



EUROPEAN CENTRAL BANK

EUROSYSTEM

# Inflation in the euro area and the US – causes, persistence, outlook

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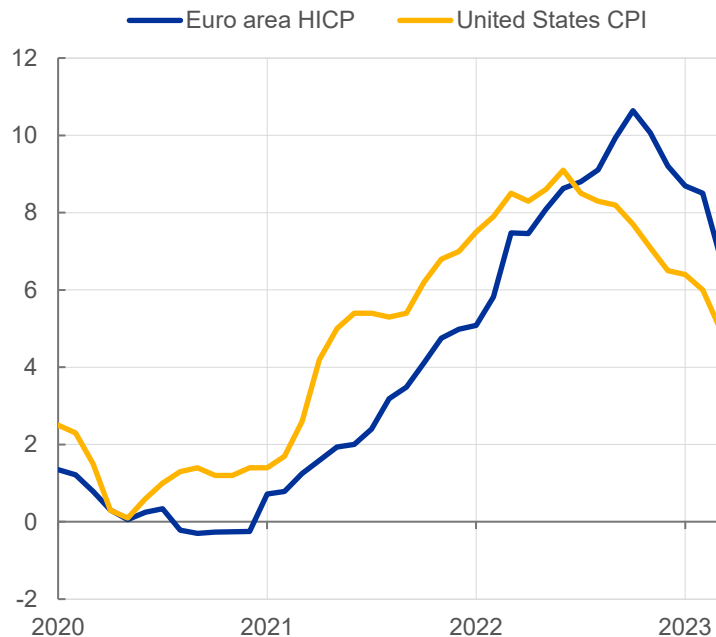


Lecture at Stanford Graduate School of Business, 20 April 2023

# Headline inflation has started to decline but core inflation proves sticky

## Headline inflation

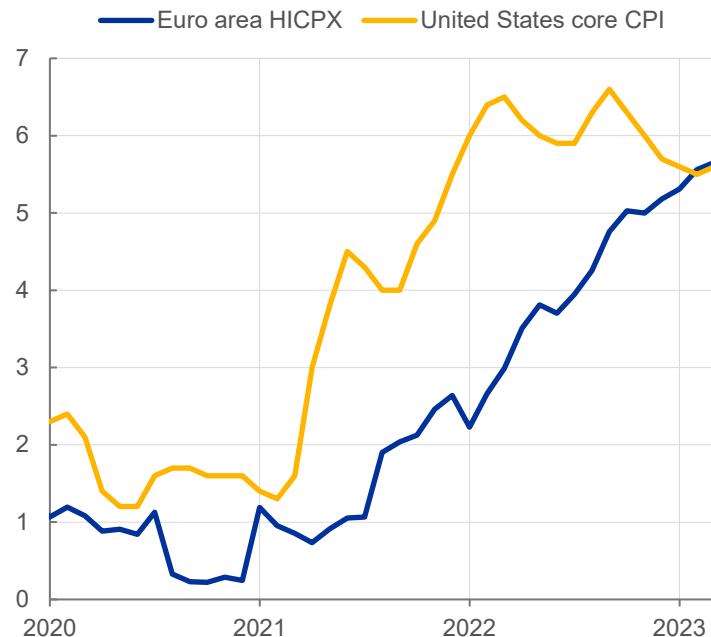
(annual percentage changes)



Sources: Eurostat, US Bureau of Labor Statistics and ECB calculations.  
Latest observation: March 2023.

## Core inflation

(annual percentage changes)

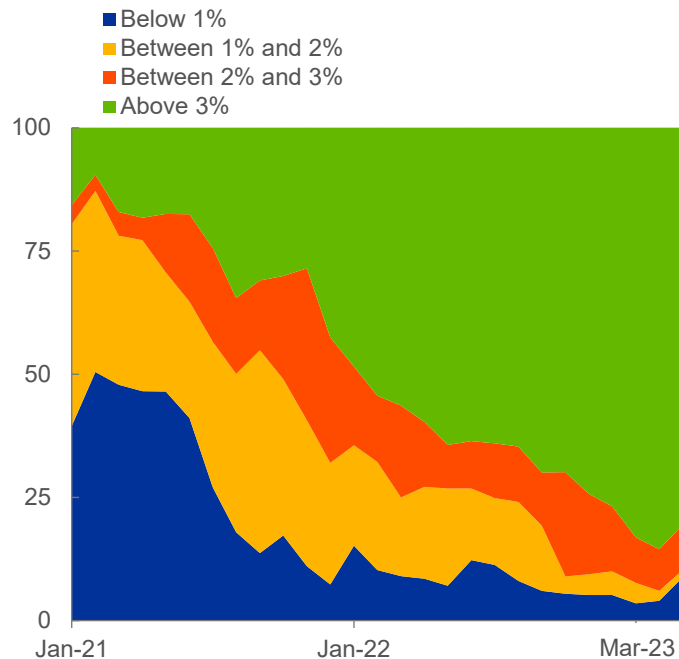


Sources: Eurostat, US Bureau of Labor Statistics and ECB calculations.  
Latest observation: March 2023.

# Broadening of inflationary pressures to most components in the consumption basket

## Share of EA HICP components according to pace of change

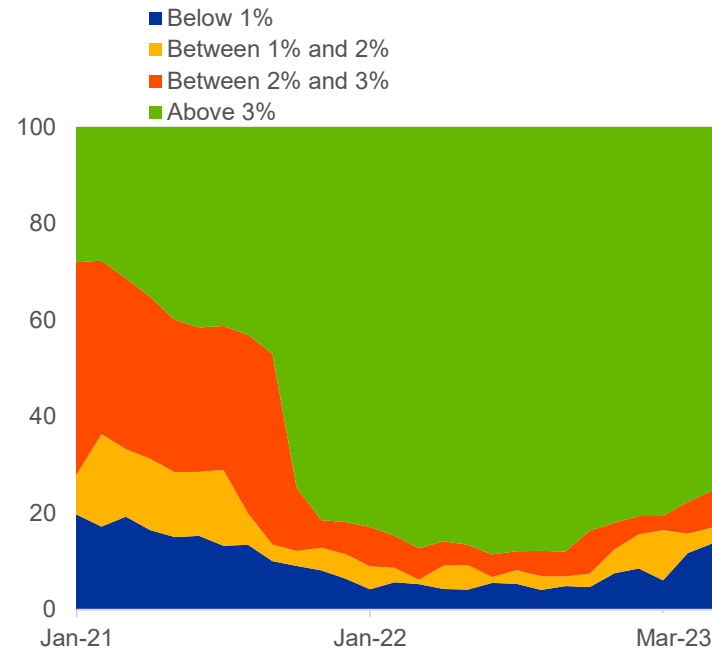
(percent)



Sources: ECB and ECB calculations.  
Latest observation: March 2023.

## Share of US CPI components according to pace of change

(percent)

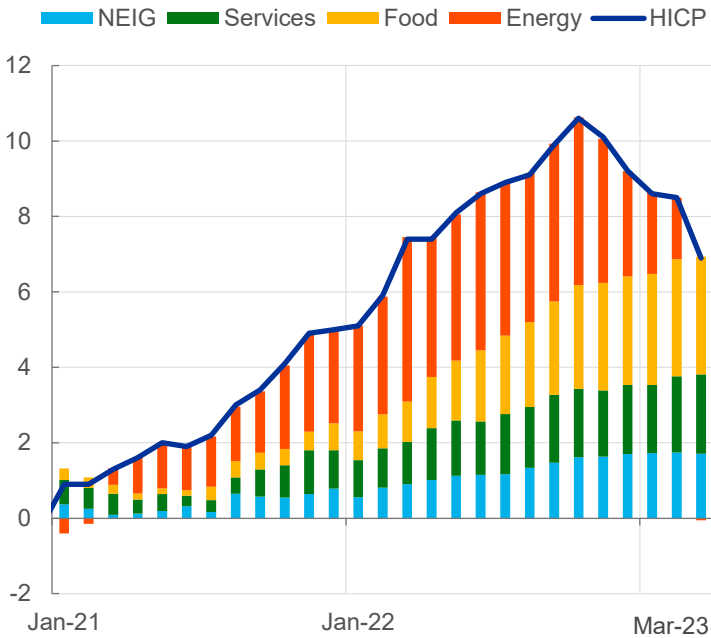


Sources: Bureau of Labor Statistics and ECB calculations.  
Latest observation: March 2023.

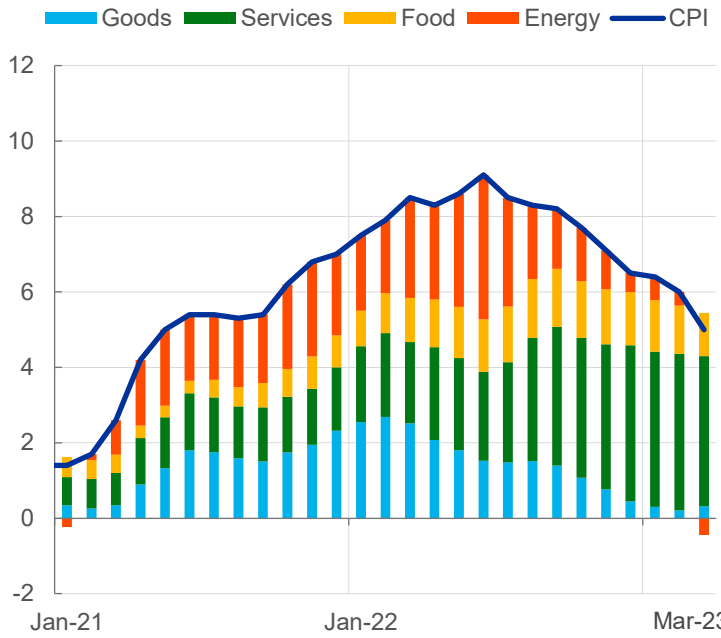
# Energy contributions are falling quickly, while many other components are still on the rise

## Contributions to headline inflation (annual percentage changes and percentage point contribution)

### Euro area



### United States



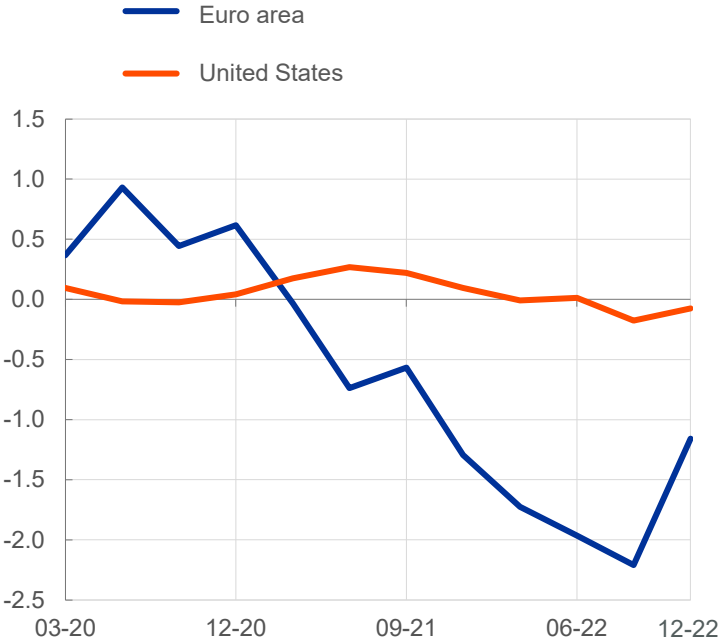
Sources: Eurostat and ECB calculations.  
Latest observation: March 2023.

Sources: US Bureau of Labor Statistics and ECB calculations.  
Latest observation: March 2023.

# Different intensities of terms-of-trade shock and fiscal responses

## Income effects of terms-of-trade shock

(impact on year-on-year GDP growth in percentage points)

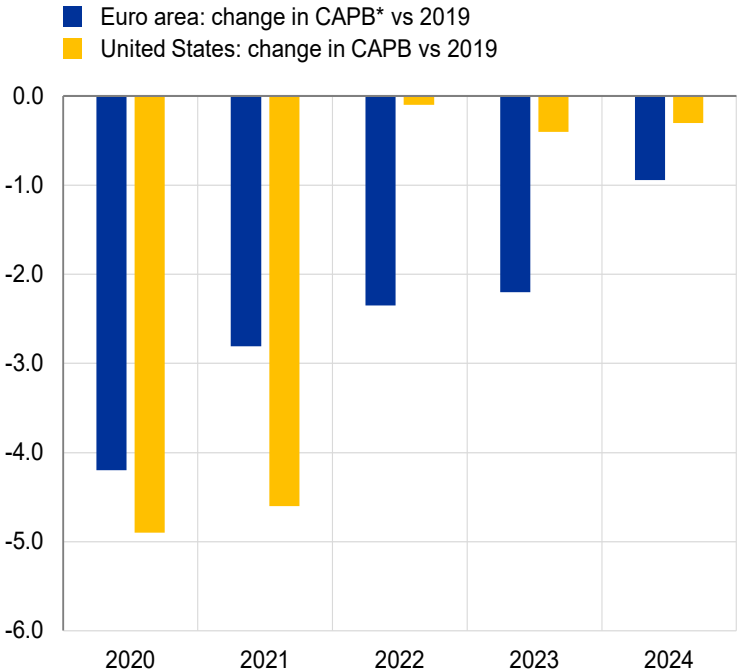


Source: Haver analytics, Eurostat and ECB calculations.

Notes: The income effect of terms of trade is calculated import and export price changes by their respective past values (one-year lag) expressed as percentage of GDP. The latest observation is 2022 Q4.

## Fiscal response to pandemic and energy crisis in the euro area and the US

(percentage point of potential GDP)



Source: March 2023 ECB staff Macroeconomic projections and IMF Fiscal Monitor, April 2023.

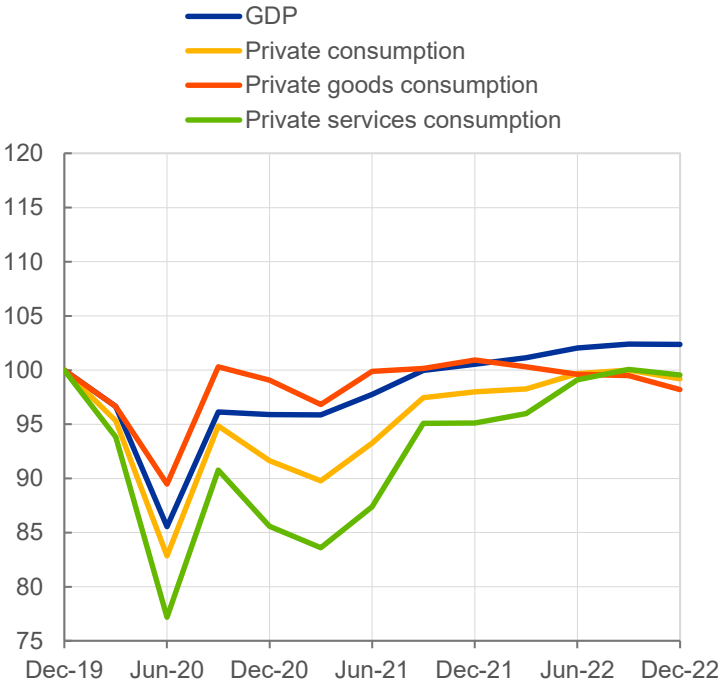
Notes: Negative (positive) numbers denote fiscal loosening (tightening) vs 2019.

\*CAPB stands for the cyclically adjusted primary balance. For the EA, this is adjusted for NGEU grants on the revenue side, in line with the definition for the EA fiscal stance. The measure shown in chart is a proxy for the discretionary fiscal policy response since the pre-pandemic period (2019). It includes also other factors (such as revenue windfalls/shortfalls). The measures for the EA and US are not fully comparable due to the timing and other methodological differences between the two sources.

# Different consumption dynamics due to different shocks and policy responses

## Euro area real GDP components

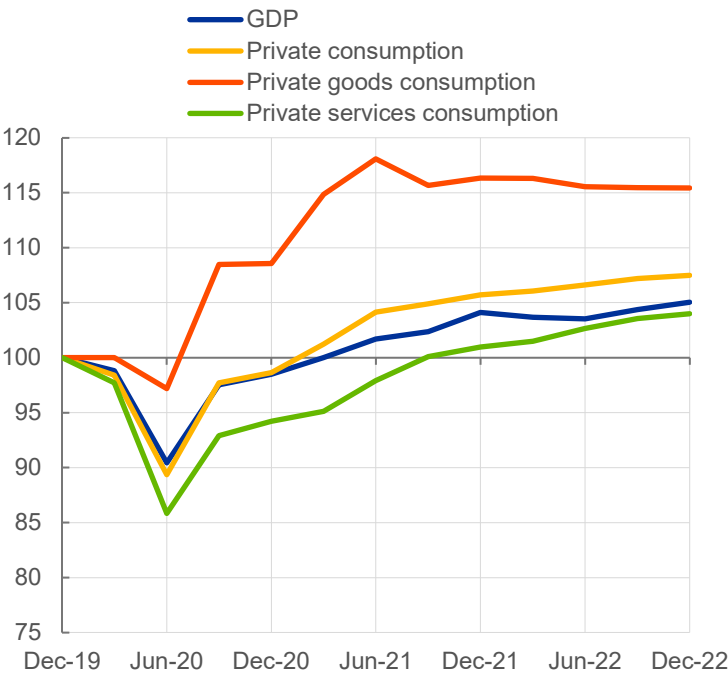
(index, Dec-2019 = 100)



Sources: Eurostat and ECB calculations.  
Latest observation: 2022Q4.

## United States real GDP components

(index, Dec-2019 = 100)

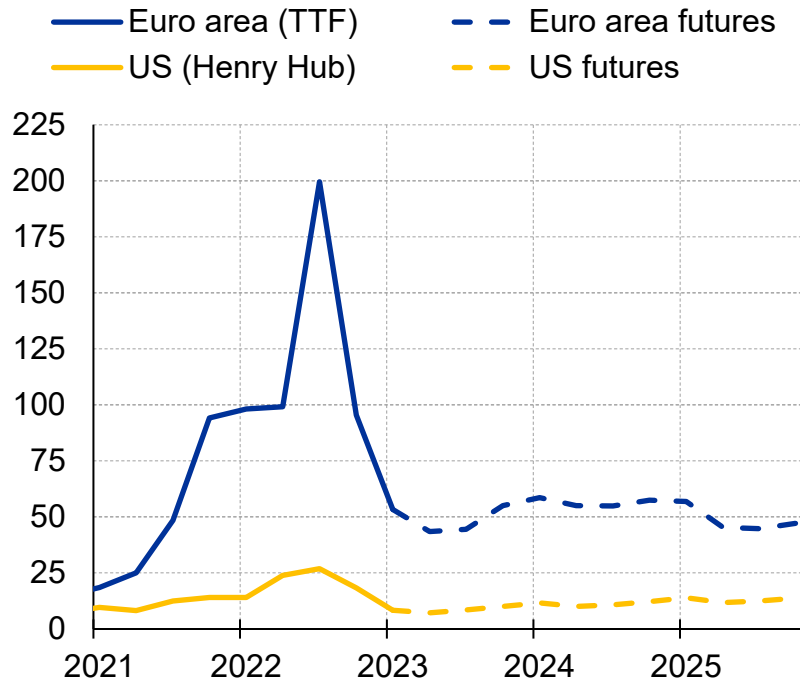


Sources: BEA, Haver Analytics and ECB calculations.  
Latest observation: 2022Q4.

# Supply-side factors related to energy prices and bottlenecks continue to fade

## Gas prices and futures

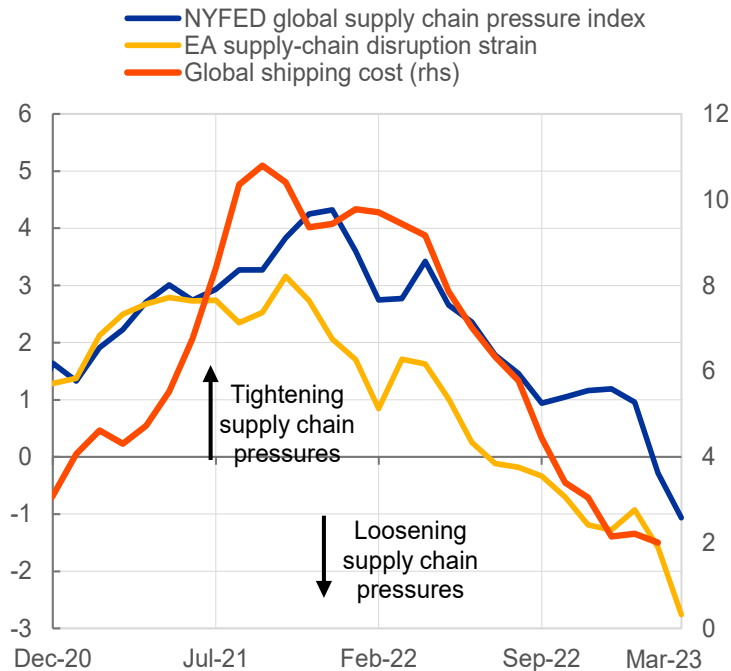
(EUR/MWh)



Sources: Refinitiv, Bloomberg and ECB calculations.  
Latest observation: 18 April 2023.

## Supply bottlenecks

(lhs: standard deviations; rhs: USD per TEU)

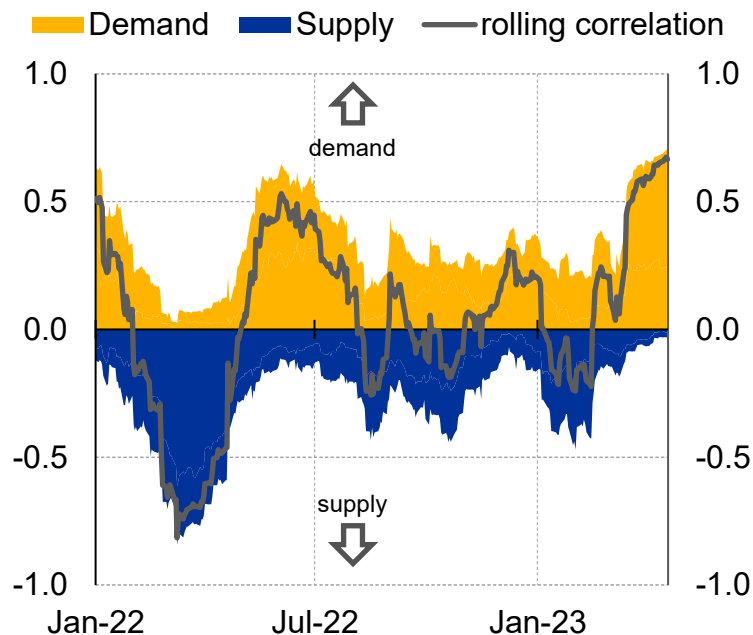


Sources: Haver Analytics, Refinitiv and ECB calculations.  
Notes: Global shipping cost is Freightos Baltic aggregate across major trade routes. TEU stands for twenty-foot equivalent unit shipping container.  
Latest observation: February 2023 for global shipping costs, March 2023 for the rest.

# Rotation towards demand-side factors amid stronger-than-expected macroeconomy

## Rolling correlation between daily changes in 1y1y ILS rates and daily Euro Stoxx returns

(correlation coefficient)

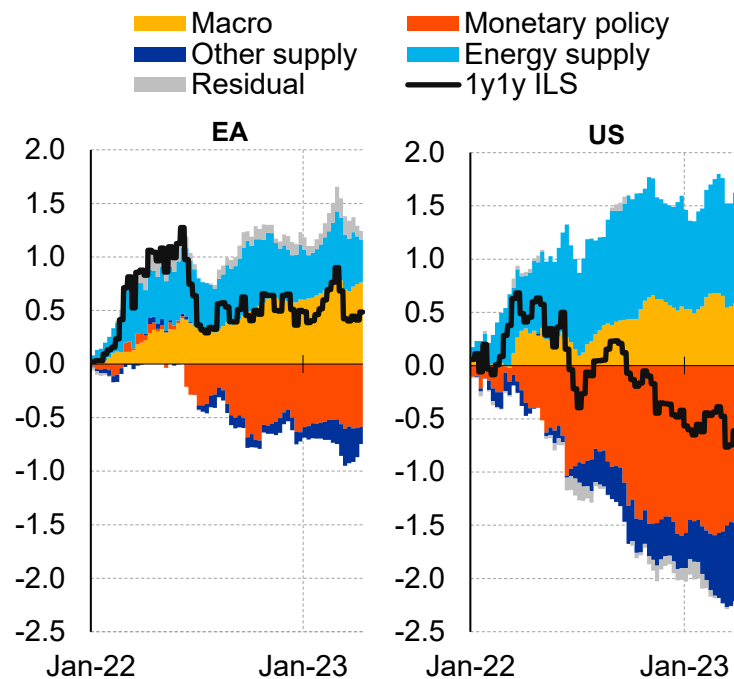


Sources: Refinitiv and ECB calculations.

Notes: 30-trading days rolling correlation of daily percentage point changes in 1Y1Y ILS rates and daily returns on Euro Stoxx. Demand (supply) refers to that part of the correlation coming from trading days on which ILS rates and stock returns moved in the same (opposite) direction. In each subsample, the split between favourable and adverse is based on the share of days in the rolling window of favourable (equities up) or adverse (equities down) market dynamics. Latest observation: 18 April 2023.

## Decomposition of 1Y1Y ILS change

(since 1 Jan 2022; percent p.a.)



Sources: Bloomberg, Refinitiv, NY Fed and ECB staff calculations.

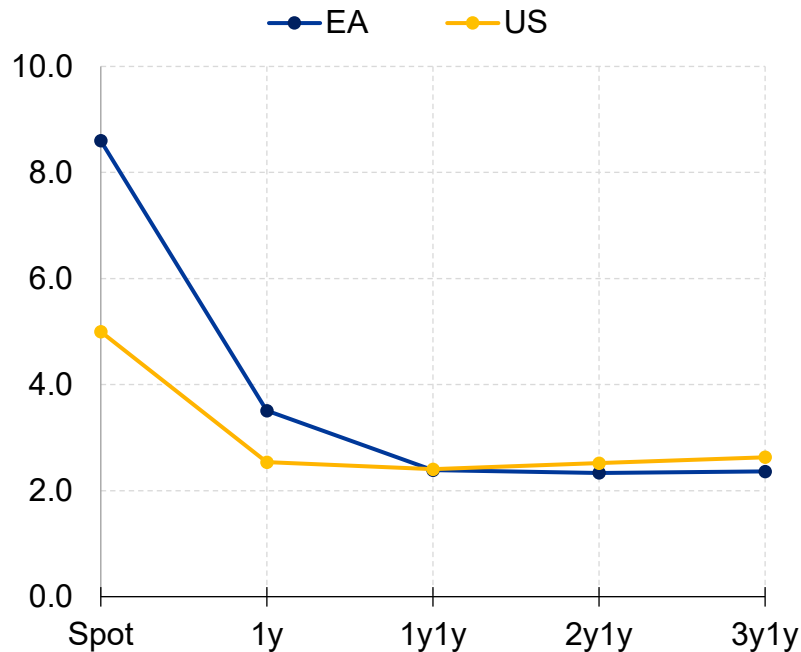
Notes: Decompositions are based on a weekly mixed-frequency BVAR model estimated with weekly observations of US 10-year benchmark yield, US inflation linked swaps 1Y1Y, oil prices, stock prices and monthly observations of the Global Supply Chain Pressure Index of the NY Fed. For the EA, oil price is replaced by a synthetic index based on gas and oil prices. Identification via sign and zero restrictions, using data from 2005. Latest observation: 14 April 2023 (weekly data).



# Markets expect inflation to ease rapidly, 5y5y inflation compensation in EA now above US

## Inflation forward swap curves

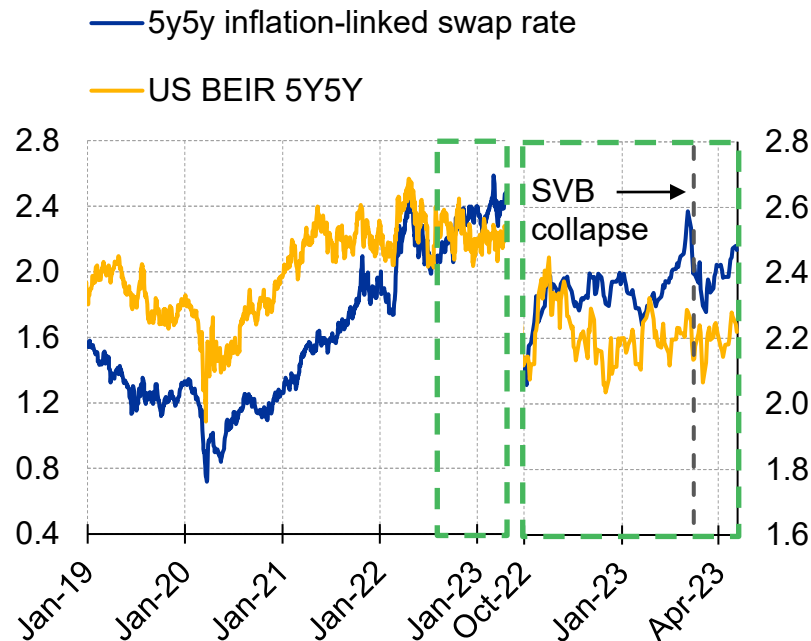
(percent per annum)



Sources: Bloomberg and ECB staff calculations.  
Latest observation: 18 April 2023.

## 5y5y inflation compensation

(percentage per annum)

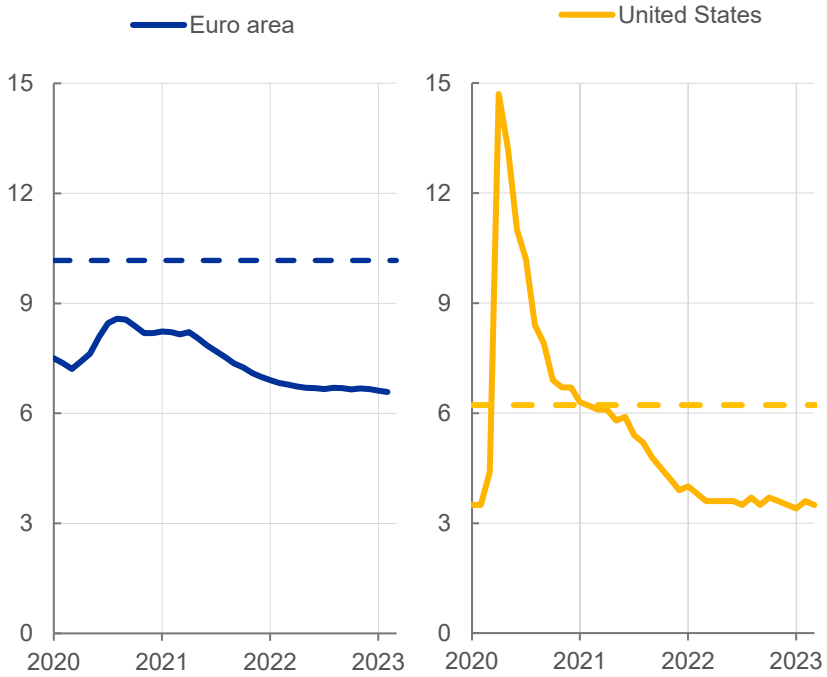


Source: Bloomberg, Refinitiv and ECB calculations.

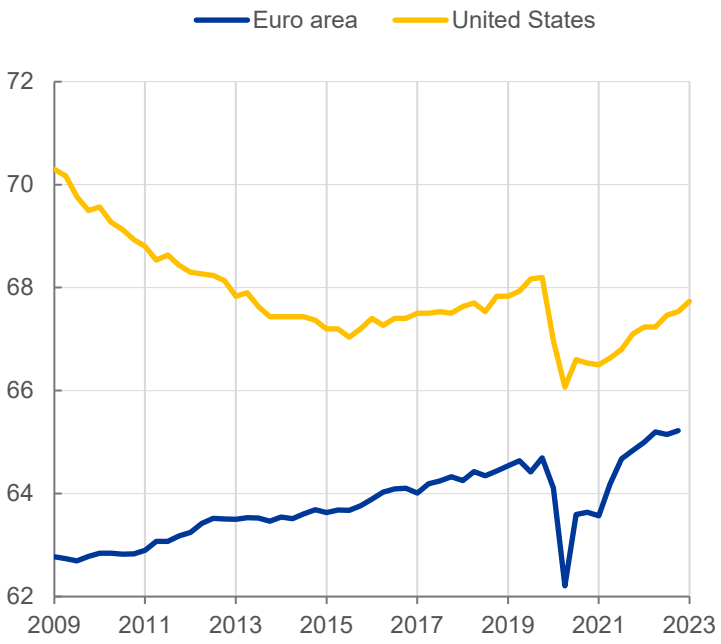
Notes: The solid vertical line refers to the day before the SVB collapse (7 March 2023). One caveat applying to BEIRs is that the market for inflation-linked bonds is less liquid than that for standard bonds. This implies that BEIRs also reflect liquidity premia. Latest observation: 18 April 2023.

# Strong labour markets and recovery of labour force participation

## Unemployment (percent)



## Labour force participation rates (percentages)

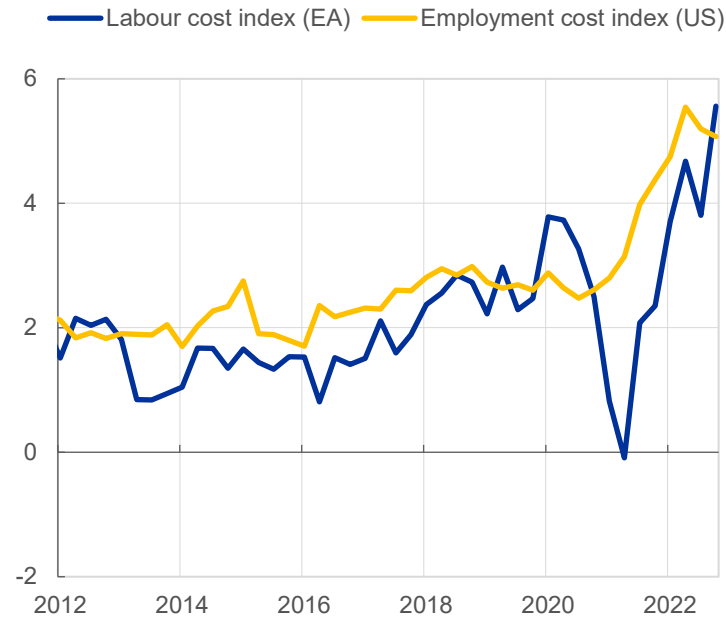


Sources: Eurostat Labour Force Survey (EA) and Bureau of Labor Statistics (US).  
Notes: The dashed line refers to the sample average over 2010-2019. Unemployed data do not include workers in job retention schemes.  
Latest observation: February 2023 (EA) and March 2023 (US).

Sources: Eurostat, OECD.  
Latest observations: 2022 Q4 (EA) and 2023 Q1 (US).

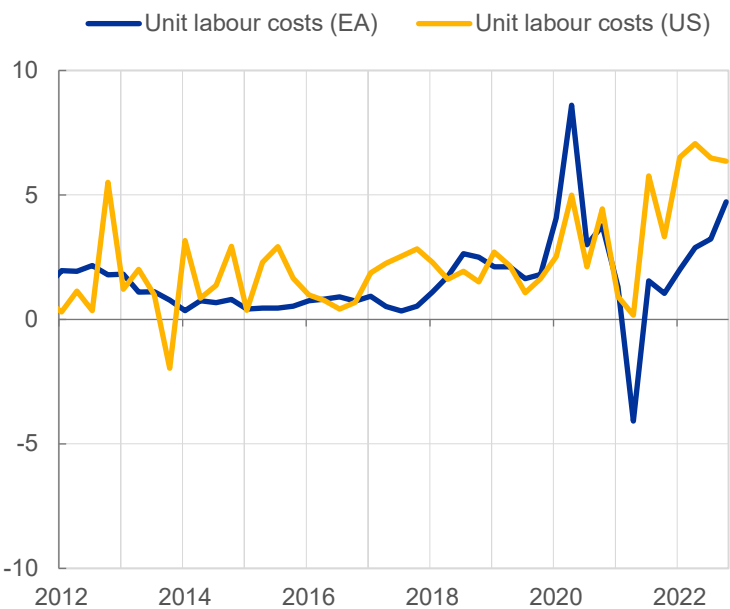
# Rapid pick-up in wage growth and unit labour costs

## Wage developments (annual percentage change)



Sources: Eurostat, Bureau of Labor Statistics and ECB calculations.  
Latest observation: 2022 Q4.

## Unit labour costs (annual percentage change)

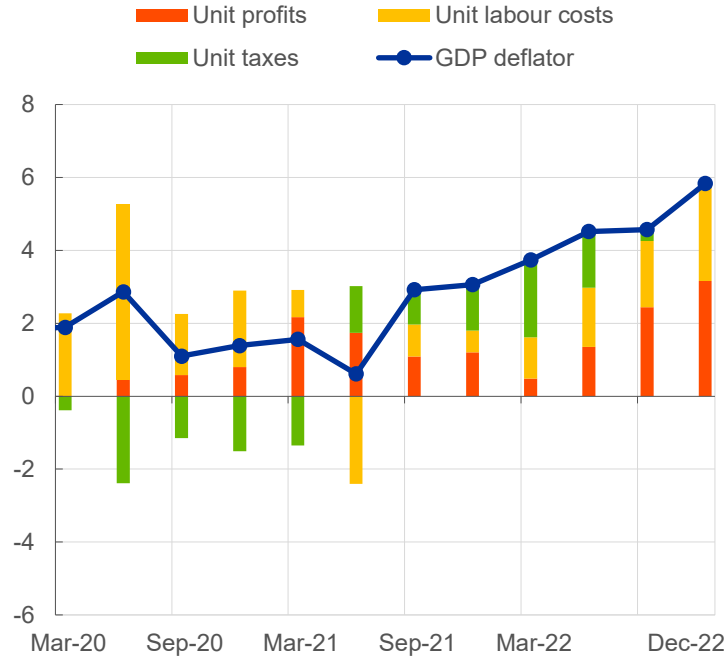


Sources: Eurostat, Bureau of Labor Statistics and ECB calculations.  
Latest observation: 2022 Q4.

# Profit growth played an important role for the rise in domestic inflation

## Euro area GDP deflator

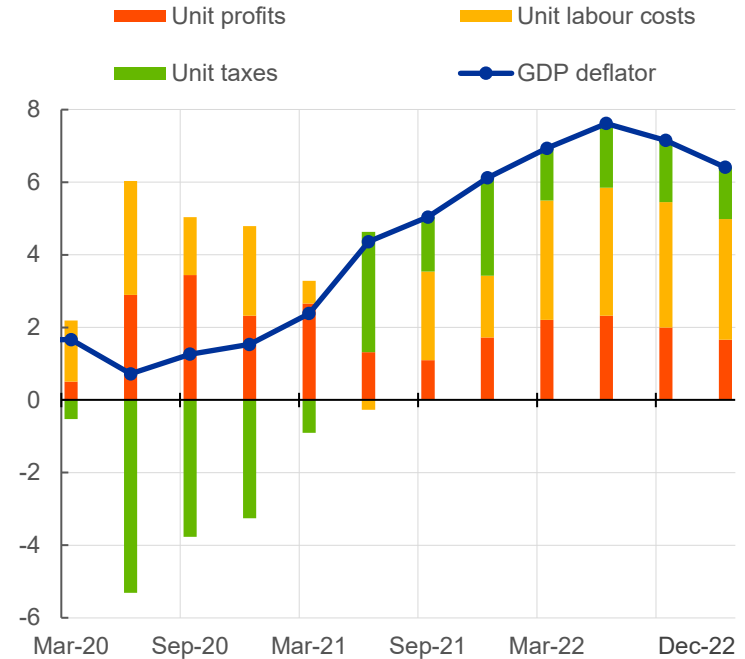
(annual percentage changes; percentage point contributions)



Sources: Eurostat and ECB staff calculations.  
Latest observation: 2022 Q4.

## US GDP deflator

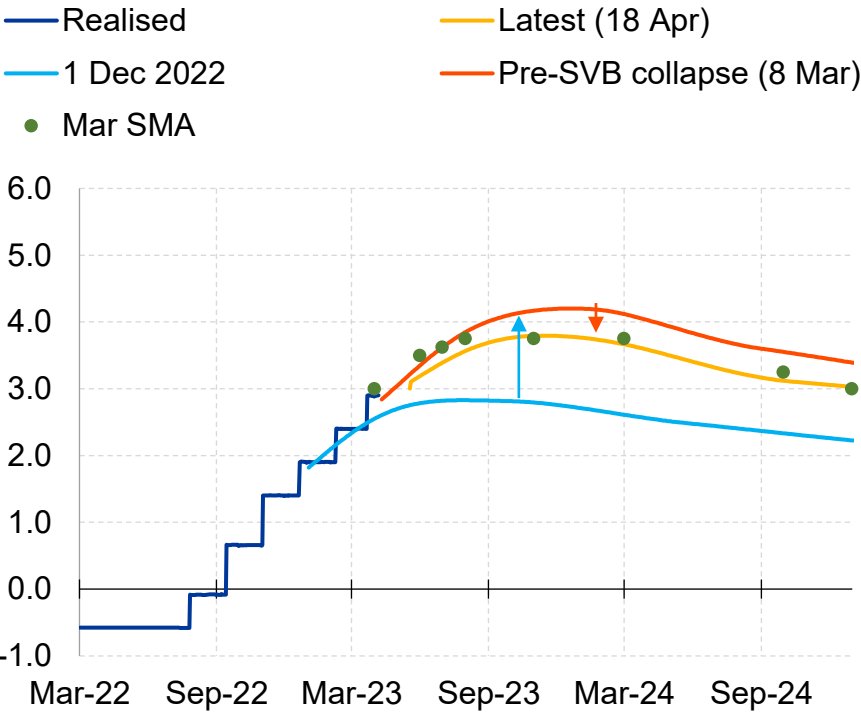
(annual percentage change; percentage point contributions)



Sources: Bureau of Economic Analysis.  
Latest observation: 2022 Q4.

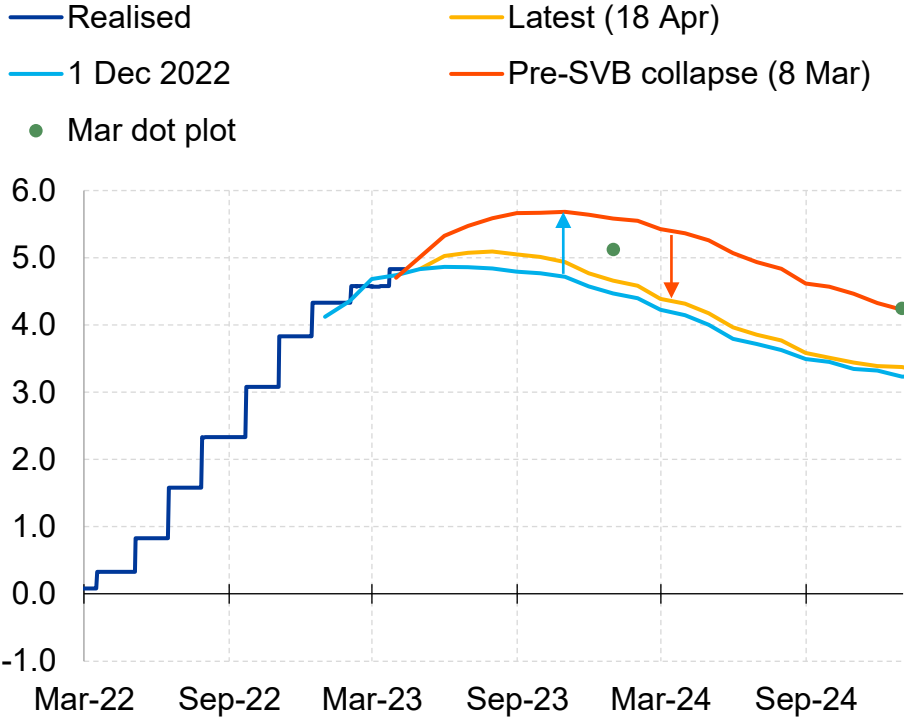
# Sharp repricing of rate expectations due to persistent inflation and financial instability

### EA nominal OIS forward curve (percent)



Sources: Bloomberg, ECB calculations.  
Notes: Chart refers to realized and forward €STR levels. SMA refers to the expected level of deposit facility rate (DFR). Latest observation 18 April 2023.

### US nominal OIS forward curve (percent)

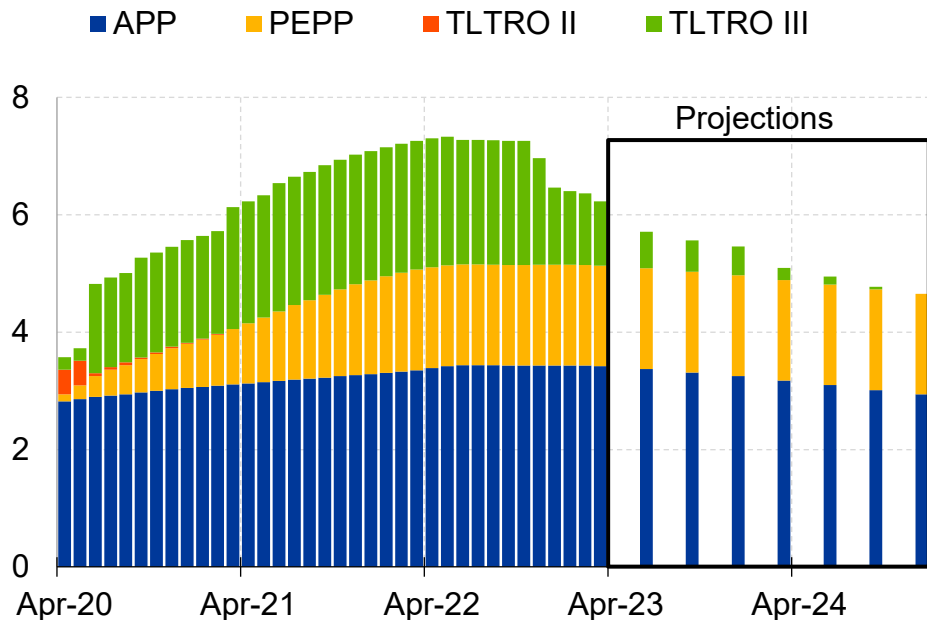


Sources: Bloomberg, ECB calculations.  
Notes: Chart refers to realized and forward fed funds rate level. Latest observation 18 April 2023.

# Central banks are reducing their balance sheets from high levels

## Eurosystem balance sheet

(EUR trillion)



Source: ECB, Survey of Monetary Analysts (SMA).

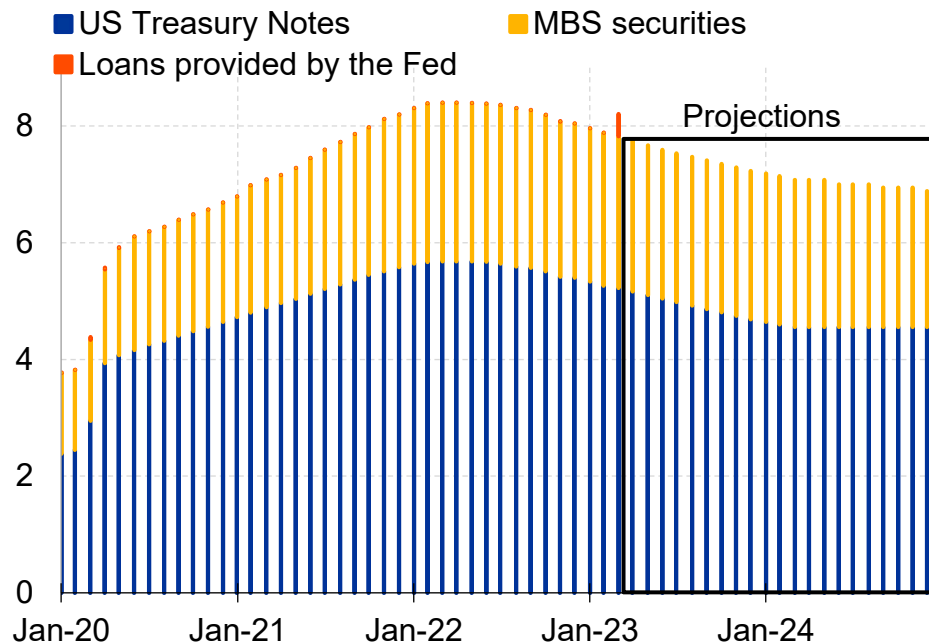
Notes: Blue and yellow bars show Eurosystem aggregated holdings under the asset purchase programme (APP) and pandemic emergency purchase programme (PEPP) in book amortized values.

SMA responses for the projections.

Latest observation: March 2023.

## FED SOMA balance sheet

(USD trillion)

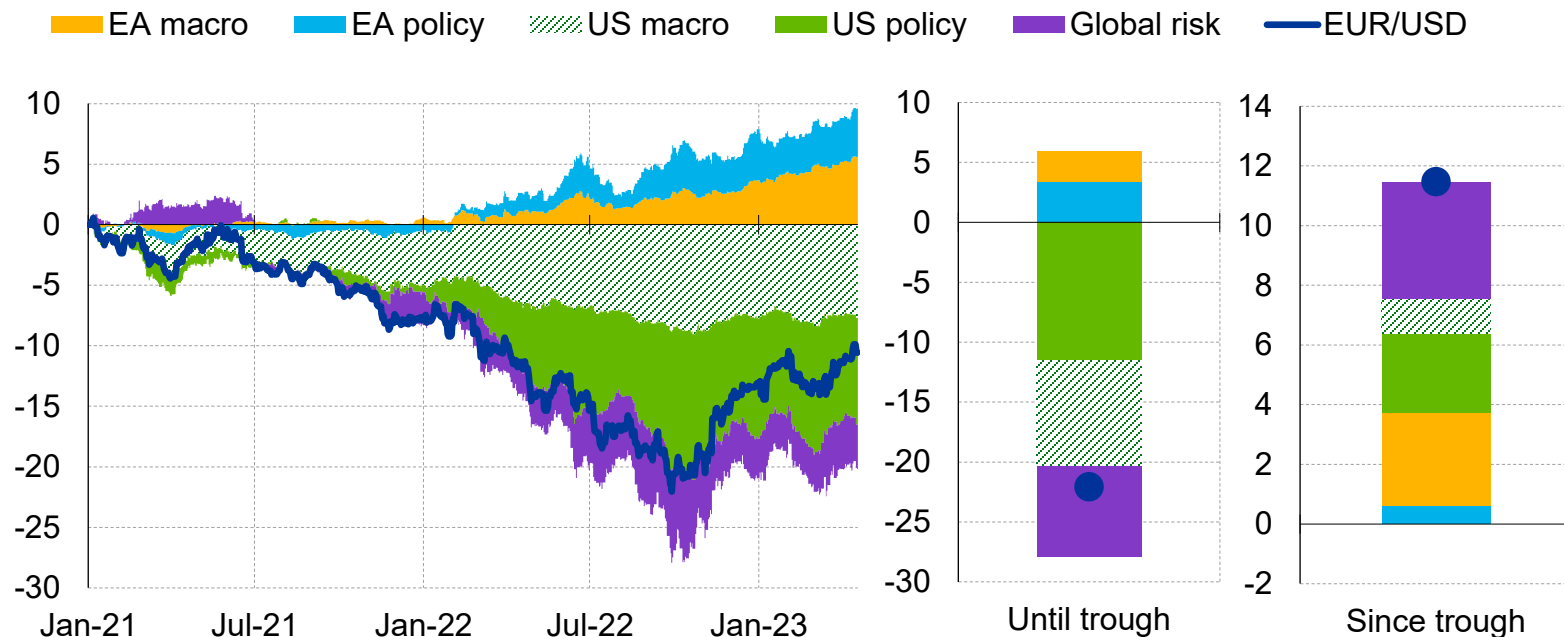


Source: Federal Reserve Bank and ECB calculations.

Notes: MBS securities include CMBS and agency securities. Loans provided by the Fed (no projections available) are the sum of the loans provided under the Discount window, Bank Term Funding Programme, FIMA and other Credit Extensions. Projections based on Federal Reserve Bank of New York Survey of Primary Dealers January/February median expectations.

Latest observation: March 2023.

## Drivers of EUR/USD (percent)



Source: ECB calculations.

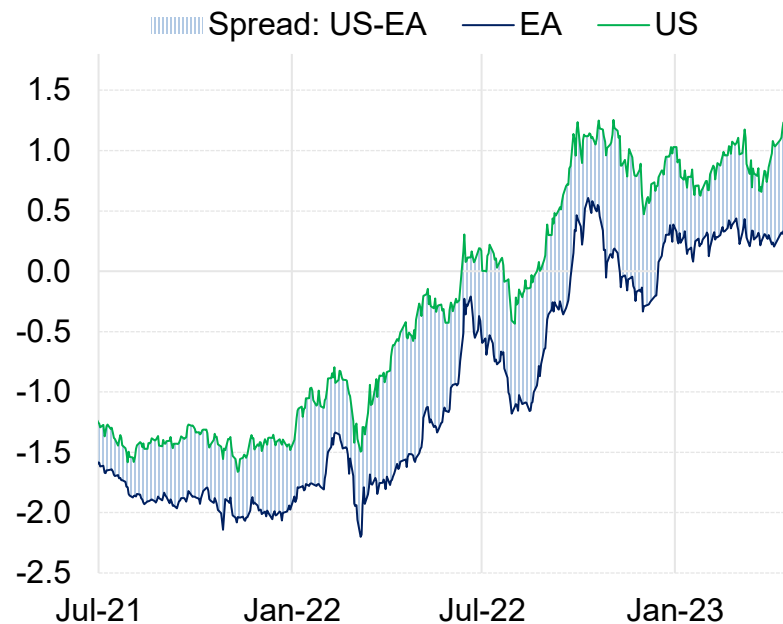
Notes: Based on extended 2-country BVAR including 10-year EA OIS rate, EA stock price, EUR/USD, 10-year EA - US Treasury spread and US stock prices. Identification via sign and narrative restrictions, using daily data 2005-23. The day of the trough corresponds to the 28/09/2022.

Latest observation: 18 April 2023.

# Real rates have risen from very low levels with stable sovereign spreads in the euro area

## 5-year real OIS rates: EA vs US

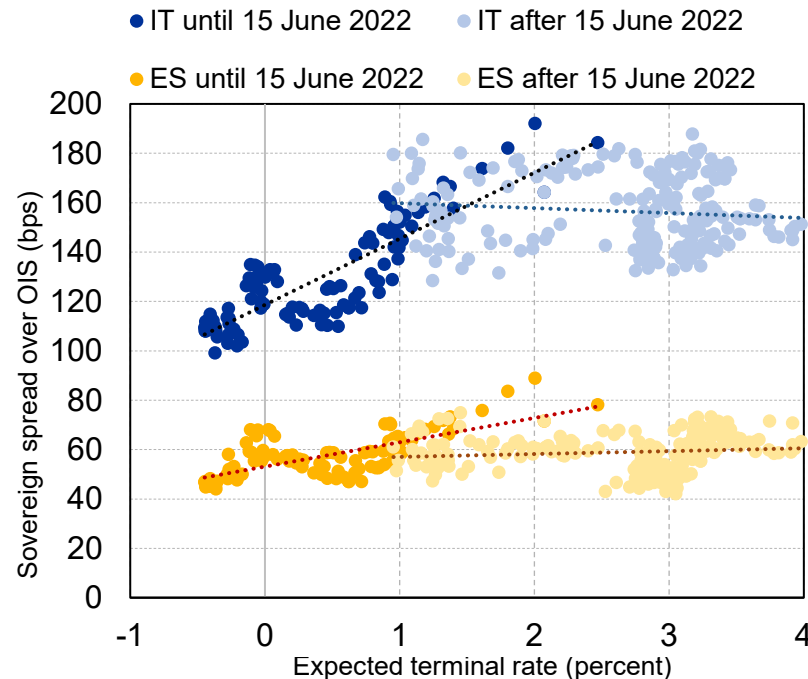
(percent)



Sources: Bloomberg.  
Latest observation: 18 April 2023.

## Sensitivity of sovereign spreads to risk-free rate expectations

(basis points, percentage)



Sources: Bloomberg and ECB calculations. \* This chart shows the relationship between the spread of selected sovereign 10-year benchmarks over the 10-year EA OIS rate (y-axis) versus the outright level of the ESTR OIS forward covering the 8th ECB maintenance period from today (%). The chart differentiates between the period from the start of 2022 until 15 June 2022 (ECB announcement on activation of PEPP flexibility and work on an anti-fragmentation instrument) and the period thereafter. Latest observation: 14 April 2023.

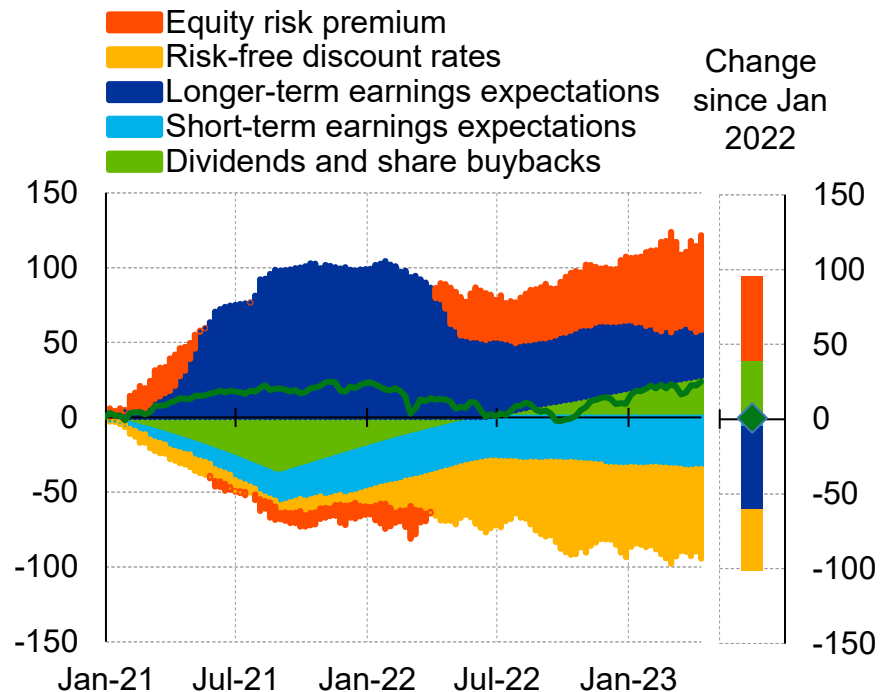
[www.ecb.europa.eu](http://www.ecb.europa.eu)



# Equity prices are kept high by compressed risk premia in spite of higher discount rates

## Equity prices in the euro area

(lhs panel: cumulative change re-based to zero in Jan-21,  
rhs panel: percentages)



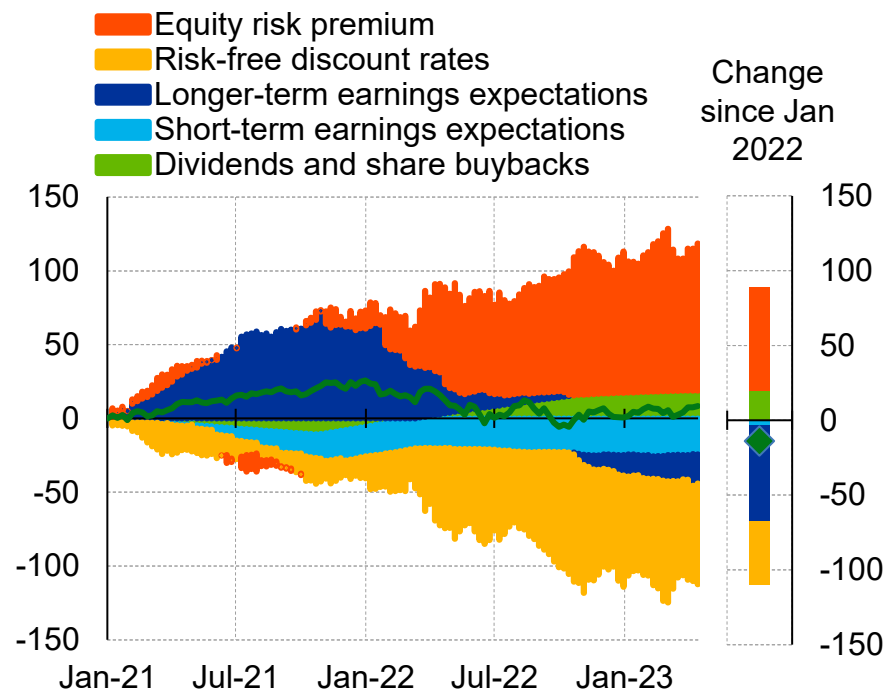
Sources: Refinitiv, IBES, Consensus Economics, Bloomberg, and ECB calculations.

Notes: The decomposition is based on a dividend discount model. The model includes share-buybacks, discounts future cash-flows with interest rates of appropriate maturity and includes five expected dividend growth horizons. See ECB Economic Bulletin, issue 4/2018 for more details.

Latest observation: 14 April 2023 (weekly data).

## Equity prices in the United States

(lhs panel: cumulative change re-based to zero in Jan-21,  
rhs panel: percentages)



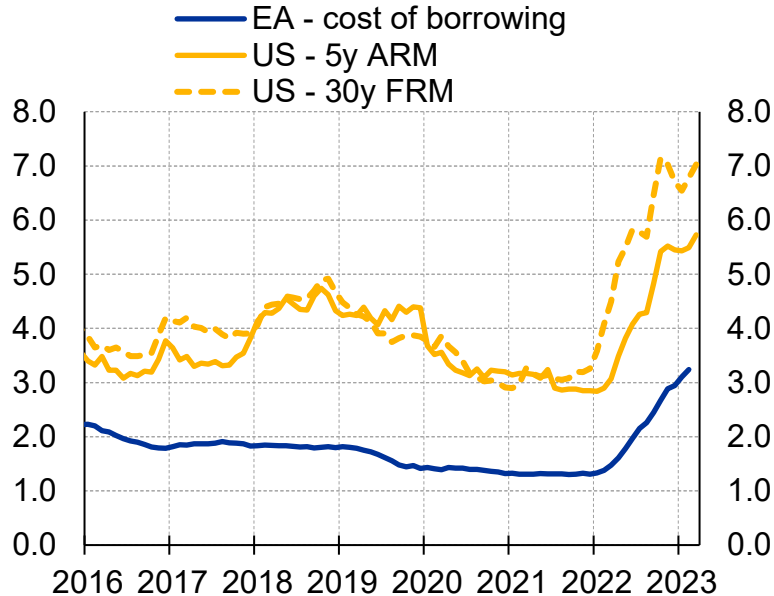
Sources: Refinitiv, IBES, Consensus Economics, Bloomberg, and ECB calculations.

Notes: The decomposition is based on a dividend discount model. The model includes share-buybacks, discounts future cash-flows with interest rates of appropriate maturity and includes five expected dividend growth horizons. See ECB Economic Bulletin, issue 4/2018 for more details.

Latest observation: 14 April 2023 (weekly data).

# Higher bank lending rates eventually translate into lower loan growth

## Mortgage rates (percentages per annum)

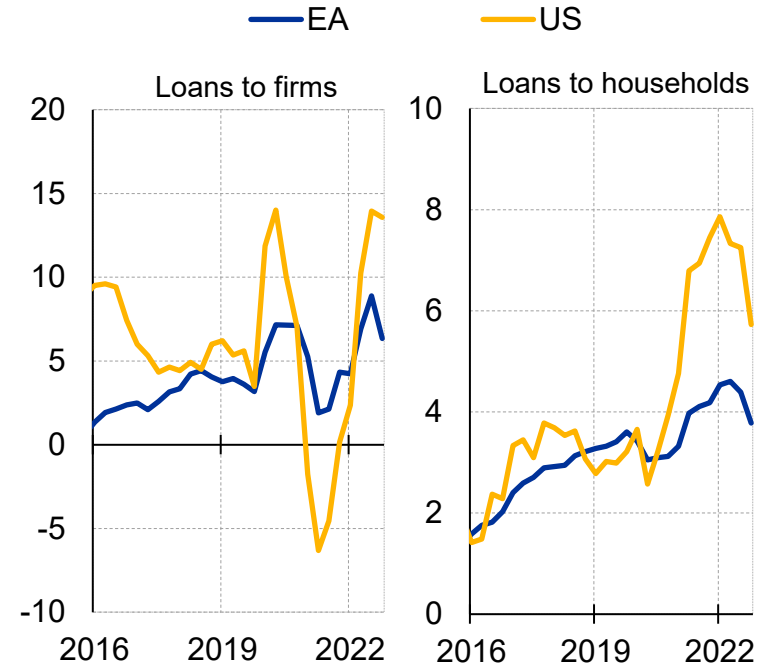


Sources: ECB, Wall Street Journal and ECB calculations.

Notes: "5y ARM" stands for 5-year adjustable mortgage rate. "30y FRM" stands for 30-year fixed mortgage rate. For the euro area, the cost of borrowing indicator is calculated as a weighted average of MFI interest rates on short-term and long-term loans to households for house purchase, where the new business volumes used are smoothed with a moving average of the previous 24 months' observations.

Latest observation: March 2023 for the US, February 2023 for the euro area.

## Bank loans by borrower type (annual percentage changes)



Sources: ECB (Balance Sheet Statistics), Federal Reserve Board (Flow of Funds) and ECB calculations.

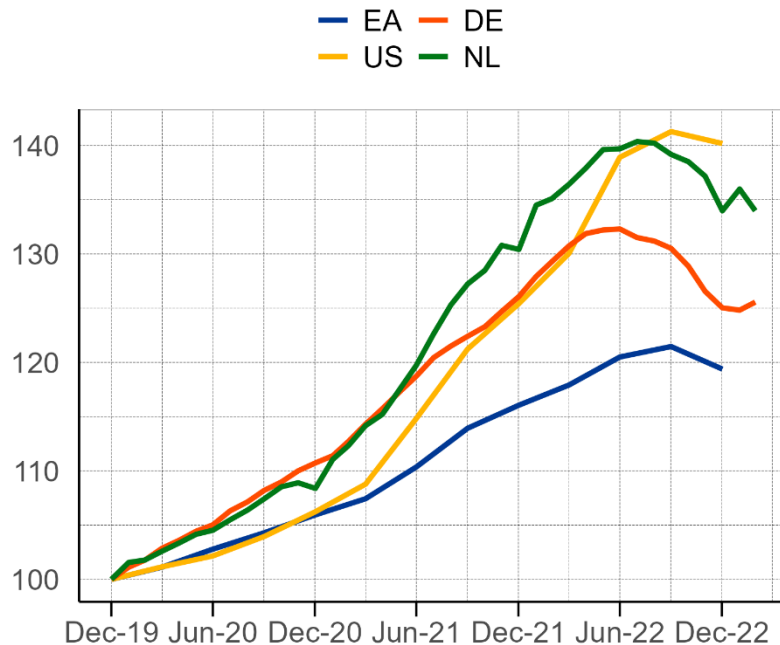
Notes: In the euro area, loans are adjusted for loan sales and securitization as well as positions arising from notional cash pooling services provided by MFIs.

Latest observation: 2022 Q4.

# House prices are starting to fall with further declines being likely

## House price developments

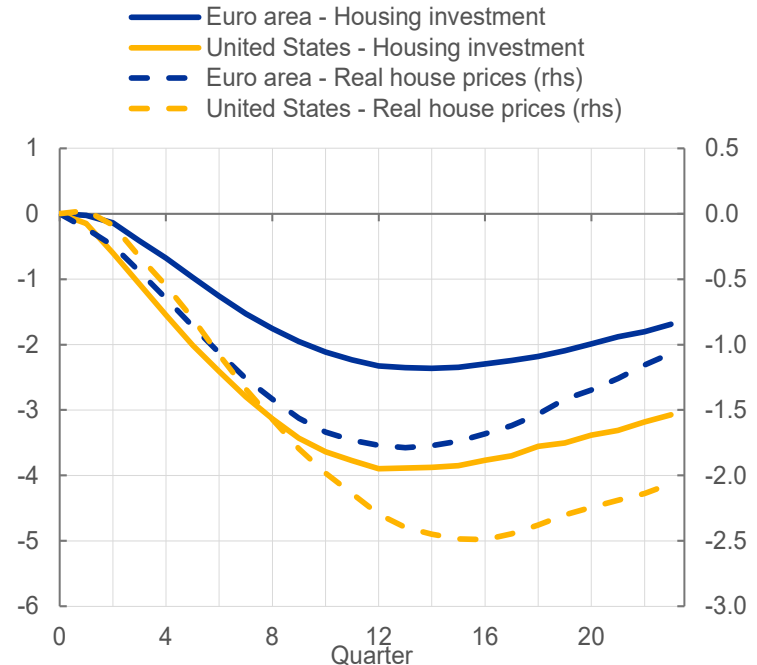
(Monthly RRE price indices – December 2019 = 100)



Sources: Europace, Statistics Netherlands, Eurostat, SDW (U.S. Federal Housing Finance Agency).  
Notes: RRE stands for Residential Real Estate. Last EA observation from Eurostat is for Q4 2022, so several countries with more timely data available are added.  
Latest observation: February 2023 for DE, NL, Q4 2022 for US, EA

## Impact of a monetary policy shock on housing investment and house prices

(change in levels after a 50 bp shock, %)

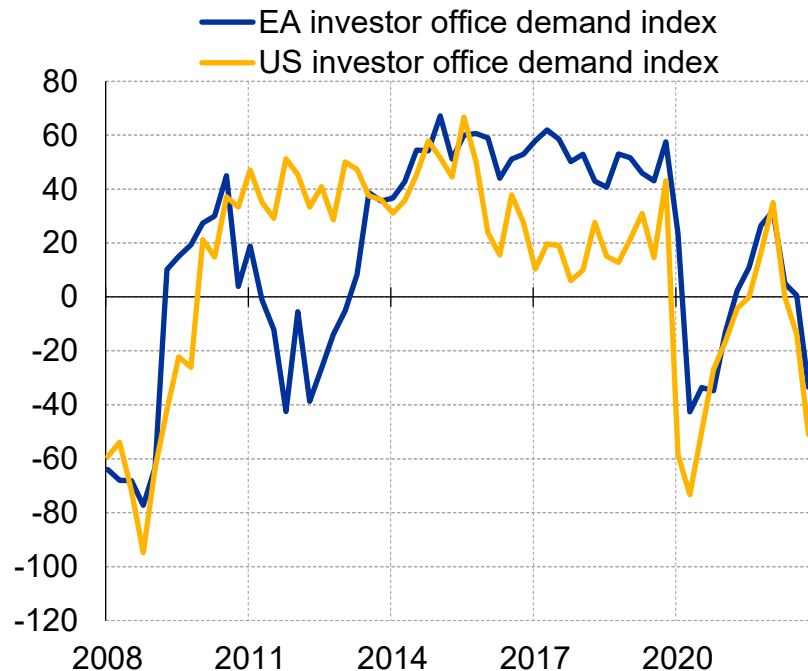


Sources: Eurostat, ECB, BEA, FRB, Wu-Xia and ECB calculations.  
Notes: BVAR-based results. Responses are significantly different from zero at the 90% confidence level.

# Declining demand for commercial real estate with high vacancy rates in the US

## Investor demand for US and EA offices

(index)



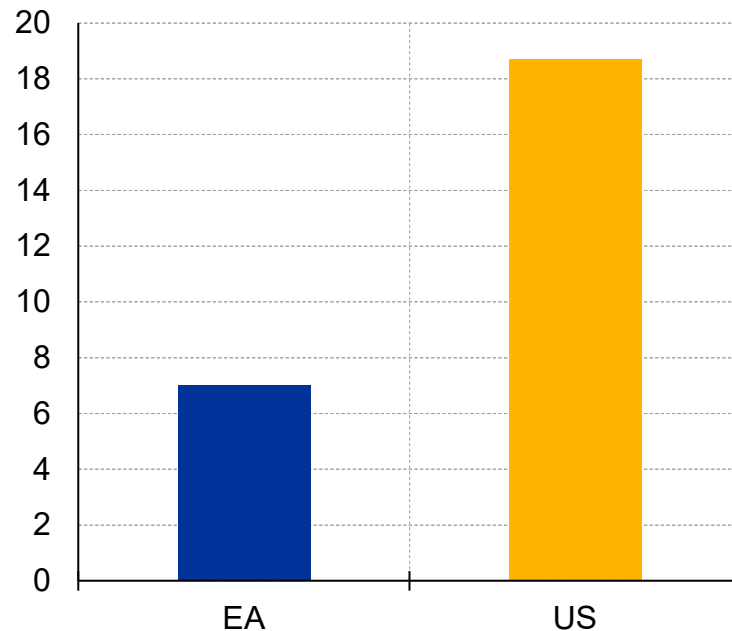
Sources: RICS.

Notes: Investor survey sentiment index: The perception of the change in the number of investment enquiries per property during the last three months.

Latest observation: Q4 2022.

## Office property vacancy rates

(percent)



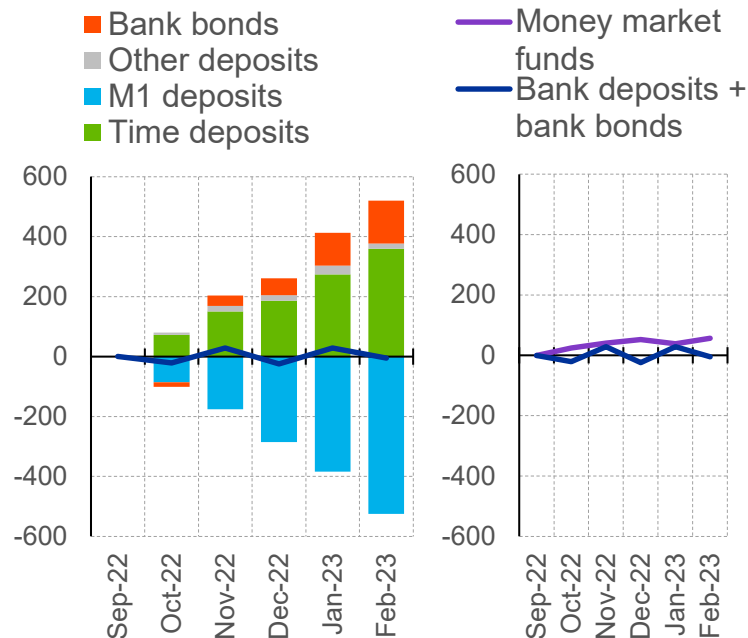
Sources: BNP Paribas Real Estate for EA, Reis, Inc. for US.

Latest observation: Q4 2022.

# Change in composition of bank funding in EA, deposit outflows towards MMFs in US

## Bank funding in the euro area

(cumulated flows in EUR bn since end-September 2022; SA)



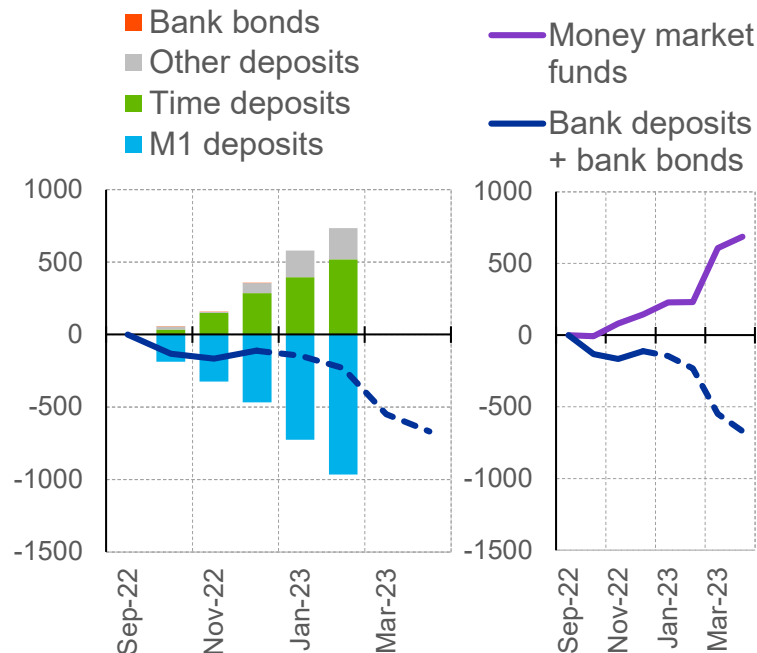
Sources: ECB (BSI) and ECB calculations.

Notes: Bank deposits consist of deposits held with the MFI sector by euro area residents excluding MFIs, central government and financial vehicle corporations involved in securitisation activity. Their flows have been adjusted for the operational incident in TARGET2 which is the main factor affecting deposits with the Eurosystem in recent months. This factor inflated the September 2022 OFI deposits, being reversed in October and November 2022. "M1 deposits" are overnight deposits. "Other deposits" includes deposits other than time and M1 deposits.

Bank bonds are those held by euro area residents excluding MFIs and central government. Latest observation: February 2023.

## Bank funding in the United States

(cumulated monthly differences in outstanding amounts in USD bn since end-September 2022; SA bank deposit, NSA bank bonds)



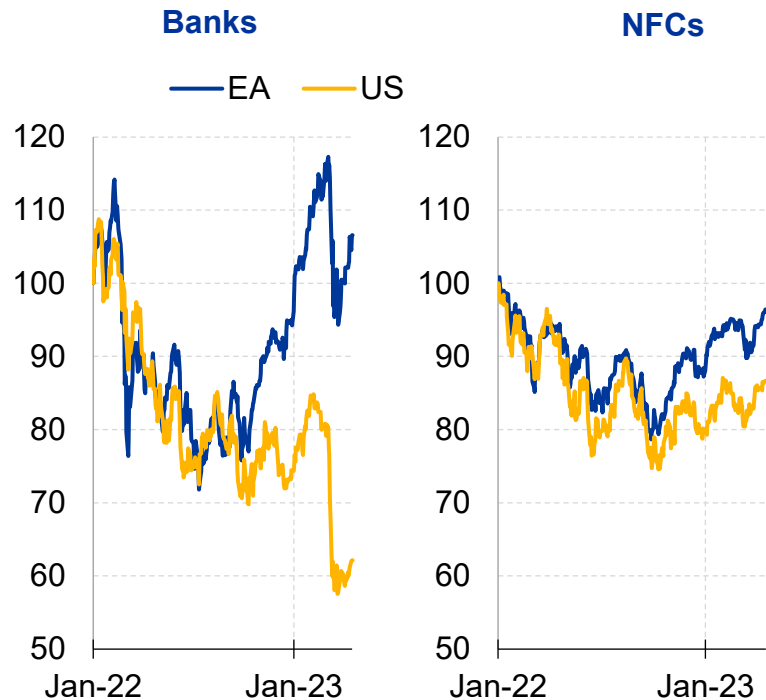
Sources: Federal Reserve Board/Haver Analytics and ECB cal

Notes: Banks are domestically chartered commercial banks, US branches and agencies of foreign banks and Edge Act and agreement corporations. Bank bond data are quarterly and interpolated at monthly frequency. Consolidated bank bond issuance. "M1 deposits" include demand and other liquid deposits. "Other deposits" includes deposits other than time and M1 deposits.

Latest observation: April 2023 for bank deposits (up to 5 April) and money market funds (up to 12 April). December 2022 for bank bonds and thus also for the total. Dashed line only include bank deposits.

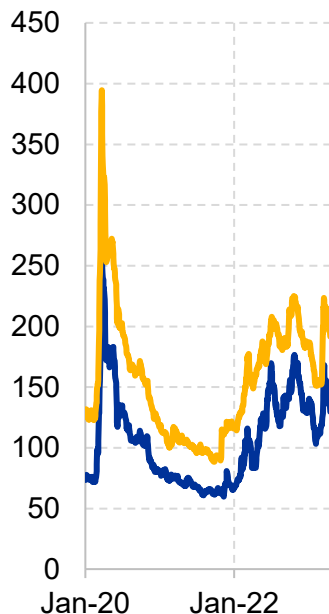
# Financial turbulence has mainly affected financial firms but limited fallout in EA

**Equity prices**  
(Index levels, Jan 2022 = 100)

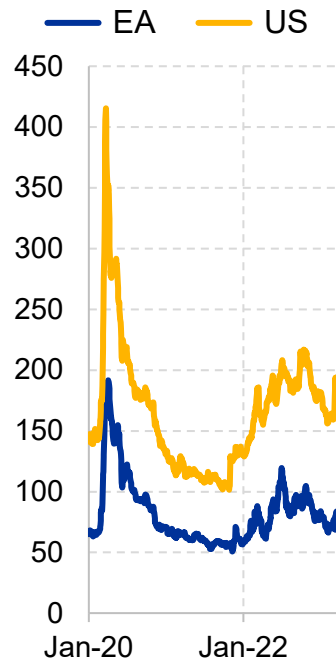


Sources: Bloomberg, ECB calculations. Notes: NFC series are based on standard S&P500 and Eurostoxx indices, stripped of banks and financial sectors. Daily data. Last observation: 18 April 2023.

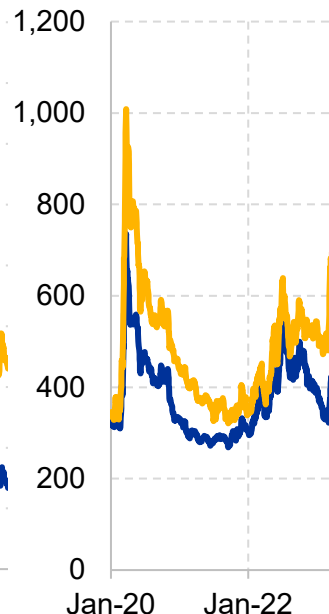
**IG financials  
spreads**  
(basis points)



**IG non-financials  
spreads**  
(basis points)



**HY spreads**  
(basis points)

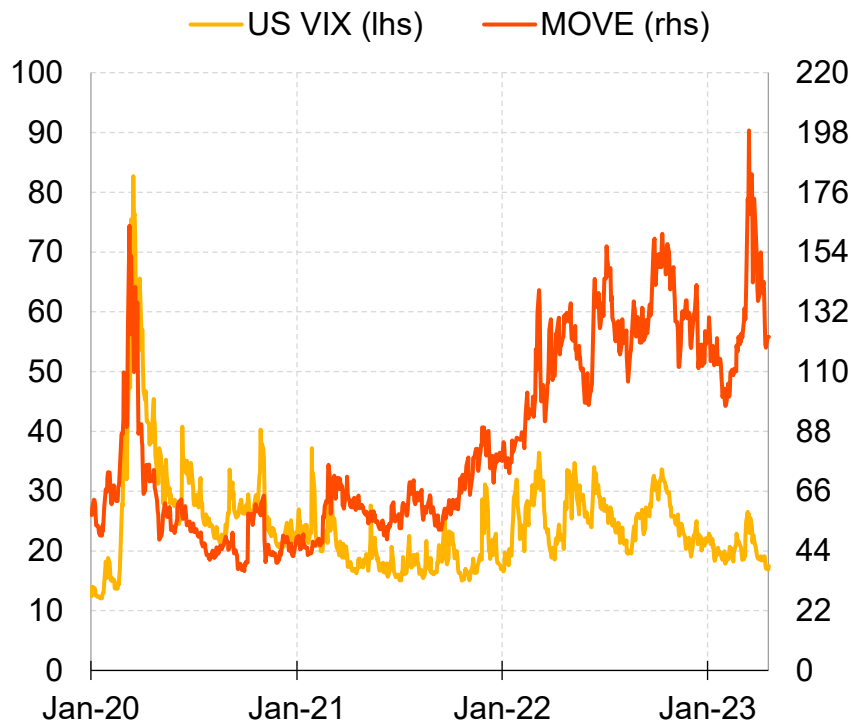


Sources: iBoxx, ECB calculation.  
Latest observation: 18 April 2023.

# Temporary spike in bond market volatility and systemic risk indicators

## Option-implied volatility

(lhs: points; rhs in bps)

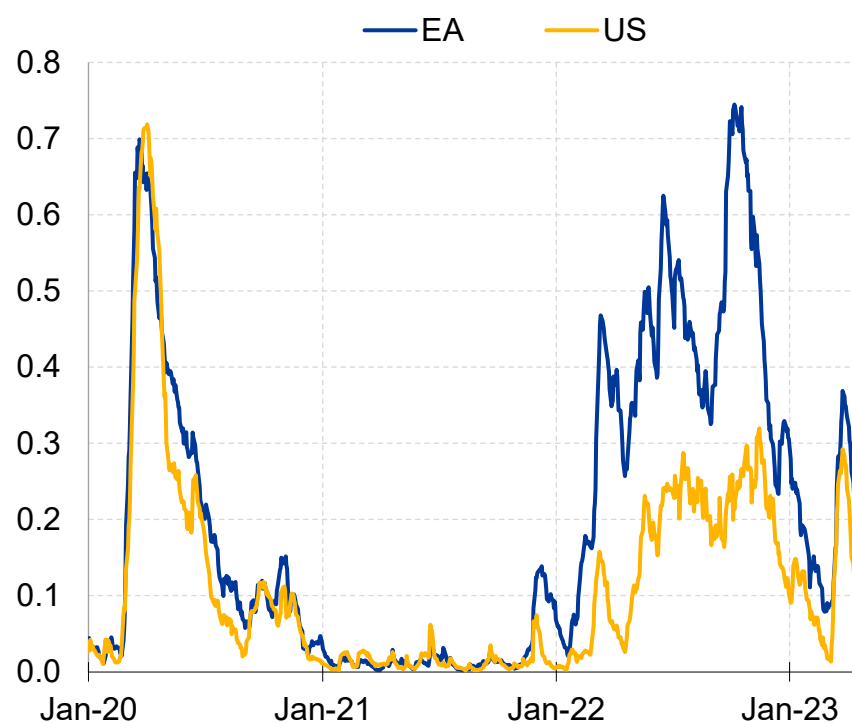


Sources: Bloomberg.

Notes: US VIX is market estimate of expected volatility of S&P 500, EA VIX/V2X measures implied volatility of EURO STOXX 50 and MOVE measures implied volatility of Treasury options.  
Last observation: 18 April 2023.

## Composite Indicator of Systemic Stress (CISS)

(0=No Stress, 1=High Stress)



Sources: ECB.

Last observation: 17 April 2023.

**Thank you very much for your attention!**