1,349 new ETFs were launched globally in 2021 (a record high net number), including 167 in the EU. The majority of newly launched ETFs in Europe track benchmarks related to climate change, while among the rest, a high number offer exposure to the wider theme of digitalisation. ETFs were also able to attract a high share of the inflows into

investment funds in 2021 measured relative to their size. Relative to total assets at the end of 2020, ETFs received 16% of inflows, compared with 5.6% for other investment funds.

Continued monitoring of the ETF sector is warranted, as further growth may increase the risk that the sector transmits and amplifies risks in the financial system. ETFs are generally seen as very liquid instruments, and bond ETFs especially are often used by institutional investors to manage liquidity in a portfolio context. However, the events of March 2020 raised doubts about the liquidity of ETFs' underlying assets during market stress and hence their capacity to properly value their assets and generate large NAV discounts. The selling of assets redeemed from ETFs, i.e. by APs and liquidity providers, can aggravate already existing liquidity pressures in the event of market turmoil. In addition, there is evidence that the prices of securities held by ETFs tend to co-move more strongly with the indices in which they are included. This is relevant from a financial stability perspective, as it can increase spillover effects and lead to synchronised sell-offs. There are further concerns regarding the counterparty risk exposure of investors in ETFs that use derivatives or engage in securities lending transactions[50] (see Box 4).

Box 4
ESRB Occasional Paper on exchange-traded funds and systemic risk

The academic literature and policy discussions have identified several systemic risks that could emanate from exchange-traded funds (ETFs). An upcoming Occasional Paper by the ESRB takes a new look at the systemic risks linked to the ETF infrastructure. By investigating the extent to which ETFs contribute to systemic risk, the paper follows up on and deepens certain aspects of the analysis conducted by the ESRB Advisory Scientific Committee.[51]

The analysis uses a unique dataset combining regulatory data on the use of derivatives and ETFs' holdings with public information and market intelligence to cast further light on the EU ETF market. First, the EU ETF market shows a high degree of interconnectedness: most ETFs are domiciled in a few countries, while their investors are spread out across EU countries and across institutional sectors. In particular, investment funds are the main investors in ETFs (with a share of approximately 40%), enhancing intrasectoral connectedness and thus increasing the channels for shock transmission. Second, most ETFs engage in derivatives transactions: around 73% of the 1,437 EU ETFs traded derivatives in 2020. This includes ETFs that perform synthetic replication of their benchmark through total return and equity swaps, but also ETFs using physical replication. ETFs trade with few counterparties (82 counterparties, mainly dealer banks), indicating a high degree of market concentration.[52] Third, several market participants in all parts of the ETF ecosystem are interviewed. Their insight proves very useful in putting the potential risks mentioned

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50 See Special Feature C "**Counterparty and liquidity risks in exchange-traded funds**", *Financial Stability Review*, ECB, November 2018, and "**Can ETFs contribute to systemic risk?**", *Reports of the Advisory Scientific Committee*, No 9, ESRB, June 2019. "The short on shorting ETFs: The art of create to lend", K. Kaminski and V. Sokolovski, Institutional Insights, May 2014. ETF sponsors might lend out securities backing ETF shares which are then delivered by APs to the ETF sponsor to create new ETF shares. This practice could create risks as the same securities could be used to back multiple ETF shares. High and long-lasting short positions, as seen on US ETFs, suggest additional risks related to leverage. Further work in this area, including short selling of ETF shares, might be warranted to assess the materiality of these risks looking forward.

51 See "**Can ETFs contribute to systemic risk?**", *Reports of the Advisory Scientific Committee*, No 9, ESRB, June 2019.

52 ETFs can also be active in securities financing transactions such as securities lending. Such activities can be monitored looking forward using data reported under the SFTR.

in the academic literature in the perspective of risk management and governance of the involved parties.

Five systemic risks are most frequently mentioned in the literature. These are (i) the risk of a widespread withdrawal of authorised participants (APs) from the primary market without new APs entering ("step-in failure"); (ii) the risk of idiosyncratic events at major ETF providers in the EU; (iii) the risk stemming from counterparty risk and the use of derivatives; (iv) the risk of passively managed ETFs mechanically distorting the price formation, liquidity and volatility of the underlying assets; and (v) the risk concerning excessive redemption dynamics in ETFs investing in illiquid assets.

The risk of a widespread step-in failure is deemed low. As APs are a crucial component of the ETF infrastructure and this function is highly concentrated, a widespread step-in failure could have a substantial impact on the functioning of the market, inducing panic and loss of confidence among end investors. However, based on empirical research and market intelligence, the likelihood of a step-in failure is small. Past events have also shown that the withdrawal of a single AP will likely induce other APs to step in.

The remaining risks are assessed to be at a medium level. Counterparty risk and the use of derivatives could be a particular source of concern. The failure of counterparties in derivative markets or in securities financing markets could undermine the capacity of ETF issuers to realise their promised investment strategy. For synthetic structures, if no replacement is found within a sufficiently short time frame, the failure of a counterparty in a swap transaction could induce end investors to sell their ETF shares as the tracking error increases, bringing about substantial volatility and contemporaneous losses in the secondary market. It is likely that the severity of the sell-off would be greater if the counterparty in question had been servicing multiple synthetic constructions. Were ETFs to increasingly influence liquidity, asset price formation and volatility in secondary securities markets, specific features of market structures could trigger meaningful effects on local asset markets. Although some research suggests that short selling ETFs contributes to market liquidity, the increase in counterparty risk due to the securities lending activities by ETF issuers may be a potential source of contagion risk.

There are still data limitations that prevent a complete assessment of systemic risks related to ETFs. Some risks cannot be definitively assessed until the reporting and data frameworks are enhanced, which is why developments in ETF markets still need to be monitored. More specifically, Securities Financing Transactions Regulation data could give an insight into securities lending activities.

3.1.5 Hedge funds

Hedge funds main risks	
Leverage	Leverage is very high on average, particularly for strategies highly reliant on derivatives, and concentrated in a few funds.
Interconnectedness	Hedge funds rely on counterparties to borrow funds (financial leverage) and obtain exposure through derivatives (synthetic leverage). Shocks to hedge funds could be amplified by leverage and have an impact on financial institutions exposed to those funds.

Hedge funds aim to generate returns not correlated with market trends by using a wide range of investment strategies. The investment styles of hedge funds vary widely, featuring different techniques and instruments. Although hedge funds can have a directional bias (long or short) or try to take advantage of corporate events (e.g. takeovers), many strategies seek to exploit arbitrage opportunities or price differentials between closely correlated assets or asset classes that differ from those observed in the past. EU hedge funds are regulated entities, which are mostly subject to AIFMD rules but also, in some cases, to UCITS rules.[53] They usually make greater use of leverage compared with other fund types and are typically restricted to professional investors.

The size of the euro area hedge fund sector as defined by the ECB increased to €504 billion in 2021. AuM of hedge funds domiciled in the euro area increased by 23% in 2021 compared with 2020 (Chart A-28). The euro area hedge fund market is small, with AuM accounting for around 3% of the overall European fund industry.

By contrast, the size of EU hedge funds according to AIFMD data stood at €105 billion in net asset value and €495 billion in regulatory AuM in 2021 (Chart A-12.1). The substantial difference between the ECB and AIFMD measures is related to several factors.[54] First, the AIFMD does not explicitly define hedge funds but instead relies on AIF managers to self-classify some of the funds they manage as hedge funds. In some cases, funds classified as hedge funds by the ECB are classified in other categories under the AIFMD. In addition, the ECB measure includes UCITS performing hedge fund-like strategies (so-called alternative UCITS), which are outside the scope of the AIFMD. Finally, regulatory AuM under the AIFMD include gross exposures through derivatives and SFTs.

Leverage continues to be markedly high for hedge funds compared with other funds, while liquidity mismatch remains low. According to AIFMD data, hedge funds' leverage stood at 400% in 2021, mainly driven by derivatives exposures (see Box 5). In addition, the aggregate measure of leverage masks substantial heterogeneity within funds, with some hedge funds having leverage levels as high as 10 or 20 times their NAV. The difference between portfolio and investor liquidity remains low for hedge funds: in the space of one week, around 22% of the NAV can be redeemed and 19% of the portfolio liquidated (Chart A-12.2).

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53 For statistical purposes, the ECB defines hedge funds as funds "which apply relatively unconstrained investment strategies to achieve positive absolute returns and whose managers, in addition to management fees, are remunerated in relation to the fund's performance" (Guideline ECB/2014/15).

54 See "**ESMA Annual Statistical Report: EU Alternative Investment Funds**", ESMA, 2022 for a comparison of the size of the EU and euro area hedge fund sectors.

Box 5

Alternative investment fund risk indicators

Reporting requirements under the Alternative Investment Fund Managers Directive (AIFMD) facilitate the monitoring of systemic risks, though risk indicators must be interpreted with caution. A deep dive into AIFMD data allows for a better understanding of structural vulnerabilities stemming from liquidity transformation and the use of leverage. However, the presence of reporting errors and diverging interpretations of requirements in different jurisdictions currently complicates the usability of risk indicators when systematically analysing financial stability risks.

Liquidity mismatch in the fund sector can be measured by the level of liquidity shortage.[55] This measure represents the percentage of liquidity mismatch to the sector's net asset value (NAV). At fund level, the shortage measure is equal to the difference between the liquidity provided to investors (as a percentage of NAV) and portfolio liquidity (where the percentage is divided by the assets under management/NAV ratio to adjust for the use of leverage by funds).[56] To avoid an underestimation of the liquidity shortage at aggregated level, the measure does not allow for any liquidity compensation between funds with a liquidity shortage and funds with excess liquidity.

A liquidity shortage over a specific period can be computed for any time bucket to which portfolio and investor liquidity are assigned under the AIFMD, ranging from one day to over one year. For most funds, liquidity shortages are higher at shorter than at longer maturities.[57] From a financial stability perspective, it appears reasonable to assess liquidity shortages over shorter time periods, such as one day or one week (Charts A and B), as they are more likely to materialise during stress periods associated with large-scale redemptions from investors.

Among alternative investment fund types, funds of funds exhibit the largest liquidity shortages, at around 30% of NAV over 1 day and 15% over one week in the fourth quarter of 2021. Other funds and hedge funds reveal liquidity shortages of around than 15% at the one-day frequency, which decline at the one-week frequency. This contrasts with real estate funds, whose liquidity shortages increase from the one-day to the one-week measure. This suggests that several real estate funds offer investors the option to redeem fund shares on a weekly basis, while not being able to liquidate investments at the same frequency.

55 See "**ESMA Annual Statistical Report EU Alternative Investment Funds**", ESMA, 2021, page 14.

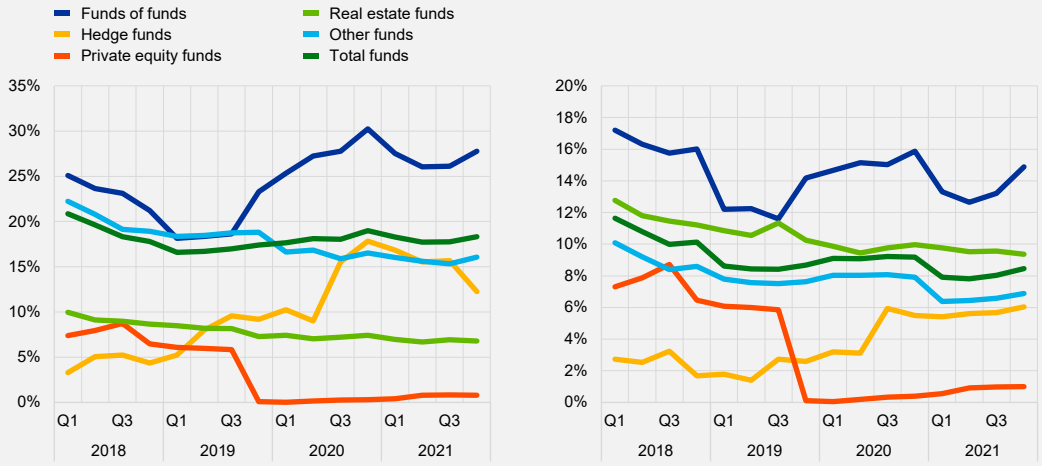
56 Investor liquidity is defined as the shortest period within which investors are entitled, under the fund documents, to withdraw invested funds or receive redemption payments. Portfolio liquidity measures the portfolio share that can be liquidated within a time period. For more information, see "**Questions and Answers – Application of the AIFMD**", ESMA, 2021.

57 By definition, the liquidity shortage becomes zero for the longest reported bucket, as portfolio and liquidity both cumulate to 100%.

Charts A and B

Liquidity shortages over one day (left panel) and one week (right panel)

(percentages of NAV)



Sources: AIFMD and ESRB calculations.
Note: EU-domiciled funds. The indicators show the average shortage weighted by fund NAVs. For the Irish market, data for the fourth quarter of 2021 had been approximated by data for the third quarter of 2021.

Leverage can be measured through balance sheet leverage or synthetic leverage. While balance sheet leverage involves outright borrowing through repos, loans or other sources of funding, synthetic leverage measures exposures through investments, including the use of derivatives.[58] By considering derivative exposures, synthetic leverage provides a better picture of the overall exposure through investments than balance sheet leverage, as it captures synthetic exposures through derivatives.

Adjusted leverage allows for better comparability of synthetic leverage across AIF types and strategies. Therefore, and given persistently poor data quality in the reported leverage measures for the gross method and the commitment approach under the AIFMD, the European Securities and Markets Authority mostly refers to the adjusted leverage measure in its annual AIF statistical reports. Adjusted leverage is calculated as gross leverage to NAV, leaving aside foreign exchange exposures for hedging purposes and any exposures through interest rate derivatives, as these are reported in notional values and thus inflate the leverage measure.

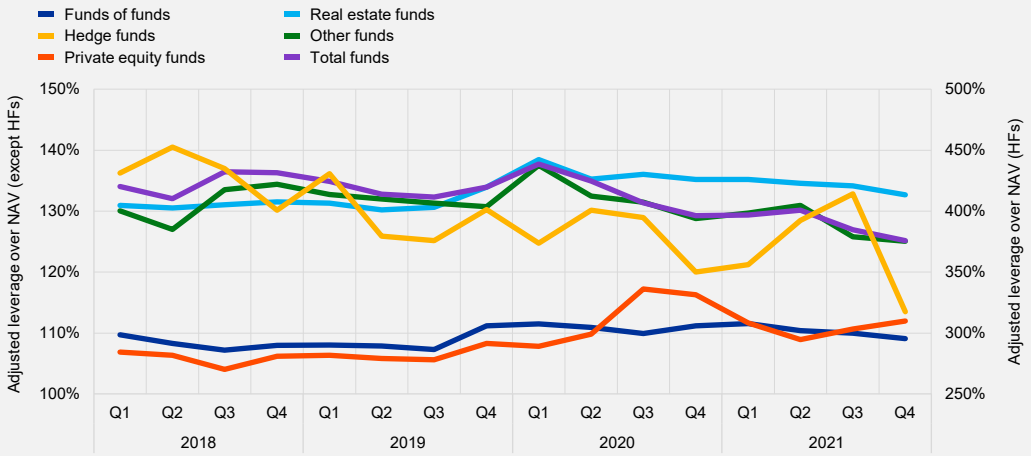
Among all fund types, hedge funds applied by far the highest adjusted leverage. Adjusted leverage is less pronounced for other AIF types, with the exception of real estate funds (with leverage of 133% of NAV). In terms of recent trends, average adjusted leverage has declined across all AIF types, especially for hedge funds (Chart C).

58 For further information, see "**Final Report Guidelines on Article 25 of Directive 2011/61/EU**", ESMA, 2020.

Chart C

Adjusted leverage

(percentages of NAV)



Sources: AIFMD and ESRB calculations.
Notes: EU-domiciled funds. The indicator shows the average leverage weighted by fund NAVs. Outliers have been removed from the sample (indicator smaller than 100% and greater than 5,000%). For the Irish market, data for the fourth quarter of 2021 had been approximated by data for the third quarter of 2021.

3.1.6 Private equity and private debt funds

Private equity and private debt funds main risks

Data gaps	Insufficient information prevents a more comprehensive risk assessment, including the use of leverage at portfolio company level.
Leverage	Low at fund level but may be large at portfolio company level.
Interconnectedness	Funds are predominantly used by professional investors (– mainly other investment funds and OFIs). Linkages with the banking sector take the form of subscription credit lines and engagement in leveraged buyouts.

PE and PD funds provide funding for companies with restricted access to bank or public market financing. They invest in equity-like and debt-like instruments issued by non-listed small and medium-sized companies and may be actively involved in their management. The funds follow diversified investment strategies, with PE funds mostly engaged in growth capital (33%), venture capital (16%) and mezzanine capital (6%)[59] and PD funds in direct lending (40%) and distressed debt (25%)[60].

Funds continue to grow amid the low interest rate environment and the search for yield. Net assets of PE funds domiciled in the EU increased by 21% in 2021, reaching €523 billion (Chart A-29). Similarly, the size of EU PE funds according to AIFMD data stood at €557 billion.[61] Despite

[59] See "**ESMA Annual Statistical Report on EU Alternative Investment Funds 2022**", ESMA, February 2022.

[60] See "**2021 Prequin Private Debt Report**", Prequin, February 2022.

[61] See section on hedge funds for the explanation of the difference between the ECB and AIFMD data.

recent growth, PE funds remain a small part of the EU investment fund sector, accounting for 3.2% of its total net assets and less than 10% of equity funds' net assets at the end of 2021. This implies that PE funds' role in corporate financing remains small. PE funds are concentrated in a few countries, with the top three jurisdictions accounting for 68% of the sector. Assets of Europe-focused PD funds recorded 23% growth in 2020 and amounted to €284 billion at the end of March 2021.[62] The largest of them were domiciled outside the EU.

Remaining data gaps impede the assessment of PE and PD funds' vulnerabilities. The fund classification embedded in current regulation does not include PD funds, while the information available from commercial data sources on EU-domiciled funds is scarce. In addition, supervisory data for AIFs (including PE funds) are not always timely and granular enough to allow the comprehensive identification of risks.

PE funds do not engage in substantial liquidity transformation. Portfolio liquidity is low, as funds invest in non-traded instruments. At the same time, most of them (96% of PE funds in terms of NAV) are constituted as closed-ended funds, which mitigates liquidity risk since investors cannot redeem their shares. Open-ended PE funds usually offer weekly or lower redemption frequencies.[63]

Little use of leverage should be interpreted with caution. PE funds do not directly hold large levels of debt (Chart A-30) and are not heavy users of derivatives. However, funds may use leverage indirectly, as leverage can be used at the level of the portfolio companies owned by PE funds or through the use of special-purpose vehicles (SPVs). These exposures are not captured by the current reporting framework for AIFs, which exempt PE funds from the look-through approach used for other AIFs. Leverage in PE and PD funds can take the form of "subscription credit lines" collateralised by capital committed by investors but not yet invested (dry powder), which allows asset managers to delay making capital calls.[64]

PE and PD funds remain exposed to the materialisation of interest rate and credit risk. Most PD funds lend on a floating rate, which partially mitigates interest rate risk. However, as their portfolio usually consists of loans to companies with high credit risk, interest rate hikes could impede their ability to make loan payments, potentially triggering defaults. Higher market rates can also be detrimental to some PE strategies, particularly those relying on substantial borrowing (e.g. leveraged buyouts).

62 See "**2021 Prequin Private Debt Report**", Prequin, February 2022.

63 See "**ESMA Annual Statistical Report on EU Alternative Investment Funds 2022**", ESMA, February 2022.

64 See "**BIS Quarterly Review, December 2021**", BIS, December 2021.

3.2 Other financial institutions

3.2.1 Financial vehicle corporations engaged in securitisation

Financial vehicle corporations engaged in securitisation main risks	
Interconnectedness	FVCs have strong linkages with the banking sector, especially when banks buy back substantial portions of FVCs' assets, thus retaining the risks they initially intended to transfer. Thus, shocks could spread throughout the financial system.
Credit risk	The risk associated with underlying collateral is transferred by FVCs according to both the product and the waterfall structure.
Leverage	FVCs hold only a small amount of equity and therefore have high leverage. They can engage in the securitisation of leveraged loans and possibly contribute to the amplification of stress across the financial system.

Financial vehicle corporations (FVCs) are SPVs that carry out securitisation transactions. Securitisation denotes the process of pooling illiquid and non-tradable assets, such as loans, into a new financial product that can be tradable on or off the balance sheet (see Section 4.3). FVCs aim to isolate the payment obligations of the undertaking from those of the originator and issue debt securities or other specific financial instruments, thereby facilitating the transfer of credit risk from the originator to investors. Other types of assets held by FVCs include deposits and loan claims as well as securitisation, equity and investment fund shares.

Assets of euro area FVCs increased by 5.3% in 2021, reaching €2.2 trillion (Chart A-31). FVCs were concentrated in a few countries, with those domiciled in Ireland, Italy and Luxembourg accounting for around 65% of the sector (Chart A-32). Securitised loans were the main component of FVCs' portfolios. Net acquisitions of securitised loans in the fourth quarter of 2021 did not balance out net disposals in the previous quarters. Net disposals of securitised loans originated by euro area monetary financial institutions amounted to €14 billion in 2021 (Chart A-33).

Risks associated with FVCs arise from either their structure or their activity, with the main ones stemming from their interconnectedness with other parts of the financial system. Banks often use securitisations by FVCs to transfer assets and their related risks from their balance sheets to the investors in FVC securities (while retaining some of the risk due to risk retention rules), making any shock to FVCs a potential contagion channel for the banking sector if the risk transfer remains incomplete. Furthermore, after retaining a substantial part of securitisations in previous years, banks' retention rate decreased in 2021. Given the potential tapering of accommodative policies introduced in response to the COVID-19 pandemic, some companies that relied heavily on debt and public subsidies could also be at risk of insolvency, with possible losses for creditors.

Leverage and maturity transformation remained at high levels in 2021. Collateralised loan obligations continued to grow substantially.[65] Leverage stayed at the same high level as in 2020 (Chart A-34), while securitised loans to total assets shrunk. Maturity transformation indicators decreased over the course of the year to levels last seen in the first quarter of 2020, which meant that there was a larger portion of total assets in the form of short-term securitised loans and debt

[65] See "**ESMA Report on Trends, Risks and Vulnerabilities No. 1, 2022**", ESMA, February 2022.

securities. Despite continuing to trend downward, interconnectedness remained elevated, underlying a potential source of systemic risk.

3.2.2 Special-purpose entities

Special-purpose entities main risks	
Data gaps	A lack of information at the EU level prevents comprehensive risk assessment.
Interconnectedness	SPEs are usually part of complex, international structures.

SPEs are created to fulfil narrow, specific or temporary objectives other than securitisation. Their general function is to channel financial flows from one corporation (and country) to another, frequently within a corporate group structure and often for corporate tax structuring purposes. The cross-border nature of many of their transactions make SPEs an important contributor to international financial flows.[66] Often, they have little or no connection to the domestic economy of their country of domicile. SPEs can issue debt securities and may engage in liquidity transformation.

SPEs perform a broad range of activities. For instance, non-securitisation SPEs domiciled in Ireland mostly engage in investment fund-linked activities (predominantly sponsored by US and UK entities), intragroup and external financing and operational leasing.[67] Their assets increased by 7% relative to 2020, reaching €447 billion at the end of 2021. SPEs domiciled in the Netherlands were financing companies to foreign subsidiaries, holding companies owning shares of foreign subsidiaries and royalty and licensing companies set up for payment of fees related to intellectual property rights.[68]

The interconnectedness of SPEs could be a source of contagion. SPEs are usually part of complex ownership structures, often within multinational capital groups. In times of stress, the complexity of their cross-border linkages could lead to the amplification and spread of shocks through the financial system.

A lack of detailed information on SPEs' activities at the EU level impedes systemic risk monitoring. The proper identification of systemic vulnerabilities and potential contagion channels requires a better understanding of SPEs' complex business models and their linkages to other parts of the financial system. To this end, granular, cross-country data are needed, which are currently unavailable.

66 See "**Special Purpose Entities Shed Light on the Drivers of Foreign Direct Investment**", IMF, March 2022.

67 See "**Special Purpose Entities Statistics Q4 2021**", Central Bank of Ireland, March 2022.

68 See "**What shall we do with pass-through? DNB's experiences with special financial institutions**", BIS, September 2016.

3.2.3 Security and derivative dealers

Security and derivative dealers' main risks

Liquidity transformation:	SDDs may rely on short-term funding to provide market-making services and perform proprietary trading.

SDDs are investment firms specialising in securities trading that are authorised to provide investment services to third parties in line with MiFID II.[69] They provide a range of services and play an important role in facilitating savings and investment flows across the EU. SDDs tend to trade in financial instruments on their own account and at their own risk. This type of trading also forms part of their market-making activities. In doing so, SDDs give investors access to securities and derivatives markets through investment advice, portfolio management, brokerage, the execution of orders, proprietary trading, underwriting and the placing of financial instruments on behalf of an issuer on a firm commitment or on a standby commitment basis in line with MiFID II.

The degree of maturity transformation, liquidity and leverage risk borne by SDDs depends on their specific business model. SDDs engage with a variety of lenders, including banks, and can hold a wide range of asset types with different maturities. They tend to hold liquid securities which can be converted into cash through repos and securities lending or can be posted as collateral to support various trading strategies. This can result in some maturity and liquidity transformation.

SDDs may rely on banks as a funding source, especially when they are consolidated into banking groups. The consolidated banking group is usually required to hold capital, including against the risks related to the group's SDDs. This incentivises banks to exert a degree of control over the risks borne by SDDs, which implies that risks stemming from such SDDs may be considered low or mitigated. However, this may not be the case across all jurisdictions, as SDDs may not always be consolidated into banking groups.

Overall, risks in SDDs appear to have remained largely unchanged in 2021 compared with the previous year. The revisions to the CRR may result in structural shifts in the SDD market, which will need to be monitored (see Section 1.4).

3.2.4 Financial corporations engaged in lending

Financial corporations engaged in lending main risks

Credit intermediation	FCLs perform lending activities but are not always subject to banking regulation.
Leverage	FCLs are substantially leveraged.
Liquidity transformation	Like banks, FCLs rely on short-term loans and deposits to fund long-term loans.

FCLs are non-bank credit grantors that principally specialise in asset financing for households and NFCs. The entities in this sub-sector include financial leasing, factoring, mortgage lending and consumer lending companies. When carrying out lending activities, FCLs

[69] **Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU**.

engage in credit intermediation outside the banking regulatory perimeter[70]. At European level there are no current legal initiatives to create a harmonised regulatory framework for these entities.

The extent of regulation for FCLs varies across Member States. Some jurisdictions have prudential regulation in place to address liquidity and leverage risk, although the features of such regimes vary substantially[71]. In some countries and to the extent that FCLs form part of a banking group, the assets of these FCLs are partly consolidated into the corresponding banking groups and therefore fall within the banking regulatory perimeter, while in other jurisdictions FCLs are not subject to any prudential requirements.

Assets of FCLs increased by 8% in 2021, compared with lower increases of around 5.7% on average in the previous three years. Total assets of FCLs were around €623 billion at the end of 2021, up from €577 billion at the end of 2020 (Chart A-36). This represented about 2.6% of OFIs' total assets. The balance sheet composition has remained broadly stable in recent years, with loans to non-monetary financial institutions continuing to represent around 94% of total loans provided by FCLs. The liabilities side of the balance sheet shows a gradual increase in FCLs' capital and reserves over the last five years. Debt securities issued posted a 30% increase in 2021 (Chart A-37).

Systemic risks emanating from the sector appear to be medium when leverage, liquidity and interconnectedness channels are considered. A simple FCL leverage measure suggests that it is below the median value for the banking sector. However, current levels of leverage remain elevated, with total assets amounting to five times equity. Although there is large variation across countries, the liquidity risks faced by FCLs are broadly similar to those for the banking sector, and the liquidity conditions of the two sectors have been increasingly ample over the years. Finally, interconnectedness with the banking system appears to be low, as only 3% of FCL assets in 2021 had direct counterparty exposure to the banking sector. Overall, risks appear to have remained unchanged compared with the previous year.

3.2.5 Captives and OFI residuals

Captives and OFI residuals main risks

Data gaps	There is little information available to monitor risks in captives and OFI residuals.
Interconnectedness	Captives can be closely linked to other entities of the same group, including through intragroup lending.

OFI residuals refer to non-bank financial institutions for which primary statistics are not currently available at the EU level. OFI residuals are mostly represented by CFIs – the largest OFI sub-sector in many jurisdictions (Charts A-6 and A-7).

[70] In November 2017, the EBA published an opinion on regulatory perimeter issues relating to the Capital Requirements Directive IV (CRD IV). This opinion explains that those FCLs which are in the same group as a credit institution must be consolidated pursuant to Article 18(1) of the CRR, as they are regarded as "financial institutions".

[71] The EBA has undertaken a comprehensive analysis of the regulatory perimeter further to the 2014 EBA opinion and report on the perimeter of credit institutions. Similar results have been obtained in an ECB survey.

According to the ESA 2010 classification, entities included in CFIs can be grouped into five broad types. These are: (i) units which are legal entities such as trusts, estates, agency accounts which are legal entities or "brass plate" companies; (ii) holding companies that hold controlling levels of equity of a group of subsidiary corporations and whose principal activity is owning the group without providing any other service to the businesses in which the equity is held; (iii) SPEs, financing conduits that qualify as institutional units and raise funds in open markets to be used by their parent corporation; (iv) units which typically provide financial services exclusively with own funds; and (v) sovereign wealth funds classified as financial corporations.

CFIs and money lenders form an economic sector comprised of institutional units, usually as part of a larger corporate structure, that provide a variety of financial services to the corporate group. They include a wide range of entities that undertake different activities with diverse business models. The entities are not subject to a uniform European legal framework, but to different national legal systems (i.e. in terms of authorisation, regulation and tax systems). Consequently, it is important to define the perimeter of the sector that is relevant for systemic risk analysis due to its potential interconnectedness with other parts of the financial system.

Recent initiatives have been launched at Eurosystem level to better understand, classify and collect data on CFIs. Early results show that for holding companies, there is overall a well-established identification criterion on which further activities such as data collections could be based. However, identifying the remaining CFIs is still considered difficult due to the fact no harmonised approach exists. Consequently, there is a need for additional criteria to identify these entities.

Due to data gaps, it is difficult to judge whether CFIs and other entities included in OFI residuals engage in activities that give rise to risks from a financial stability perspective, but they may be interconnected with other parts of the financial system. Such entities do not necessarily engage in credit intermediation. However, they also tend not to be regulated and can form part of a complex financial intermediation chain in which they may engage in SFTs or maintain high levels of leverage through the use of derivatives. In addition, their business model and possible involvement in the credit chain may vary across the different EU jurisdictions. Owing to a lack of harmonised data on CFIs and the importance of these entities in some jurisdictions, additional analysis and data collection will need to be undertaken to better understand their business models and the role they play in the overall financial system and beyond.

It is therefore currently not possible to make a clear assessment of the risks borne, propagated or possibly generated by these entities. However, work in international fora[72] is ongoing to better understand the detailed characteristics of CFIs, including the business models and regulatory regimes of these entities. A survey conducted by the ECB found that most CFIs can be categorised as holding companies of larger groups or as SPEs. The interconnectedness with banking groups does not appear to be a source of risk, although credit intermediation undertaken by some of these entities requires further assessment. Further work on the identification of these entities for the future availability of data appears fundamental to disentangle the potential risks and

[72] IMF, OECD, ECB and ESRB.

complexities of this OFI sub-sector and to assess whether additional policy actions should be considered.

4 Activity-based monitoring

Activity-based monitoring complements entity-based monitoring, thereby ensuring a more holistic understanding of financial stability risks. Entity-based monitoring may not capture all aspects of systemic risks, in particular those that may arise in specific markets and that cut across entities. Complementing entity-based monitoring with activity-based monitoring sheds further light on the use of certain financial instruments and the type of markets in which investment funds and OFIs interact with each other and with entities outside the monitoring framework. Thus, it provides further insights on the nature of risks that may arise due to these activities from a systemic perspective.

4.1 Derivatives

Derivatives main risks

Interconnectedness	Use of derivatives can create complex intermediation chains, which can include various financial sectors and asset classes.
Leverage	Use of derivatives can increase market risk exposure beyond risk-bearing capacities.
Counterparty risk	Insufficient margining can lead to unintended market exposures in the event of counterparty default.

Derivatives can be used for hedging or speculation but increase interconnectedness within the financial system.[73] Derivatives can be used by investment funds and OFIs as well as other market participants to reduce or to take on risk. They allow market participants to transfer risks, including market risk (e.g. movements in market variables such as exchange rates, interest rates and asset prices) and credit risk (e.g. the risk of late or non-payment by a borrower). While derivatives can transfer risks to participants better placed to manage or bear them, they can also create complex financial intermediation chains that increase interconnectedness between entities and across markets. Moreover, counterparty risk, credit risk and procyclical behaviour, alongside risks and vulnerabilities arising from interconnectedness, can act as interrelated risk transmission channels in which the non-bank financial sector can play an important role, as witnessed by the losses related to the collapse of Archegos in March 2021.

The trading and execution of derivatives contracts play a central role in market integrity, efficiency and transparency. Derivatives executed in a regulated market and on an OTC basis have distinctive characteristics in terms of the levels of standardisation, transparency, liquidity and

[73] Derivatives are usually defined as instruments whose value is derived from the value of an underlying instrument. They can have a predefined maturity and may entail an obligation or option to acquire or sell underlying assets or to effect a cash settlement determined with reference to transferable securities, currencies, interest rates or yields, commodities, or other indices or measures. Different derivative classes are used by different counterparties to address different needs and allow counterparties to obtain synthetic leverage. In general, IRSs are widely used as hedging instruments among banks and other intermediaries, although they may leave individual entities sensitive to interest rate changes. Credit derivatives, in particular CDSs, transfer credit risk on the underlying reference entity. Foreign exchange (FX) derivatives allow financial and non-financial counterparties to hedge against unwanted FX risk and constitute a closer link between the financial system and the real economy than other forms of derivatives. See Abad, J. et al., "**Shedding light on dark markets: First insights from the new EU-wide OTC derivatives dataset**", *Occasional Paper Series*, No 11, ESRB, September 2016, for more details and an in-depth analysis.

post-trading processes such as central clearing. In contrast to OTC derivatives, exchange-traded derivatives (ETDs) are traded on regulated markets and are therefore more standardised and transparent. ETDs have become more widely used in response to regulatory requirements, as the standardisation of contracts, liquidity, the reduction of counterparty risk and transparency have become determining factors in investment strategies. Following MiFID II there has been an increase in trading on multilateral and organised trading facilities for interest rate, currency and credit derivatives. Derivatives traded on these markets are considered as OTC under the EMIR, but in other respects are similar to ETDs.

EMIR data show that the EU derivatives market had a total gross notional outstanding amount of €264 trillion and 29 million open trades at the end of 2021.[74] This was an increase from the €244 trillion and 24 million trades a year earlier. The market continued to be dominated by IRDs, representing 72% of the total gross notional amount. About 14% of the total gross notional amount was in currency derivatives, with the remaining 14% in equity, credit and commodity derivatives (Chart A-41). OTC contracts accounted for 94% of the total gross notional amount in the fourth quarter of 2021, with the remaining 6% in ETDs. However, 10% of the total gross notional amount was in OTC contracts executed on trading venues which have characteristics more comparable to ETDs.

Equities account for a large proportion of ETDs, since instruments in this asset class are more frequently traded on regulated markets. Overall, ETDs are still smaller in terms of gross notional outstanding than OTC derivatives, though in equity and commodity derivatives ETDs account for a sizeable proportion of that amount. In the fourth quarter of 2021, the largest shares of ETDs in the gross notional amount outstanding were for commodities (38%) and equities (28%) (Chart A-42).

As in previous years, credit institutions and investment firms account for the largest proportions of notional outstanding overall and in almost all asset classes (Chart A-43). Credit institutions account for over half of the amount overall (54.4%), and investment firms for just over a quarter (26.6%). Investment firms hold the largest proportions in equities (65.9%) and commodities (36.2%). Non-financial firms also account for a large share of commodities (32.3%). However, some of the exposures of credit institutions and investment firms are on behalf of clients that do not report directly under the EMIR. These positions are sometimes misreported as the exposures of credit institutions or investment firms rather than as exposures of the sector of the client. As such, these statistics understate the exposures of other sectors.

Central clearing rates for credit and IRD assets increased in 2021, with products subject to a clearing obligation in the EU. The proportion of gross outstanding notional amount for OTC credit and interest rates cleared stood at 45% and 75%, respectively, at the end of 2021, both up from a year earlier (+4 percentage points, respectively) (Chart 22). Central clearing of OTC derivatives in other asset classes remained minimal (7% in commodities and 1% in each of equities and currencies). Margins collected by EU CCPs for commodity derivative positions increased starting with the price surge in energy commodity prices during the second half of 2021. Margins increased again at the start of the Russian invasion due to a price but also volatility increase, reaching a peak

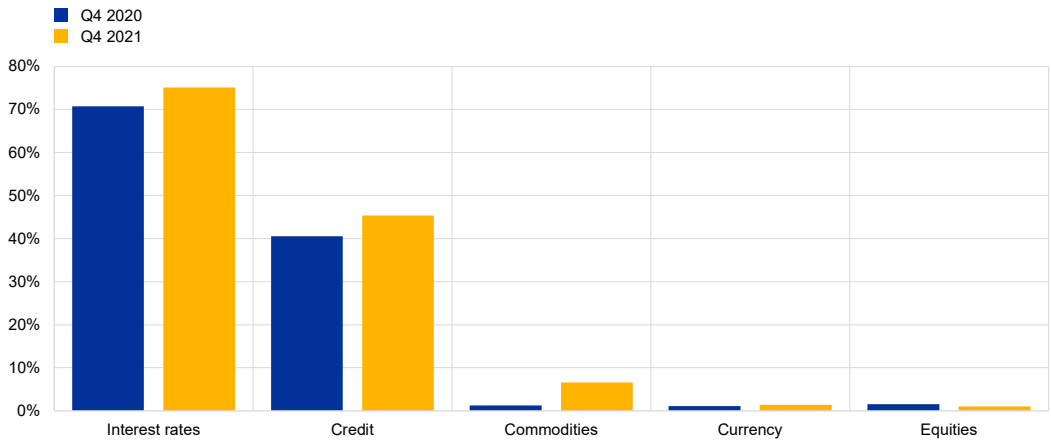
[74] These market size metrics are substantially lower than a year earlier because the United Kingdom is no longer included in the statistics given its withdrawal from the European Union on 31 January 2020.

at the beginning of March. Overall however, initial margins collected by EU CCPs since the second half of 2021 have remained below the COVID-19 stress levels observed in the first quarter of 2020. Looking ahead, challenges remain in 2022 as the rises in prices of various commodities have led to increases in margin calls on commodity derivative contracts, thus resulting in a liquidity squeeze for some market participants.

Chart 22

Share of notional amount outstanding cleared by asset class

(percentages)



Sources: Trade repositories and ESMA.
Note: Outstanding amounts of initial margin required and excess collateral and of variation margin received by EU27 CCPs for derivatives.

4.2 Securities financing transactions

Securities financing transactions main risks

Counterparty risk	During periods of stress, when the market moves adversely, the collateral proceeds may fall short of the repurchase price. In such cases, if the counterparty fails to pay the repurchase price, the market value of the collateral will not cover the losses resulting from the counterparty default.
Leverage	SFTs can enable institutions to increase their exposures via secured borrowing.
Reinvestment	If cash collateral is reinvested in volatile/illiquid assets, the counterparty may suffer losses, which may in turn result in a more widespread spillover to unsecured funding markets.
Liquidity	SFTs have short maturities, while initial/variation margin calls during periods of stress may amplify liquidity risks.
Procyclicality	During periods of stress, counterparties may face liquidity demands from higher haircuts and a decline in the value of collateral. Procyclicality associated with margining and haircut practices may increase contagion risks.

SFTs allow investors and firms to use securities, such as the shares or bonds they own, to secure funding for their activities. SFTs can provide additional liquidity, which is useful for price discovery, as well as funding to market participants. Improved liquidity in the markets tends to attract more informed traders and analysts, which in turn increases the information context. At the

same time, as new information is incorporated into prices, efficiency is increased. This may attract more investors, who in turn contribute to more market liquidity and the potential for providing it to a wider range of market participants.[75] SFTs include four types of instruments: securities lending, repurchase agreements, buy-sell back transactions and margin lending transactions. They can enhance the efficiency of the financial sector by facilitating credit growth, maturity transformation and liquidity transformation outside the banking system.

Securities lending activity increased in 2021.[76] EU securities on loan include government bonds, corporate bonds and equities. SFTs involving European government bonds grew further. The average value of loans increased by 23% in 2021 to USD 409 billion, while the amount of lendable assets remained substantial (up 8% to USD 1.3 trillion) and the average utilisation (ratio of assets on loans to lendable assets) remained elevated at 27%. Securities lending activity involving European equities increased.

The total value of the European repo market amounted to approximately €9.2 trillion in December 2021 (Chart A-38). This compares with €8.3 trillion in December 2020, representing a year-on-year increase of 11%. According to data reported directly by tri-party agents, the share of government securities used as collateral increased to 48.7% in 2021 from 46.7% in 2020, due to a large increase in the allocation of French, German, Italian, UK and US government securities. In addition, there was a reduction in corporate bonds (to 10.6% from 15.5%), covered bonds remained fairly stable and 6.4%, and there was a large increase in equity (to 13.1% from 11.9%).[77] Volatility remained contained during the ten-month period of 2021. However, concerns were raised in November 2021 about the potential of collateral shortages. This was to some extent due to the increased pace of the pandemic emergency purchase programme (PEPP) by the ECB, which reached €241 billion in net purchases in June 2021 (€186 billion in March 2021) out of a total target of €1.85 trillion.[78] In addition, typically low trading volumes around the end of the year contributed to volatility spikes (Chart A-39). In a bid to help meet demand for the securities, the ECB doubled the amount of cash it would accept as collateral from banks looking to borrow sovereign debt to €150 billion[79], while the increase in the relevant national central bank (NCB) credit lines helped to ease any potential bottlenecks. This led to a normalisation to relatively orderly trading in the repo markets. The ECB also adopted further measures with the aim of preserving favourable financing conditions over the pandemic period. By the end of 2021 the USD/EUR cross-currency basis reverted, and it was cheaper to fund in euro than through the USD swap.

Overall financing conditions on euro-denominated SFTs continued to ease for all collateral types in the fourth quarter of 2021, excluding OTC derivatives.[80] In relation to SFTs, survey respondents reported an ongoing easing of credit terms across most collateral types, with a slight increase in maximum amounts of funding and maturity of funding. Haircuts to collateral increased

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75 See Gong, Q., Tang, Z. and Xu, B., "**Trading behaviors on knowledge of price discovery in futures markets**", *Journal of Innovation & Knowledge*, Vol. 6. Issue 3, 2021, pp. 191-195.

76 See IHS Markit Securities Finance Quarterly Reviews Q4 2018, Q1 2019, Q2 2019, Q3 2019, Q4 2019, Q2 2020, Q4 2020, Q2 2021 and Q4 2021.

77 Data from the International Capital Market Association (ICMA) based on a survey sent to 5,957 financial institutions in December 2021.

78 See "**ESMA Report on Trends, Risks and Vulnerabilities No. 2, 2021**", ESMA, September 2021, page 8.

79 See **Securities lending – Q&A**.

80 See the ECB's December 2021 "**Survey on credit terms and conditions in euro-denominated securities financing and OTC derivatives markets (SESFOD)**".

slightly, while financing rates/spreads for funding continued to decrease against almost all collateral types. Demand continued to weaken against most collateral types.

Interconnectedness between banks and the monitoring universe through the use of repo transactions increased. Banks' repo liabilities to non-MMF investment funds and other OFIs increased from €63.2 billion at the end of 2020 to €78.8 billion at the end of 2021 (Chart A-40). The share of repo transactions conducted by banks as counterparties to non-MMF investment funds and OFIs continued to grow and reached 36% at the end of 2021, compared with 31% at the end of 2020 and 18% at the end of 2019. This shows that non-MMF investment funds have become much more interconnected with banks over the last two years. Banks' repo liabilities to CCPs – the largest bank counterparty, as the bulk of EU repo transactions are centrally cleared[81] – decreased to €119 billion at the end of 2021 from €130 billion at the end of 2020. Their share as counterparties of bank repo liabilities decreased consistently and amounted to 54% at the end of 2021 compared with 60% at the end of 2020.

4.3 Securitisation

Securitisation main risks

Interconnectedness	Interconnections through securitisation open up contagion channels between financial institutions, across sectors and the whole economy.
Leverage	Securitisation can create excessive leverage in the financial system fuelling a rise in asset prices and overindebtedness across borrowers.

Securitisation allows non-tradable, illiquid assets such as loans to be pooled and tranched into tradable securities. In this process, financial institutions that originate the loans transfer credit risk to investors holding those securities. This is usually done through issuers, such as FVCs (see Section 3.2.1), which buy the portfolio of loans, repackage it into tradable securities and sell the latter to investors. In some cases, securitisation is also achieved via the issuance of securitisation fund units or with the use of financial derivatives. Most securitisations are structured such that investors buy claims to the cash flows of the assets underlying the securities.

The securitisation market in the EU is smaller than in the United States and has shrunk since the global financial crisis of 2008.[82] As of the second quarter of 2021, total EU securitisations outstanding amounted to around €0.7 trillion (in terms of notional amounts), compared with €9.8 trillion in the United States. Over the past ten years, the EU securitisation market has shrunk by around 40% (from €1.2 trillion in 2012).

Securitisation activity in the EU remains subdued. Since 2013, the yearly volume of new issuances has remained constant at an average of around €220 billion, with a peak in 2018 (€270 billion) and a low in the second quarter of 2021 (annualised to €171 billion) (Chart A-35). To some extent, these low levels of issuances in the EU reflect the loss of confidence (or remaining stigma) in securitised products since the global financial crisis, which has affected the expansion of the

81 See also "**Setting EU CCP policy – much more than meets the eye**".

82 In June 2022 the ESRB published its first report on the financial stability implications of the EU securitisation market. See "**Monitoring systemic risks in the EU securitisation market**", ESRB, July 2022.

market. By segment, new issuances have been mostly driven by residential mortgage-backed securities (RMBSs) since 2008.

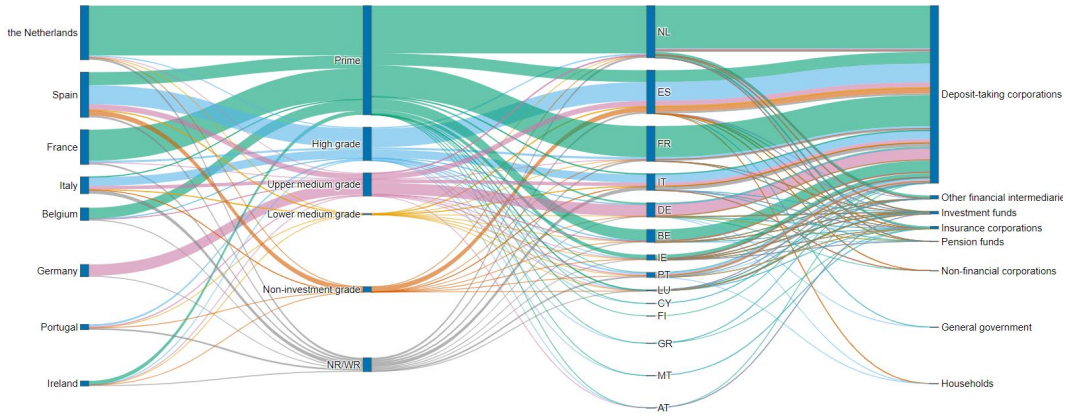
The total loan balance underlying EU RMBSs also decreased from €745 billion in the fourth quarter of 2014 to €458 billion in the second quarter of 2021. Compared with loans originated and securitised between 2004 and 2008 (€227 billion) and between 2015 and 2018 (€191 billion), loans originated and securitised in 2020 – the year of the onset of the COVID-19 pandemic – represented a small amount of the total underlying loans (€17 billion).

Leverage indicators behind EU RMBSs show non-excessive levels of risk. The loan-to-value (LTV) ratio of the loans underlying EU RMBSs is on average below 100%, although the share of riskier loans has risen since the beginning of the 2000s. Based on an unweighted average taken across loans and across origination years, the average LTV ratio of the original balance of loans underlying EU RMBS was 72% in the second quarter of 2021. This means that, on average, the mortgage exposure represented 72% of the value of the property at origination. The weighted debt-to-income (DTI) ratio of the loans underlying EU RMBS is 5.3, with almost 34% of borrowers having a DTI ratio above five. This means that the loans granted to borrowers at origination represented just over five times their annual income.

Chart 23

Link between originators and holders of EU RMBS by rating grade

(Q2 2021)



Sources: EDW, SHS, CSDB and ESRB calculations.
Notes: The first column of the chart refers to the sum of the nominal value of EU RMBSs by country of origination. The second column refers to the sum of the nominal value of EU RMBSs by the highest external credit rating received between Moody's, S&P and Fitch. The third column refers to the sum of the nominal value of EU RMBSs by country holding the security. The fourth column refers to the sum of the nominal value of EU RMBSs by sector holding the security. Prime refers to an external rating equivalent to AAA. High grade refers to an external rating between AA+ and AA-. Upper medium grade refers to an external rating between A+ and A-. Lower medium grade refers to an external rating between BBB+ and BBB-. Non-investment grade refers to an external rating between BB+ and D. NR/WR means not rated or withdrawn rating.

The concentration observed in EU RMBSs across and within Member States, including from retained self-securitised loans, indicates that the benefits of securitisation are not being fully reaped. The origination and holding of EU RMBSs are concentrated in a few banks domiciled in a few Member States. Based on data that link the originators of EU RMBSs with the holders of

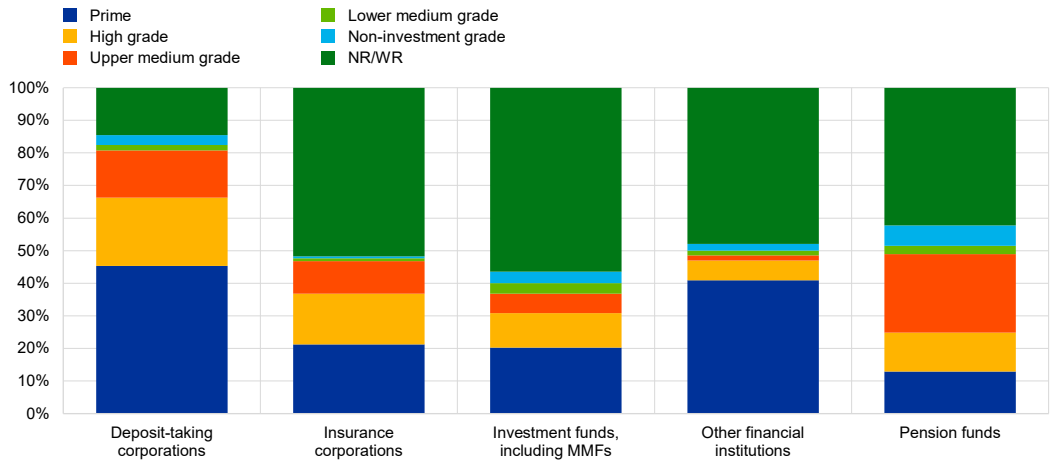
EU RMBSs (Chart 23), 75% of EU RMBSs were backed with mortgages located in the Netherlands, Spain, Italy and France, while 72% of EU RMBS were held by institutional sectors in the same Member States in the second quarter of 2021. Moreover, ten important banking groups headquartered in the Netherlands, Spain, France, Germany and Italy originated 66% of EU RMBSs during the same period. At the same time, ten banking groups held 84% of the total holdings of EU RBMSs in the euro area.

Holdings of securitisations by investment funds and OFIs are skewed towards unrated positions. Around 40% of the holdings held by banks and OFIs had an AAA rating in the second quarter of 2021 (Chart 24). For general governments, insurance corporations, investment funds (including MMFs) and pension funds, this share was below 21%. At the low end of the quality spectrum, 6% and 4% of EU securitisation holdings held by pension funds and investments funds (including MMFs) had a non-investment grade rating. Investment funds hold mainly non-rated securitisations (€32.8 billion, corresponding to 56% of funds' securitisation holdings). Funds' holdings account for 19% of non-rated securitisations held by euro area institutional sectors). This implies that funds are most exposed to credit risk from the underlying collateral and would be the first investors to bear losses in case of default. Insurance corporations and OFIs also tend to hold predominantly lower-rated or unrated securitisation instruments, although their holdings are lower in absolute terms (at €19.5 billion for insurance corporations and €5.8 billion for OFIs).

Chart 24

Holdings of euro area securitisations by euro area institutional sectors by rating grades

(Q2 2021, percentage)



Sources: ECB and ESRB calculations.
Notes: Deposit-taking corporations refer to banks and do not include central banks. Holdings correspond to securitisations issued by institutional sectors resident in the euro area and held by institutional euro area residents. The data do not disentangle across tranches. CDOs are not included. Holdings are at market value. Prime refers to an external rating equivalent to AAA. High grade refers to an external rating between AA+ and AA-. Upper medium grade refers to an external rating between A+ and A-. Lower medium grade refers to an external rating between BBB+ and BBB-. Non-investment grade refers to an external rating between BB+ and D. NR/WR means not rated or withdrawn rating. The NR/WR category consists, for the most part, of generic ABS products.

A Statistical overview

A1 Statistical classification for investment funds and other financial institutions

Table A-1

Entities: Sectors and sub-sectors			Description
Investment funds (IFs)	Money market funds (ESA S.123)		Part of the monetary financial institution (MFI) sector
	Non-MMF investment funds (ESA S.124)	Bond funds	Allocated to investment policy according to assets in which they primarily invest
		Equity funds	
		Mixed funds	
		Real estate funds	
		Hedge funds	
		Other funds	
		Exchange-traded funds (ETFs)	ETFs and private equity funds are included in the above fund types, depending on the strategy of the fund
		Private equity funds	
Other financial institutions (OFIs)	Other financial intermediaries (ESA S.125)	Financial vehicle corporations engaged in securitisation (FVCs)	i.e. special-purpose vehicles engaged in securitisation
		Financial corporations engaged in lending (FCLs)	e.g. financial leasing, factoring, hire-purchase
		Security and derivative dealers (SDDs)	i.e. dealers on own account
		Specialised financial corporations	e.g. venture capital, export/import financing, central counterparties (CCPs)
	Financial auxiliaries (ESA S.126)		e.g. insurance or loan brokers, fund managers, head offices of financial groups, financial guarantors
	Captive financial institutions and money lenders (ESA S.127)		e.g. special-purpose entities not engaged in securitisation, “brass plate” companies, holding companies

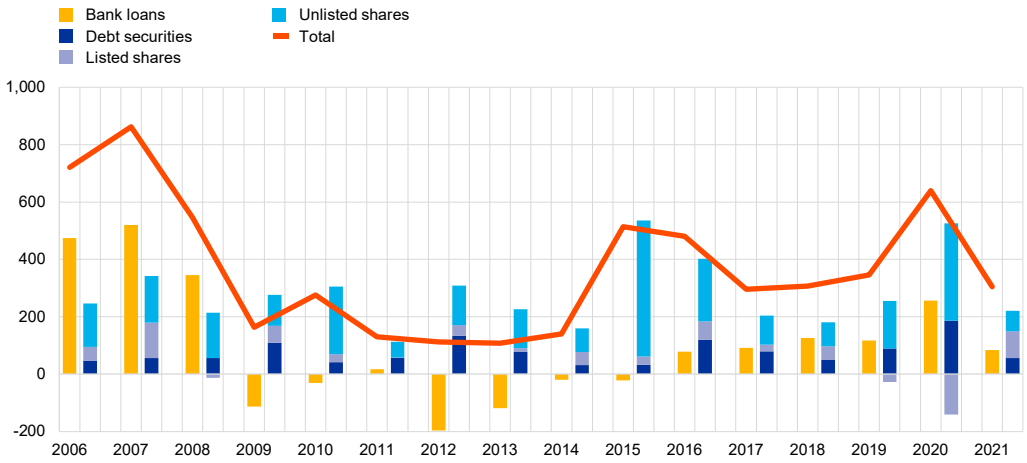
Source: ECB.
Note: Some CCPs are classified as specialised financial corporations in the ESA 2010, while others have bank licences and are included in the MFI statistics.

A2 Developments in main aggregates

Chart A-1

Net finance raised by euro area non-financial corporations

(EUR billions)

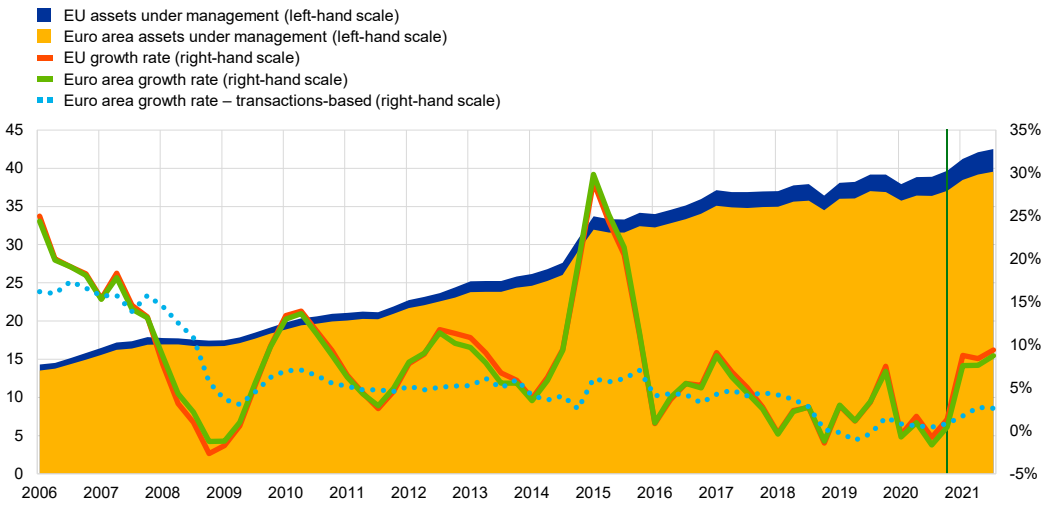


Sources: ECB QSA and ESRB calculations.

Chart A-2

Assets under management in EU and euro area investment funds and other financial institutions

(left-hand scale: EUR trillions; right-hand scale: annual growth rates in percentages)

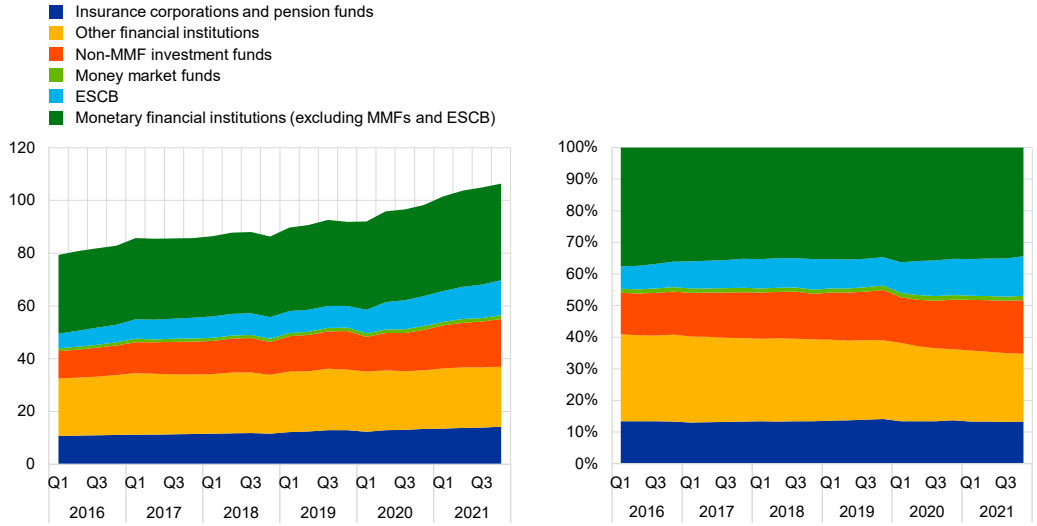


Sources: ECB and ESRB calculations.
Notes: The continuous lines indicate annual growth rates based on changes in outstanding amounts. The dotted line indicates the annual growth rate based on transactions – i.e. excluding the impact of exchange rate variations or other revaluations and statistical reclassifications.

Charts A-3.1 and A-3.2

EU financial sector

(Chart A-3.1: EUR trillions; Chart A-3.2: percentages)

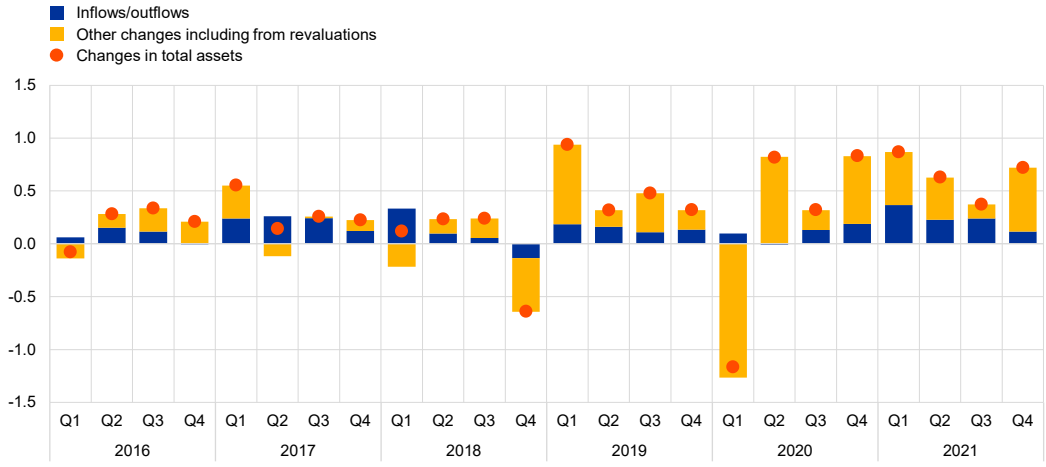


Sources: ECB and ESRB calculations.
Notes: Based on financial accounts data for the total financial assets of the financial sector of euro area plus non-euro area EU Member States. To exclude central banks from the MFI time series, European System of Central Banks (ESCB) is estimated based on BSI data for the Eurosystem and national central bank data for the non-euro area EU central banks.

Chart A-4

EU investment funds and other financial institutions: financial transactions and other changes

(EUR trillions)

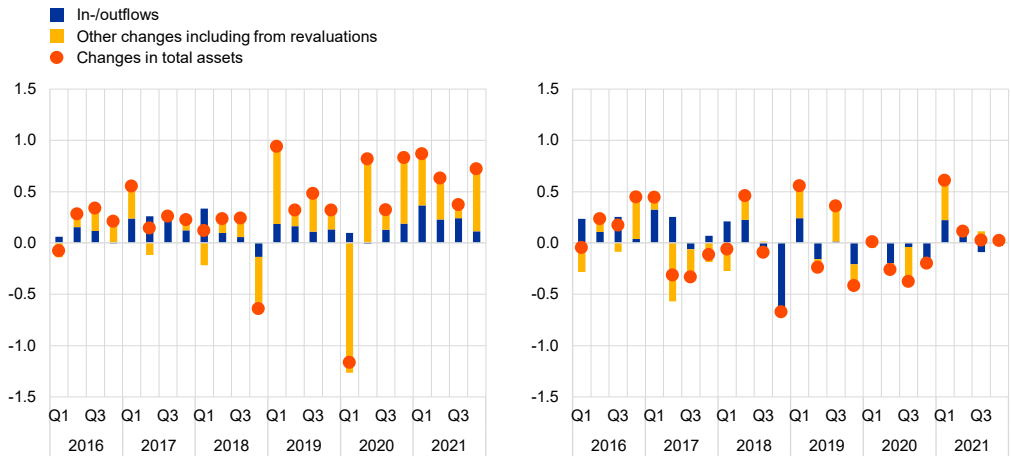


Sources: ECB and ESRB calculations.
Notes: Based on financial accounts data for the total financial assets of the financial sector of euro area plus non-euro area EU Member States. Inflows//outflows are calculated from differences in outstanding amounts adjusted for revaluations, exchange rate variations, statistical reclassifications and any other changes which do not arise from transactions.

Charts A-4.1 and A-4.2

Euro area investment funds (left panel) and euro area other financial institutions (right panel): transactions and other changes

(EUR trillions)

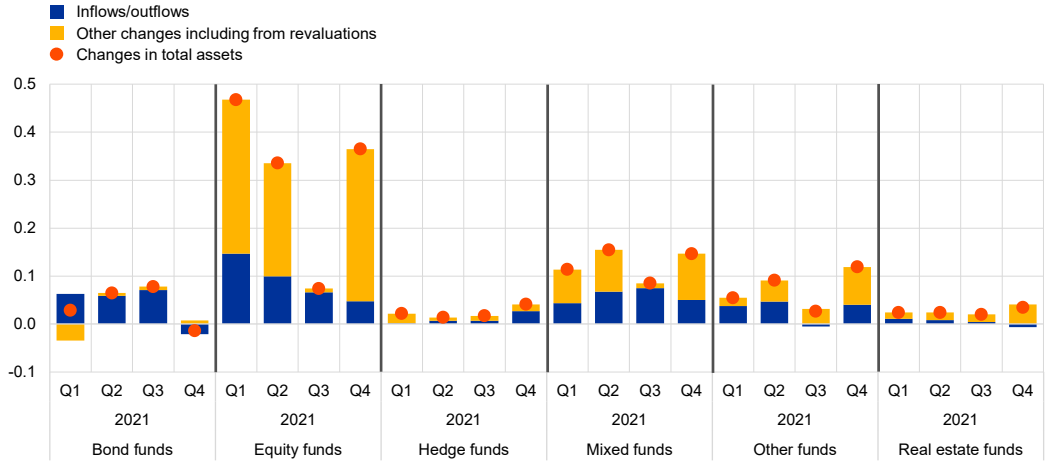


Sources: ECB and ESRB calculations.
Notes: Based on financial accounts data for the total financial assets of the financial sector of the euro area. Inflows//outflows are calculated from differences in outstanding amounts adjusted for revaluations, exchange rate variations, statistical reclassifications and any other changes not arising from transactions.

Chart A-5

Euro area investment fund types: in/outflows and other changes

(EUR trillions)

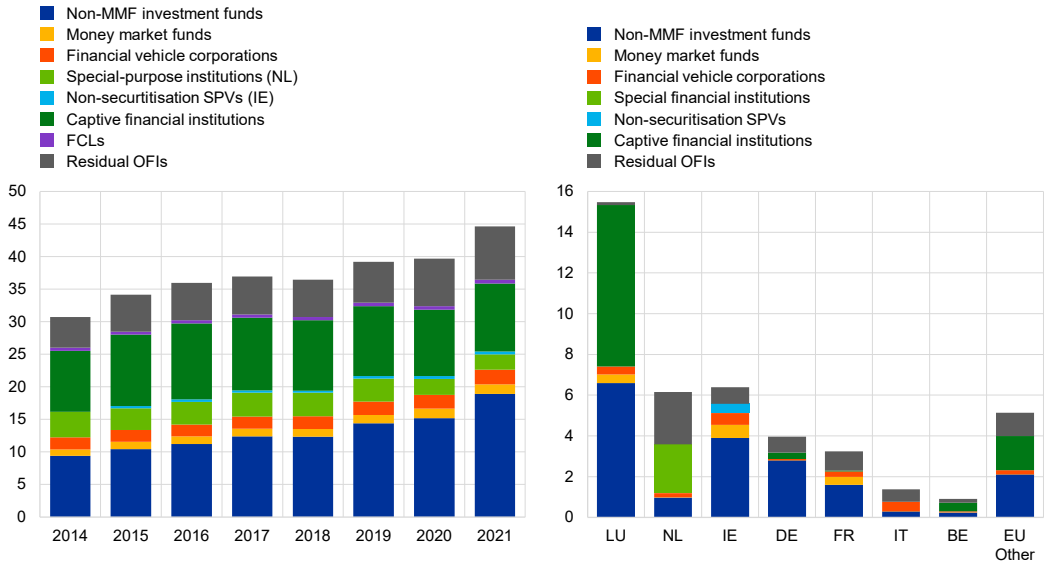


Sources: ECB and ESRB calculations.
Notes: Based on financial accounts data for the total financial assets of the financial sector of the euro area. Inflows/outflows are given by the net issuance of fund shares.

Charts A-6 and A-7

Breakdown of investment funds and other financial institutions by type in the EU (left panel) and by domicile (right panel)

(EUR trillions)

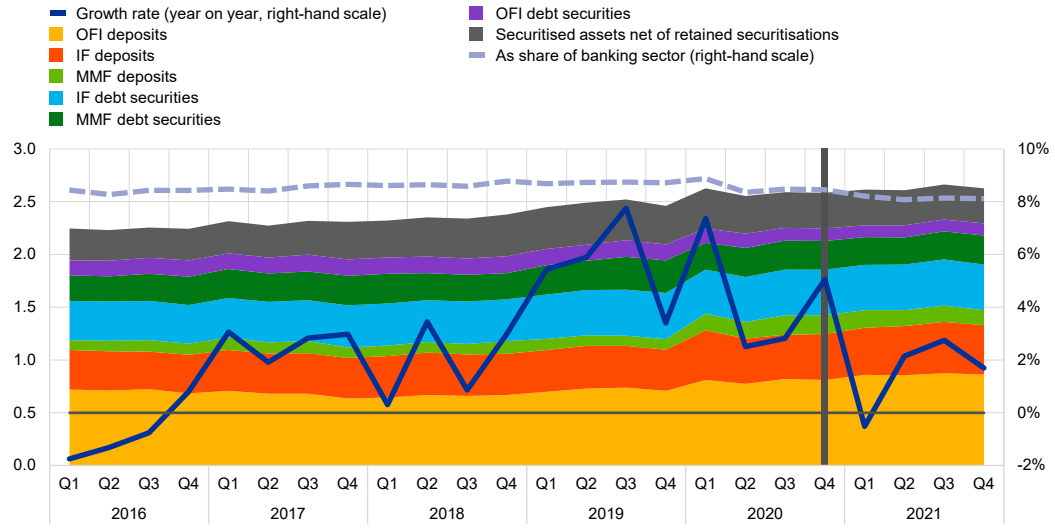


Sources: ECB, Eurostat, Central Bank of Ireland, De Nederlandsche Bank, National Bank of Belgium and ESRB calculations.
Notes: Data for the total OFI sector are sourced from financial account statistics; data on IFs, MMFs and FVCs are based on ECB monetary statistics. Data on FCLs are based on OFI BSI statistics. Data on SFIs, non-securitisation SPVs and captive financial institutions cover only particular countries. Captive financial institutions are sourced from Eurostat financial account statistics. In the financial accounts, SFIs, non-securitisation SPVs and captive financial institutions are included in the sector "captive financial institutions and money lenders (ESA S.127)". Data as of end-2021, except for Luxembourgish captive financial institutions for which the latest observation is end 2020.

Chart A-8

Wholesale funding provided by euro area investment funds and OFIs to the euro area banking sector

(left-hand scale: EUR trillions; right-hand scale: percentages)

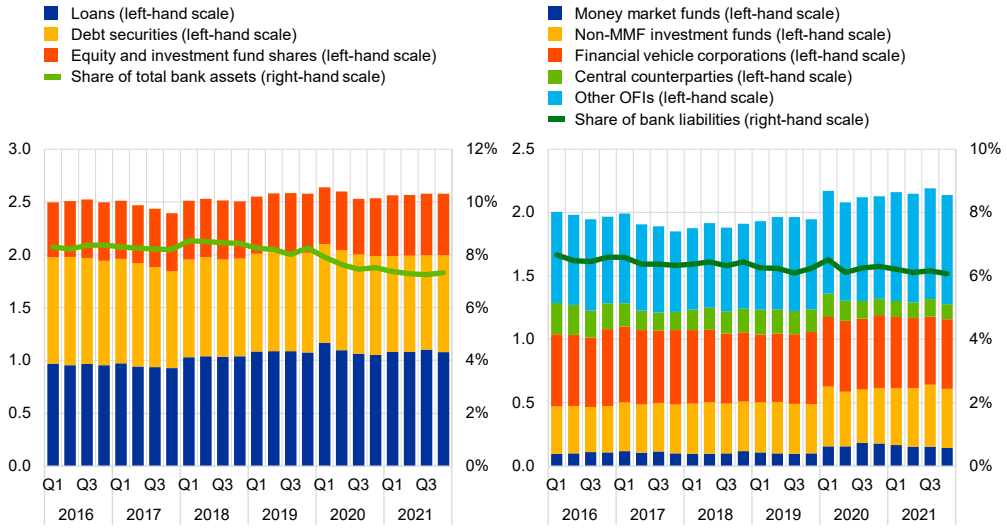


Sources: ECB and ESMA calculations.
Notes: The wholesale funding measure is the sum of: MFI funding arising from securitisation; IF, MMF and OFI deposits at euro area MFIs; and IF, MMF and OFI holdings of debt securities issued by euro area MFIs. "OFIs" reflects the difference between the total financial sector and the known sub-sectors in the statistical financial accounts (i.e. assets from the banking sector, insurance companies, pension funds, FVCs, IFs and MMFs).

Charts A-9 and A-10

Euro area credit institutions' assets vis-à-vis (left panel) and deposits from (right panel) euro area investment funds and other financial institutions

(EUR trillions and shares of credit institutions' total assets)



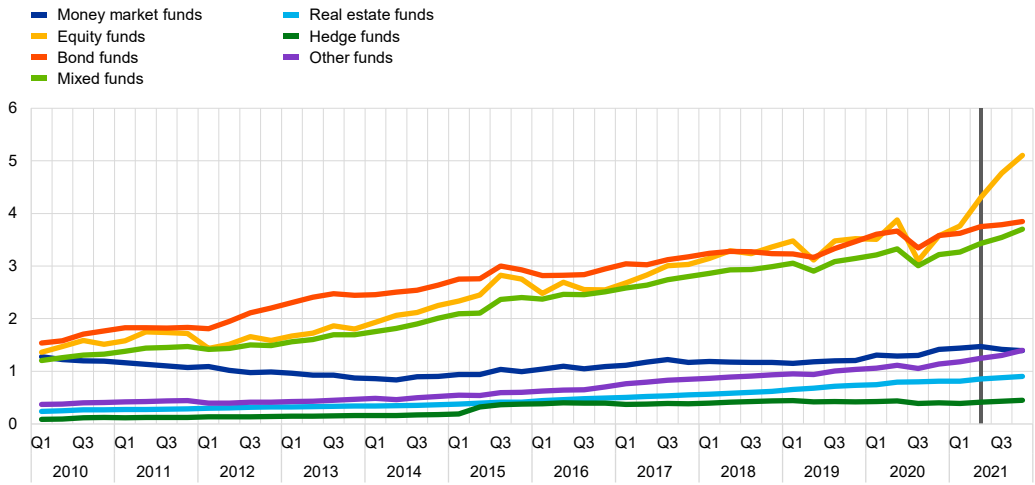
Source: ECB.

A3 Entity-based monitoring

Chart A-11

EU investment funds: net asset values

(EUR trillions)

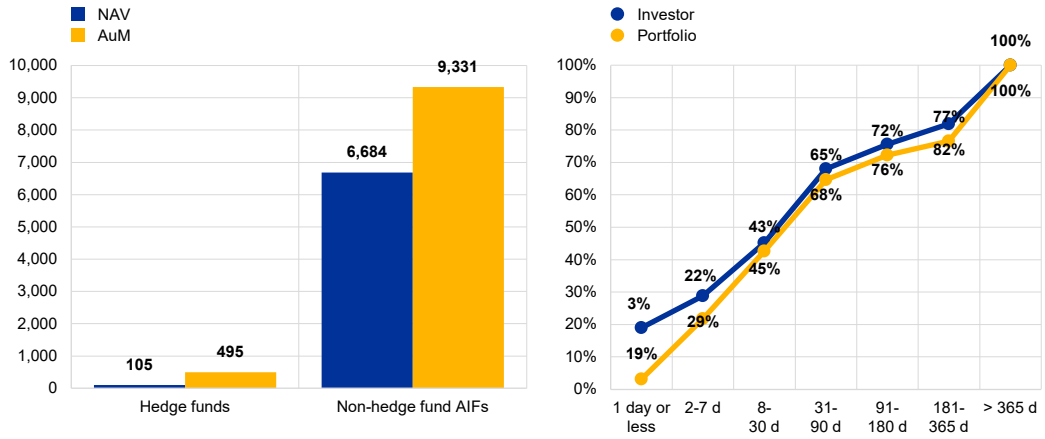


Source: ECB.
Notes: Based on data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. In 2016, some hedge funds were reclassified as "other funds", affecting the series for these funds.

Charts A-12.1 and A-12.2

Hedge funds subject to AIFMD rules: net asset value and regulatory assets under management (left panel) and liquidity profile (right panel)

(Chart A-12.1: EUR billions; Chart A-12.2: percentages)



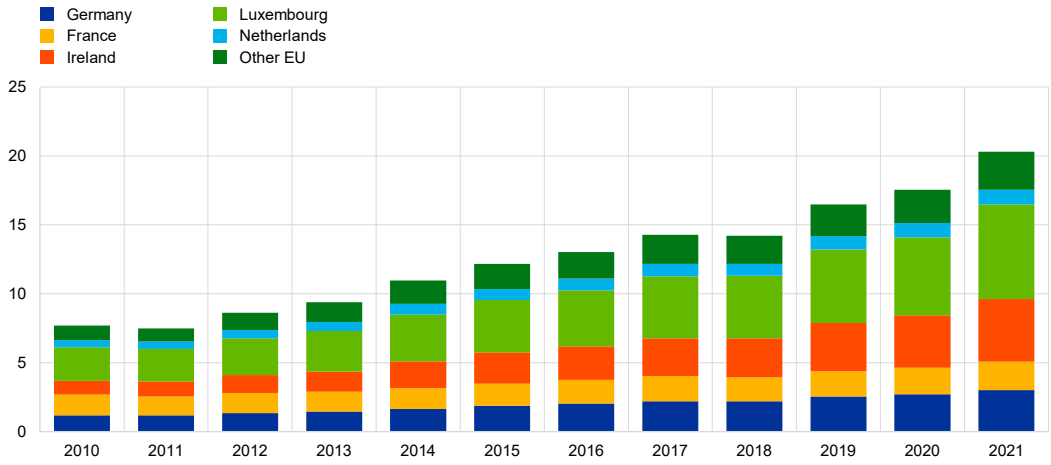
Sources: AIFMD database, NCAs and ESMA.
Notes: Chart A-12.1: NAV and AuM by AIF type. "Regulatory AuM" refers to the value of all portfolio assets, including all assets acquired through the use of leverage (borrowing of cash or securities and leverage embedded in derivative positions). Chart A-12.2: portfolio and investor liquidity profiles of hedge funds managed and/or marketed by authorised EEA AIFMs. Portfolio profile determined by percentage of the portfolios capable of being liquidated within each specified period; investor profiles

depend on the shortest period within which redemption payments could be received. The latest observations are for end-2021 except for Irish market where data for the third quarter are used. Smaller AIFs managed by Irish AIF managers that report on a half-yearly or yearly basis are not included for data for the third quarter for Ireland.

Chart A-13

EU investment funds: total assets by country of domicile

(EUR trillions)

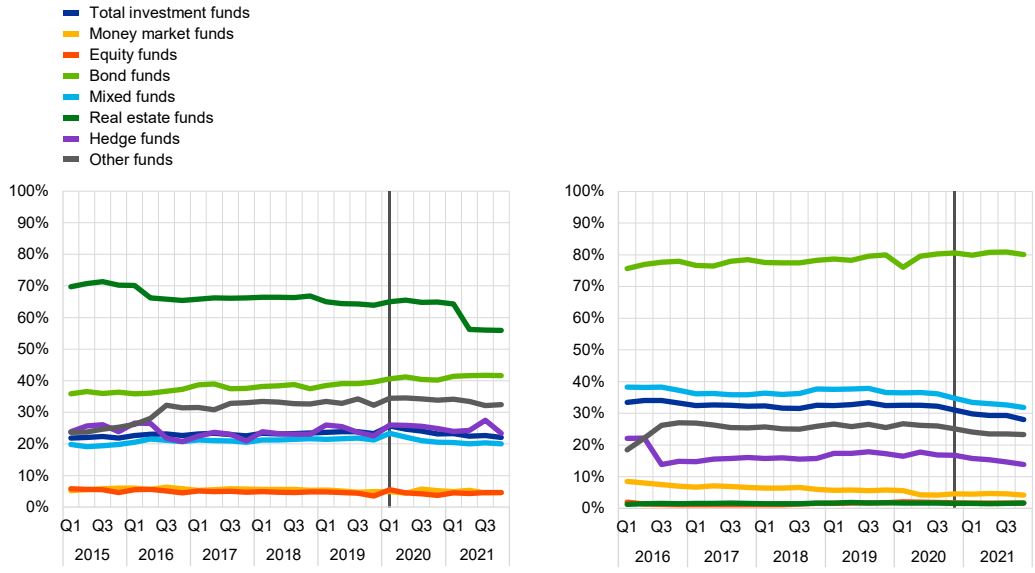


Source: ECB.
Note: Data for non-MMF IFs are based on investment fund statistics for the euro area countries and QSA for non-euro area countries.

Charts A-14 and A-15

EU investment funds: liquidity transformation (left panel) and maturity transformation (right panel)

(percentages)



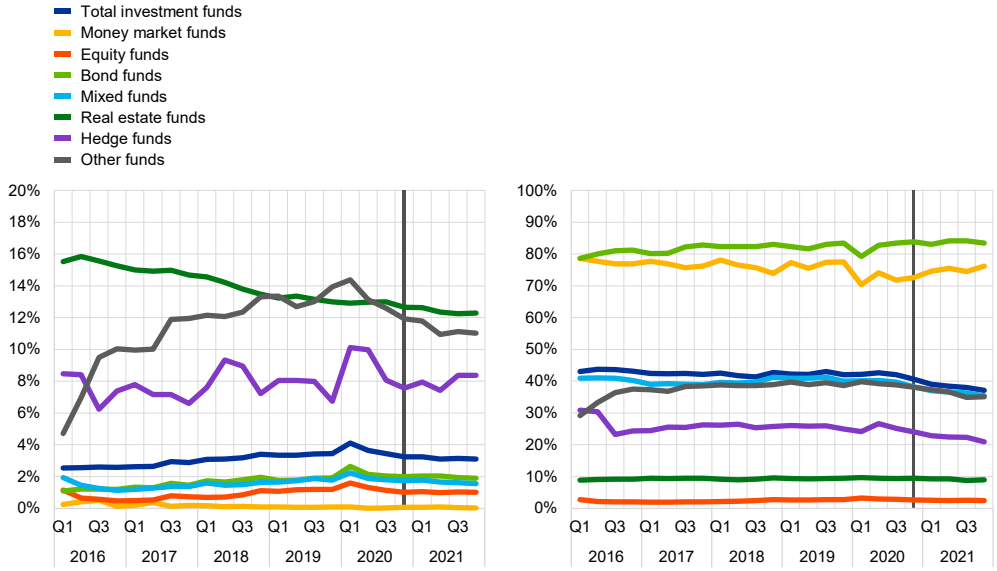
Source: ECB.

Notes: Data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. During 2016, some hedge funds were reclassified as "other funds". In Chart A-14, the proxy for liquidity transformation is expressed as total assets minus liquid assets (deposits, sovereign bonds, debt securities issued by MFIs and equity and open-ended investment fund shares), as a share of total assets of open-ended investment funds. Estimates are made for non-MMF funds' holdings of non-euro area securities and deposits. In Chart A-15, maturity transformation is shown as the ratio of all long-term assets (original maturities of over one year) to total assets. By this measure, maturity transformation is low for equity funds and real estate funds (which invest in non-financial assets). For MMFs, long-term assets vis-à-vis the government sector are not included.

Charts A-16 and A-17

EU investment funds: financial leverage (left panel) and credit intermediation (right panel)

(percentages)

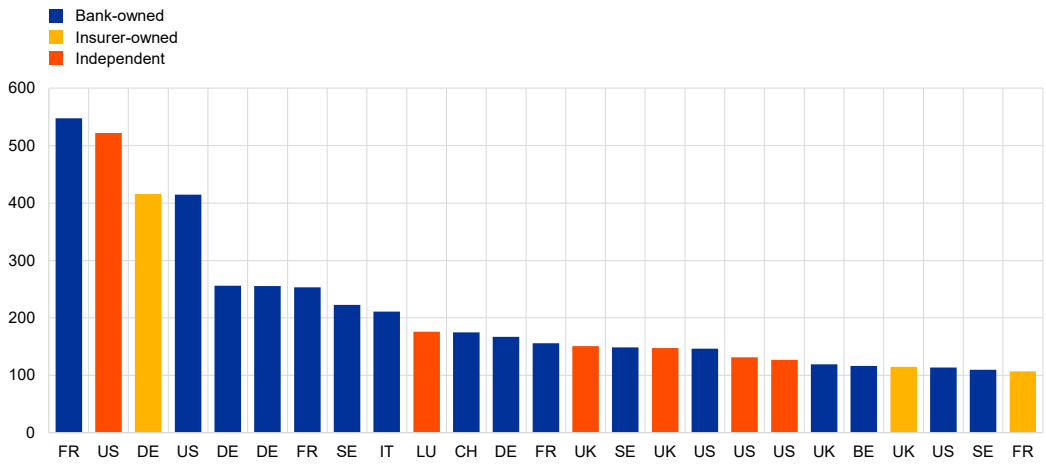


Source: ECB.
Notes: Data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. During 2016, some hedge funds were reclassified as "other funds". In Chart A-16, financial leverage is calculated as the ratio of loans received to total liabilities. In Chart A-17, credit intermediation is calculated as the ratio of holdings of loans and debt securities vis-à-vis non-MFIs to total assets. An estimate is made for non-MMF funds' loans to non-euro area counterparties.

Chart A-18

Aggregate net assets of the top 25 asset management companies in the EU

(EUR billions)



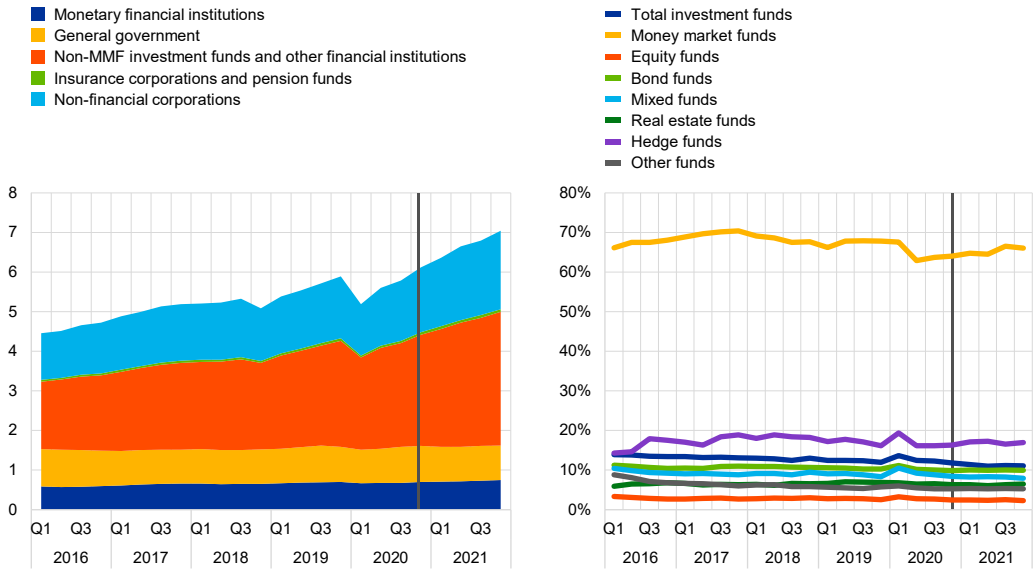
Sources: Thomson Reuters Lipper and ESRB calculations.
Notes: Asset managers are classified as held by banks/insurers when the asset manager is a subsidiary of the bank/insurer (this excludes cases where bank/insurance activities are a subordinate business of the group or where the holding company

also holds banks/insurers) or has a bank/insurer as a majority shareholder. The horizontal axis shows the domicile of the asset manager. The latest observations are for end-2021.

Charts A-19 and A-20

Euro area investment funds: exposures to other financial and non-financial sectors in the euro area (left panel) and holdings of MFI assets as a share of total assets (right panel)

(Chart A-19: EUR trillions; Chart A-20: percentages)



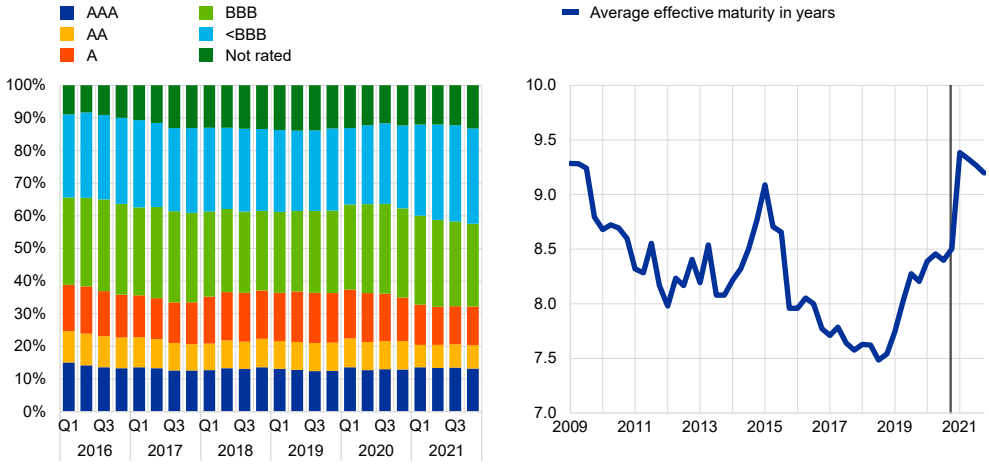
Source: ECB.

Notes: Chart A-19: euro area IF holdings of debt securities, IF shares and other equity issued by euro area entities. Chart A-20: based on data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. Interconnectedness is proxied by holdings of debt securities and loans with an MFI as a counterparty as a share of total assets. Estimates made for non-MMFs' loans to non-euro area counterparties. MMF data in the fourth quarter of 2014 are affected by reclassifications.

Charts A-21 and A-22

EU bond funds: average rating of fund holdings (left panel) and weighted average effective maturity of assets (right panel)

(Chart A-21: share of total assets; Chart A-22: years)

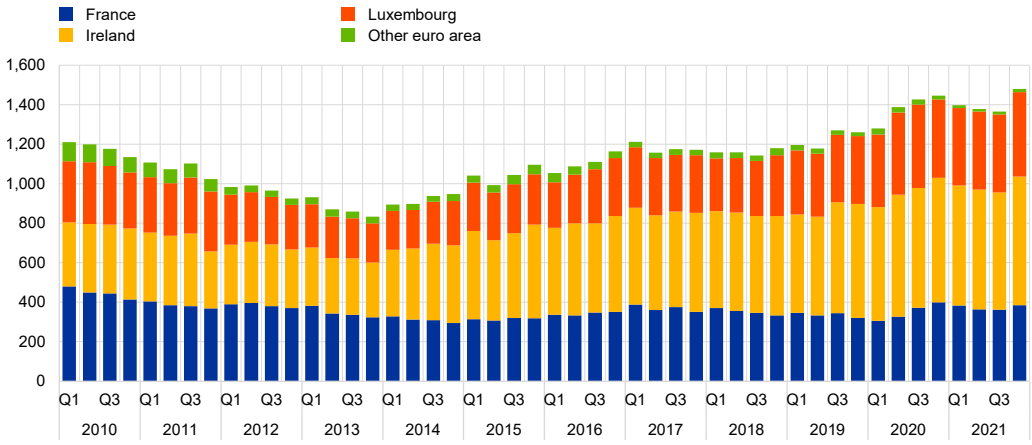


Sources: Thomson Reuters Lipper, Standard & Poor's and ESMA.

Chart A-23

Euro area MMFs: total assets by country of domicile

(EUR billions)

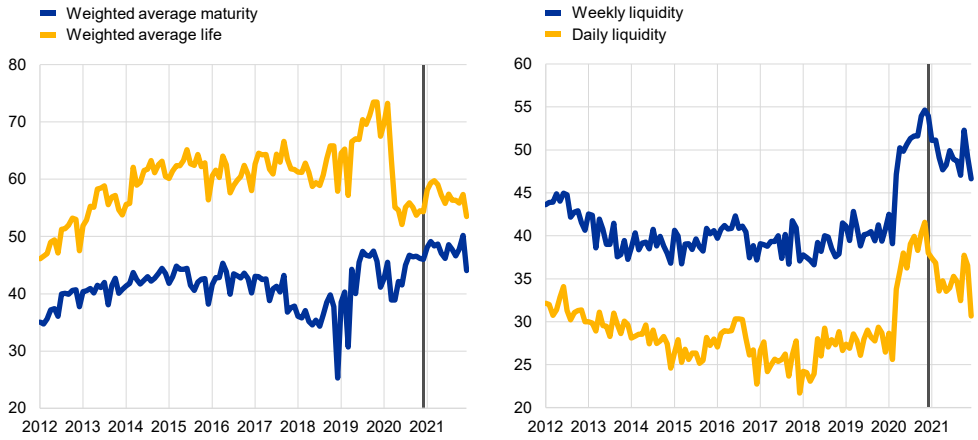


Source: ECB.

Charts A-24 and A-25

EU MMFs: weighted average maturity and life (left panel) and weekly and daily liquidity (right panel)

(Chart A-24: days; Chart A-25: percentages)

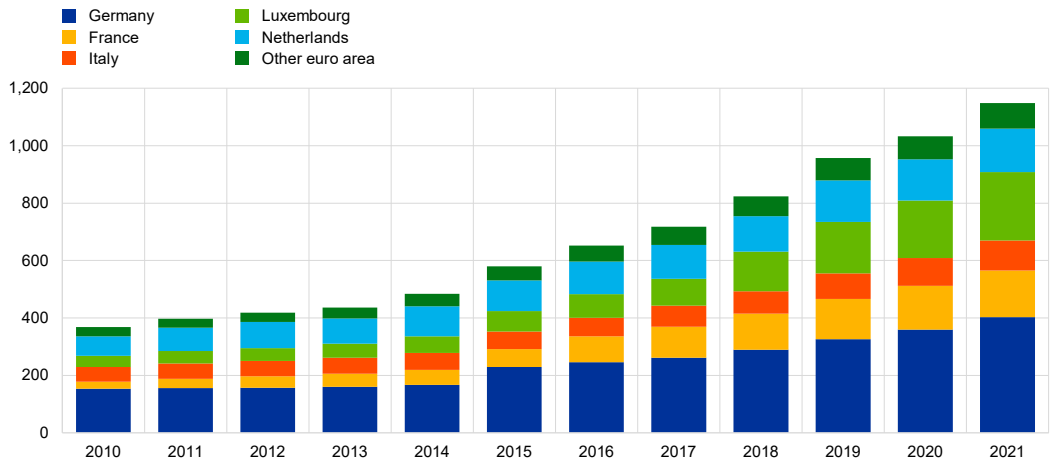


Sources: Fitch Ratings and ESMA.
Notes: Chart A-24: weighted average maturity (WAM) and weighted average life (WAL) of EU and UK prime MMFs. Aggregation carried out by weighting individual MMFs' WAM and WAL by AuM. Chart A-25: daily liquidity includes all assets maturing overnight, and weekly liquidity includes shares issued by AAA-rated MMFs and securities issued by highly rated sovereigns with a maturity of less than one year. Aggregation carried out using individual MMF data weighted by AuM.

Chart A-26

Euro area real estate funds: total assets by country of domicile

(EUR billions)

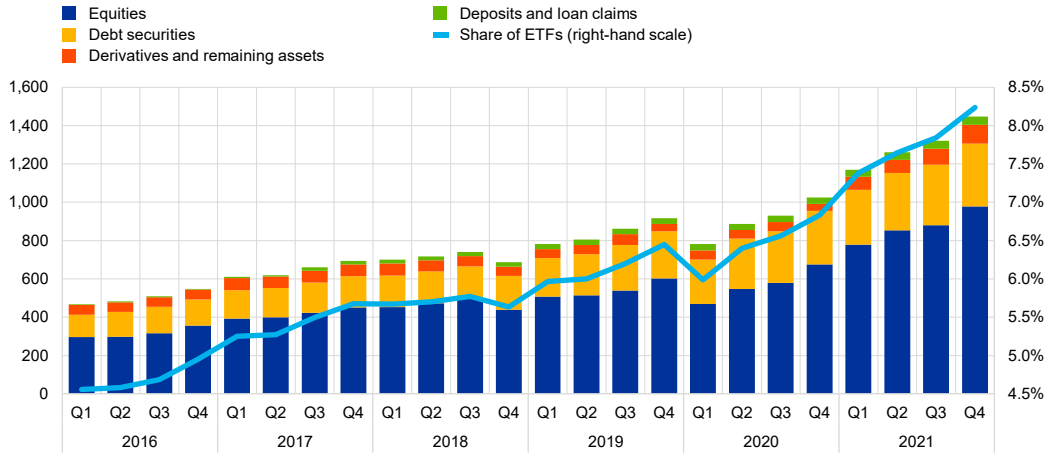


Source: ECB.
Note: The data of German closed-ended funds have been included in the calculation of total assets since 2015.

Chart A-27

Euro area exchange-traded funds: assets by type and share of total

(left-hand scale: EUR billions; right-hand scale: percentages)

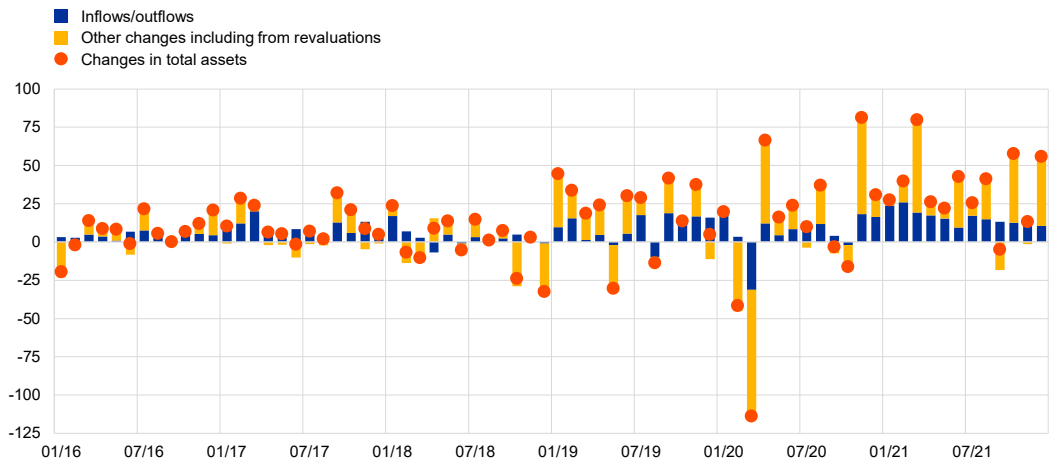


Source: ECB.
Note: Share of ETFs is calculated relative to assets held by the euro area investment fund sector.

Chart A-27.1

Euro area ETFs: flows and changes in valuation

(EUR billions)

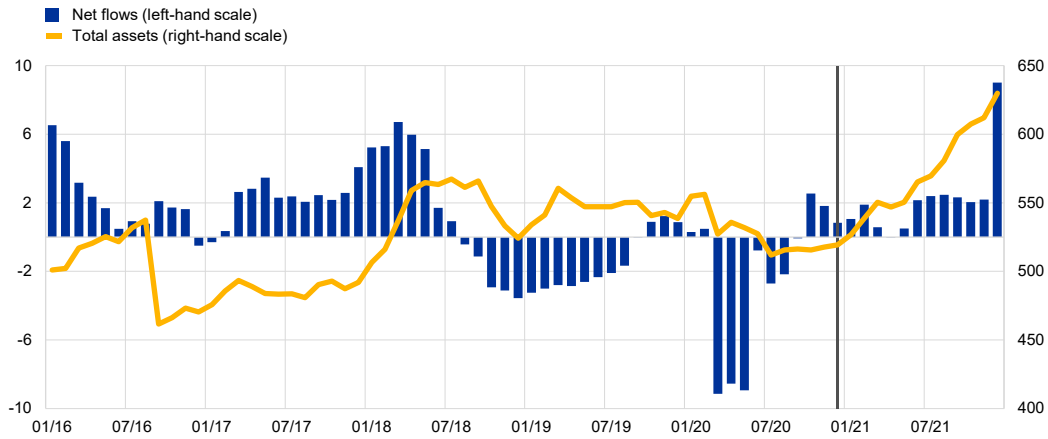


Sources: ECB and ESRB calculations.
Notes: Based on ECB investment fund balance sheet statistics for exchange-traded funds in the euro area. Transactions are calculated from differences in outstanding amounts adjusted for revaluations, exchange rate variations, statistical reclassifications and any other changes which do not arise from transactions.

Chart A-28

EU hedge funds: net flows and total assets

(left-hand scale: EUR billions; right-hand scale: percentages)

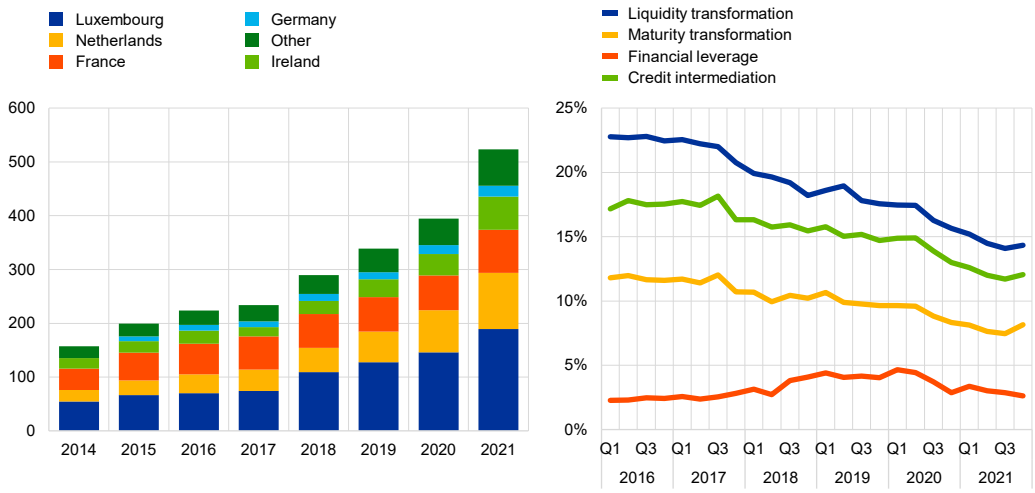


Source: ECB.
Notes: Based on available data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. Three-month moving average for net issuance of shares. Reclassifications and revisions affect the series for total assets.

Charts A-29 and A-30

EU private equity funds: net assets by country of domicile (left panel) and maturity transformation, leverage, credit intermediation and interconnectedness (right panel)

(Chart A-29: EUR billions; Chart A-30: percentages)

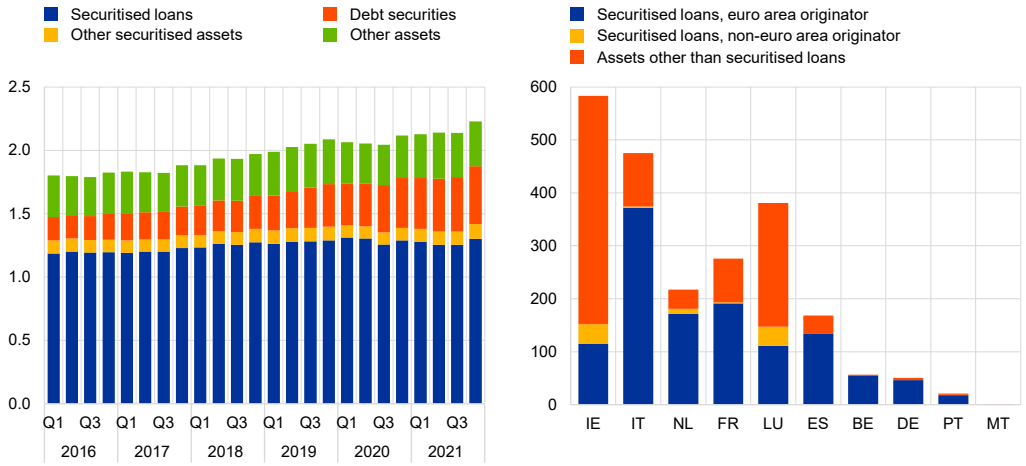


Source: ECB.

Charts A-31 and A-32

Euro area FVCs' total assets (left panel) and total assets by domicile (right panel)

(Chart A-31: EUR trillions; Chart A-32: EUR billions)



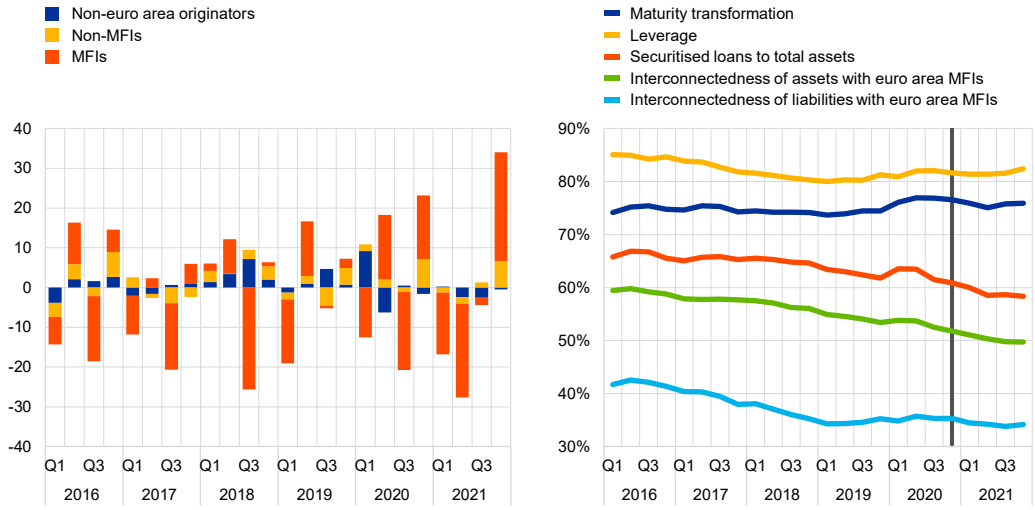
Source: ECB.

Notes: Chart A-31: "Other assets" includes shares and other equity, financial derivatives and remaining assets. Chart A-32: observation for end-2021.

Charts A-33 and A-34

Euro area FVCs' net issuance of securitised loans by originator (left panel) and maturity transformation, leverage, credit intermediation and interconnectedness (right panel)

(Chart A-33: EUR billions; Chart A-34: percentages)



Source: ECB.

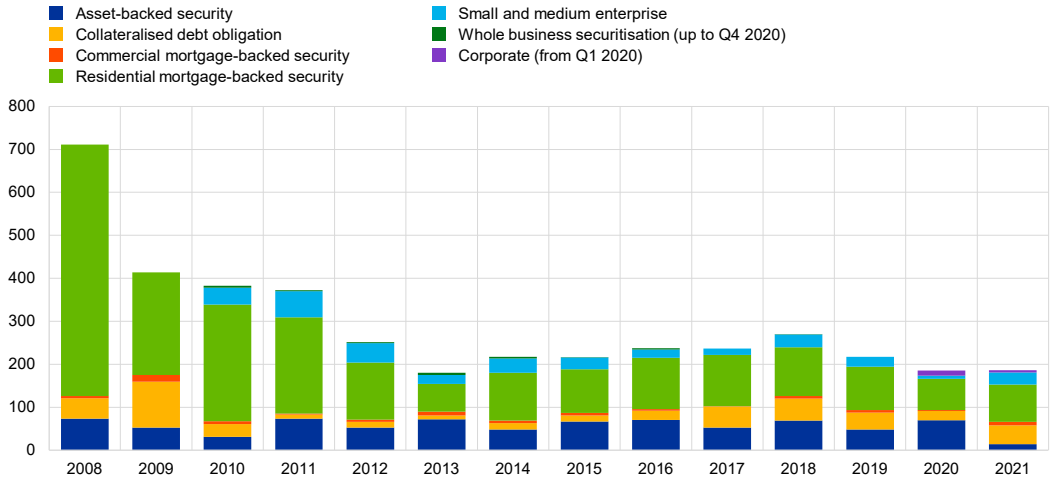
Notes: Chart A-33: euro area FVCs' securitised loans by originator. Chart A-34: the proxy for maturity transformation is calculated by summing long-term securitised loans and debt securities (both with an initial maturity of more than one year) divided by total assets. Leverage is computed as the sum of loans received and debt securities issued divided by total assets. FVC assets with a euro area MFI counterparty are computed as the sum of loans and debt securities where the counterparty is

a euro area MFI, and securitised loans originated by a euro area MFI. FVC liabilities are computed as debt securities held by euro area MFIs, excluding the ESCB reporting sector, using BSI statistics for MFIs.

Chart A-35

European securitisation issuance by collateral type

(EUR billions)

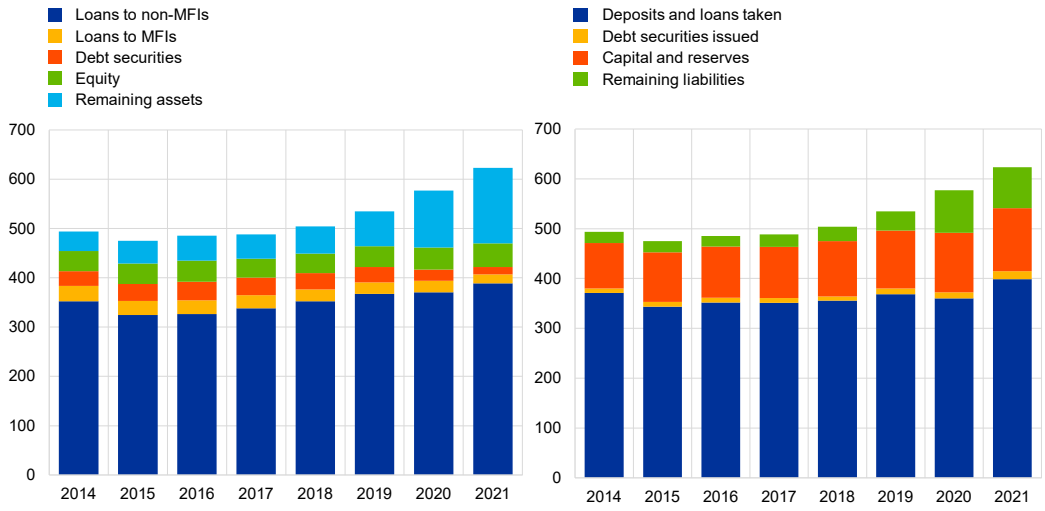


Source: Association for Financial Markets in Europe (AFME).
Notes: "Asset-backed security" includes auto loans, credit card receivables, leases, loans and other receivables; certain public finance initiative securitisations are included within the category "whole business securitisation" as of the fourth quarter of 2013. Owing to a change in sources of securitisation issuance data, collateral types include a "corporate" category from the first quarter of 2020 onwards, while data for "whole business securitisation" are no longer published. "European" covers all EEA countries and certain non-EEA countries located on the geographical European continent.

Charts A-36 and A-37

Euro area FCLs' assets (left panel) and liabilities (right panel)

(EUR billions)



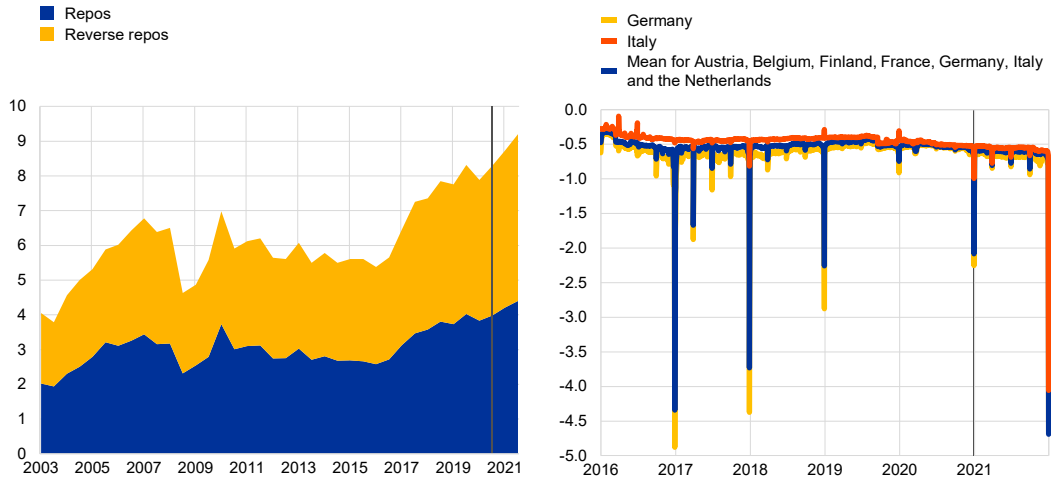
Source: ECB.

A4 Activity-based monitoring

Charts A-38 and A-39

Size of EU repo market (left panel) and repo rate for selected sovereigns (right panel)

(Chart A-38: EUR trillions; Chart A-39: percentages)

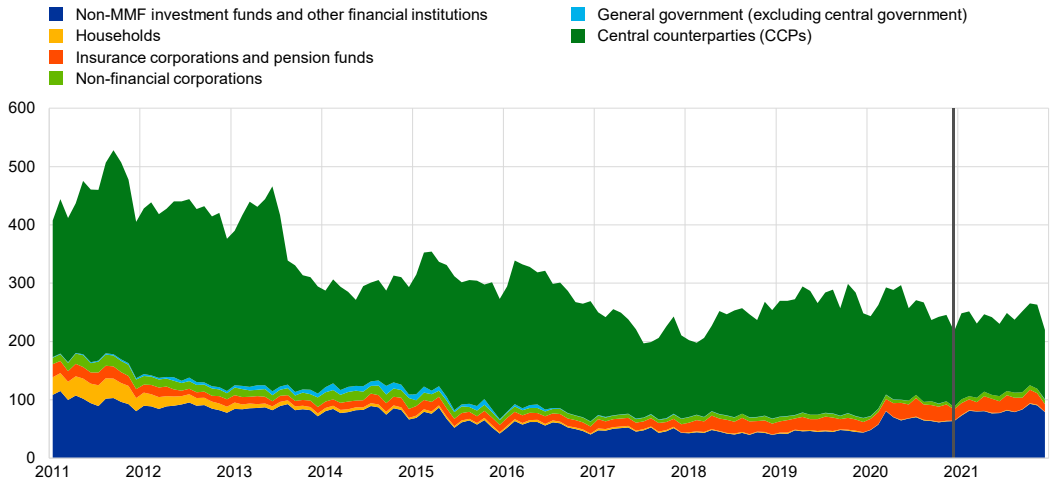


Sources: ICMA, RepoFunds Rate and ESMA.
Notes: Chart A-38: total value of repos and reverse repos outstanding on the books of the institutions which participated in the ICMA repo surveys. Chart A-39: volume-weighted average of fixed rate index value, by origin of the collateral. Centrally cleared sovereign repos only.

Chart A-40

Euro area MFIs' repo liabilities with non-MFIs, by sector

(EUR billions)

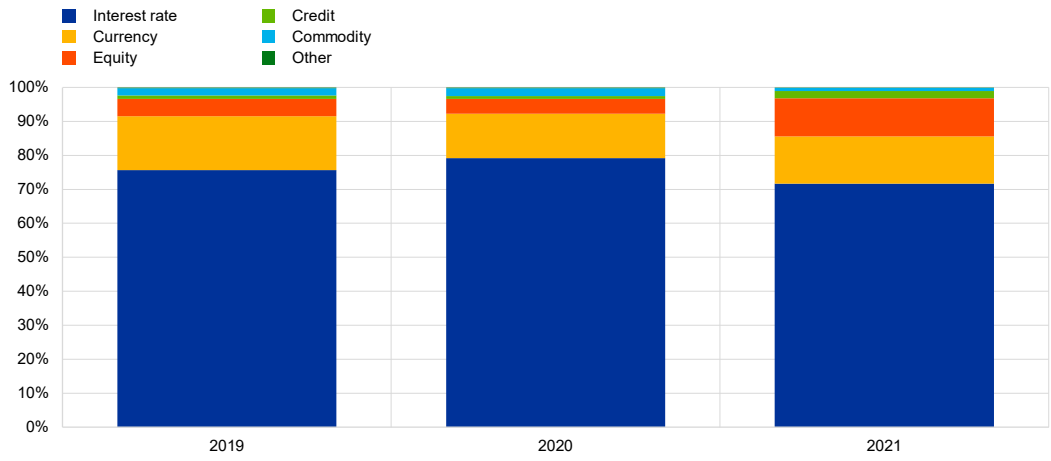


Source: ECB.
Note: Euro area MFIs' repo liabilities with euro area non-MFI counterparties.

Chart A-41

Derivatives: gross notional amount outstanding by asset class

(percentages)

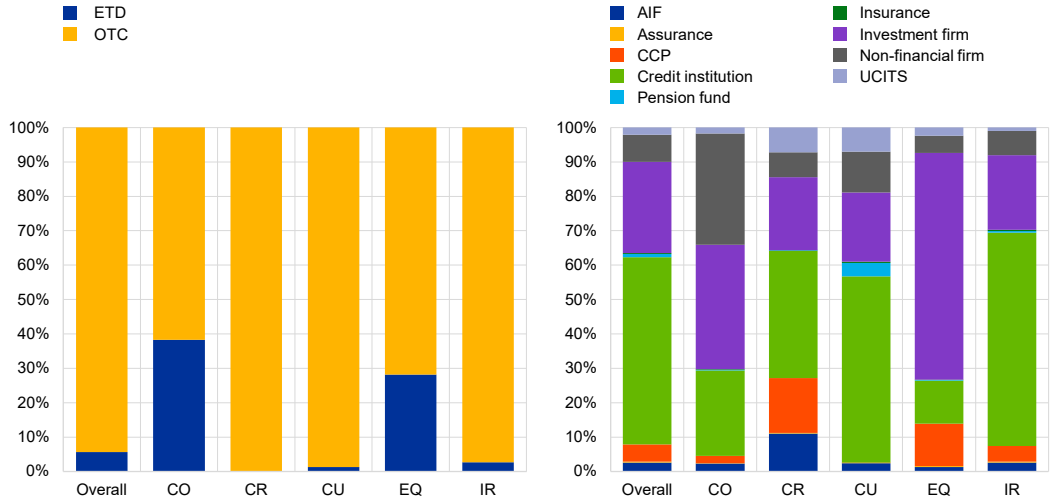


Sources: Trade repositories and ESMA.
Note: Proportion of gross outstanding notional amounts by asset class by quarter for EU (2019 does not include UK data).

Chart A-42 and A-43

Derivatives: ETD versus OTC notional amount (left panel) and gross notional amount by sector of counterparty (right panel)

(percentages)



Sources: Trade repositories and ESMA.
Notes: Data as of 10 December 2021. CO stands for commodity, CR for credit, CU for currency, EQ for equity, IR for interest rate. Chart A-42: outstanding notional amounts by asset class of underlying, percentage split by ETD and OTC. Chart A-43: outstanding notional amounts by asset class and sector of counterparty.

Abbreviations

ABS	asset-backed security
AIF	alternative investment fund
AIFMD	Alternative Investment Fund Managers Directive
AP	authorised participant
AuM	assets under management
BIS	Bank for International Settlements
BSI	balance sheet item
CCP	central counterparty
CD	certificate of deposit
CDO	collateralised debt obligation
CDS	credit default swap
CFI	captive financial institution
CLO	collateralised loan obligation
CNAV	constant net asset value
CP	commercial paper
CRD	Capital Requirements Directive
CRR	Capital Requirements Regulation
CSDB	Centralised Securities Data Base
DLT	distributed ledger technology
DTI	debt-to-income
EA	euro area
EBA	European Banking Authority
ECB	European Central Bank
EDW	European Data Warehouse
EEA	European Economic Area
EIOPA	European Insurance and Occupational Pensions Authority
ELTIF	European long-term investment funds
EMIR	European Market Infrastructure Regulation
ESA	European Supervisory Authority, European System of Accounts
ESCB	European System of Central Banks
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
ETD	exchange-traded derivative
ETF	exchange-traded fund
EU	European Union
EUR	euro
FCL	financial corporation engaged in lending
FSB	Financial Stability Board
FVC	financial vehicle corporation
FX	foreign exchange
GBP	pound sterling
GDP	gross domestic product
HY	high-yield
ICMA	International Capital Market Association
IF	investment fund
IMF	International Monetary Fund
IRD	interest rate derivative
IRS	interest rate swap
IOSCO	International Organization of Securities Commissions
LTV	loan-to-value
LVNAV	low-volatility net asset value
MIFID	Markets in Financial Instruments Directive
MFI	monetary financial institution
MMF	money market fund
MMFR	Money Market Fund Regulation
MMI	money market instrument
NAV	net asset value
NCA	national competent authority
NCB	national central bank
NEU CP	Negotiable European Commercial Paper
NFC	non-financial corporation
OECD	Organisation for Economic Co-operation and Development
OFI	other financial institution
OTC	over-the-counter
PD	private debt
PE	private equity
PEPP	pandemic emergency purchase programme
QSA	quarterly sector accounts
repo	repurchase agreement
RE	real estate
RMBS	residential mortgage-backed security
RTS	regulatory technical standards

SDD	security and derivative dealer
SFI	special financial institution
SFTR	Securities Financing Transactions Regulation
SHS	Securities Holdings Statistics
SPE	special-purpose entity
SPV	special-purpose vehicle
STEP	Short-Term European Paper
SEC	Securities and Exchange Commission
TRS	total return swap
UCITS	undertakings for collective investment in transferable securities
UK	United Kingdom
US	United States
USD	US dollar
VNAV	variable net asset value
WAL	weighted average life
WAM	weighted average maturity

Imprint and acknowledgements

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For specific terminology please refer to the **ESRB glossary** (available in English only).

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