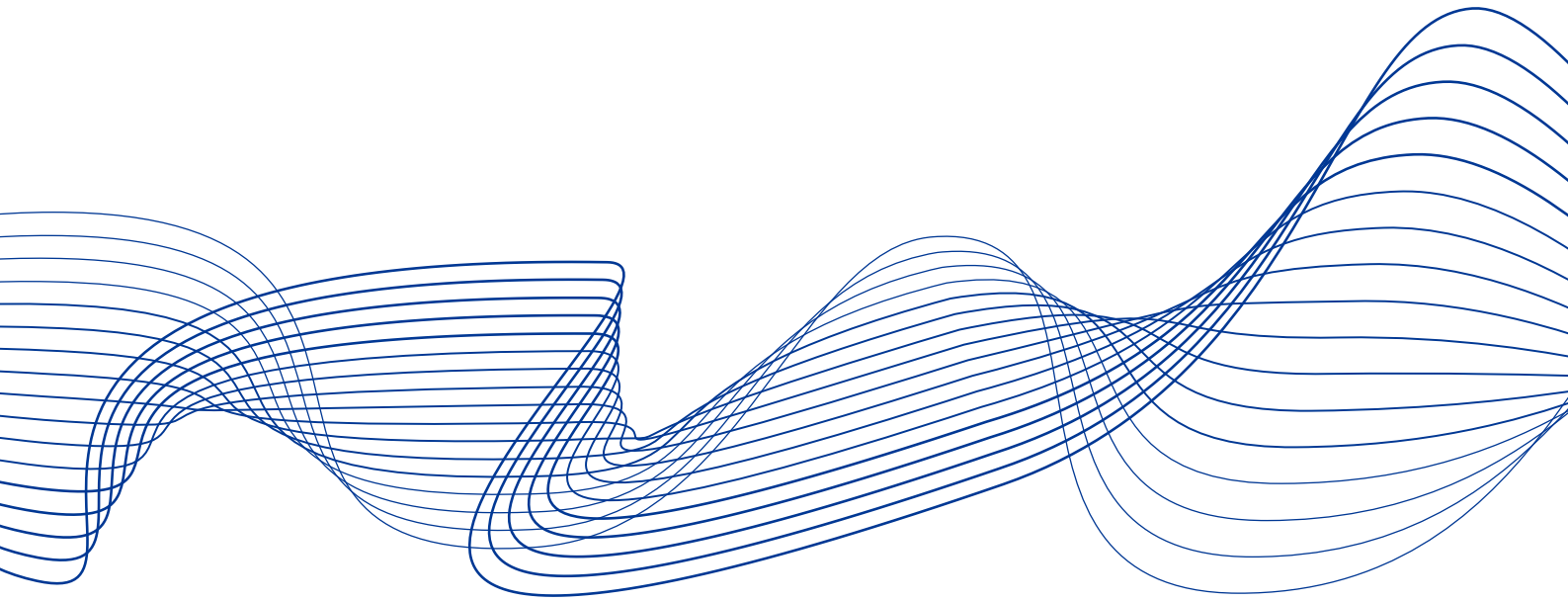


# NBFI Monitor

No 9 / June 2024

EU Non-bank Financial  
Intermediation Risk Monitor 2024  
Annexes



**ESRB**

European Systemic Risk Board

European System of Financial Supervision

# Contents

<b>Annex I Statistical classification for investment funds and other financial institutions</b>	<b>2</b>
<b>Annex II Descriptions and business models</b>	<b>3</b>
<b>Annex III Statistical overview</b>	<b>6</b>
A1    Developments in main aggregates	6
A2    Entity-based monitoring	12
A3    Crypto-assets, centralised finance and decentralised finance	24
A4    Activity-based monitoring	28



# 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	
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)	
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.



## 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 a 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. SDDs offer a range of services which focus on providing investors with access to securities and derivatives markets. Those services include, among others, receipt 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 (CCP) clearing houses 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 insurance brokers, loan brokers, securities brokers, investment advisers, managers of pension funds, mutual funds, payment institutions, corporations providing stock exchange and insurance exchange.
<b>Captive financial institutions (CFIs)</b>	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.

Source: ESRB.

Note: 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**

<b>Crypto ecosystem</b>	<b>Description</b>
<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>	<p>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 EMIR1 but in other respects are similar to ETDs.</p>
<b>Securities financing transactions (SFTs)</b>	<p>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 transactions 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.</p>
<b>Securitisation</b>	<p>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. Securitisation allows non-tradable, illiquid assets such as loans to be pooled and tranching into tradable 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 tradable 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.</p>

Source: ESRB.

Note: 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.

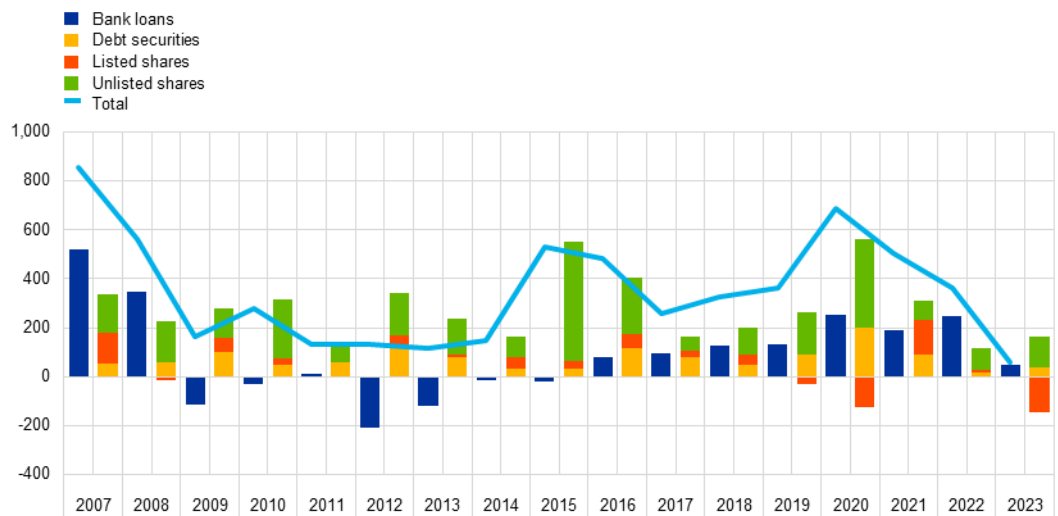


# Annex III Statistical overview

## A1 Developments in main aggregates

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

(EUR billions)



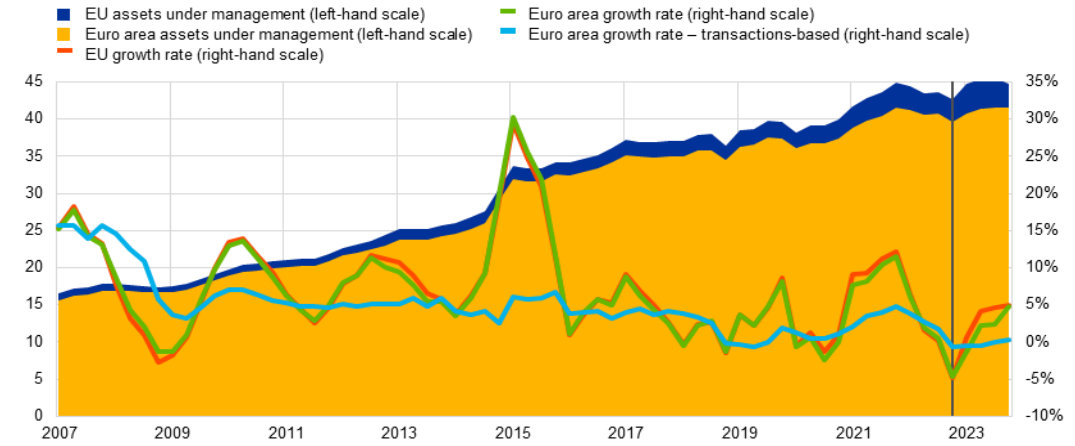
Sources: ECB and ESRB calculations.



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.

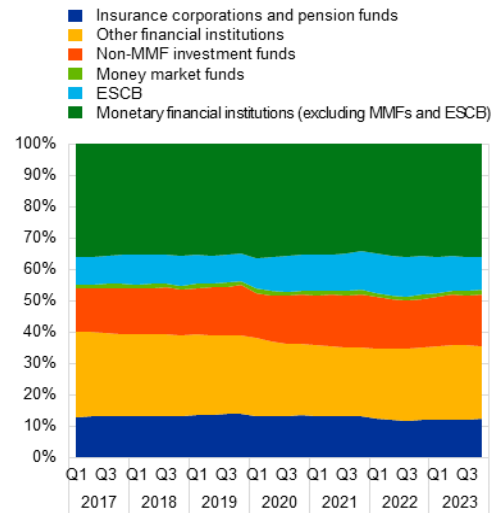
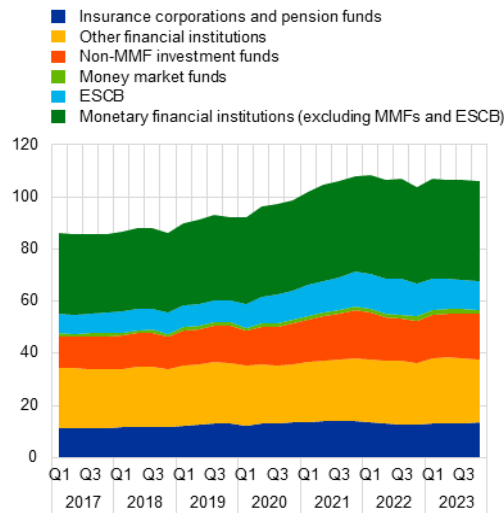
Notes: The red and green lines indicate annual growth rates based on changes in outstanding amounts. The blue line indicates the annual growth rate based on transactions, i.e. excluding the impact of exchange rate variations or other revaluations and statistical reclassifications.

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.

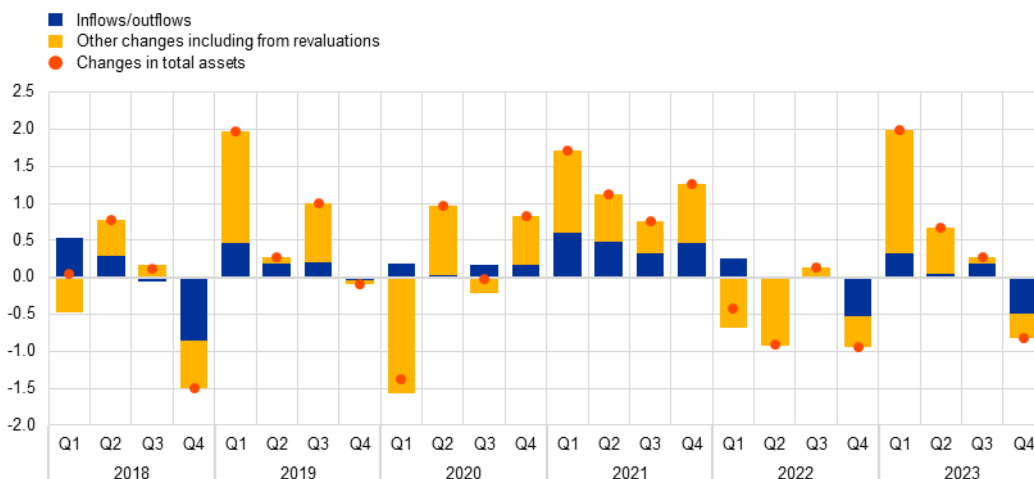
Notes: Based on financial accounts data for the total financial assets of the financial sector of euro area plus non-euro area EU Member States. To exclude central banks from the MFI time series, the European System of Central Banks (ESCB) is estimated based on BSI data for the Eurosystem and national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





## Chart A4 EU investment funds and other financial institutions: financial transactions and other changes

(EUR trillions)



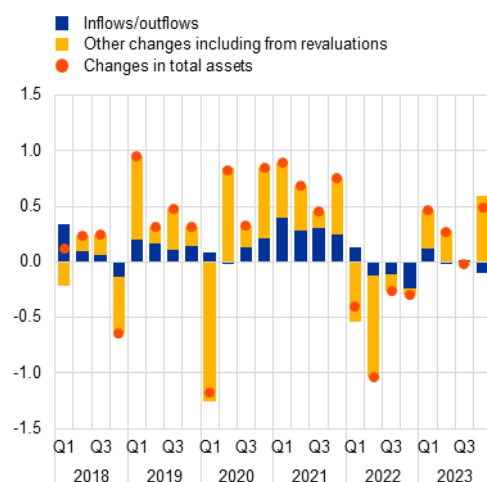
Sources: ECB and ESRB calculations.

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 (panel a) and euro area other financial institutions (panel b): transactions and other changes

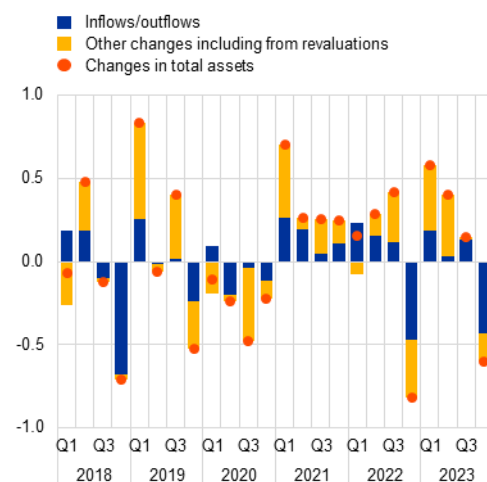
a) Euro area investment funds

(EUR trillions)



b) Euro area other financial institutions

(EUR trillions)



Sources: ECB and ESRB calculations.

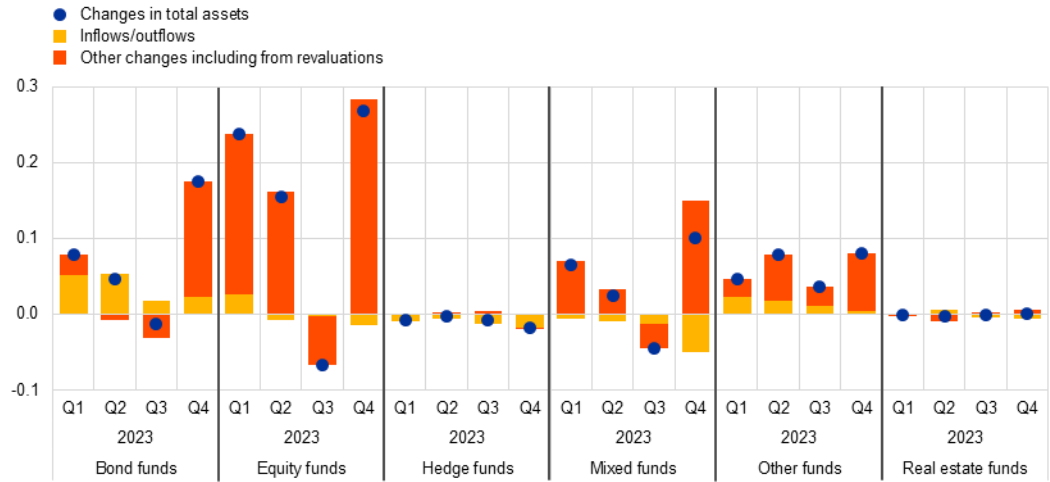
Notes: Based on financial accounts data for the total financial assets of the financial sector of the euro area. Inflows/outflows are calculated from differences in outstanding amounts, adjusted for revaluations, exchange rate variations, statistical reclassifications and any other changes not arising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



Chart 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

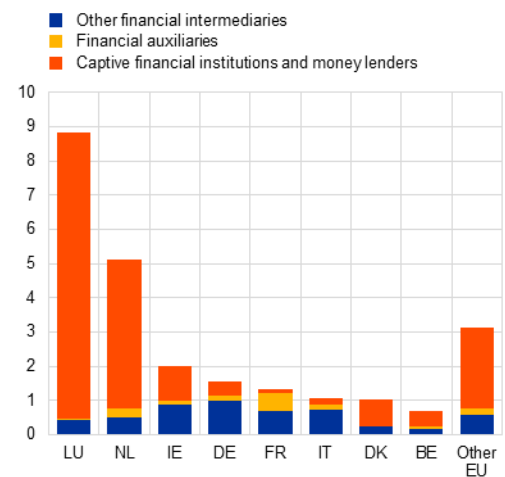
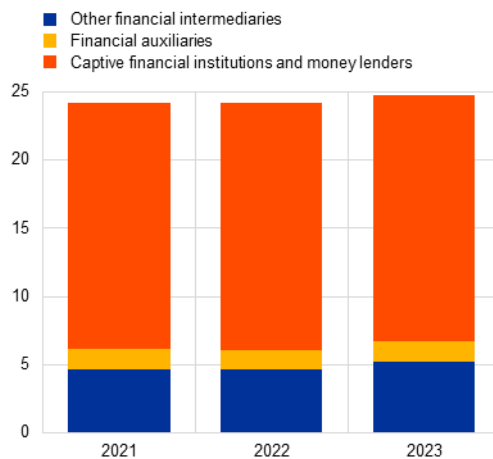
**Breakdown of EU other financial institutions (OFIs) by type (panel a) and breakdown of EU other financial institutions by domicile (panel b)**

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.

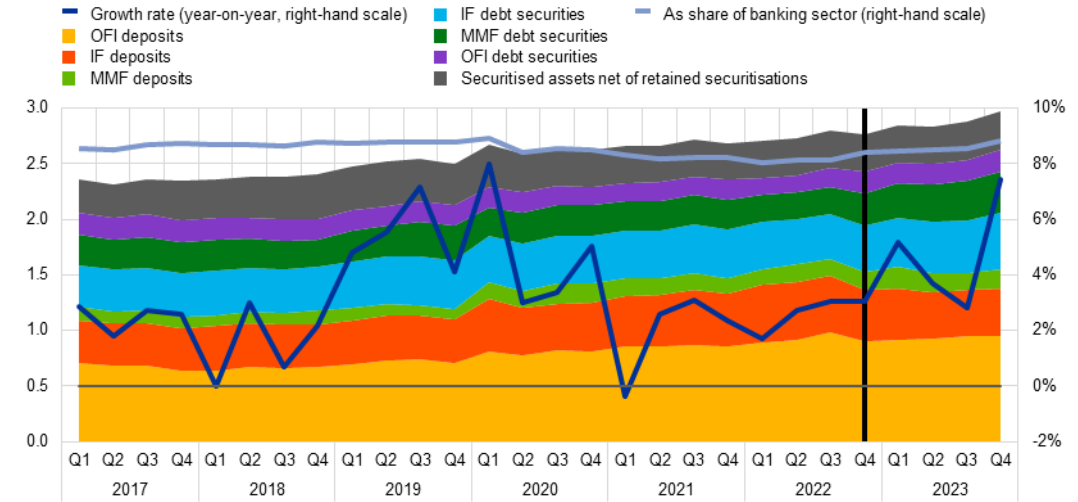
Notes: Data for the total OFI sector are sourced from financial account statistics; captive financial institutions and financial auxiliaries are sourced from Eurostat financial account statistics. In the financial accounts, SFIs, non-securitisation SPVs and captive financial institutions are included 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 (i) MFI funding arising from securitisation; and (ii) 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

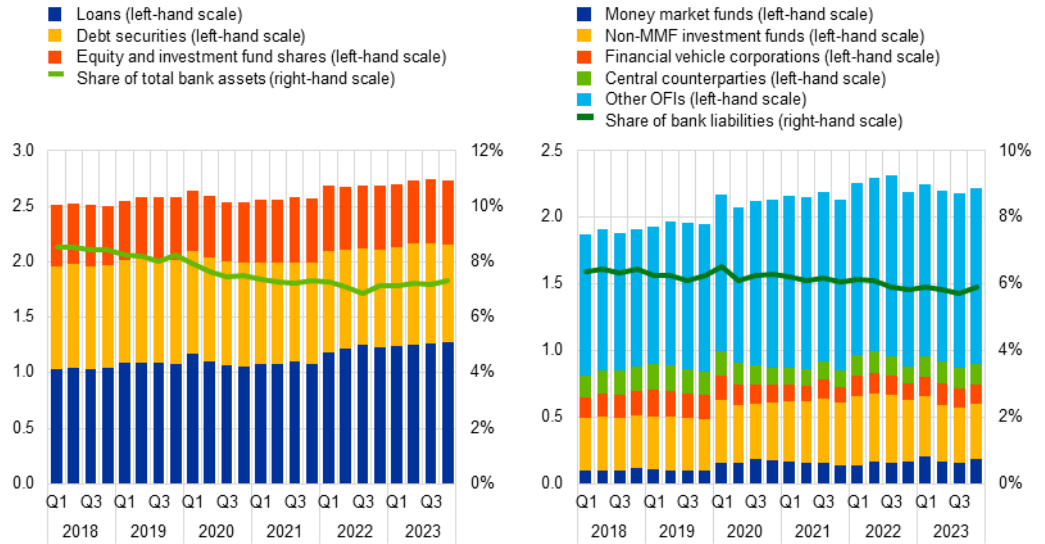
**Euro area credit institution assets vis-à-vis (panel a) and deposits from (panel b) euro area investment funds and other financial institutions**

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)



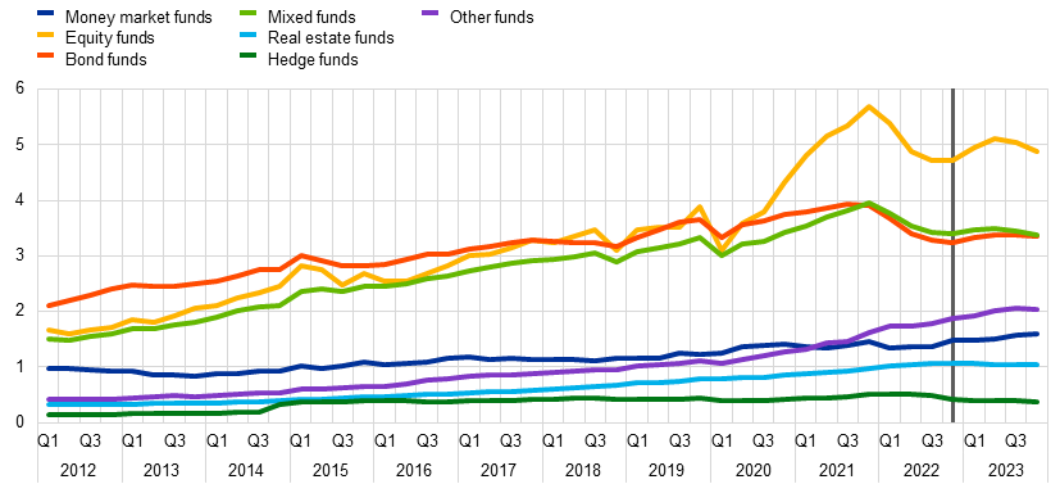
Source: ECB.



## 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.

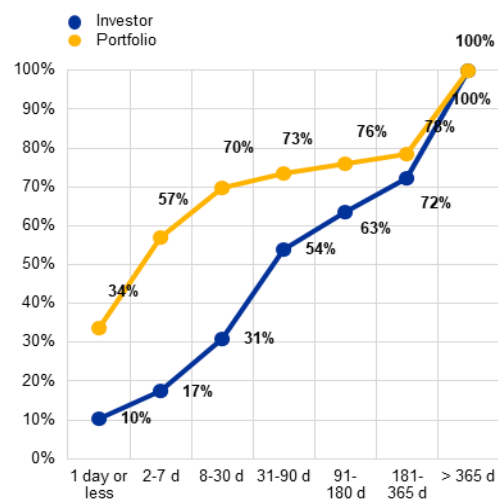
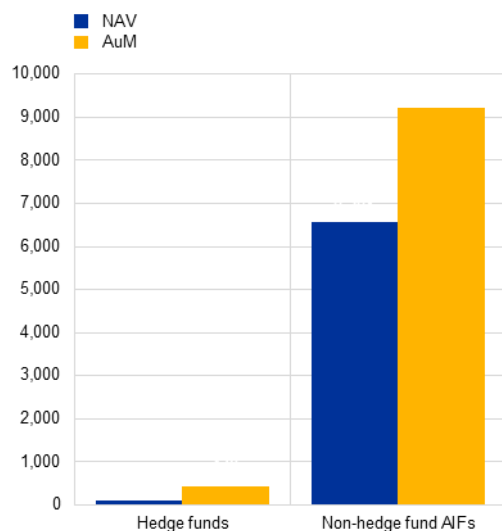


**Chart A11**  
**Hedge funds subject to AIFMD rules: net asset value and regulatory assets under management (panel a) and liquidity profile (panel b)**

a) Net asset value and regulatory assets under management    b) Liquidity profile

(EUR billions)

(percentages)



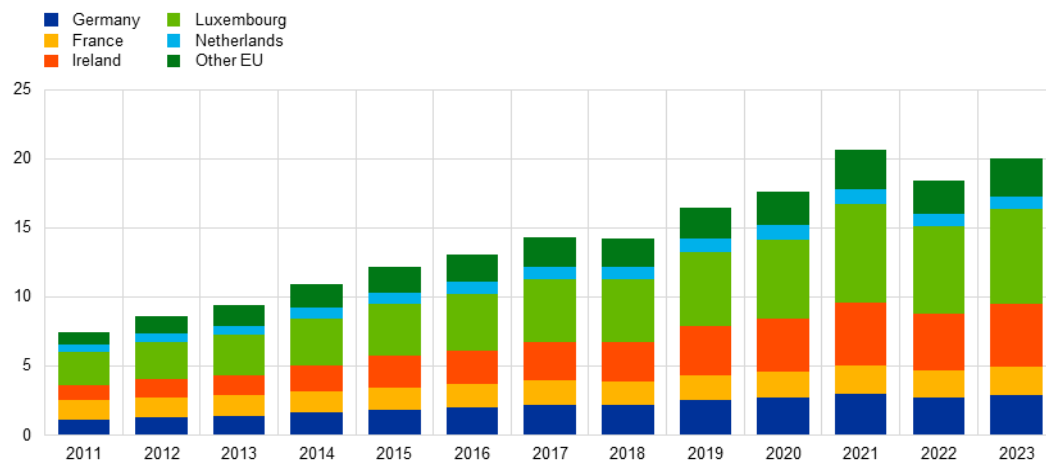
Sources: AIFMD database, NCAs and ESMA.

Notes: Observations are for the end of 2022. 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 refer to AIFs of authorised and registered AIFMs excluding feeder funds. 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 refer 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)



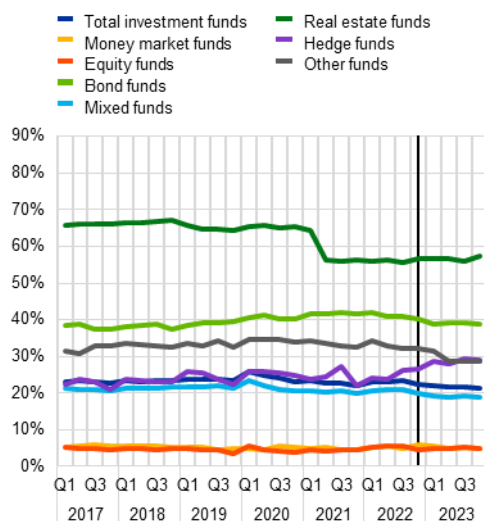
Source: ECB.

Note: Data for non-MMF investment funds are based on investment fund statistics for euro area countries and QSA for non-euro area countries.

**Chart A13**  
**EU investment funds: liquidity (panel a) and maturity transformation (panel b)**

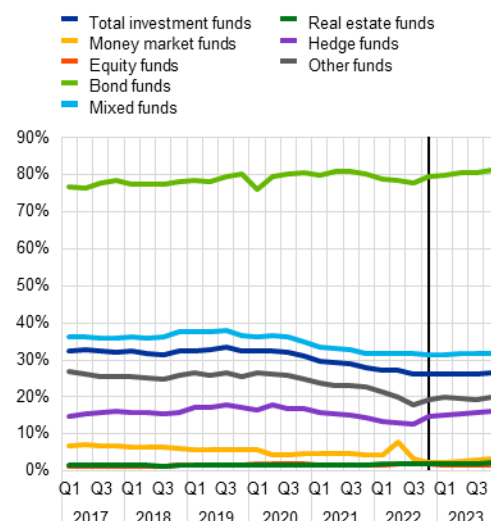
a) Liquidity transformation

(percentages)



b) Maturity transformation

(percentages)



Source: ECB.

Notes: Data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. In 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 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.

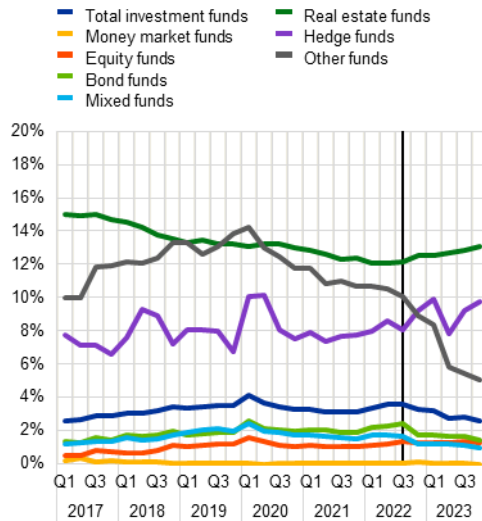


Chart A14

EU investment funds: financial leverage (panel a) and credit intermediation (panel b)

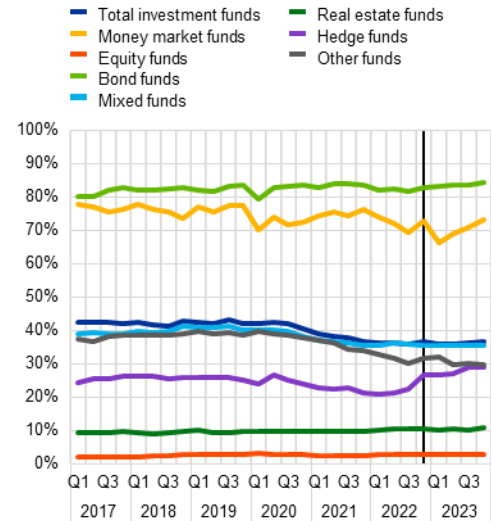
a) Financial leverage

(percentages)



b) Credit intermediation

(percentages)



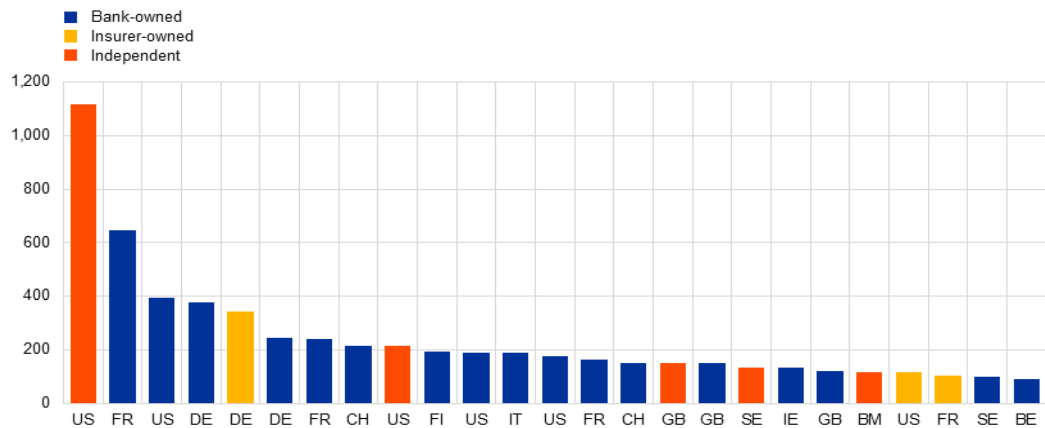
Source: ECB.

Notes: Data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. In panel a), financial leverage is calculated as the ratio of loans received to total liabilities. In 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-neuro 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: Data cover assets of mutual funds and ETFs. 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. Latest observations are for the second quarter of 2023.





Chart A16

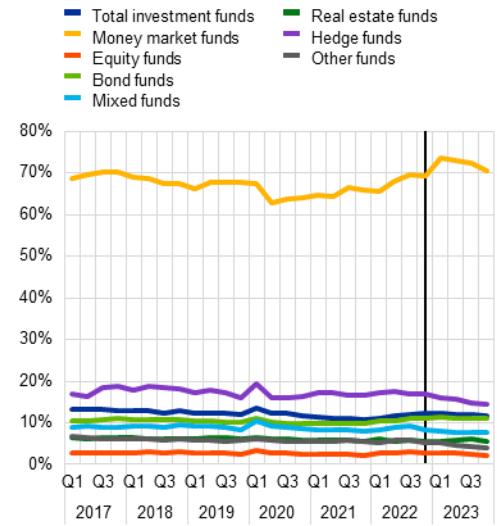
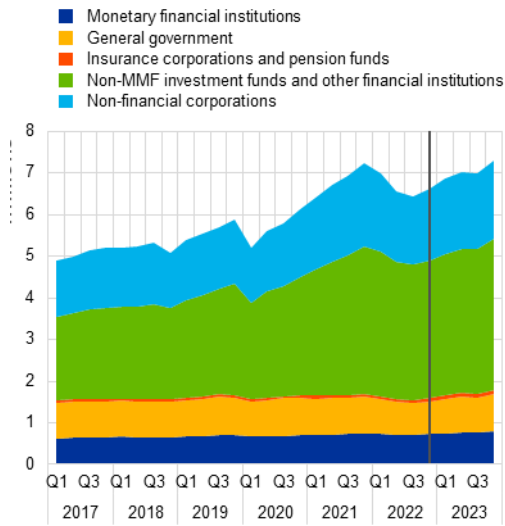
**Euro area investment funds: exposures to other financial and non-financial sectors in the euro area (panel a) and holdings of MFI assets as a share of total assets (panel b)**

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)



Source: ECB.

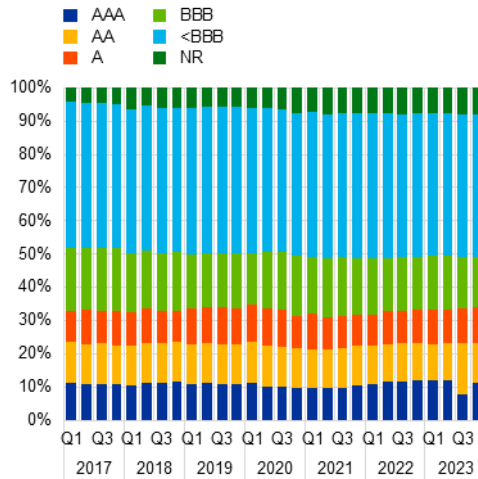
Notes: Panel a): euro area IF holdings of debt securities, IF shares and other equity issued by euro area entities. Panel b): based on data for the EU; Bulgaria, Denmark, Croatia, Sweden and the United Kingdom are not included. Interconnectedness is proxied by holdings of debt securities and loans with an MFI as a counterparty as a share of total assets. Estimates made for non-MMF loans to non-euro area counterparties.



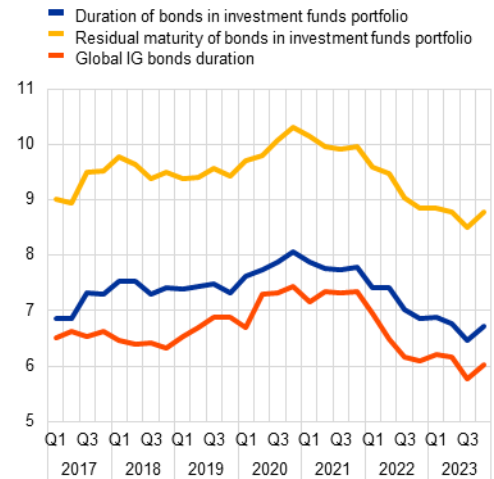
Chart A17

**Euro area investment funds' debt instrument holdings: average rating (panel a) and weighted average effective maturity and duration (panel b)**

a) Average rating of fund holdings  
(share of total assets)



b) Weighted average effective maturity and duration  
(years)



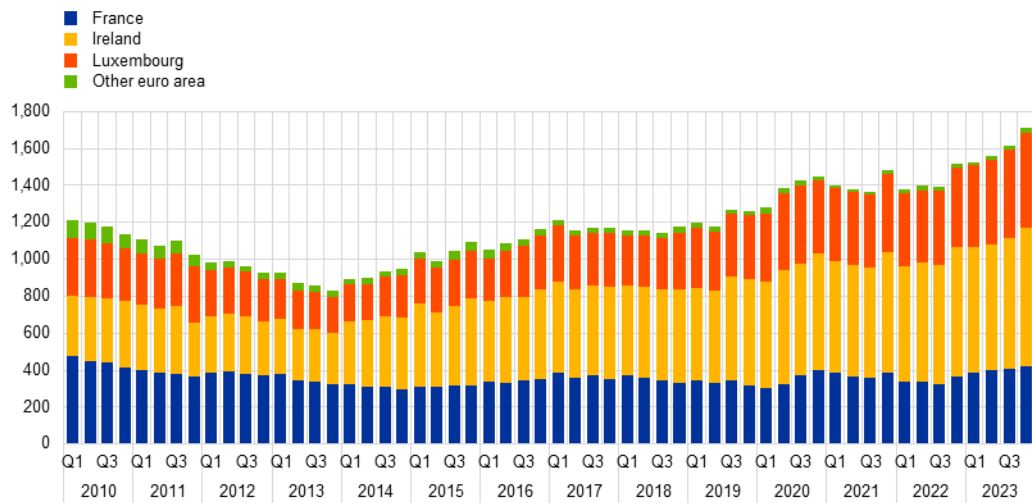
Sources: SHSS, CSDB, Refinitiv Datastream, ESMA and ESRB.

Notes: Calculations for bonds held by euro area non-MMF investment funds. Duration and residual maturity are calculated as the weighted average, where the weight is the market value of the bond in non-MMF investment funds' portfolio. Extreme observations where duration was larger than residual maturity were removed from the sample. Global IG bonds duration is the global index of investment grade bonds' duration.

Chart A18

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

(EUR billions)



Source: ECB.

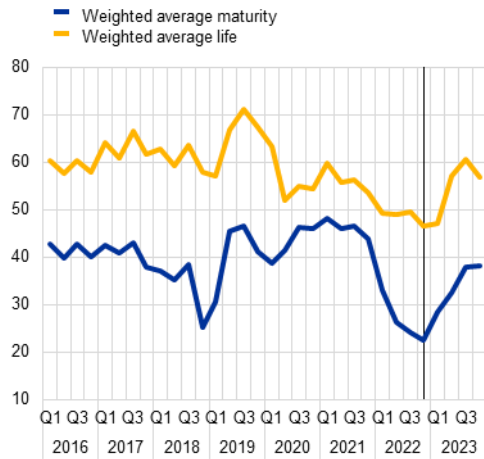


Chart A19

**EU MMFs: weighted average maturity and life (panel a) and weekly and daily liquidity (panel b)**

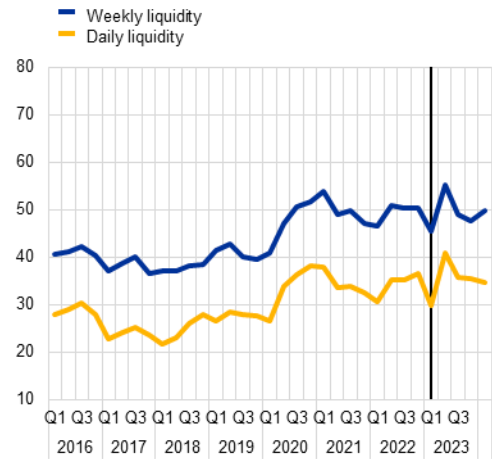
a) Weighted average maturity and life

(days)



b) Weekly and daily liquidity

(percentages)



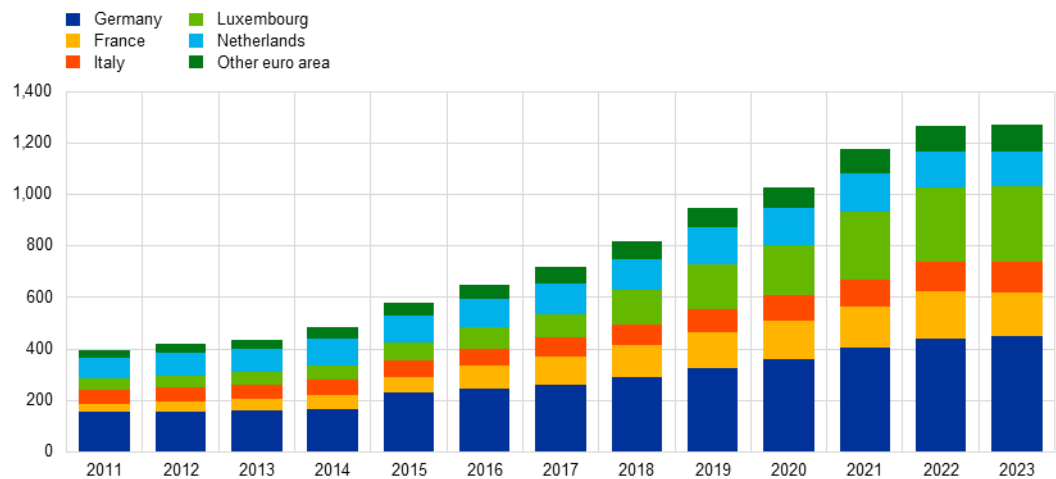
Sources: Fitch Ratings and ESMA.

Notes: Panel a): weighted average maturity (WAM) and weighted average life (WAL) of EU MMFs in days. Aggregation was carried out by weighting individual MMF WAM and WAL by AuM. 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 EU MMF data weighted by AuM.

Chart A20

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

(EUR billions)



Source: ECB.

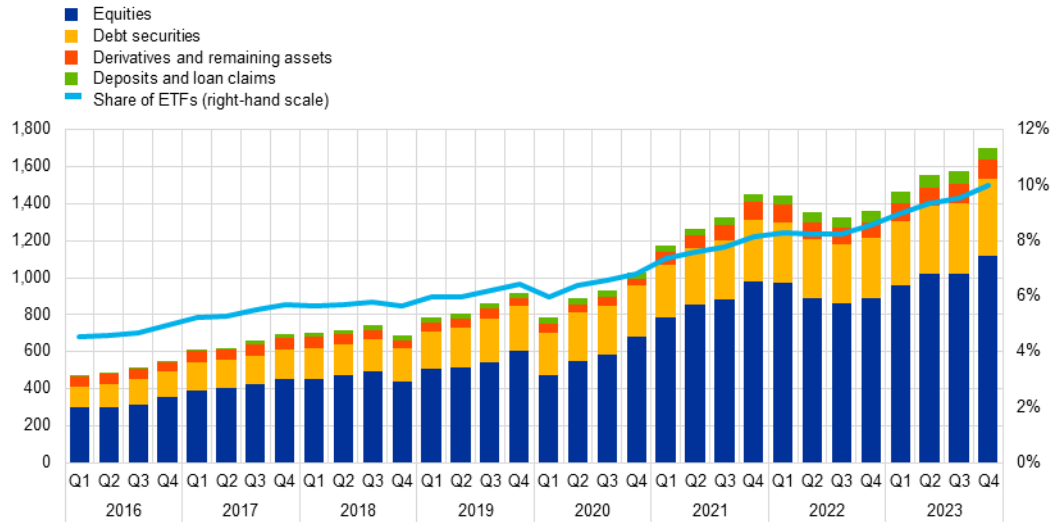
Note: The data of German closed-ended funds have been included in the calculation of total assets since 2015.



Chart A21

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

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



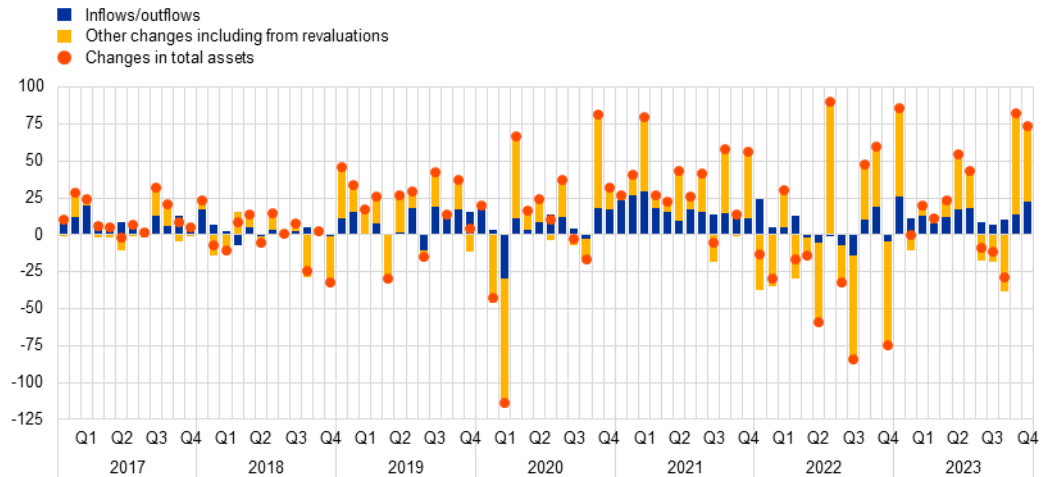
Source: ECB.

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)



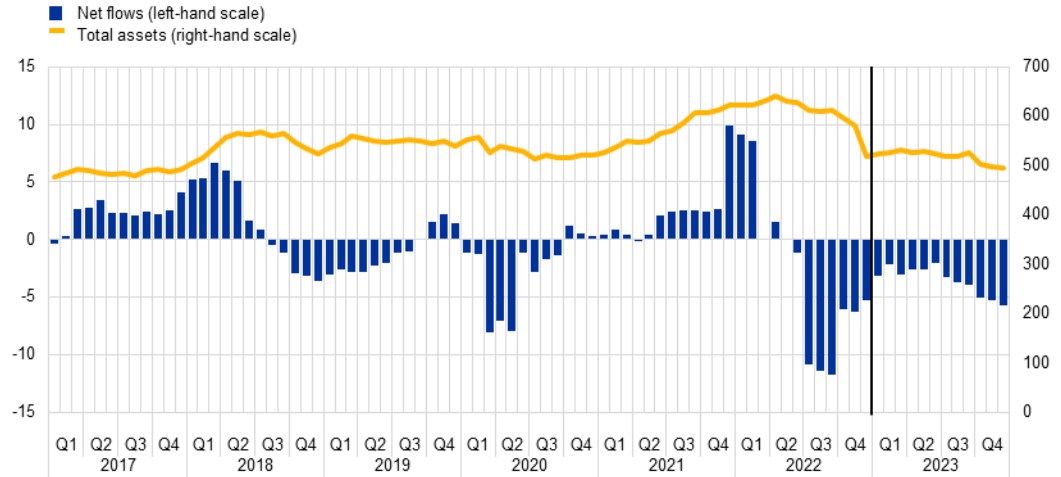
Sources: ECB and ESRB calculations.

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: EUR millions)



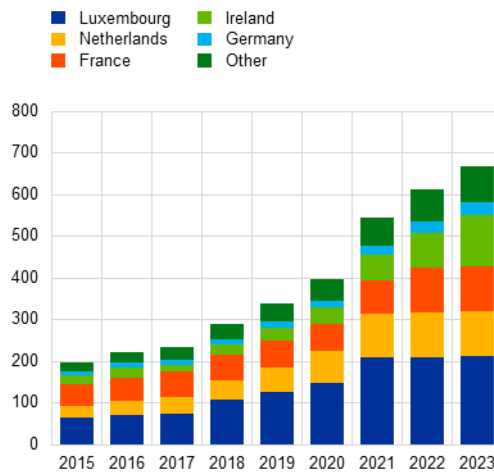
Source: ECB.

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 (panel a) and maturity transformation, leverage, credit intermediation and interconnectedness (panel b)**

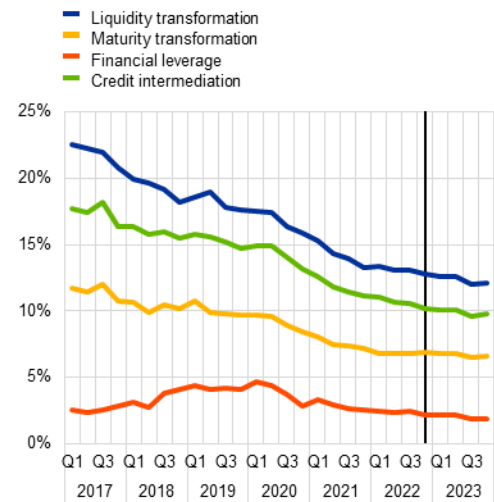
a) Net assets by country of domicile

(EUR billions)



b) Maturity transformation, leverage, credit intermediation and interconnectedness

(percentages)



Source: ECB.

Note: The chart represents private equity funds included in the ECB investment fund statistics, defined as in Guideline (EU) 2021/831 of the European Central Bank of 26 March 2021 on statistical information to be reported on financial intermediaries other than monetary financial institutions (ECB/2021/12).

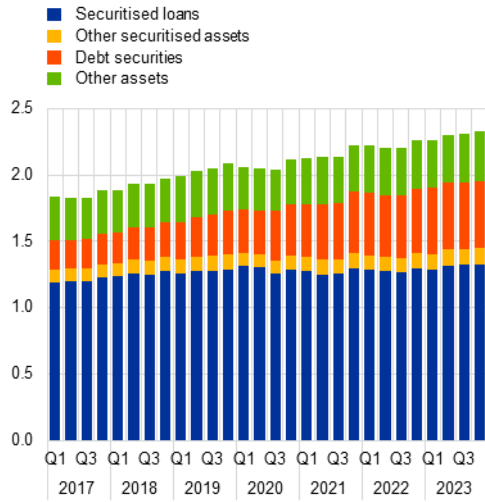


Chart A25

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

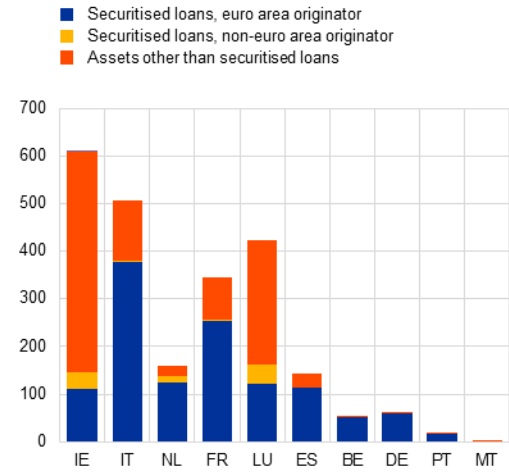
a) Euro area FVC total assets

(EUR trillions)



b) Total assets by domicile

(EUR billions)



Source: ECB.

Notes: Panel a): "Other assets" includes shares and other equity, financial derivatives and remaining assets. Panel b): Latest observations are for the fourth quarter of 2023.



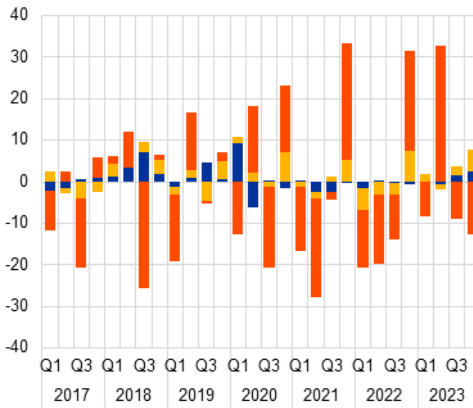
Chart A26

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

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

(EUR billions)

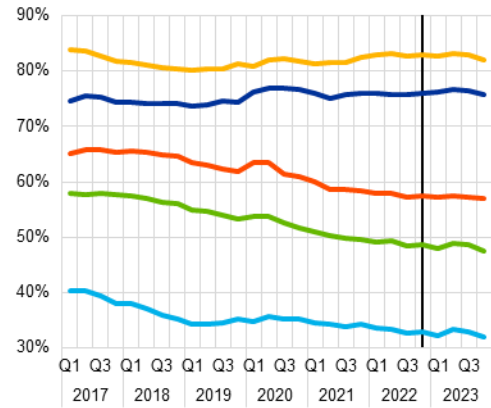
- Non-euro area originators
- Non-MFIs
- MFIs



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



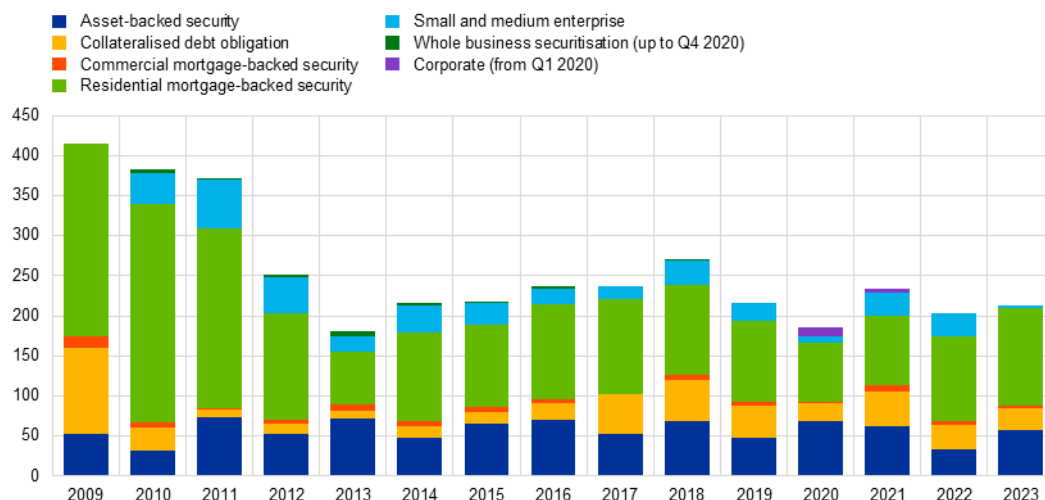
Source: ECB.

Notes: Panel a): euro area FVC securitised loans by originator. 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)



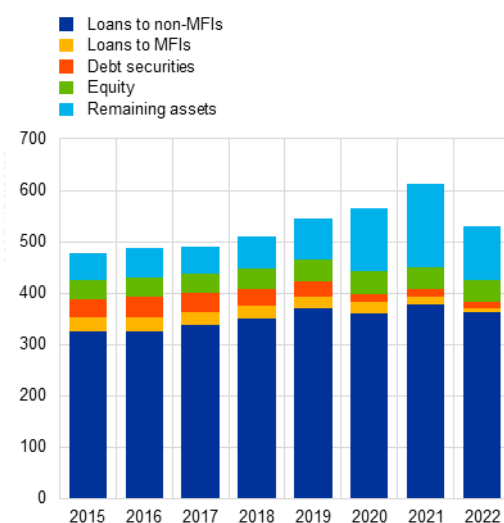
Source: Association for Financial Markets in Europe (AFME).

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 (such as the United Kingdom and Switzerland). Data as of the third quarter of 2023.

Chart A28  
Euro area FCL assets (panel a) and liabilities (panel b)

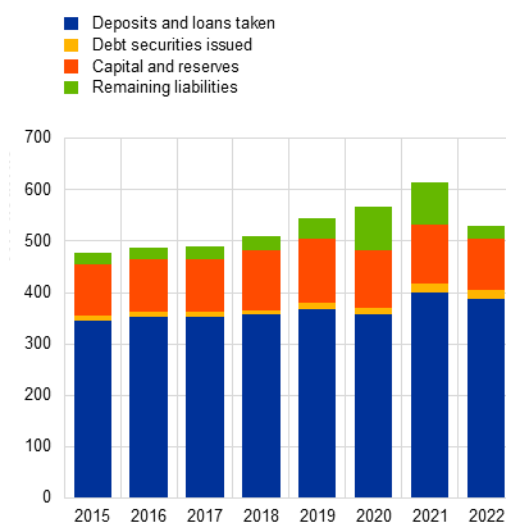
a) Euro area FCL assets

(EUR billions)



b) Euro area FCL liabilities

(EUR billions)



Source: ECB.





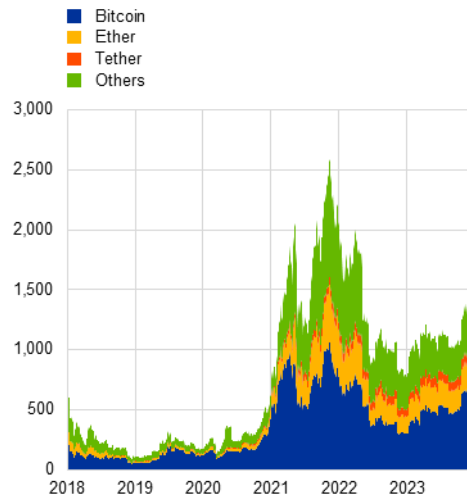
## A3 Crypto-assets, centralised finance and decentralised finance

Chart A29

### Crypto-asset market value (panel a) and trading volumes (panel b)

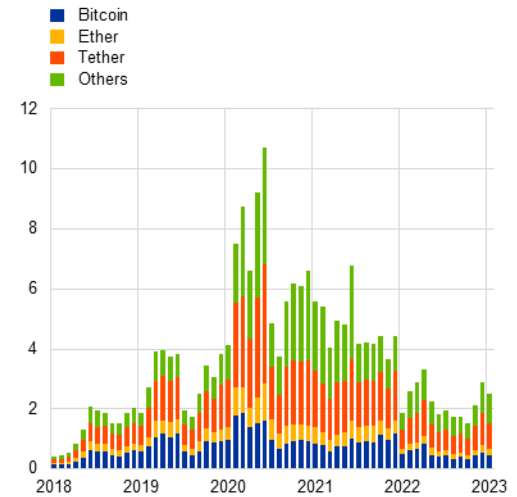
a) Crypto-asset market value

(EUR billions)



b) Crypto-asset trading volumes

(EUR trillions, monthly)



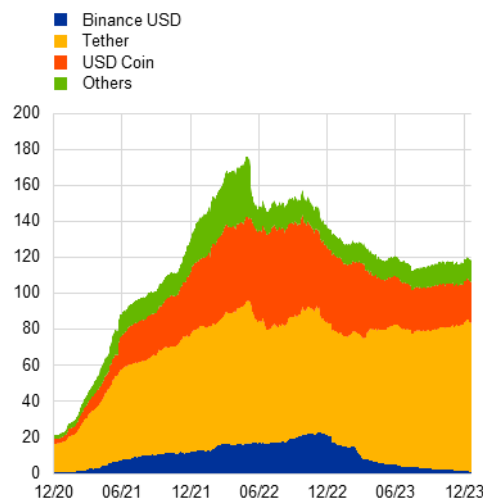
Sources: CoinMarketCap and ESMA.

Chart A30

### Stablecoin market value (panel a) and trading volumes (panel b)

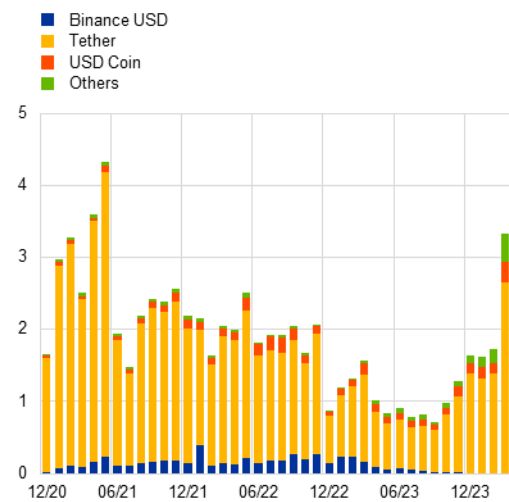
a) Stablecoin market value

(EUR billions)



b) Trading volumes

(USD trillions)



Sources: CoinMarketCap and ESMA.

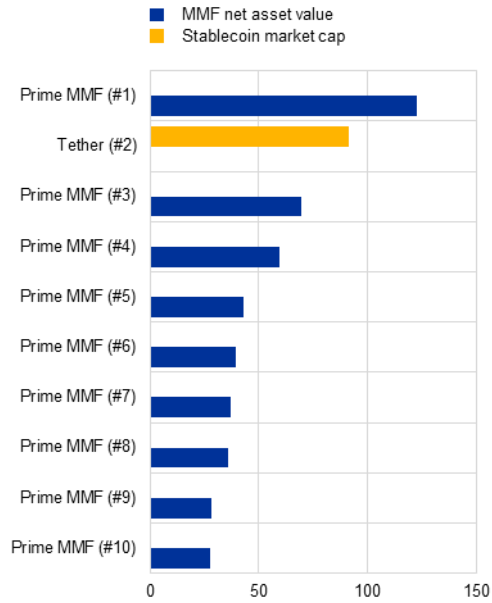


Chart A31

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

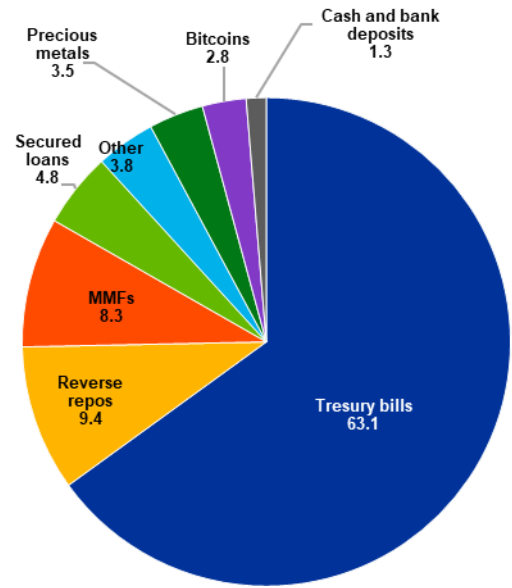
a) Comparison of largest stablecoins US Prime and EU-domiciled MMFs

(USD billions)



b) Breakdown of Tether reserves

(USD billions)



Sources: Crane, Fitch Ratings, CoinMarketCap, Tether and ESMA.  
Note: Data as of June 2023.



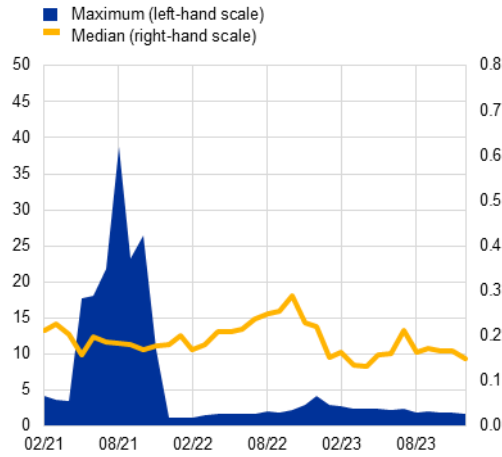
---

Chart A32

**Leverage estimates of Bitcoin (panel a) and Ether (panel b)**

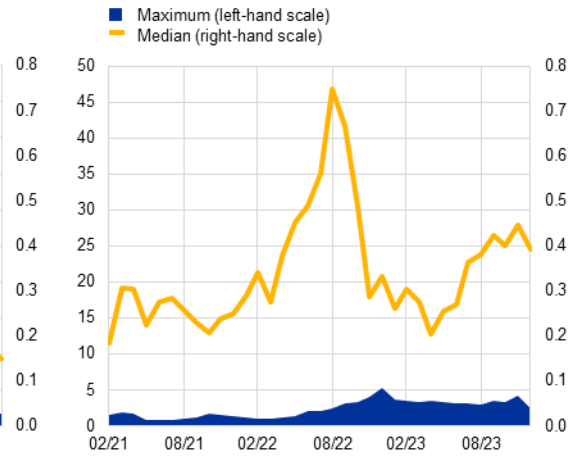
a) Leverage estimates of Bitcoin

(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.

---



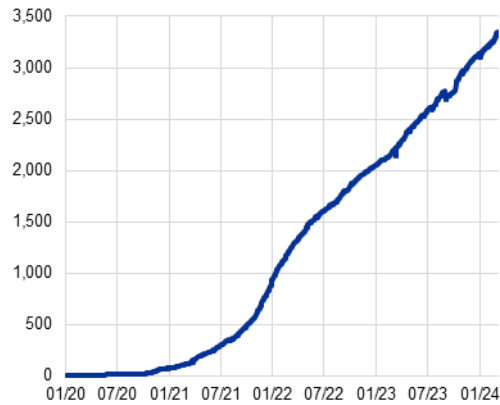
---

Chart A33

**Number of DeFi apps (panel a) and DeFi total value locked by protocol type (panel b)**

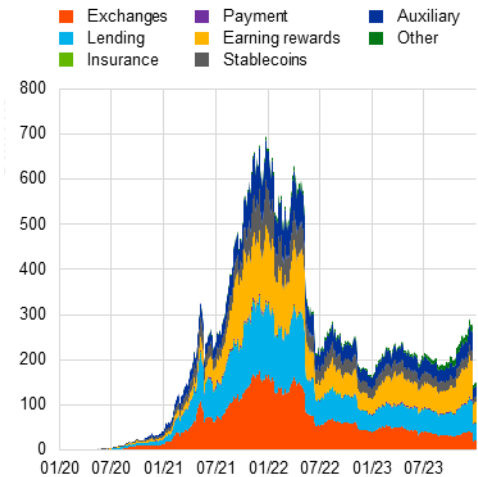
a) Number of DeFi apps

(number)



b) DeFi total value locked by protocol type

(EUR billions)



Sources: DeFiLlama and ESRB calculations.

Notes: Panel a) shows the number of DeFi apps with a positive TVL. In panel b), the categories include (1) exchanges, protocols that allow users to swap and trade crypto-assets including derivatives and indices; (2) lending, protocols that allow users to borrow and lend assets including against non-fungible tokens (NFTs) or tokenised real world assets (RWAs) as collateral, as well as without collateral; (3) insurance, protocols that offer coverage against losses caused by events typically in the DeFi ecosystem, such as hacking, malfunctioning of exchanges or smart contracts; (4) payments, protocols that allow users to pay/send/receive crypto-assets; (5) earning rewards, protocols that reward for staked assets including borrowed ones with crypto-assets or offer yield aggregation from various protocols; (6) stablecoins, protocols that mint their own stablecoins including using collateralised lending, provide algorithmic coins to stablecoins or launch new projects and coins; (7) auxiliary, protocols that bridge tokens from one network to another, support DeFi services and connect data from the outside world (off-chain) with the blockchain world (on-chain) "oracles"; and (8) others, protocols that allow users to bet on future results, have gaming components, offer marketplaces for buying/selling/renting NFTs, obscure the information about transactions, involve RWAs and their tokenisation and integrate into social media activities. TVL might be overestimated due to token reuse.

---



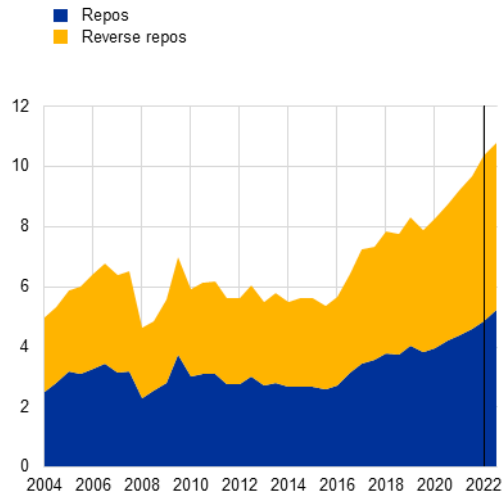
## A4 Activity-based monitoring

Chart A34

### Size of EU repo market (panel a) and repo rate for selected sovereigns (panel b)

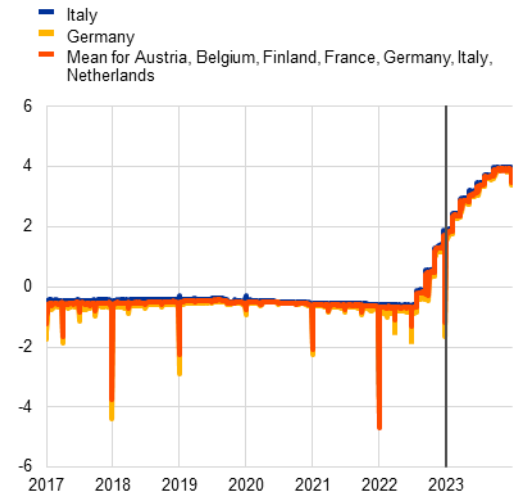
a) Size of EU repo market

(EUR trillions)



b) Repo rate for selected sovereigns

(percentages)



Sources: ICMA, RepoFunds Rate and ESMA.

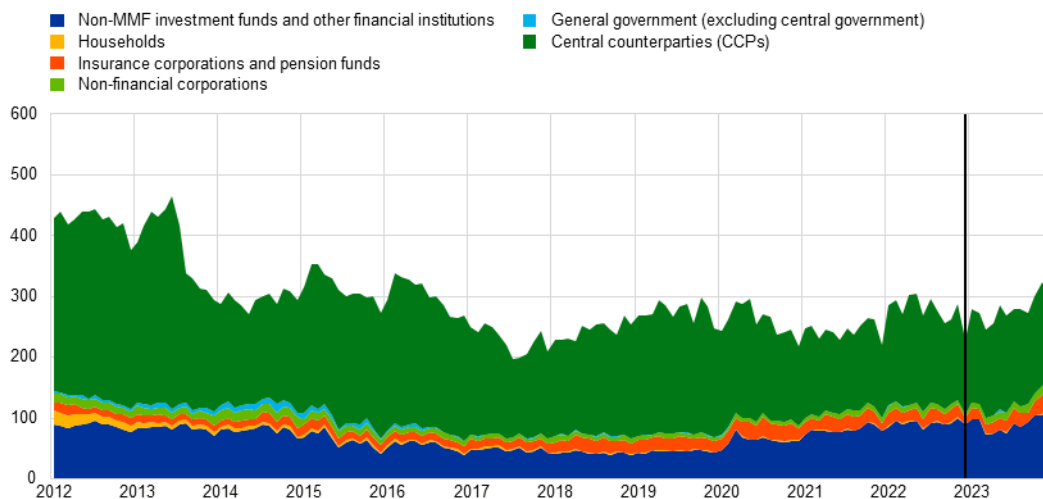
Notes: Panel a): total value of repos and reverse repos outstanding on the books of the institutions which participated in the ICMA repo surveys. Panel b): volume-weighted average of fixed rate index value, by origin of the collateral. Centrally cleared sovereign repos only.



Chart A35

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

(EUR billions)



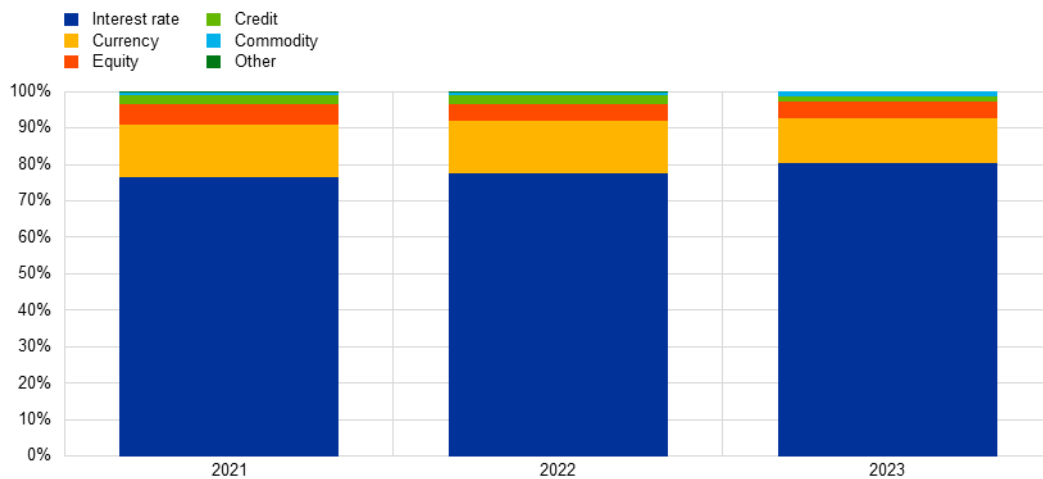
Source: ECB.

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: Data as of December 2023. Proportion of gross outstanding notional amounts by asset class by quarter for EU.

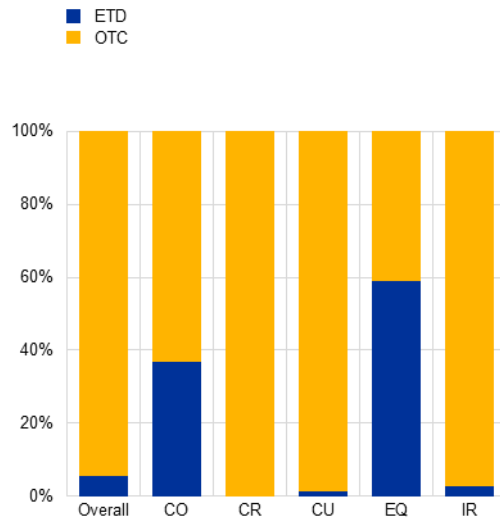


Chart A37

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

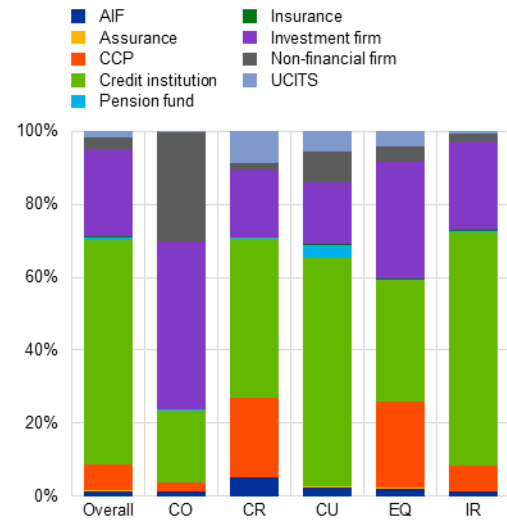
a) ETD versus OTC notional amount

(percentages)



b) Gross notional amount by sector of counterparty

(percentages)



Sources: Trade repositories and ESMA.

Notes: Data as of December 2023. CO stands for commodity, CR for credit, CU for currency, EQ for equity and IR for interest rate. Panel a): outstanding notional amounts by asset class of underlying, percentage split by ETD and OTC. Panel b): outstanding notional amounts by asset class and sector of counterparty.

