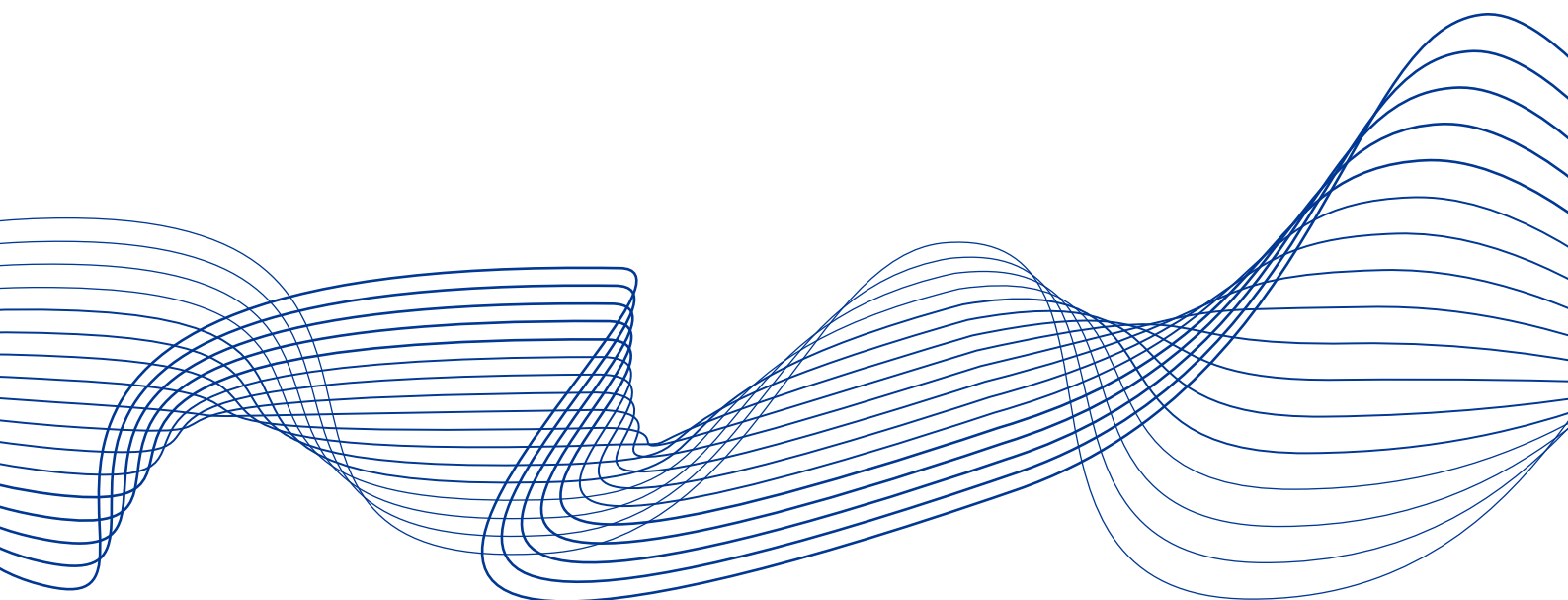


# NBFI Monitor

No 8 / June 2023

EU Non-bank Financial  
Intermediation Risk Monitor 2023  
Annexes



**ESRB**

European Systemic Risk Board

European System of Financial Supervision

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# Annex I Statistical classification for investment funds and other financial institutions

Table A1

## Statistical classification for investment funds and other financial institutions

Entities: Sectors and sub-sectors		Description	
<b>Investment funds (IFs)</b>	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			
<b>Other financial institutions (OFIs)</b>	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.



## Annex II Descriptions and business models

Table A2  
**Descriptions and business models – traditional non-bank financial intermediaries**

Entities	Description
<b>Investment funds</b>	Investment funds are financial intermediaries created with the sole purpose of gathering money from investors and investing that money collectively on behalf of the investors. Investment funds invest using a common investment strategy through a portfolio of wide variety of assets.
<b>Financial vehicle corporations engaged in securitisation (FVCs)</b>	FVCs are special purpose vehicles that carry out securitisation transactions. 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.
<b>Financial corporations engaged in lending (FCLs)</b>	FCLs are non-bank credit grantors that specialise in asset financing for households and non-financial corporations. They include financial leasing, factoring, mortgage lending and consumer lending companies.
<b>Security and derivative dealers (SDDs)</b>	SDDs are investment firms specialising in securities trading, which are authorised to provide investment services to third parties in line with MIFID II <sup>1</sup> . SDDs offer a range of services which focus on providing investors with access to securities and derivatives markets. Those services include, among other things, reception and transmission of orders in relation to financial instruments, execution of orders on behalf of clients, dealing on own account, portfolio management, investment advice, underwriting of financial instruments and/or placing of financial instruments.
<b>Specialised financial corporations</b>	Specialised financial corporations include in particular three types of financial intermediaries: (i) venture and development capital companies, (ii) export/import financing companies and (iii) financial intermediaries which acquire deposits and/or close substitutes for deposits, or incur loans vis-à-vis monetary financial institutions only, including central counterparty clearing houses (CCPs) carrying out inter-MFI repurchase agreement transactions.
<b>Financial auxiliaries</b>	Financial auxiliaries are principally engaged in activities closely related to financial intermediation but are not financial intermediaries themselves. This sector includes for instance: insurance brokers, loan brokers, securities brokers, investment advisers, managers of pension funds, mutual funds, payment institutions, corporations providing stock exchange and insurance exchange.

Source: ESRB.

Notes: 1) 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.

Table A3  
**Descriptions and business models – crypto-ecosystem**

Crypto ecosystem	Description
<b>Crypto-assets</b>	Crypto-assets are private sector digital assets dependent on cryptography and utilising distributed ledger or similar technology.
<b>Decentralised finance (DeFi)</b>	DeFi is a set of financial markets, products and systems that operate using crypto-assets and "smart contracts" using distributed ledger or similar technology.
<b>Centralised finance (CeFi)</b>	CeFi refers to centralised intermediaries within the crypto-asset space such as lending and trading platforms offering services such as custody of assets, margin lending and collateral reuse.

Source: ESRB.



Table A4

**Descriptions and business models – activity-based monitoring**

Activities	Description
<b>Derivatives</b>	Derivatives are financial instruments that 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). Derivatives can transfer risks to participants better placed to manage or bear them but can also create complex financial intermediation chains that increase interconnectedness between entities and across markets. 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 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. Derivatives traded on multilateral and organised trading facilities are considered as OTC under the EMIR <sup>1</sup> but in other respects are similar to ETDs.
<b>Securities financing transactions (SFTs)</b>	SFTs include four types of instruments: (i) repurchase transactions, (ii) buy-sell back (BSB) and sell-buy back (SBB) transactions, (iii) securities lending or borrowing transactions and (iv) margin lending transactions. In repurchase transactions a counterparty transfers assets and commits to repurchase them at a specified price on a future date. In BSB or SBB transactions a counterparty buys or sells securities, agreeing, respectively, to sell or to buy back securities, at a specified price on a future date. BSB and SBB transactions are concluded simultaneously, but, in contrast to repurchase transactions, are legally separate. From an economic point of view, both repurchase transactions and BSB/SBB are similar to secured loans. In securities lending or borrowing transactions, a counterparty transfers securities subject to a commitment that the borrower will return equivalent securities on a future date or when requested. In margin lending transactions, a counterparty extends credit in connection with the purchase, sale, carrying or trading of securities. SFTs allow investors and firms to use securities they own in order to secure funding for their activities. SFTs can improve market liquidity and thus not only facilitate price discovery and foster market efficiency but also create complex financial intermediation chains and act as risk transmission channels.
<b>Securitisation</b>	Securitisation denotes the process of pooling illiquid and non-tradeable assets such as loans into a new financial product that can be tradeable on or off the balance sheet. Securitisation allows non-tradeable, illiquid assets such as loans to be pooled and tranced into tradeable securities. In this process, financial institutions that originate the loans will transfer credit risk to investors holding those securities. This is usually done through issuers, such as FVCs, which buy the portfolio of loans, repackage it into tradeable securities and sell the latter to investors. In some cases, securitisation is also achieved via the issuance of securitisation fund units or through the use of financial derivatives. Most securitisations are structured such that investors buy claims to the cash flows of the assets underlying the securities.

Source: ESRB.

Notes: 1) Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories.

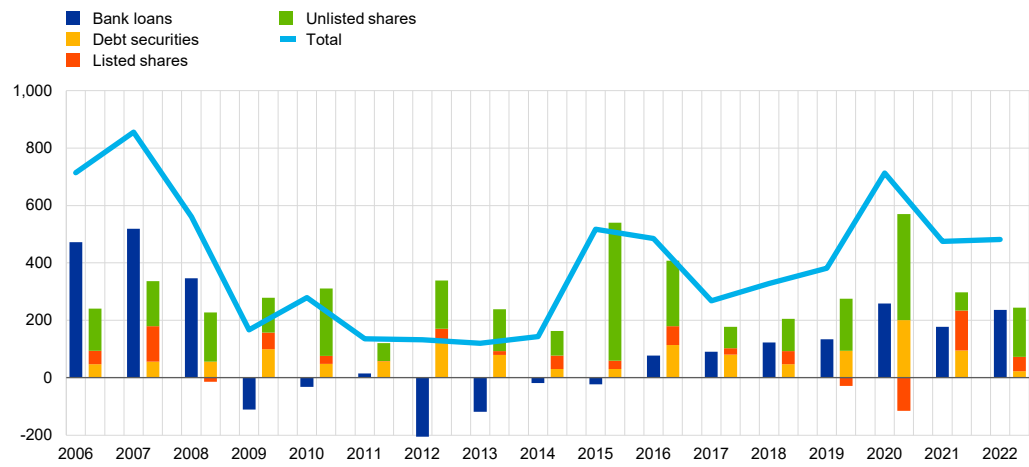


# Annex III Statistical overview

## A1 Developments in main aggregates

Chart A1  
Net finance raised by euro area non-financial corporations

(EUR billions)



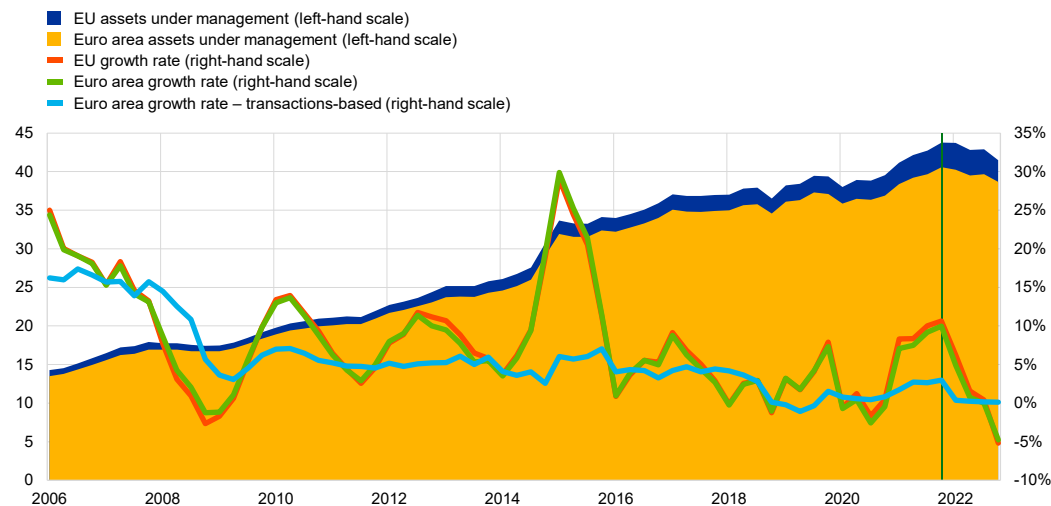
Sources: ECB QSA and ESRB calculations.



Chart A2

### 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.

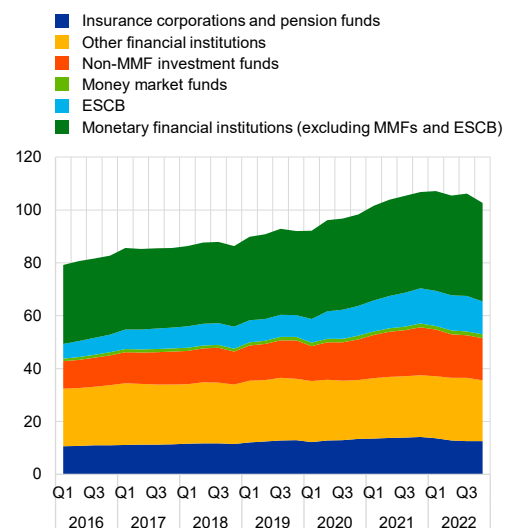
Notes: Red and green lines indicate annual growth rates based on changes in outstanding amounts. The blue line indicates the annual growth rate based on transactions, i.e. excluding the impact of exchange rate variations or other revaluations and statistical reclassifications.



## Chart A3 EU financial sector

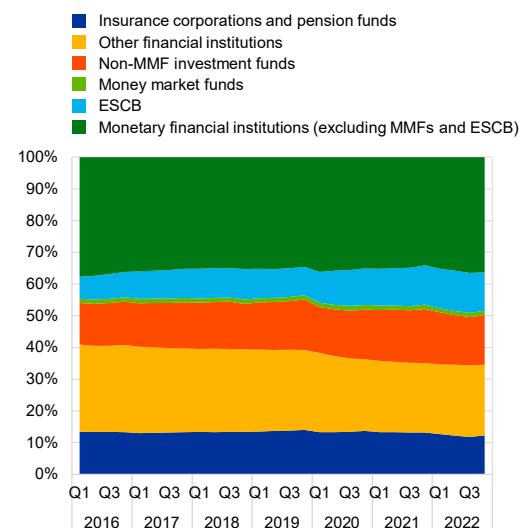
a) Structure of the EU financial sector - nominal amounts

(EUR trillions)



b) Structure of the EU financial sector - percentage share

(percentages)

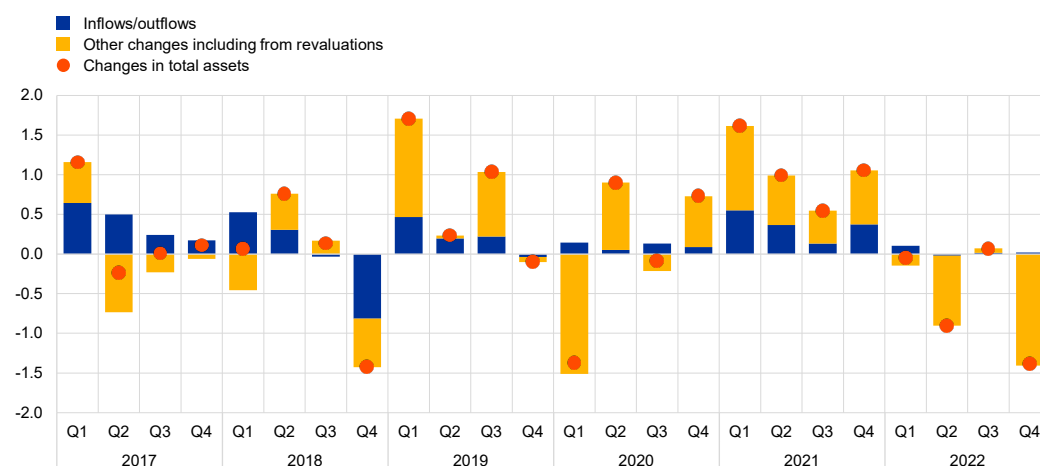


Sources: ECB and ESRB calculations.

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 A4 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.

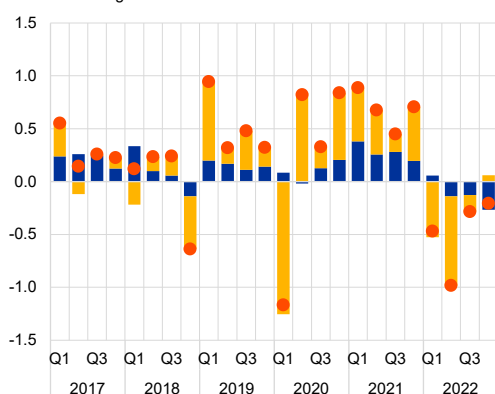
Chart A5

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

a) Euro area investment funds

(EUR trillions)

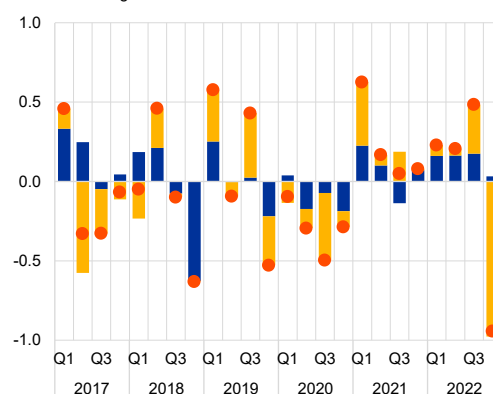
- Inflows/outflows
- Other changes including from revaluations
- Changes in total assets



b) Euro area other financial institutions

(EUR trillions)

- Inflows/outflows
- Other changes including from revaluations
- Changes in total assets



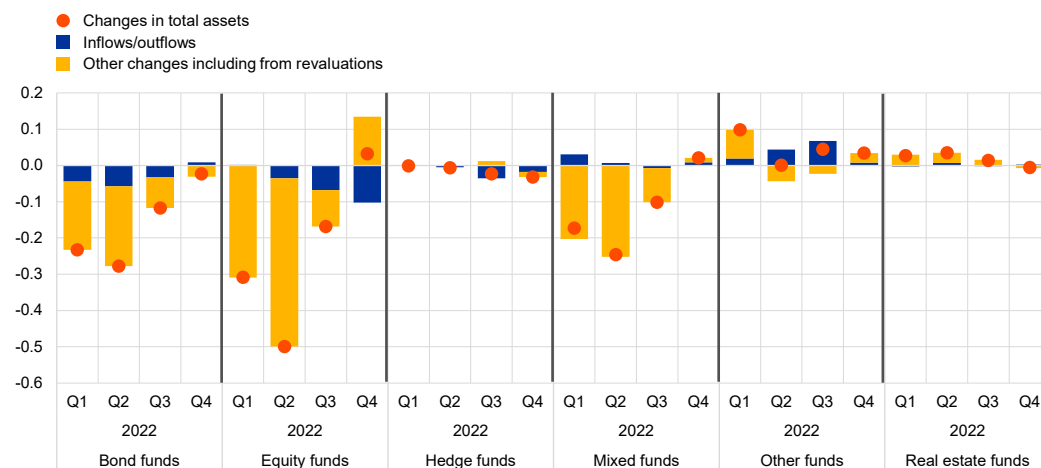
Sources: ECB and ESRB calculations.

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 A6 Euro area investment fund types: inflows/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.

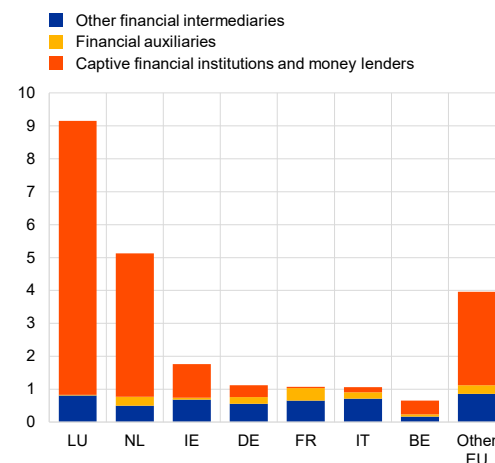
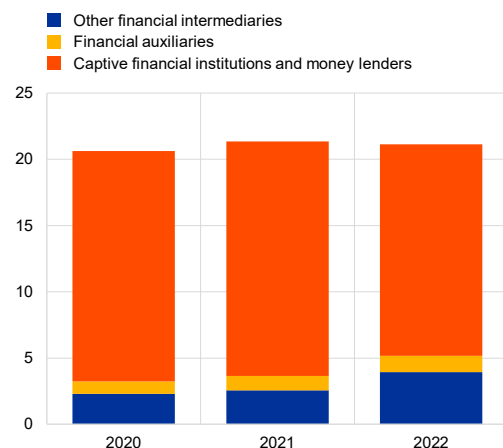
## Chart A7 Breakdown of EU other financial institutions (OFIs) by type (left panel) and breakdown of EU other financial institutions by domicile (right panel)

a) Breakdown of EU other financial institutions (OFIs) by type

b) Breakdown of EU other financial institutions by domicile

(EUR trillions)

(EUR trillions)



Sources: ECB and ESRB calculations.

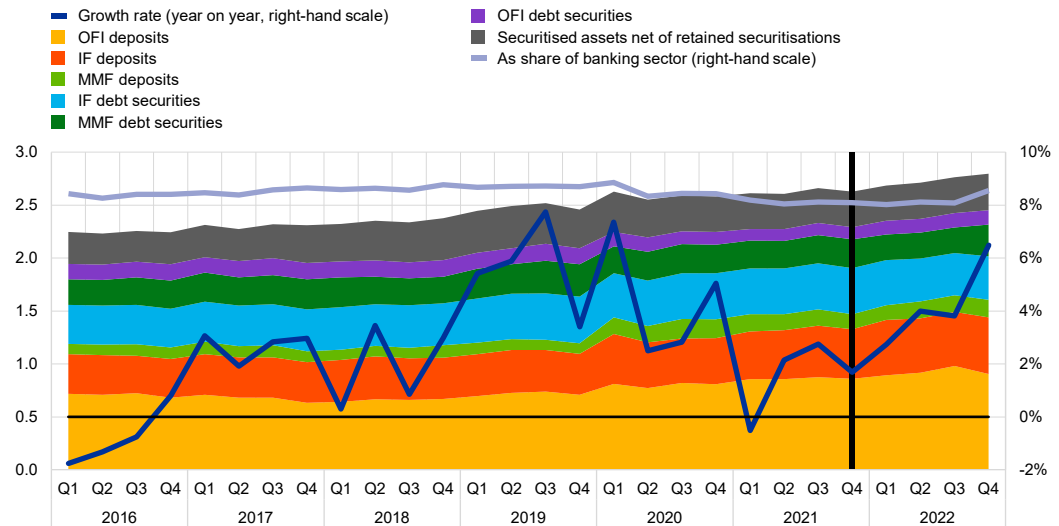
Notes: Data for the total OFI sector are sourced from financial account statistics; captive financial institutions and financial auxiliaries are sourced from Eurostat financial account statistics. In the financial accounts, SFIs, non-securitisation SPVs and captive financial institutions are included in the sector "captive financial institutions and money lenders (ESA S.127)".



Chart A8

**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 plus 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).



Chart A9

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

a) Euro area credit institution assets vis-à-vis euro area investment funds and other financial institutions

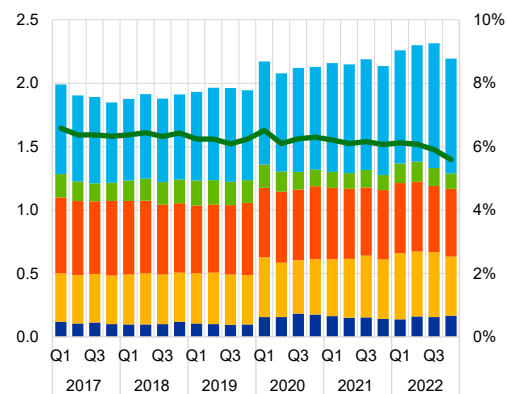
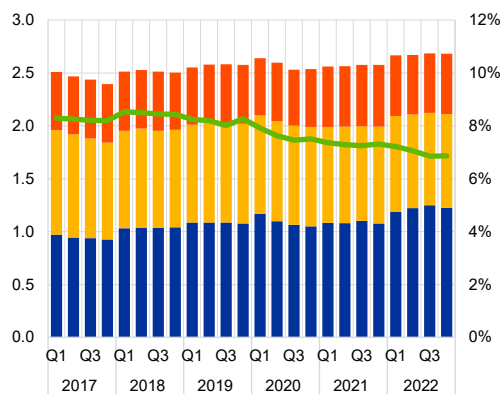
b) Euro area investment funds and other financial institutions

(EUR trillions and shares of credit institution total assets)

(EUR trillions and shares of credit institution total assets)

- Loans (left-hand scale)
- Debt securities (left-hand scale)
- Equity and investment fund shares (left-hand scale)
- Share of total bank assets (right-hand scale)

- Money market funds (left-hand scale)
- Non-MMF investment funds (left-hand scale)
- Financial vehicle corporations (left-hand scale)
- Central counterparties (left-hand scale)
- Other OFIs (left-hand scale)
- Share of bank liabilities (right-hand scale)



Source: ECB.

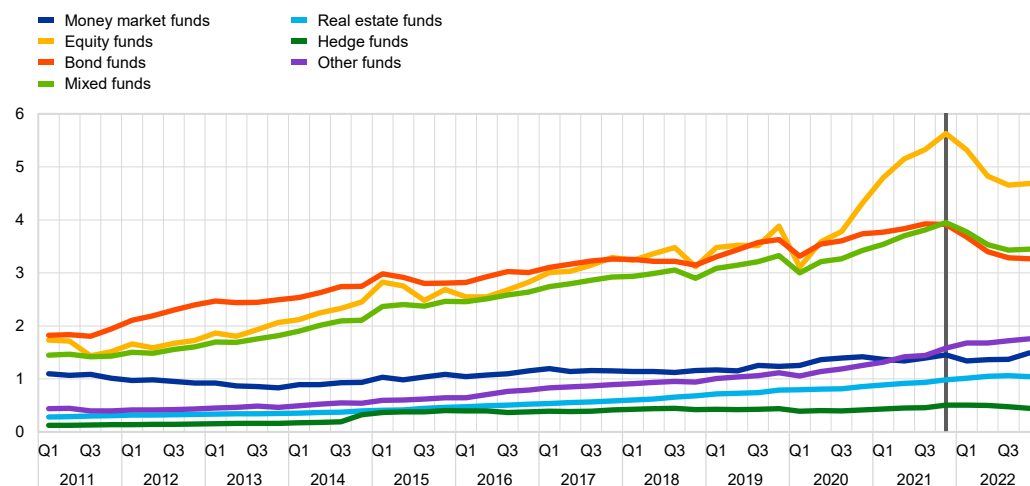


## A2 Entity-based monitoring

Chart A10

### EU investment funds: net asset values

(EUR trillions)



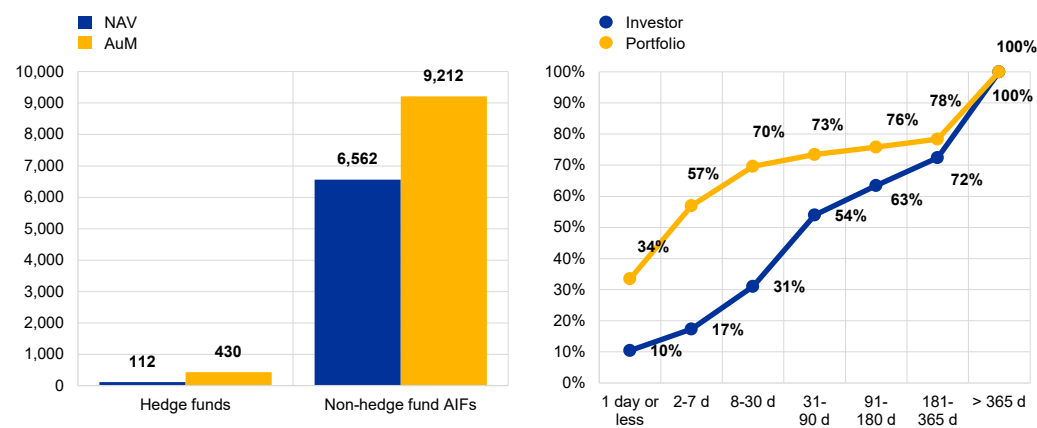
Source: ECB.

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.

Chart A11

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

a) Net asset value and regulatory assets under management (EUR billions)      b) Liquidity profile (percentages)



Sources: AIFMD database, NCAs and ESMA.

Notes: Observations are for the end of 2022. Chart A11 panel a: 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). Data refers to AIFs of authorised and registered AIFMs excluding feeder funds.

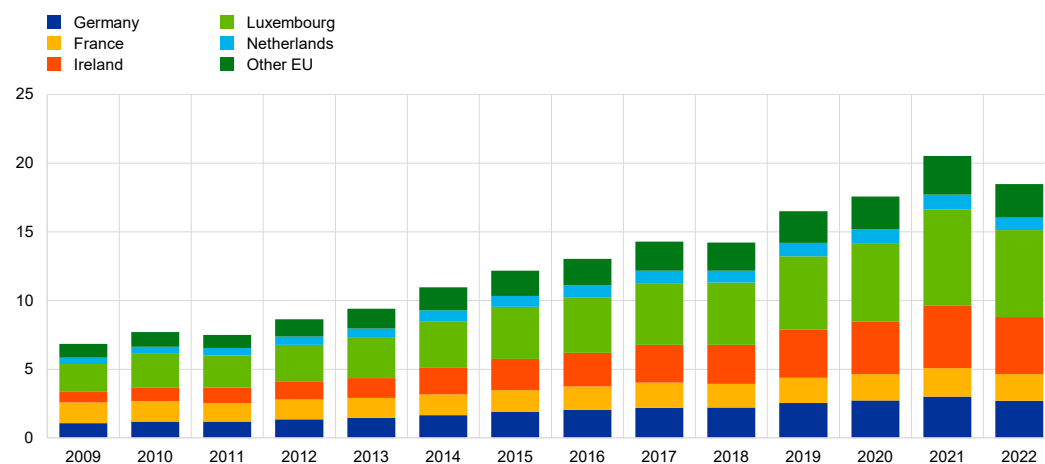


Chart A11 panel b: portfolio and investor liquidity profiles of hedge funds managed and/or marketed by authorised EEA AIFMs. Portfolio profile determined by percentage of the portfolios capable of being liquidated within each specified period; investor profiles depend on the shortest period within which redemption payments could be received. Data refers to AIFs of authorised managers excluding feeder funds and AIFs not reporting liquidity profile data.

Chart A12

**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.

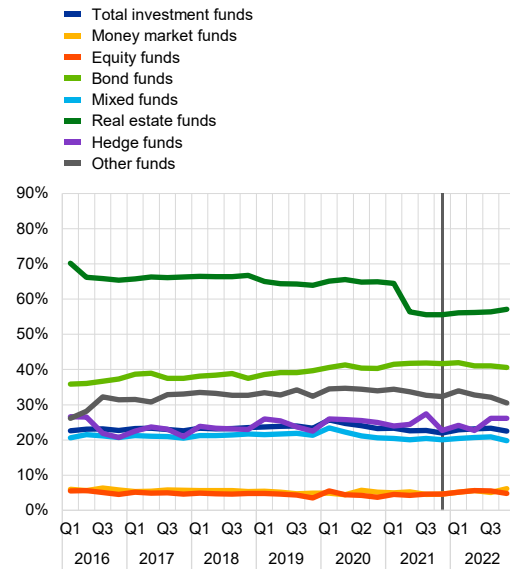


Chart A13

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

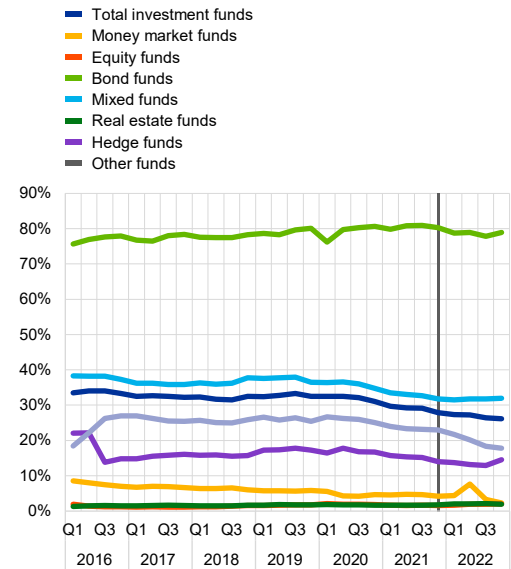
a) Liquidity transformation

(percentages)



b) Maturity transformation

(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 A13 panel a, 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 fund holdings of non-euro area securities and deposits. In Chart A14 panel b, 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.

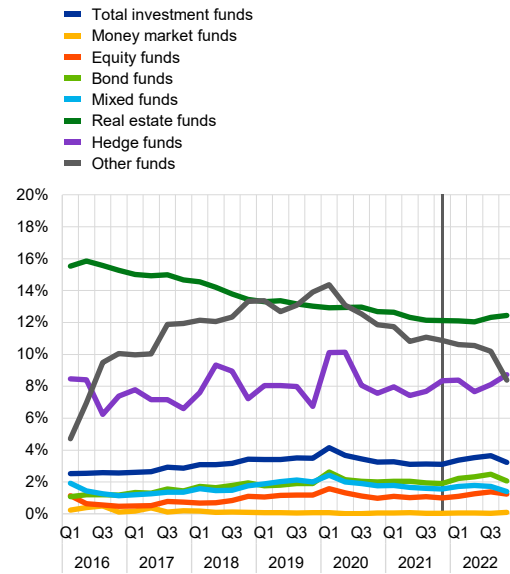


Chart A14

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

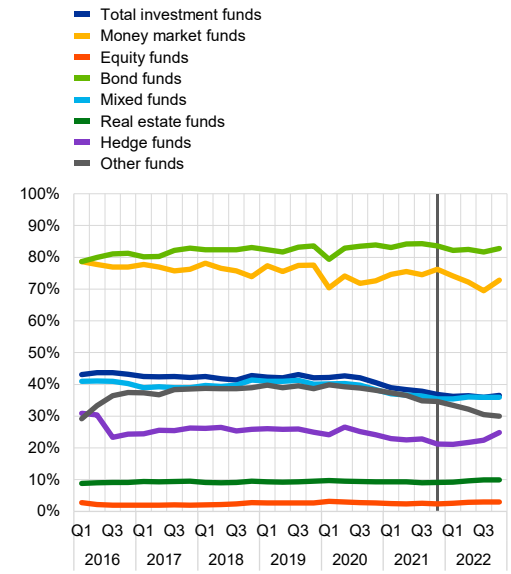
a) Financial leverage

(percentages)



b) Credit intermediation

(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 A14 panel a, financial leverage is calculated as the ratio of loans received to total liabilities. In Chart A14 panel b, 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 fund loans to non-euro area counterparties.

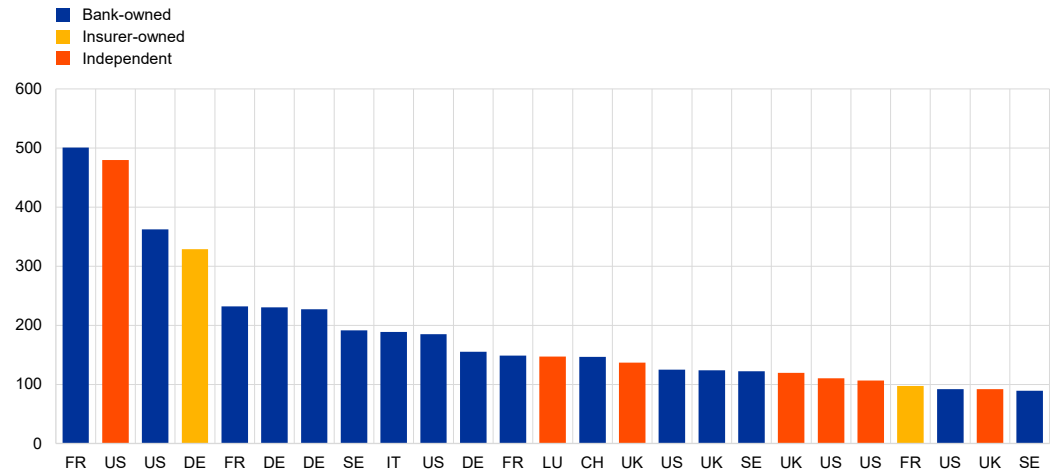




Chart A15

**Aggregate net assets of the top 25 asset management companies in the EU by group type**

(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. Observations are for the end of 2022.



Chart A16

**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 (left panel)**

a) Exposures to other financial and non-financial sectors in the euro area

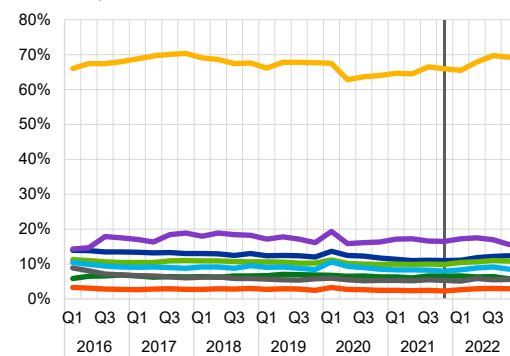
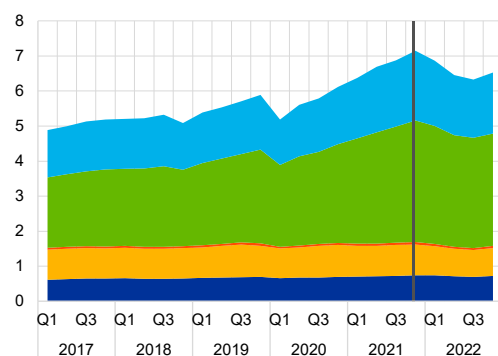
b) Holdings of MFI assets as a share of total assets

(EUR trillions)

(percentages)

- Monetary financial institutions
- General government
- Insurance corporations and pension funds
- Non-MMF investment funds and other financial institutions
- Non-financial corporations

- Total investment funds
- Money market funds
- Equity funds
- Bond funds
- Mixed funds
- Real estate funds
- Hedge funds
- Other funds



Source: ECB.

Notes: Chart A16 panel a: euro area IF holdings of debt securities, IF shares and other equity issued by euro area entities.

Chart A16 panel b: 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-MMF loans to non-euro area counterparties.

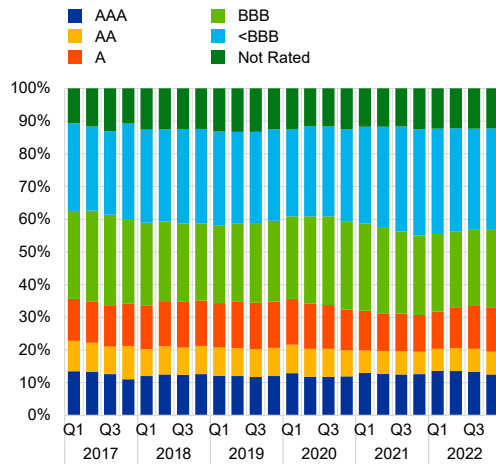


Chart A17

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

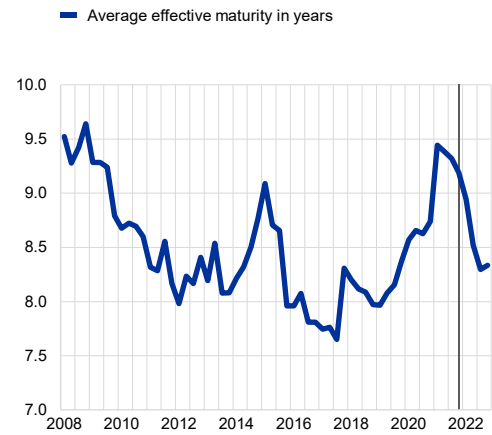
a) Average rating of fund holdings

(share of total assets)



b) Weighted average effective maturity of assets

(years)

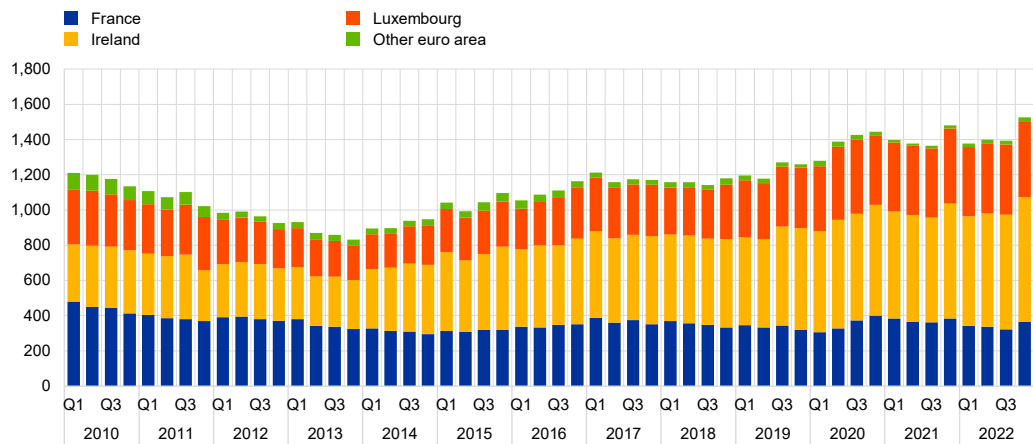


Sources: Thomson Reuters Lipper, Standard & Poor's and ESMA.

Chart A18

**Euro area MMFs: total assets by country of domicile**

(EUR billions)



Source: ECB.

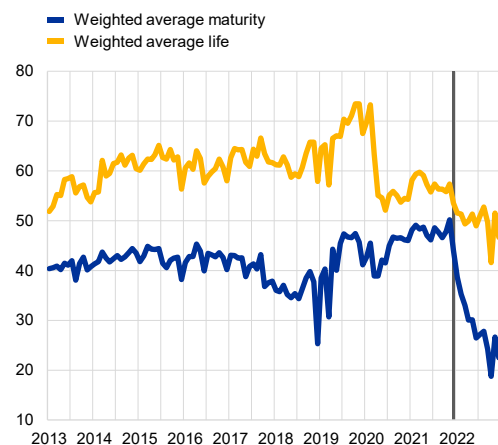


Chart A19

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

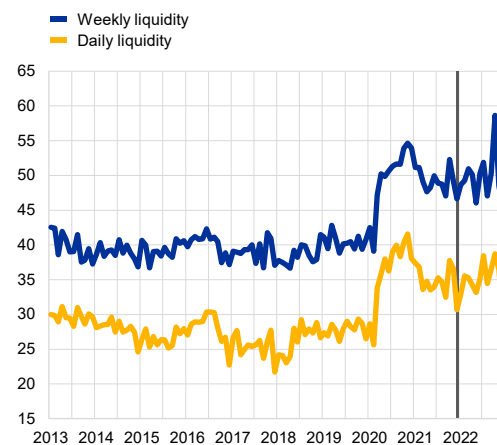
a) Weighted average maturity and life

(days)



b) Weekly and daily liquidity

(percentages)



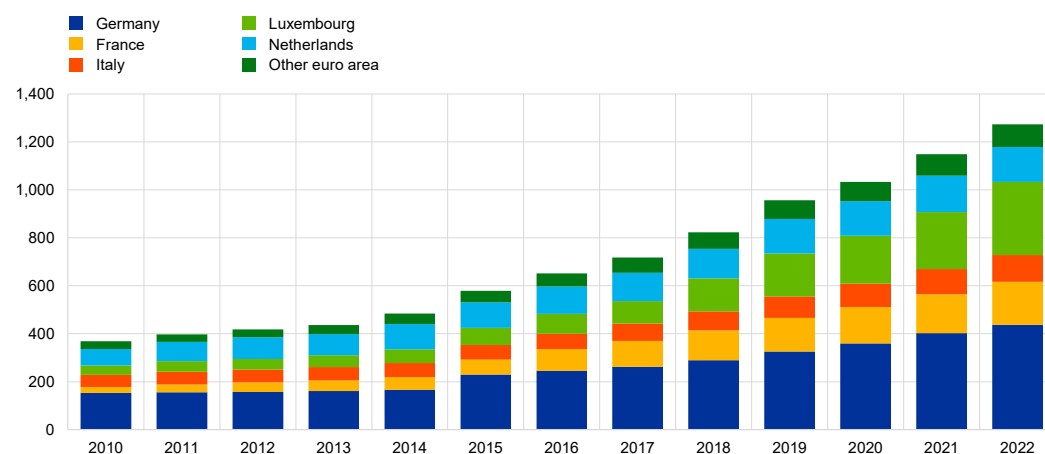
Sources: Fitch Ratings and ESMA.

Notes: Chart A19 panel a: weighted average maturity (WAM) and weighted average life (WAL) of EU and UK prime MMFs. Aggregation was carried out by weighting individual MMF WAM and WAL by AuM. Chart A19 panel b: 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 was carried out using individual MMF data weighted by AuM.

Chart A20

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

(EUR billions)



Source: ECB.

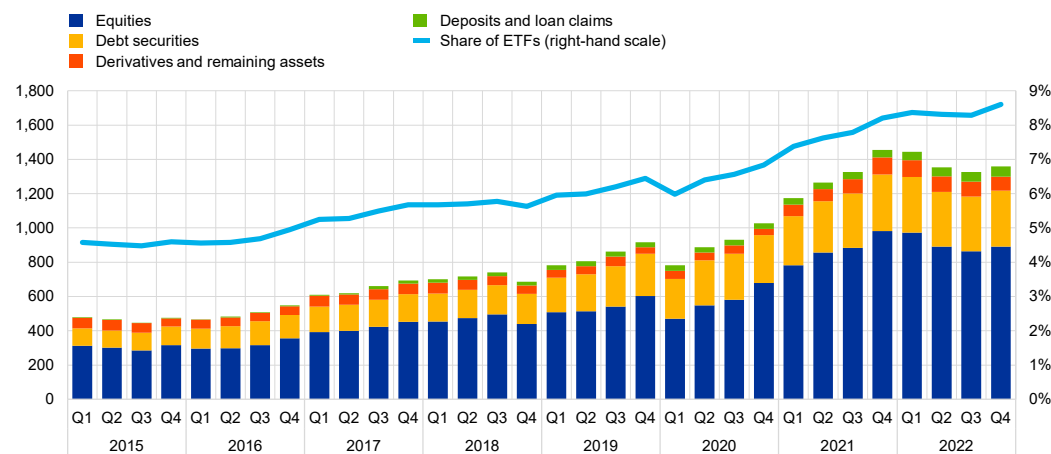
Note: The data of German closed-ended funds have been included in the calculation of total assets since 2015.



Chart A21

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

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



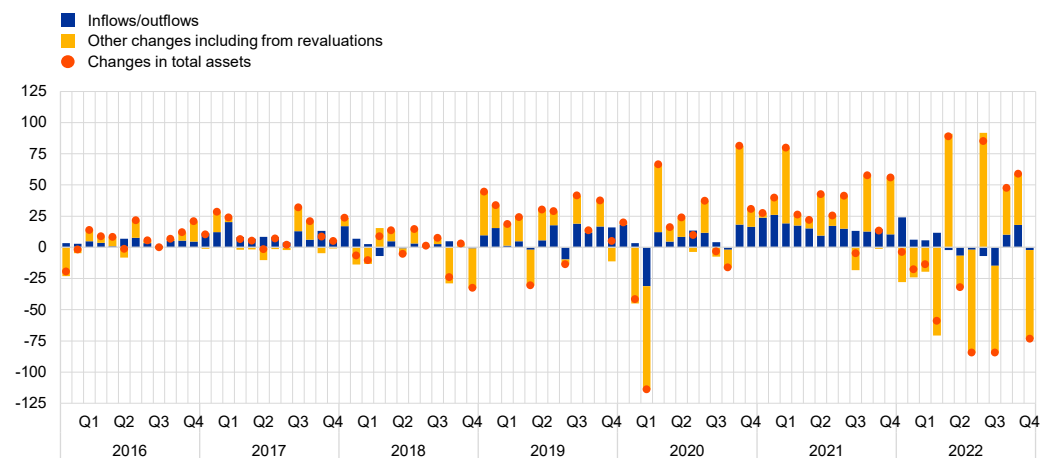
Source: ECB.

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

Chart A22

**Euro area ETFs: flows and changes in valuation**

(EUR billions)



Sources: ECB and ESRB calculations.

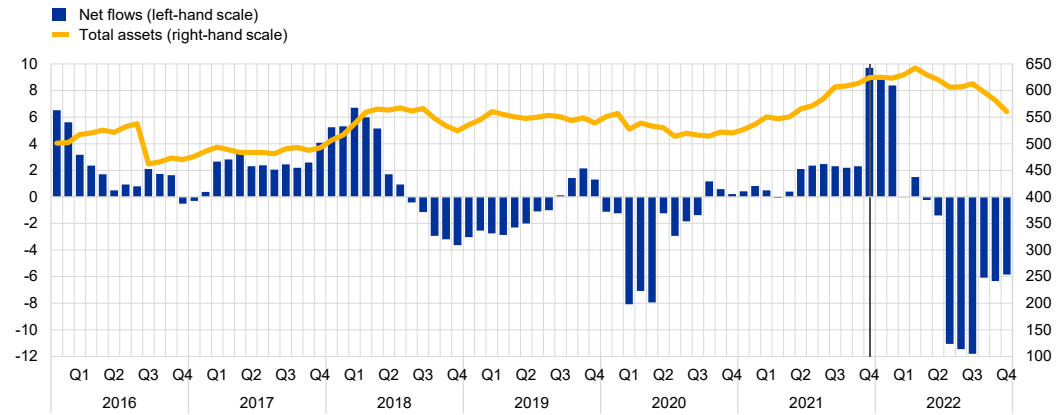
Notes: Based on ECB investment fund balance sheet statistics for exchange-traded funds in the euro area. Transactions are calculated from differences in outstanding amounts adjusted for revaluations, exchange rate variations, statistical reclassifications and any other changes which do not arise from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



Chart A23

**EU hedge funds: net flows and total assets**

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



Source: ECB.

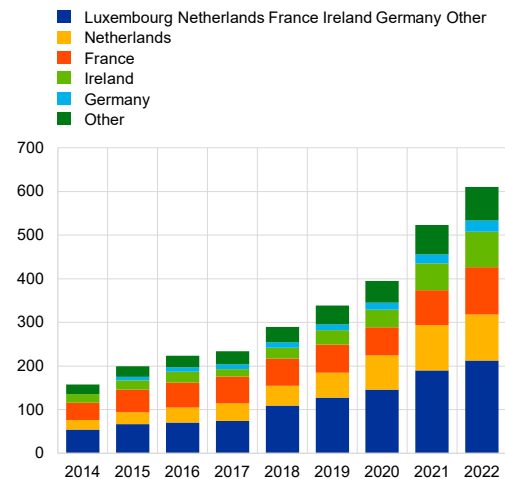
Notes: Based on available data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. Three-month moving average for net issuance of shares. Reclassifications and revisions affect the series for total assets.

Chart A24

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

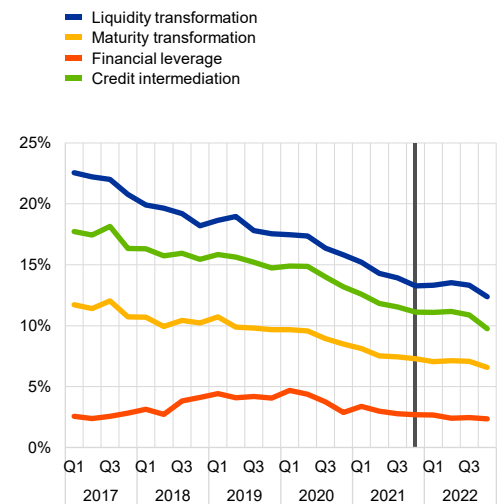
a) Net assets by country of domicile

(EUR billions)



b) Maturity transformation, leverage, credit intermediation and interconnectedness

(percentages)



Source: ECB.

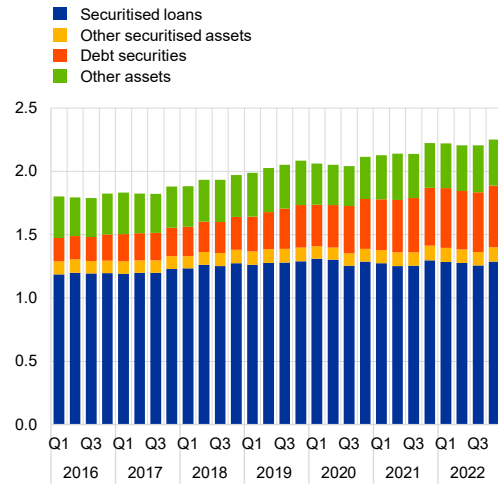


Chart A25

**Euro area FVC total assets and total assets by domicile**

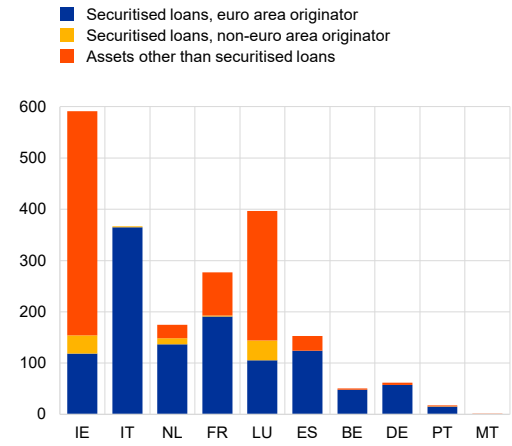
a) Euro area FVC total assets

(EUR trillions)



b) Total assets by domicile

(EUR billions)



Source: ECB.

Notes: Chart A25 panel a: "Other assets" includes shares and other equity, financial derivatives and remaining assets. Chart A25 panel b: observations for the end of 2022.



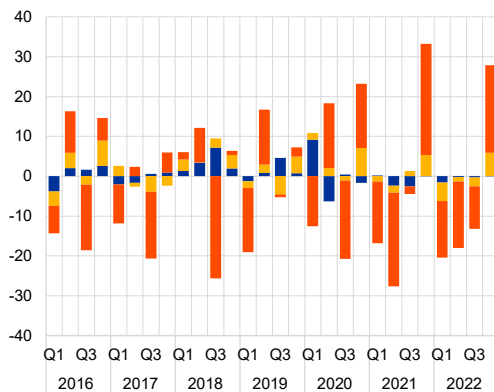
Chart A26

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

a) Euro area FVC net issuance of securitised loans by originator

(EUR billions)

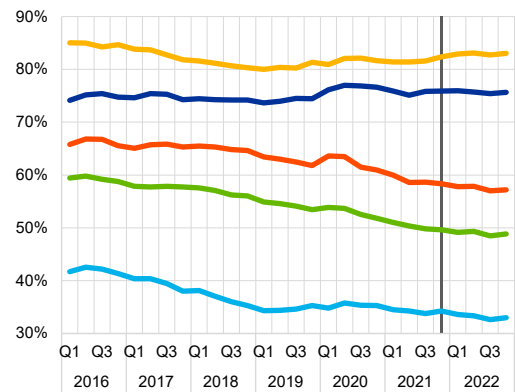
- Non-euro area originators
- Non-MFIs
- MFIs



b) Maturity transformation, leverage, credit intermediation and interconnectedness

(percentages)

- Maturity transformation
- Leverage
- Securitised loans to total assets
- Interconnectedness of assets with euro area MFIs
- Interconnectedness of liabilities with euro area MFIs



Source: ECB.

Notes: Chart A26 panel a: euro area FVC securitised loans by originator. Chart A26 panel b: the proxy for maturity transformation was 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 was computed as the sum of loans received and debt securities issued divided by total assets. FVC assets with a euro area MFI counterparty were 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 were computed as debt securities held by euro area MFIs, excluding the ESCB reporting sector, using BSI statistics for MFIs.

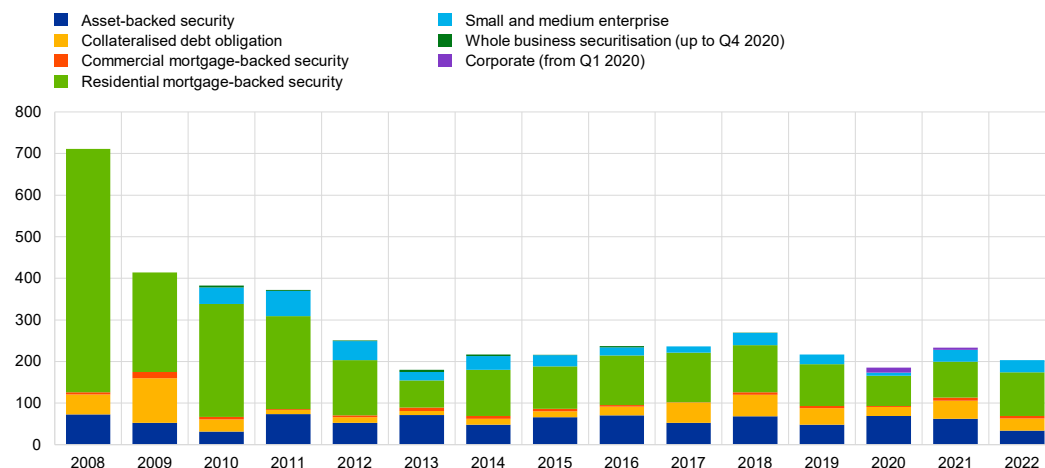




Chart A27

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.

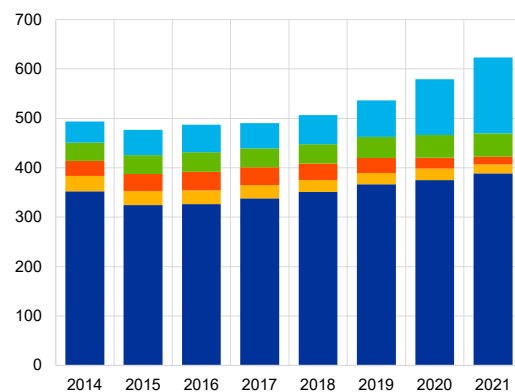
Chart A28

Euro area FCL assets (left panel) and liabilities (right panel)

a) Euro area FCL assets

(EUR billions)

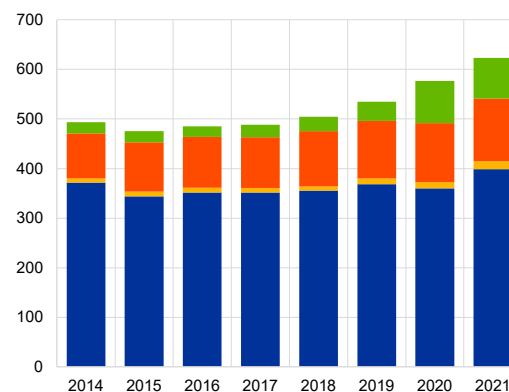
- Loans to non-MFIs
- Loans to MFIs
- Debt securities
- Equity
- Remaining assets



b) Euro area FCL liabilities

(EUR billions)

- Deposits and loans taken
- Debt securities issued
- Capital and reserves
- Remaining liabilities



Source: ECB.



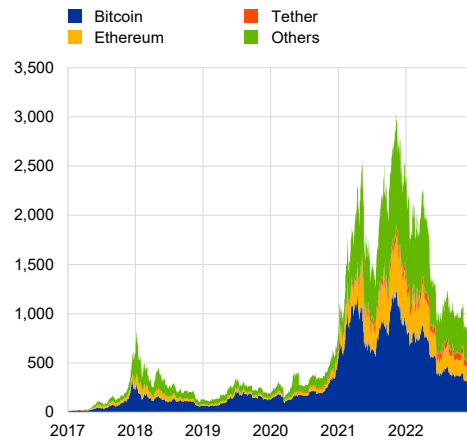
# A3 Crypto-assets, centralised finance and decentralised finance

Chart A29

**Crypto-asset market capitalisation (left panel) and trading volumes (right panel)**

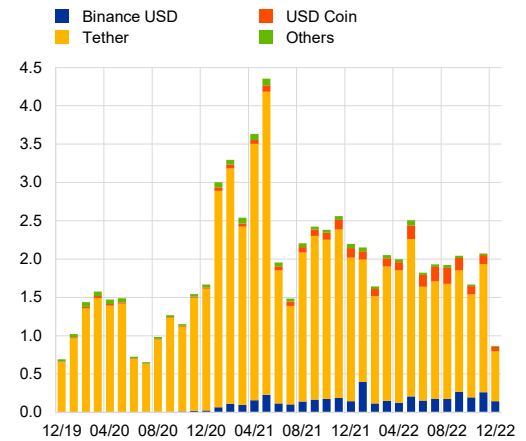
a) *Crypto-asset market capitalisation*

(USD billions)



b) *Crypto-asset trading volumes*

(USD trillions)



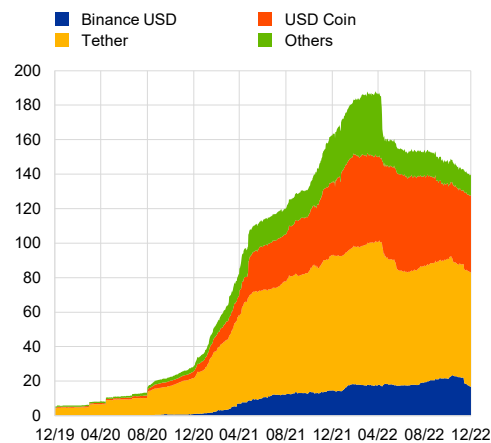
Sources: CoinMarketCap and ESMA.

Chart A30

**Stablecoin market capitalisation (left panel) and trading volumes (right panel)**

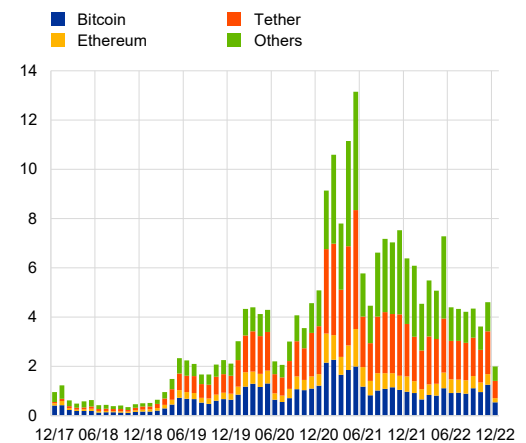
a) *Stablecoin market capitalisation*

(USD billions)



b) *Trading volumes*

(USD trillions)



Sources: CoinMarketCap and ESMA.

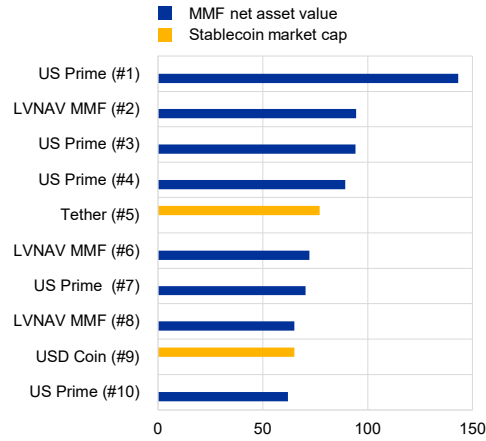


Chart A31

**Comparison of largest stablecoins US Prime and EU-domiciled MMFs (left panel) and breakdown of Tether reserves (right panel)**

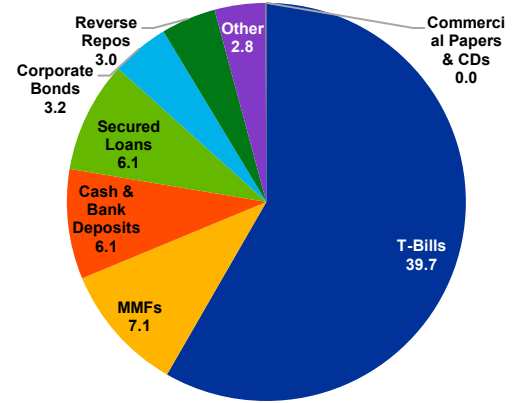
a) Comparison of largest stablecoins US Prime and EU-domiciled MMFs

(USD billions)



b) Breakdown of Tether reserves

(USD billions)



Sources: Crane, Fitch Ratings, CoinMarketCap, Tether and ESMA.

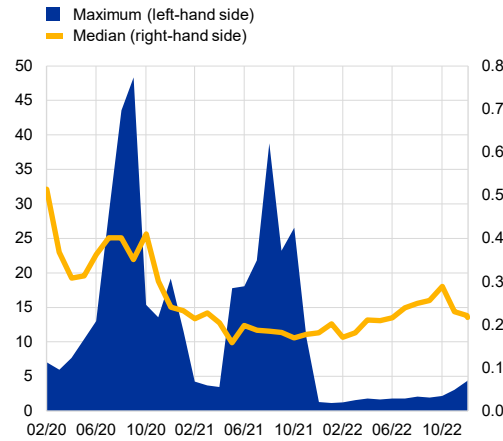
Notes: Data in Chart A31 panel a as of July 2022; data in Chart A31 panel b as of September 2022.

Chart A32

**Leverage estimates of Bitcoin (left panel) and Ether (right panel)**

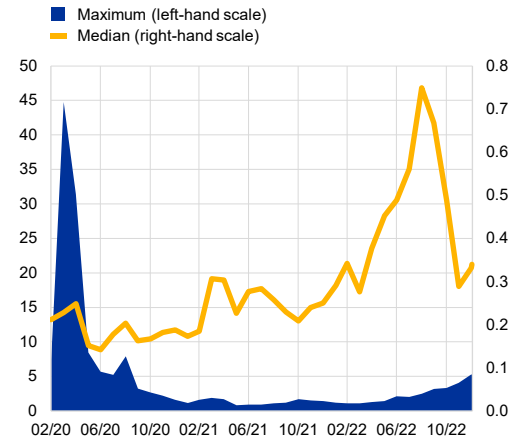
a) Leverage estimates of Bitcoin

(leverage multiple)



b) Leverage estimates of Ether

(leverage multiple)



Sources: Glassnode and ESRB calculations.

Notes: The measures are based on both Bitcoin and Ether futures. The estimated leverage ratio was calculated as (open interest of the trading platform)/(reserve of the trading platform). The following exchanges are covered for Bitcoin: Binance, Bitfinex, BitMEX, FTX, Huobi, Kraken, Bybit, Derbit, FTX and OKX; and for Ether: Binance, Bitfinex, Bybit, Derbit, FTX, Huobi, Kraken and OKX.

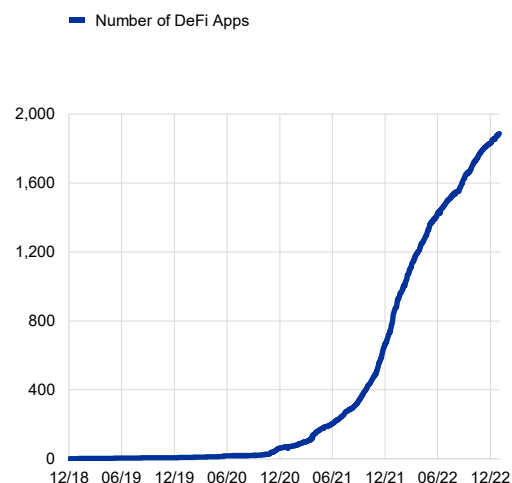


Chart A33

**Number of DeFi apps (left panel) and DeFi total value locked by protocol type (right panel)**

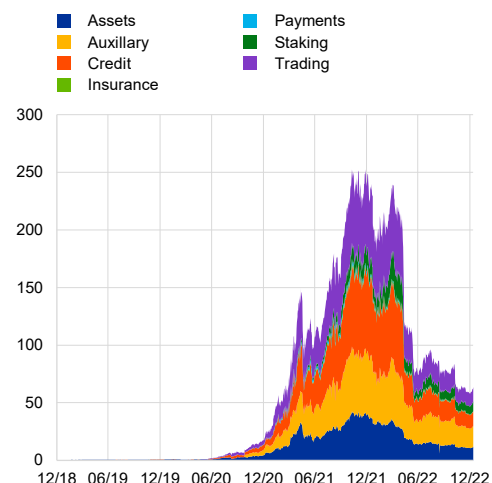
a) Number of DeFi apps

(number)



b) DeFi total value locked by protocol type

(USD billions)



Sources: DeFiLlama and ESRB calculations.

Notes: In Chart A33 panel a, the number of DeFi apps with positive TVL. In Chart A33 panel b, the categories include (i) Assets, including derivatives, synthetics, options, indices, algorithmic stablecoins and protocols that mint their own stablecoins or launch new projects and “coins”; (ii) Auxiliary, protocols that allow users to bet on future results, that bridge tokens from one network to another or allow for the interoperability among different blockchains and that support DeFi services (incl. gaming and NFT mining); (iii) Credit, protocols that allow users to borrow and lend assets and that pay a reward for the liquidity provision or aggregate yield from various protocols, as well as protocols that use reserves of assets to issue and back their native tokens; (iv) Insurance, protocols that offer coverage against losses caused by events typically in the DeFi ecosystem, such as hacking, malfunctioning of exchanges and smart contracts; (v) Payments, protocols that allow users to pay/send/receive crypto-assets; (vi) Staking, protocols that reward for staked assets with crypto-assets; and (vii) Trading, protocols that allow users to swap and trade crypto-assets. TVL might be overestimated due to token re-usage.



## A4 Activity-based monitoring

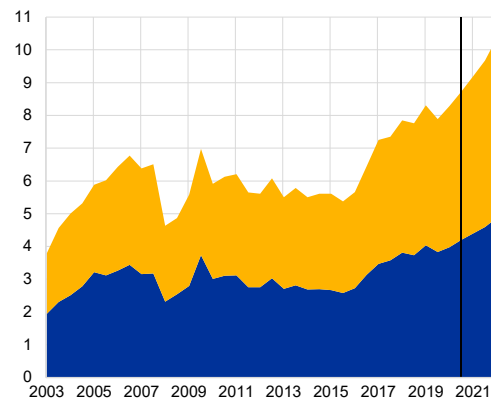
Chart A34

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

a) Size of EU repo market

(EUR trillions)

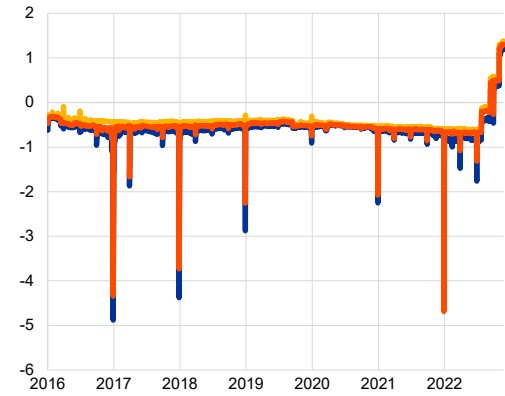
■ Repos  
■ Reverse repos



b) Repo rate for selected sovereigns

(percentages)

■ Germany  
■ Italy  
■ Mean for Austria, Belgium, Finland, France, Germany, Italy, Netherlands



Sources: ICMA, RepoFunds Rate and ESMA.

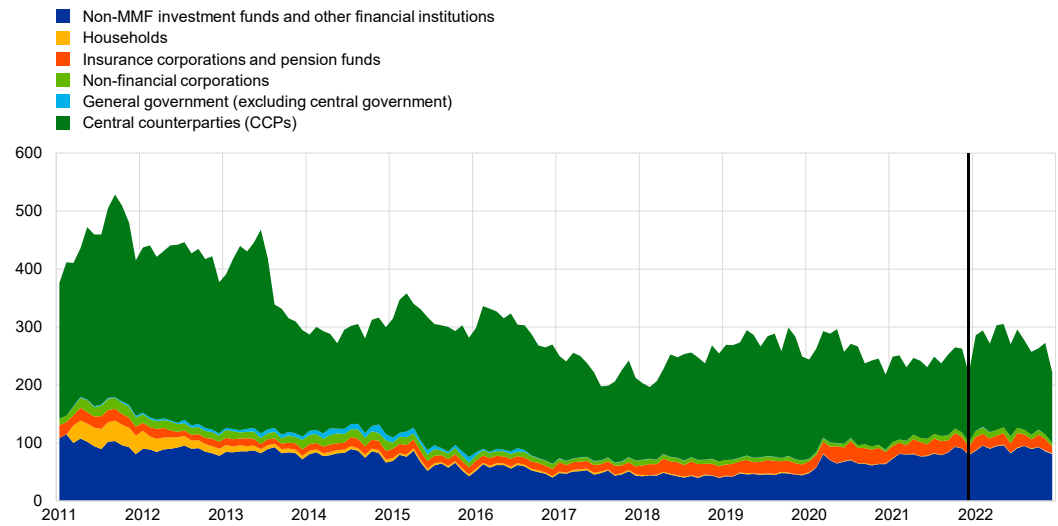
Notes: Chart A34 panel a: total value of repos and reverse repos outstanding on the books of the institutions which participated in the ICMA repo surveys. Chart A34 panel b: volume-weighted average of fixed rate index value, by origin of the collateral. Centrally cleared sovereign repos only.



Chart A35

**Euro area MFI repo liabilities with non-MFIs, by sector**

(EUR billions)



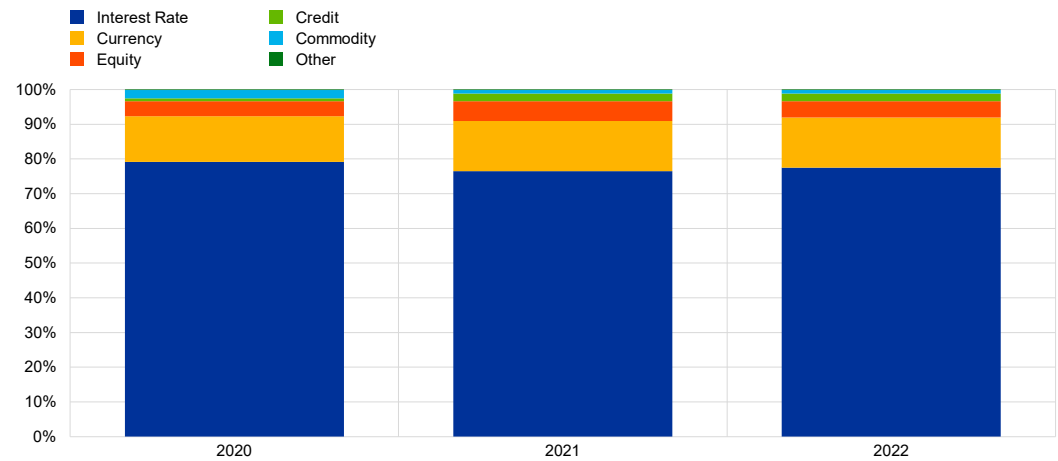
Source: ECB.

Note: Euro area MFI repo liabilities with euro area non-MFI counterparties.

Chart A36

**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.



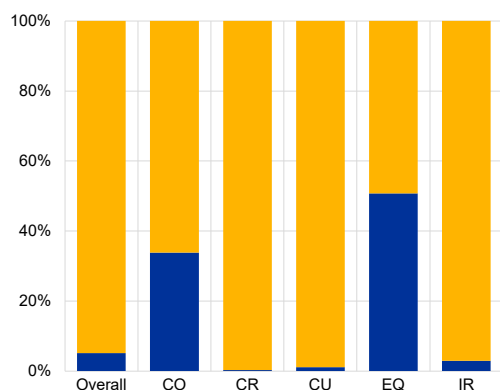
Chart A37

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

a) ETD versus OTC notional amount

(percentages)

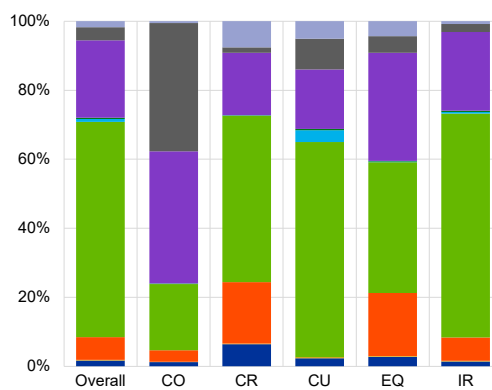
■ ETD  
■ OTC



b) Gross notional amount by sector of counterparty

(percentages)

■ AIF  
■ Assurance  
■ CCP  
■ Credit institution  
■ Pension fund  
■ Insurance  
■ Investment firm  
■ Non-financial firm  
■ UCITS



Sources: Trade repositories and ESMA.

Notes: Data as of 16 December 2022. CO stands for commodity, CR for credit, CU for currency, EQ for equity, IR for interest rate. Chart A37 panel a: outstanding notional amounts by asset class of underlying, percentage split by ETD and OTC. Chart A37 panel b: outstanding notional amounts by asset class and sector of counterparty.

