Inflation diagnostics and monetary policy

Banque de France / EUI conference
"Headwinds: upcoming macroeconomic risks" - Florence

EUROPEAN CENTRAL BANK
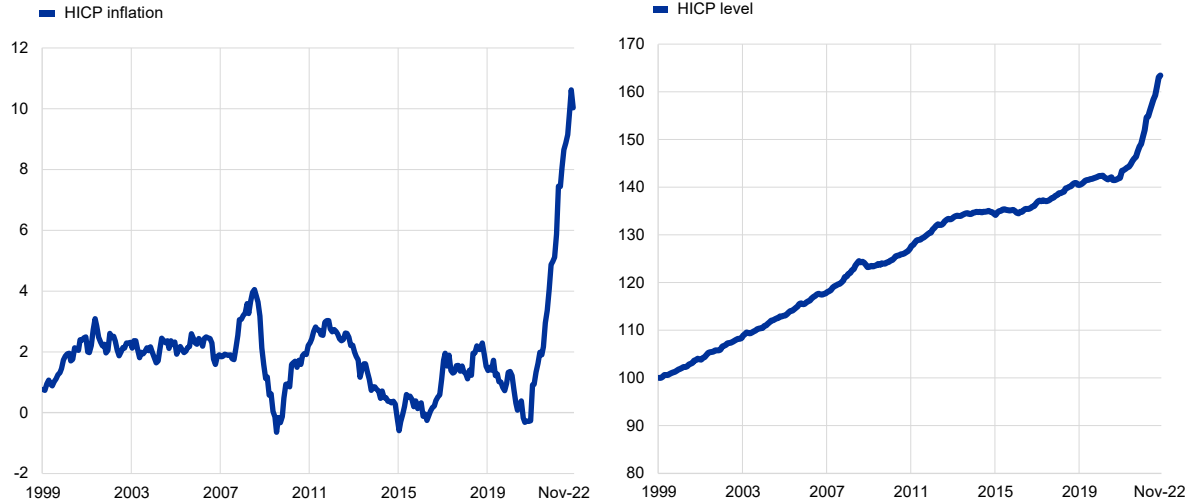EUROSYSTEM

1 December 2022

Philip R. Lane
Member of the Executive Board

Chart 1

HICP inflation and the HICP price level
(left: annual percentage changes, right: index: Dec-1998 = 100)

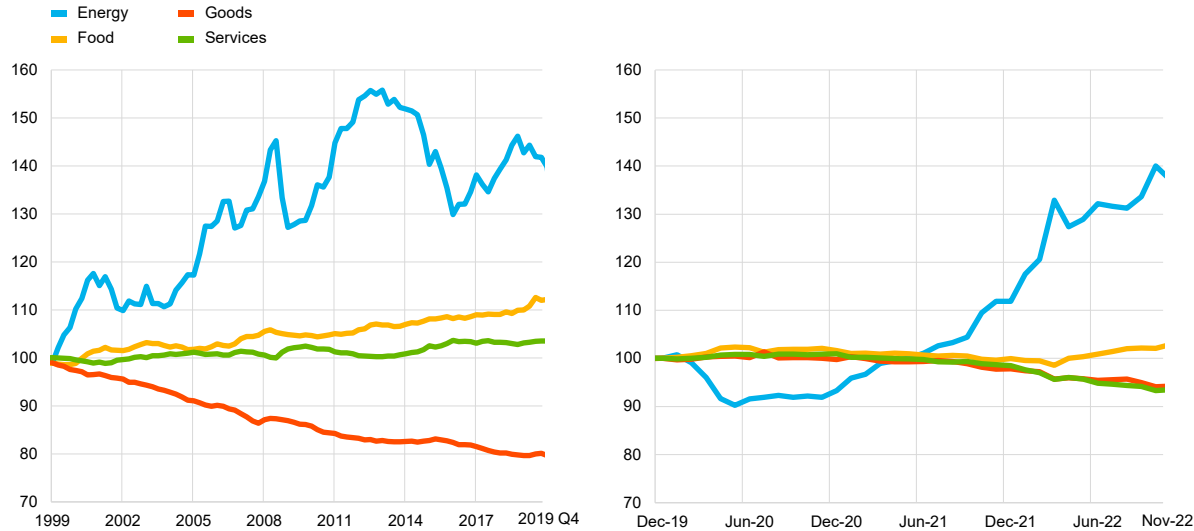Source: Eurostat
Notes: The right panel is based on seasonally adjusted data.
The latest observations are for November 2022 (flash).

Chart 2

Price developments relative to HICP for different subcomponents

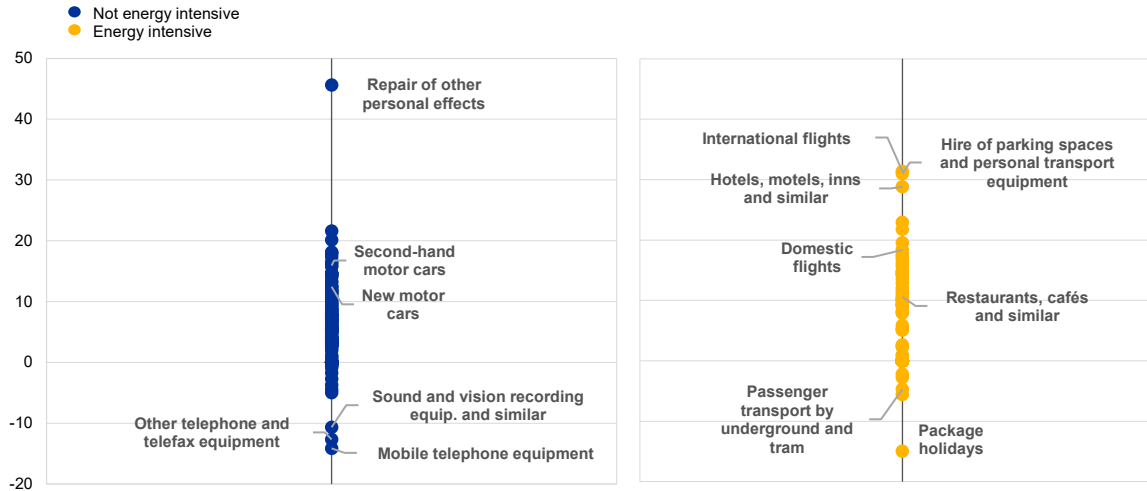*(left: index: 1998 Q4 =100, right: index: December 2019 = 100)*

Source: Eurostat
Notes: Seasonally adjusted data for HICP, food, goods and services. Seasonally adjusted series for energy are not available. The goods category here only includes non-energy industrial goods (NEIG).
The latest observations are for November 2022 (flash).

Chart 3

Cumulative prices changes at inflation-category level since December 2019
(percentage changes)

- Not energy intensive
- Energy intensive

Repair of other personal effects

Second-hand motor cars

New motor cars

Sound and vision recording equip. and similar

Other telephone and telefax equipment

Mobile telephone equipment

International flights

Hotels, motels, inns and similar

Hire of parking spaces and personal transport equipment

Domestic flights

Restaurants, cafés and similar

Passenger transport by underground and tram

Package holidays

Sources: Eurostat and ECB staff calculations.
Notes: The chart shows the inflation rates of items in HICPX. Energy sensitive items are those with an above average share of energy costs in total costs (direct and indirect). These items account for 25% of overall HICPX.
The latest observations are for October 2022.

Chart 4

Goods inflation — decomposition into energy sensitive items
*(annual percentage change and percentage point contributions)*
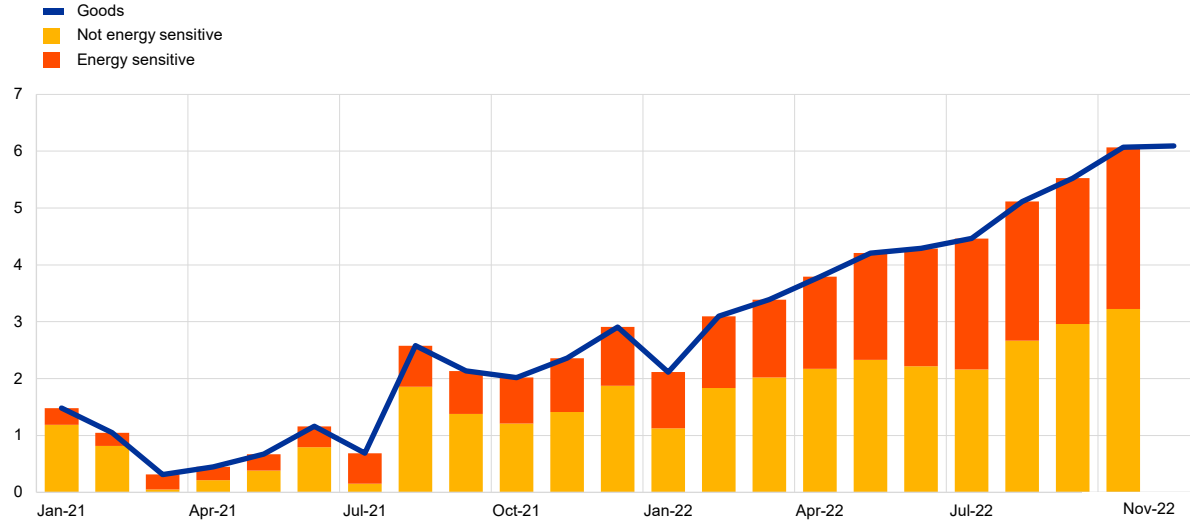
Sources: Eurostat and ECB staff calculations.
Notes: Goods here only includes non-energy industrial goods (NEIG). Energy sensitive component based on items with a share of energy in total (direct and indirect) costs above the average energy share across all NEIG items.
The latest observations are for November 2022 (flash) for goods and October 2022 for the rest.

Chart 5

Services inflation — decomposition into energy sensitive items
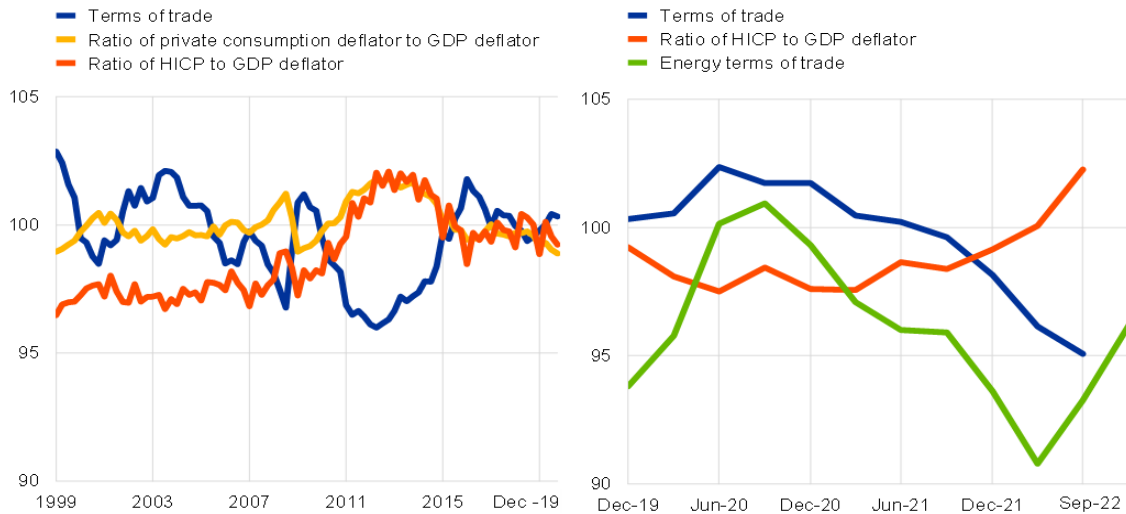*(annual percentage change and percentage point contributions)*
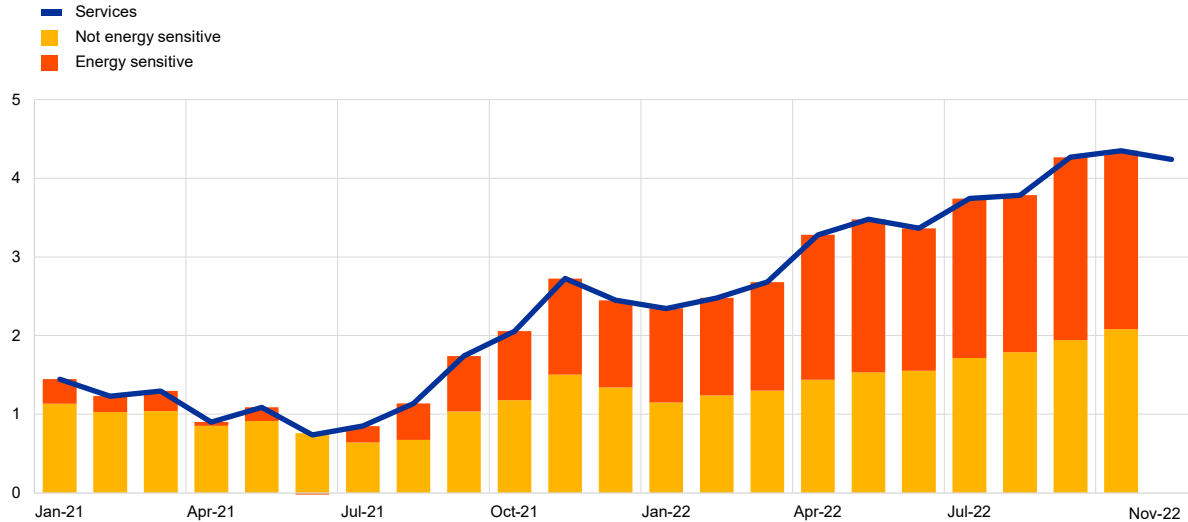
Sources: Eurostat and ECB staff calculations.
Notes: Energy sensitive component based on items with a share of energy in total (direct and indirect) costs above the average energy share across all services items.
The latest observations are for November 2022 (flash) for services and October 2022 for the rest.
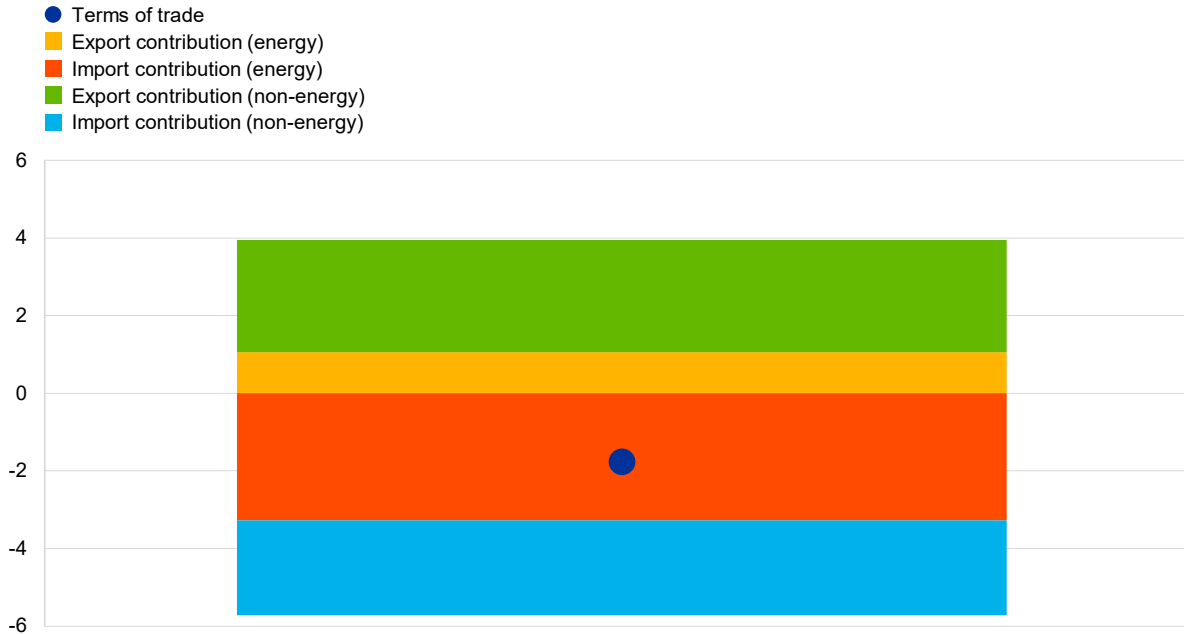
Chart 6

Terms of trade and price level deflators relative to GDP
(ratio)

Legend (left chart):
- Terms of trade
- Ratio of private consumption deflator to GDP deflator
- Ratio of HICP to GDP deflator

Legend (right chart):
- Terms of trade
- Ratio of HICP to GDP deflator
- Energy terms of trade

Sources: ECB, Eurostat and ECB staff calculations.
Notes: The terms of trade are expressed as the ratio between export and import deflators.
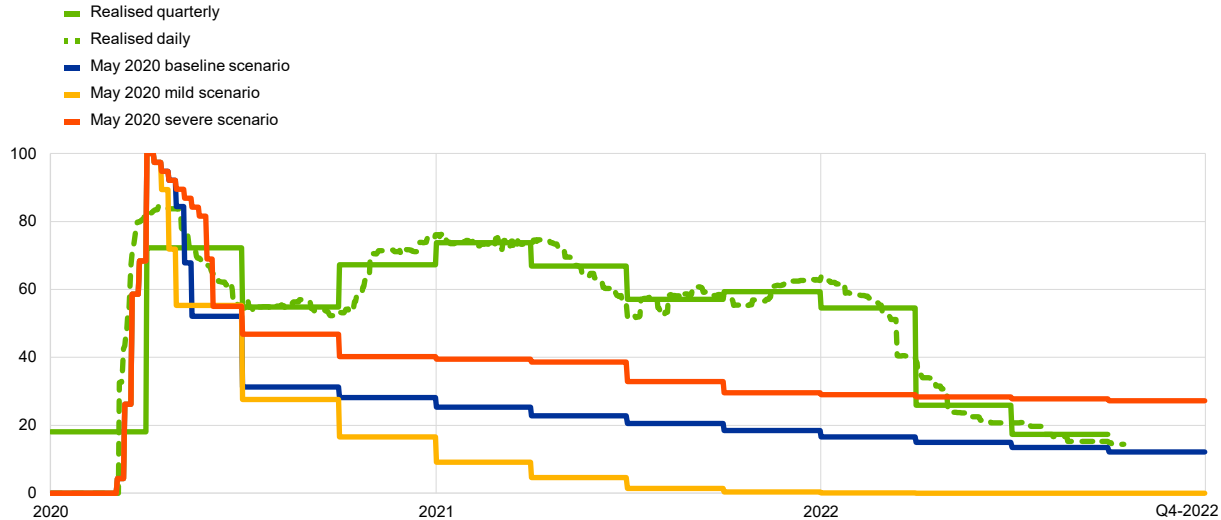The latest observations are for September 2022.

7

Chart 7

Income effects of euro area terms of trade from Q4 2019 to Q2
(ratio)

Legend:
- Terms of trade
- Export contribution (energy)
- Import contribution (energy)
- Export contribution (non-energy)
- Import contribution (non-energy)

Sources: ECB, Eurostat and ECB staff calculations.
Notes: The income effect of terms of trade is calculated by weighing export and import price changes by their respective value in the fourth quarter of 2019 and considered as a percentage share of GDP in the fourth quarter of 2019. The weights are computed based on extra-euro area trade flows and prices as obtained from the Eurostat national accounts. Due to data availability, Slovenia and Spain are not included in the euro area aggregate.

Chart 8

Oxford stringency index: realised and compared to May 2020 expectations
(max stringency = 100)

Legend:
- Realised quarterly
- Realised daily
- May 2020 baseline scenario
- May 2020 mild scenario
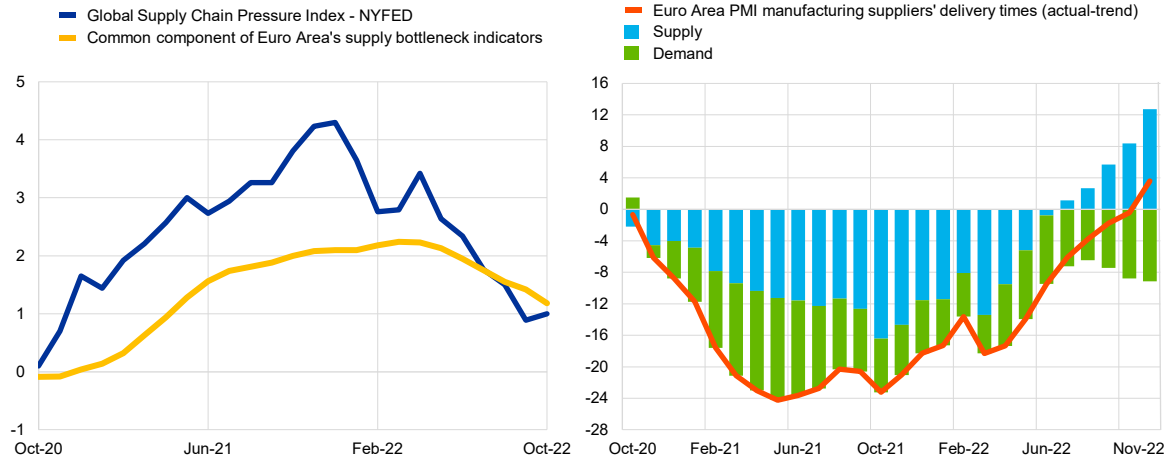- May 2020 severe scenario

Sources: Oxford university, ECB calculations.
Notes: The euro area Oxford Stringency Index is a population-weighted average of the same index available for 18 euro area countries. See Battistini, N. and Stoevsky, G., "Alternative scenarios for the impact of the COVID-19 pandemic on economic activity in the euro area", ECB Economic Bulletin Issue 3, 2020. The latest observations are for Q4 2022. Realised daily stops on 15 October 2022, realised quarterly in Q3 2022.

Chart 9

Supply bottlenecks indicators

(left: standard deviations; right: diffusion index in deviation from trend)

- Global Supply Chain Pressure Index - NYFED
- Common component of Euro Area's supply bottleneck indicators

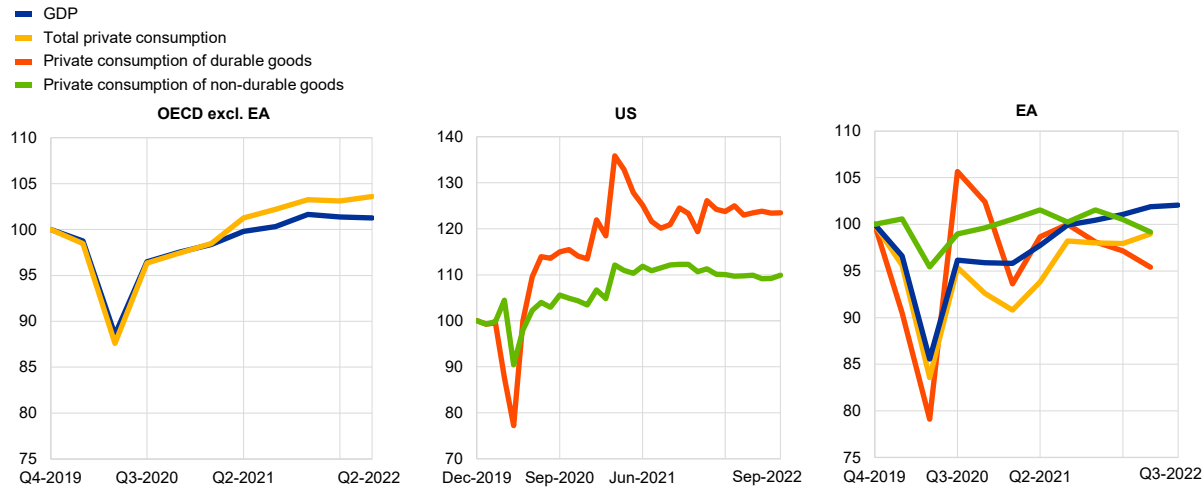- Euro Area PMI manufacturing suppliers' delivery times (actual-trend)
- Supply
- Demand

Sources: Federal Reserve Bank of New York (NYFED), S&P Global, Harper Petersen (HARPEX) shipping cost index, European Commission, Eurostat and ECB calculations.
Notes: The common component in the left-hand side panel is computed using a dynamic factor model analysis on a range of supply bottlenecks indicators (see "Supply chain bottlenecks in the euro area and the United States: where do we stand?", Economic Bulletin, Issue 2/2022). The SVAR model in the right-hand side panel shows the contribution of aggregate demand (due to demand and interest rate shocks) and aggregate supply (due to supply-chain disruption, energy and other cost-push shocks) forces (see also De Santis, Economic Bulletin, Issue 8/2021). The model is identified using sign and narrative restrictions as in Antolín Díaz, J. and Rubio-Ramírez, J.F., "Narrative Sign Restrictions for SVARs", American Economic Review, Vol. 108, No 10, 2018, pp. 2802 2829.
Latest observations: left: October 2022; right: November 2022.

Chart 10

Real GDP and consumption: OECD, US and euro area
(index: 2019Q4 = 100)

- ■ GDP
- ■ Total private consumption
- ■ Private consumption of durable goods
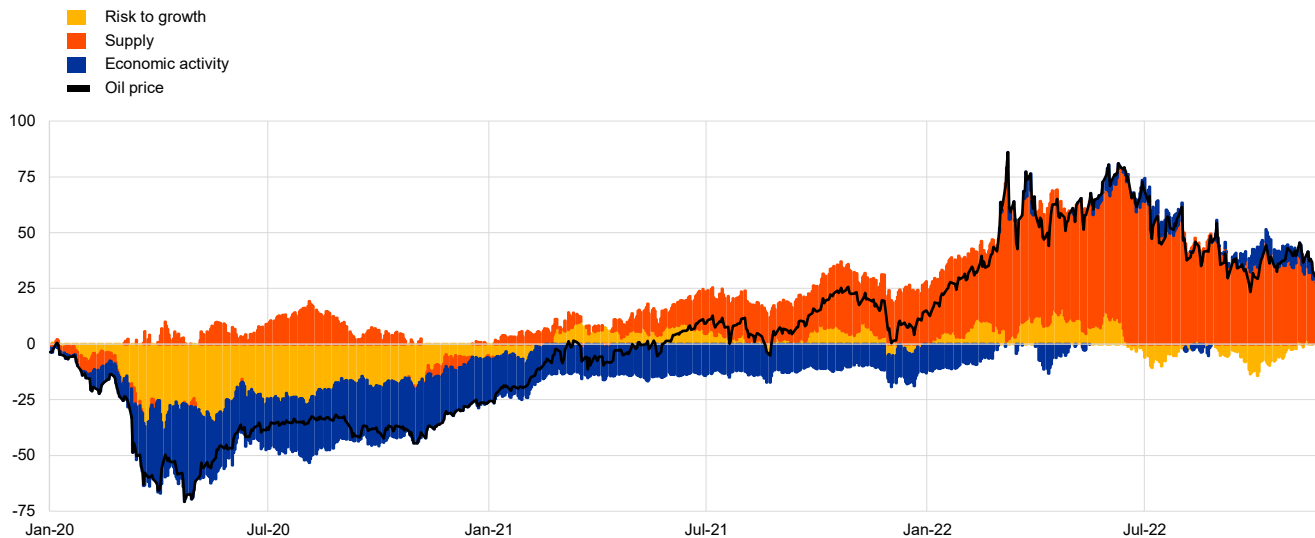- ■ Private consumption of non-durable goods

Sources: Eurostat, OECD and ECB staff calculations.
The latest observations are for September 2022 for US durable and non-durable goods, Q3 2022 for EA GDP, Q2 2022 for the other series.

Chart 11

Oil price decomposition: supply, demand and risk factors

(Daily cumulated percentage change since 31/12/2019)

Sources: Refinitiv and ECB staff calculations.
Notes: Structural shocks are estimated using the spot price, futures to spot spread, markets expectations on oil price volatility and a stock price index.
The latest observations are for 29 November 2022.

Chart 12

Gas: prices and supply
*(left panel: EUR per MWh, right panel: million cubic meters per day)*
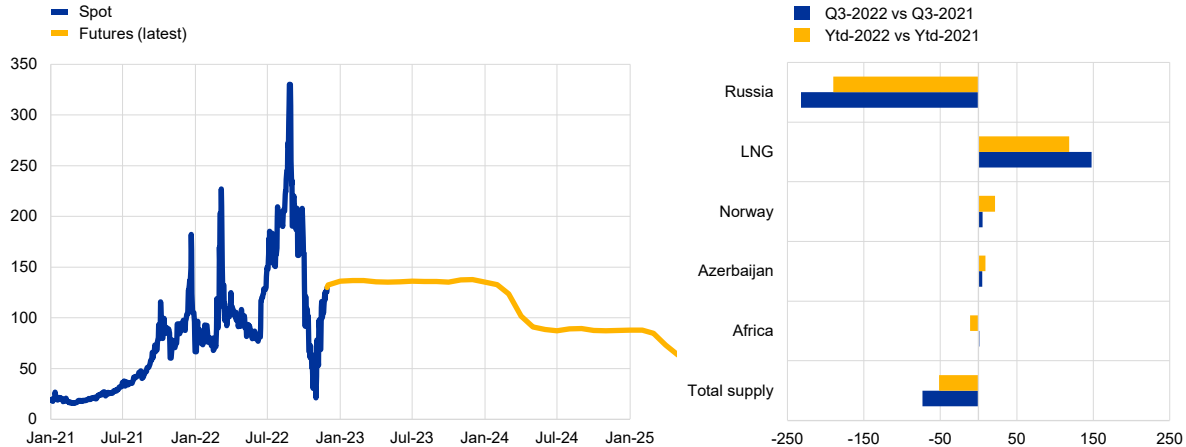
Sources: Refinitiv, Bloomberg and ECB staff calculations.
Notes: Ytd stands for year to date. Quarterly gas flows are computed by taking the average over all daily flows in a given quarter. Liquefied natural gas (LNG) supply includes flows from Russia.
The latest observations are for 29 November 2022.

Chart 13

Goods inflation — decomposition into supply and demand-driven contributions

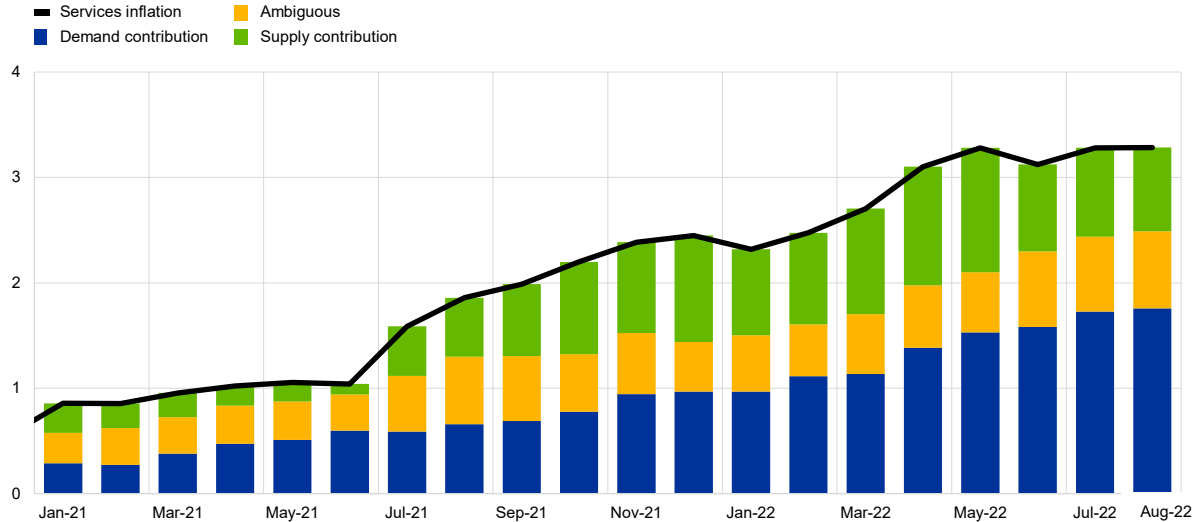*(annual percentage change and percentage point contributions)*
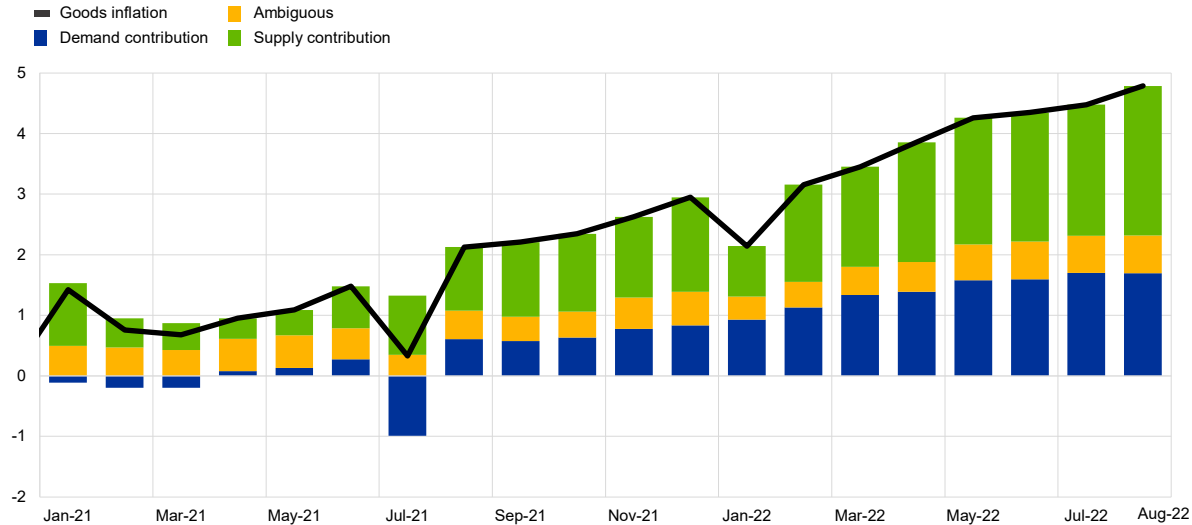
Sources: Eurostat and ECB staff calculations.
Notes: Goods inflation here only includes non-energy industrial goods (NEIG). Seasonally adjusted data. Based on Shapiro, A.H. (2022). Goods inflation is the sum of demand-driven, supply-driven and ambiguous components, calculated as the trailing sum of the last 12 monthly contributions. While price data are available for October 2022, the latest observation is for August 2022 as the turnover series used as a proxy for activity are published with some delay.

Chart 14

Services inflation — decomposition into supply and demand-driven contributions

*(annual percentage change and percentage point contributions)*

Sources: Eurostat and ECB staff calculations.
Notes: Seasonally adjusted data. Based on Shapiro, A.H. (2022). Services inflation is the sum of demand-driven, supply-driven and ambiguous components, calculated as the trailing sum of the last 12 monthly contributions. While price data are available for October 2022, the latest observation is for August 2022 as the turnover series used as a proxy for activity are published with some delay.

Chart 15

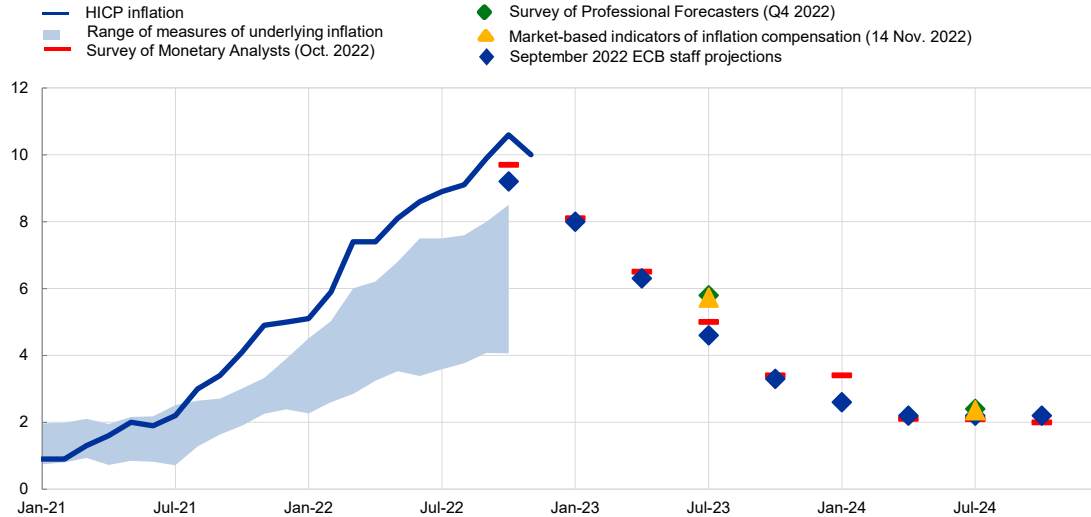**Services inflation — decomposition into contact intensive and energy sensitive items**

(annual percentage change and percentage point contributions)
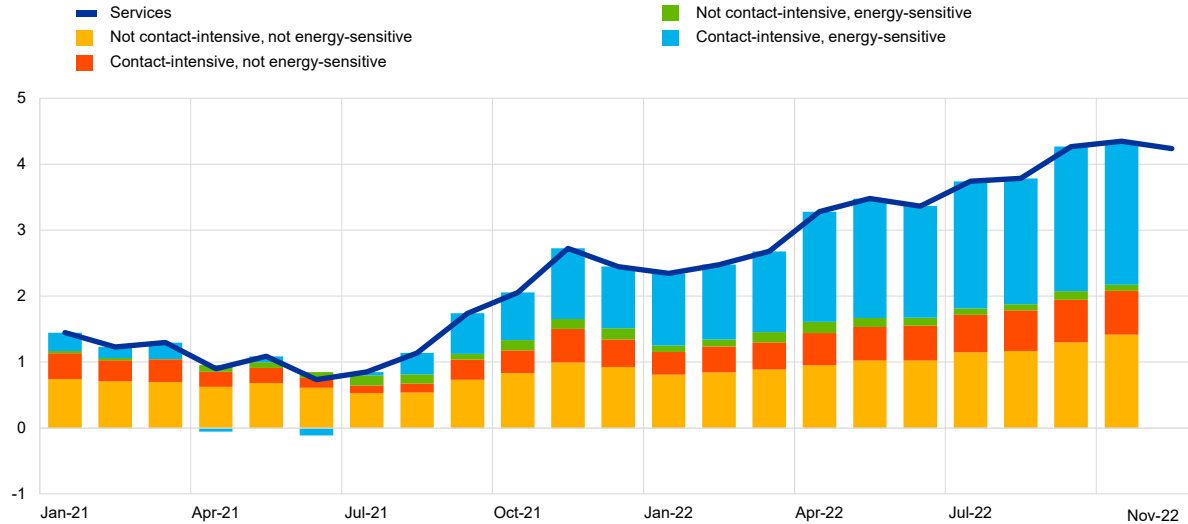
Sources: Eurostat and ECB staff calculations.
Note: Energy sensitive component based on items with a share of energy in total (direct and indirect) costs above the average energy share across all services items. The latest observations are for November 2022 (flash) for services and October 2022 for the rest.
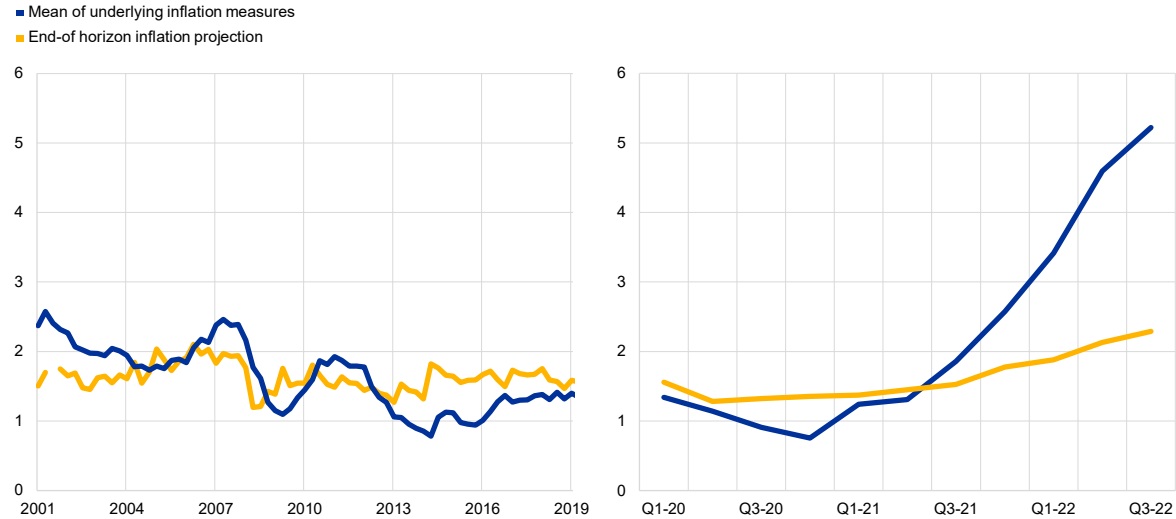
Chart 16

Headline inflation, measures of underlying inflation, and inflation projections and expectations

(annual percentage changes)

Legend:
- HICP inflation
- Range of measures of underlying inflation
- Survey of Monetary Analysts (Oct. 2022)
- Survey of Professional Forecasters (Q4 2022)
- Market-based indicators of inflation compensation (14 Nov. 2022)
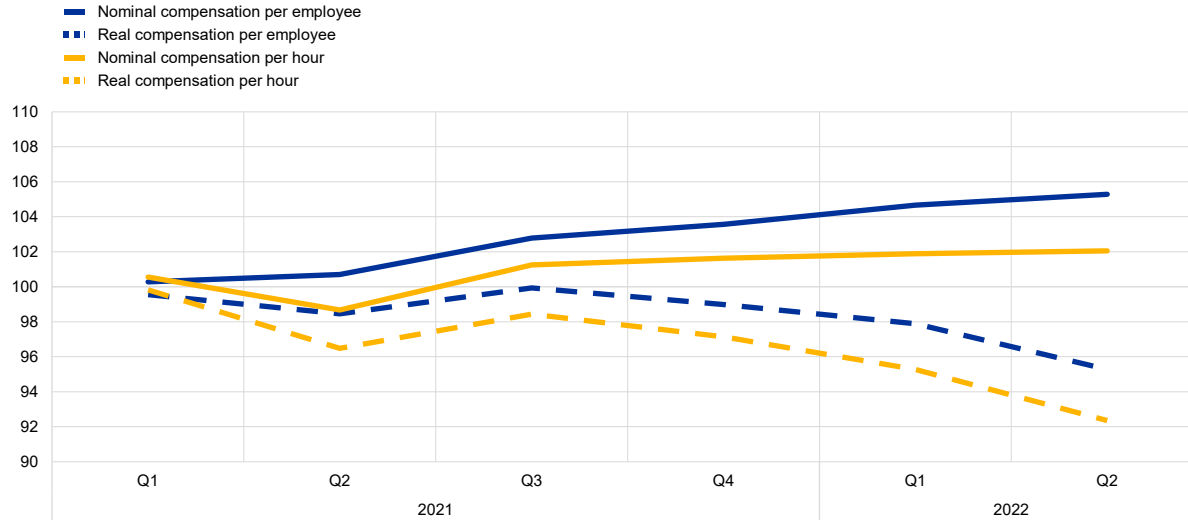- September 2022 ECB staff projections

Sources: Eurostat and ECB calculations.
The latest observations are for November 2022 (flash) for HICP, October 2022 for the range of measures of underlying inflation. The latest observations for market-based indicators of inflation compensation are for 14 November 2022. The SPF data shows expected annual percentage changes for the year 2022, 2023 and 2024. The Survey of Monetary Analysts and the September 2022 ECB staff projections show quarterly forecasts. The cut-off date for data included in the ECB staff macroeconomic projections was 25 August 2022.

Chart 17

Mean of underlying inflation measures and end-of-horizon inflation projection

(annual percentage changes)

- Mean of underlying inflation measures
- End-of horizon inflation projection

Sources: Eurostat and ECB staff calculations.
The latest observations are for 2022Q3.

Chart 18

Nominal and real wage growth (consumer wages)
(index: Q4 2020 = 100)

Legend:
- Nominal compensation per employee
- Real compensation per employee
- Nominal compensation per hour
- Real compensation per hour

Sources: Eurostat and ECB staff calculations.
Notes: Real compensation per employee and per hour are calculated using HICP (consumer wages).
The latest observations are for the second quarter of 2022.
.

Chart 19

Negotiated wage growth and nominal wage growth in job postings
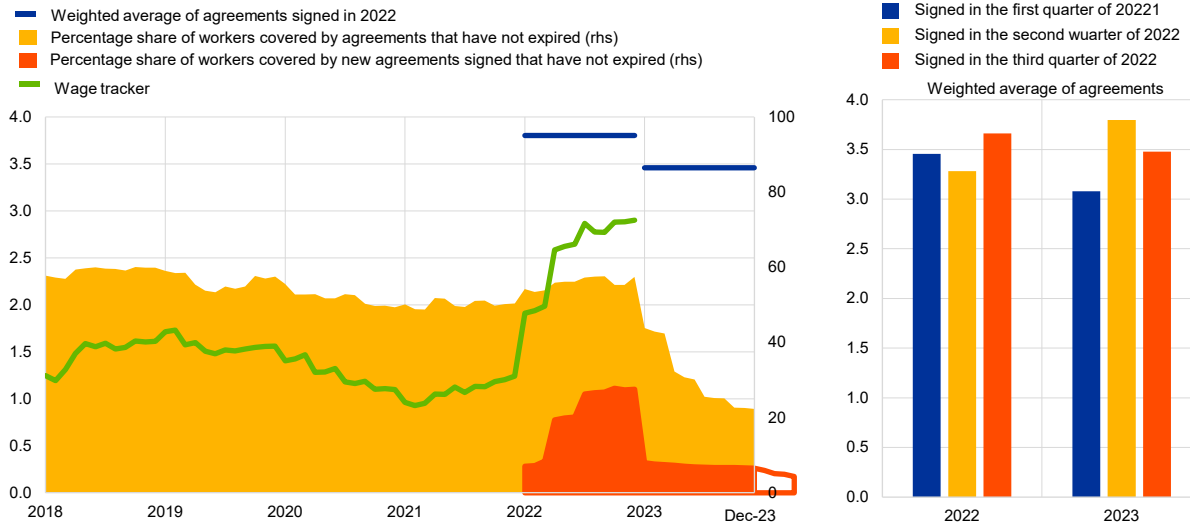*(annual percentage changes)*
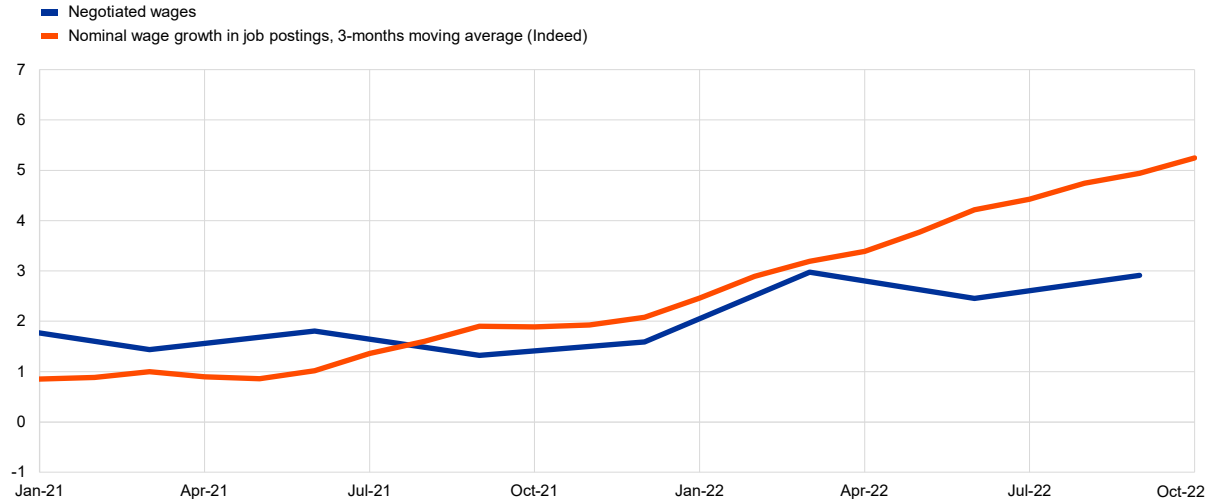
Sources: ECB, Indeed and ECB calculations.
Notes: Data on nominal wage growth in job postings (Indeed – 3 months MA) is presented at monthly frequency and covers six euro area countries (DE, ES, FR, IE, IT and NL) and is based on "Wage growth in euro area countries: evidence from job ads" – P. Adrjan & R. Lydon, Economic Letter, Central Bank of Ireland, Vol 2022, No. 7. Indeed data are shown at monthly, negotiated wages at quarterly frequency.
The latest observations are for 2022 Q3 for negotiated wages, and October 2022 for Indeed data (reflecting data up to mid-October).
.

Chart 20

**Experimental forward-looking tracker of negotiated wage growth in the euro area**
(annual percentage changes)

Legend (left chart):
- Weighted average of agreements signed in 2022
- Percentage share of workers covered by agreements that have not expired (rhs)
- Percentage share of workers covered by new agreements signed that have not expired (rhs)
- Wage tracker

Legend (right chart):
- Signed in the first quarter of 20221
- Signed in the second wuarter of 2022
- Signed in the third quarter of 2022

Weighted average of agreements

Sources: Bundesbank, Banco de España, the Dutch employer association AWVN, Banca d'Italia, Banque de France, Bank of Greece, Oesterreichische Nationalbank and ECB calculations.
Notes: The euro area aggregate is based on data from Germany, France, Italy, Spain, the Netherland, Austria and Greece. Weighted average of agreements signed in 2022 is without FR for 2023.
The latest observations are for October 2022 for DE, ES, NL and September 2022 for IT, AT, GR, FR.

Chart 21

Euro area Beveridge curve
(x-axis: unemployment rate; y-axis: job vacancy rate)

● Beveridge curve - euro area
● Beveridge curve augmented with workers in JRS

2022Q3
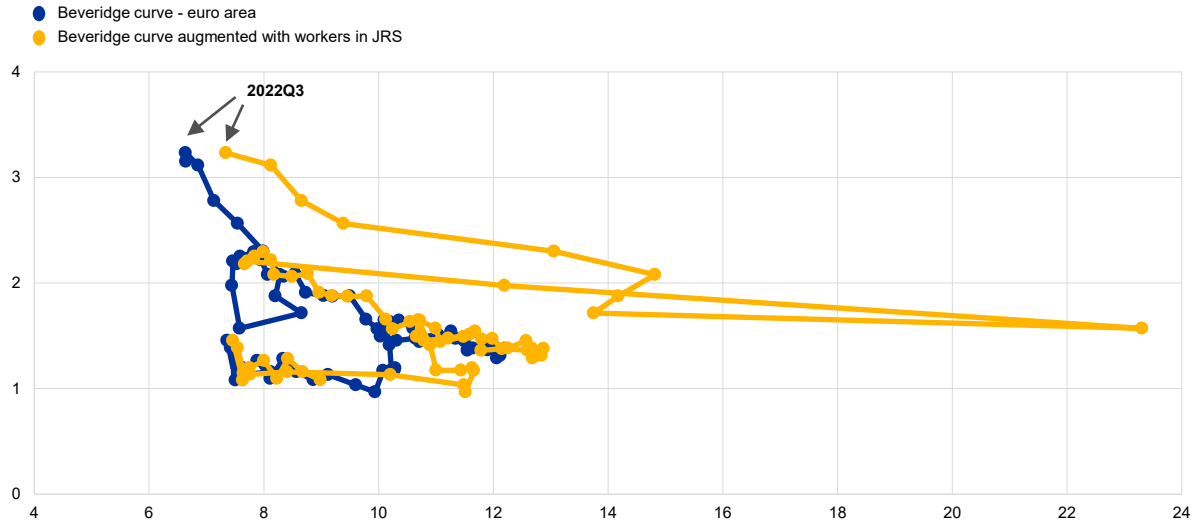
Sources: Eurostat, and ECB staff calculations based on data from Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung - IAB), Ministère du Travail, de l'Emploi et de l'Insertion, Istituto Nazionale Previdenza Sociale (INPS), and Ministerio de Inclusión, Seguridad Social y Migraciones..
Note: JRS stands for job retention schemes.
Latest observations are for 2022 Q3 for the unemployment rate and vacancy rate and 2022 Q3 for the JRS, based on August 2022 for Germany, June 2022 for France, September 2022 for Spain and April 20222 for Italy.

Chart 22

Survey of Professional forecasters: time series of mean long-term inflation expectations

(annual percentage changes)
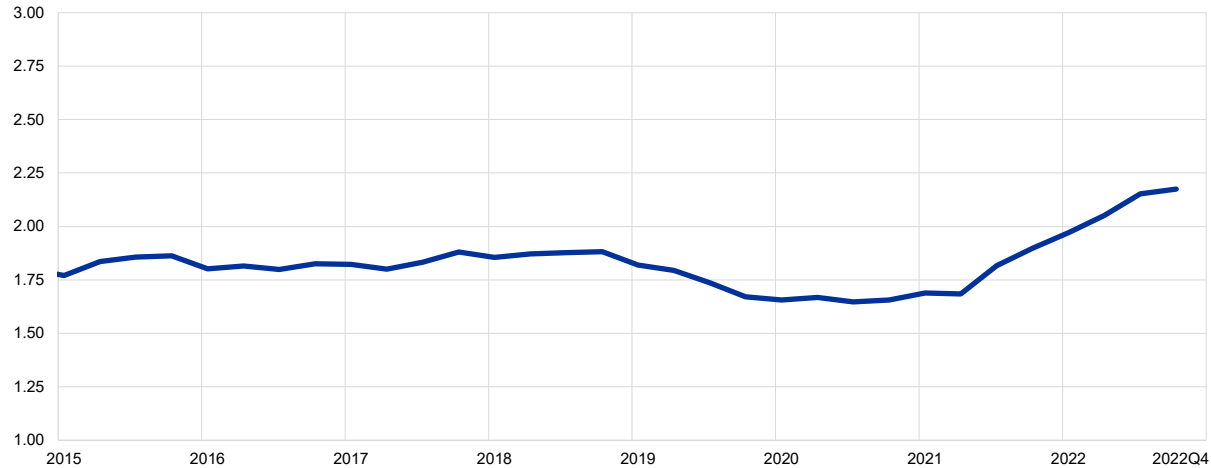
Sources: ECB Survey of Professional Forecasters (SPF).
Note: Long-term inflation expectations refers to expectations five calendar years ahead in Q3 and Q4 rounds and four calendar years ahead in Q1 and Q2 rounds. For example, longer-term expectations refer to 2027 in the third and fourth quarter of 2022 rounds and to 2026 in the first and second quarter of 2022 rounds. Last observation: 2022Q4 round conducted in October 2022.

Chart 23

Survey of Professional forecasters: distribution of longer-term expectations

(percentage of respondents)
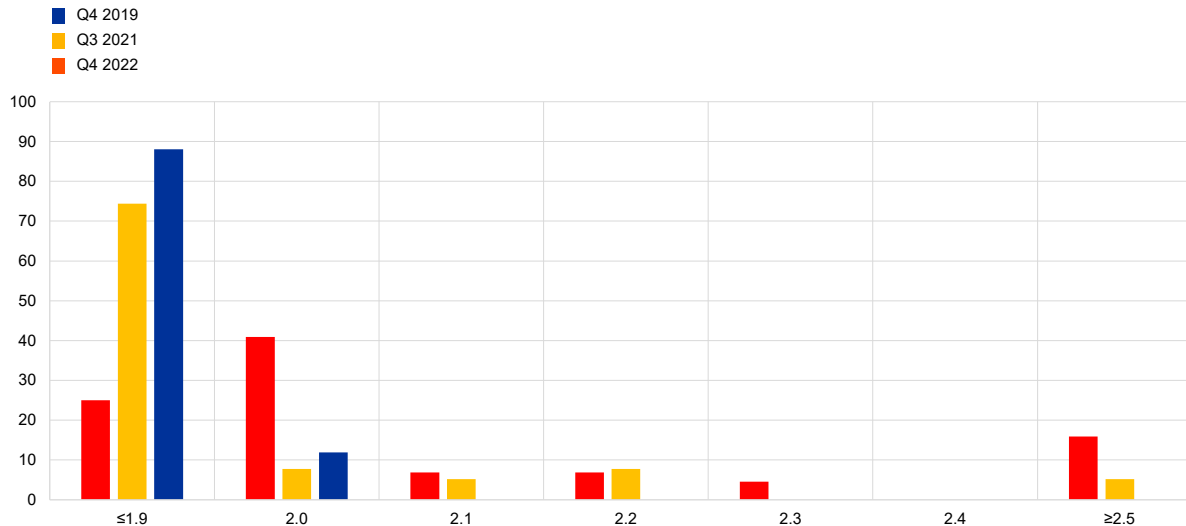
Sources: ECB Survey of Professional Forecasters (SPF).
Notes: The SPF asks respondents to report their point forecasts and to separately assign probabilities to different ranges of outcomes. This chart shows the spread of point forecast responses. Longer-term expectations refer to calendar year five years ahead in the third and fourth quarter rounds (and four calendar years ahead in the first and second quarter rounds).

Chart 24

Survey of Monetary Analysts: inflation expectations over survey rounds for 2022, 2023 and 2024

(annual percentage changes)
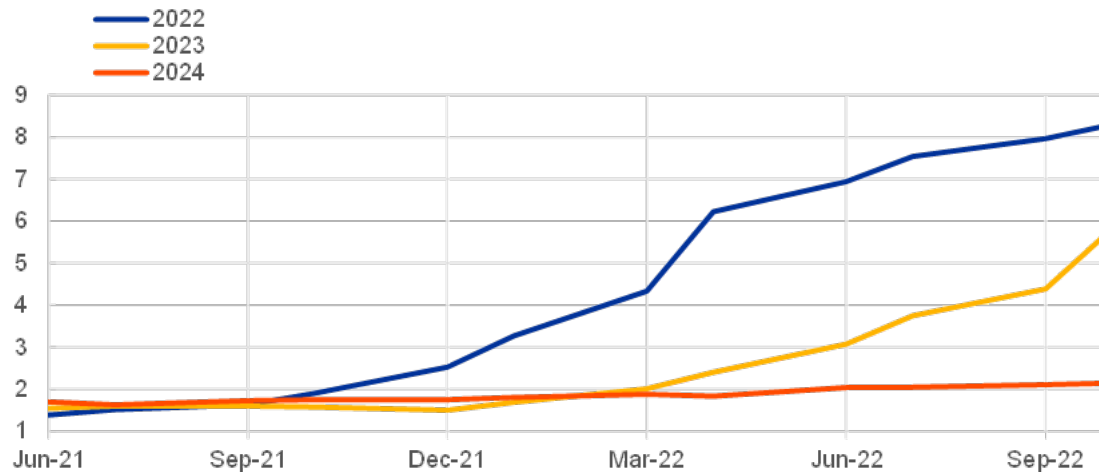
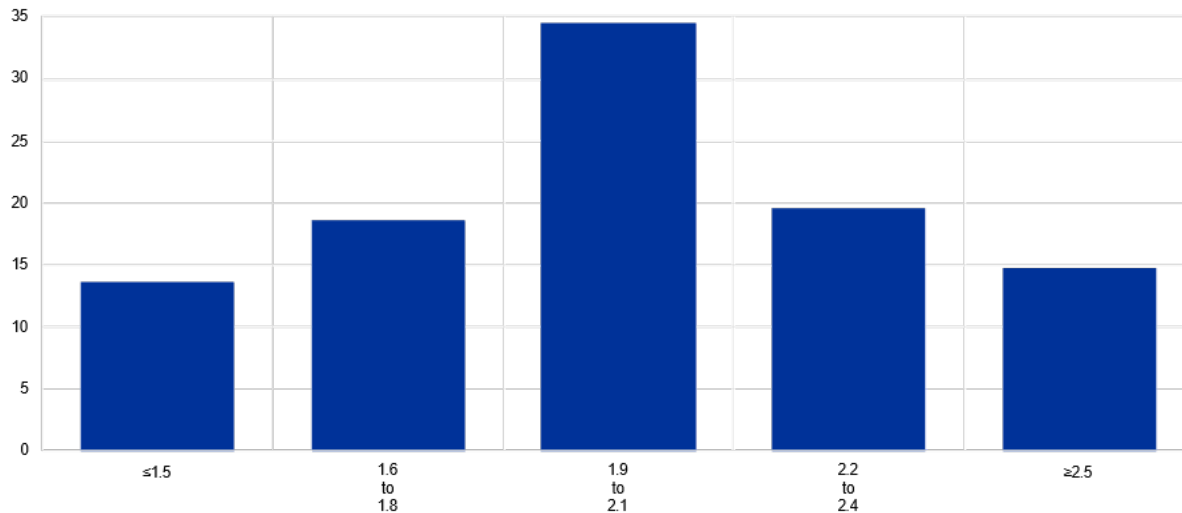Source: ECB Survey of Monetary Analysts (SMA).
Note: Chart includes survey vintages from June 2021 until October 2022 as SMA data is only published as of June 2021.

Chart 25

Survey of Monetary Analysts: long-term inflation expectations over survey rounds

(percentage changes)
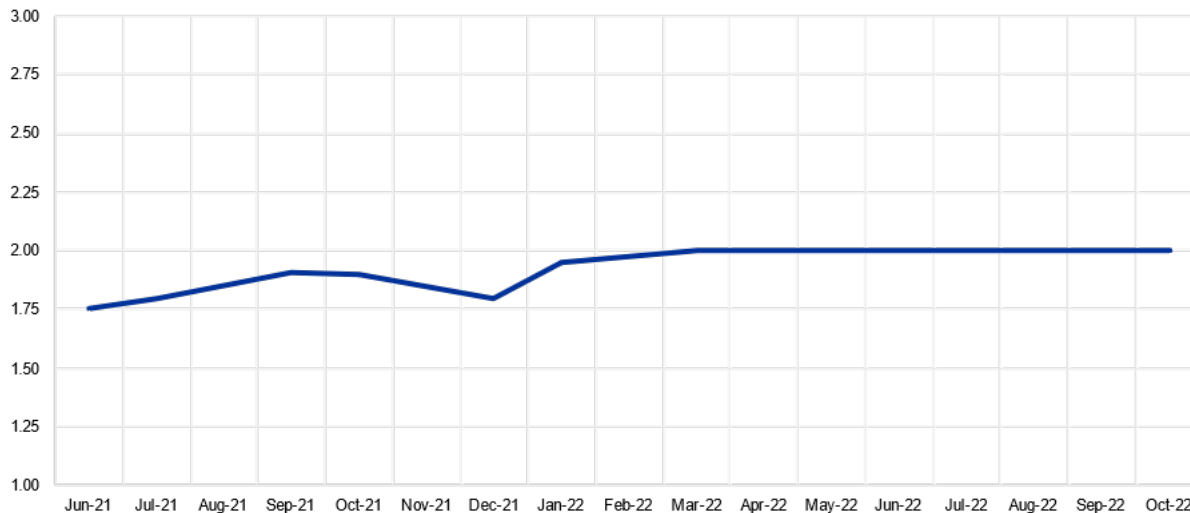
Source: ECB Survey of Monetary Analysts (SMA).
Note: Chart includes survey vintages from June 2021 until October 2022.

Chart 26

**Survey of Monetary Analysts: distribution of long-term inflation expectations in October 2022 survey**

(percentages)

Source: October 2022 ECB Survey of Monetary Analysts (SMA)..

Chart 27

Inflation linked swap (ILS) rates
(annual percentage points)
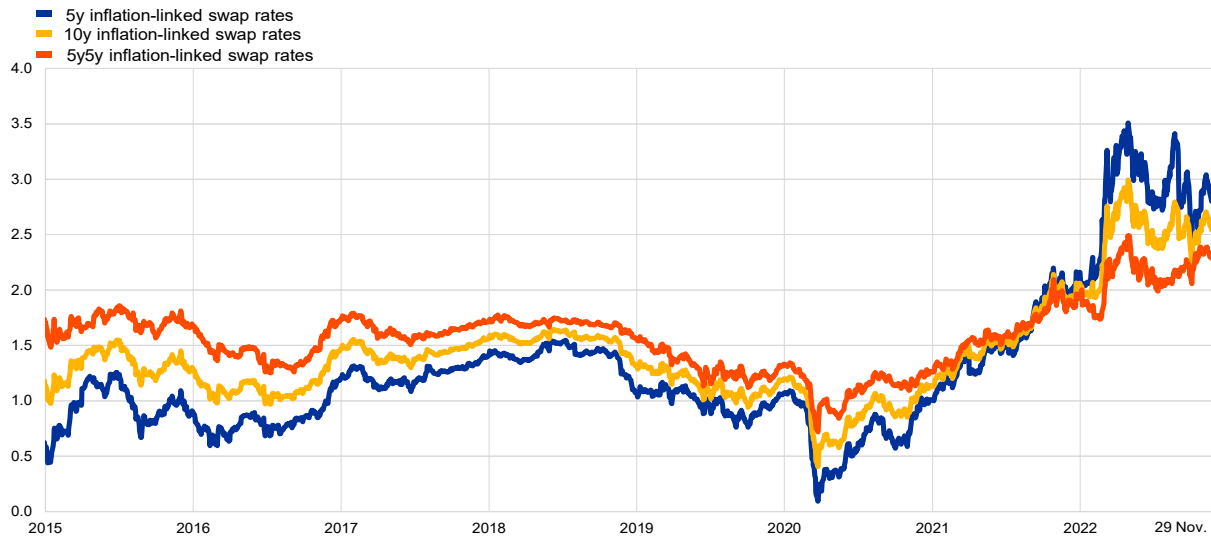
Legend:
- 5y inflation-linked swap rates
- 10y inflation-linked swap rates
- 5y5y inflation-linked swap rates

Sources: Refinitiv and ECB calculations.
The latest observations are for 29 November 2022.

Chart 28

Decomposition of the 1y4y inflation linked swap (ILS) rate
*(Annual percentage points)*

Legend: Inflation risk premia — Fitted ILS rates — Expectations components
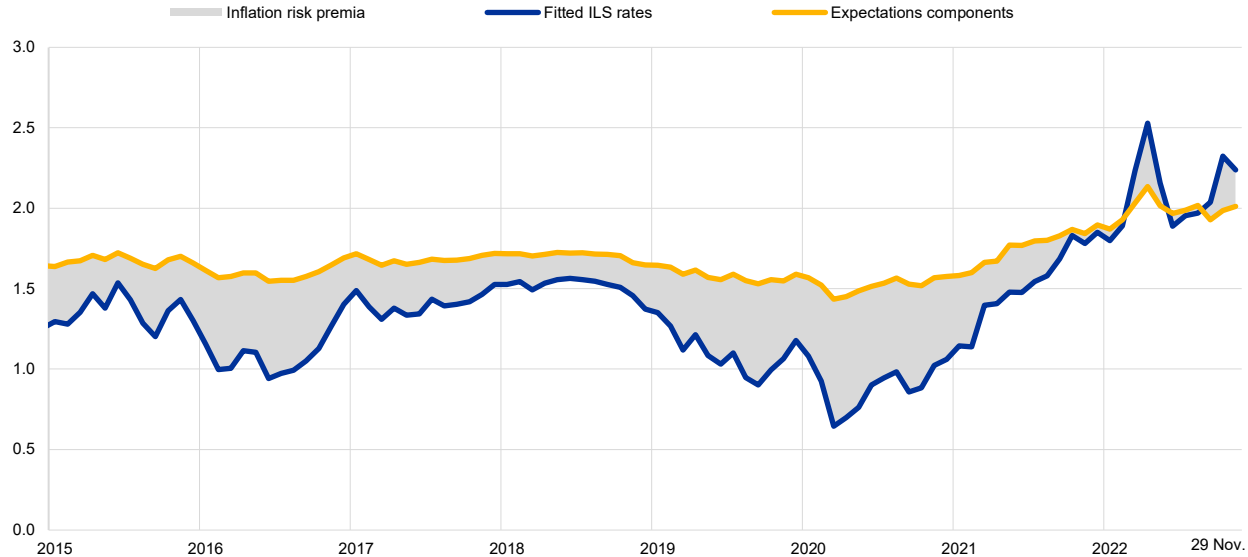
Sources: Refinitiv and ECB calculations.
Note: Average estimates based on two affine term structure models following Joslin, Singleton and Zhu (2011) applied to ILS rates adjusted for the indexation lag, as in Camba-Mendez and Werner (2017).
The latest observations are for 29 November 2022.

Chart 29

Inflation rates implied by market-based measures of inflation compensation and surveys

(Annual percentage points)
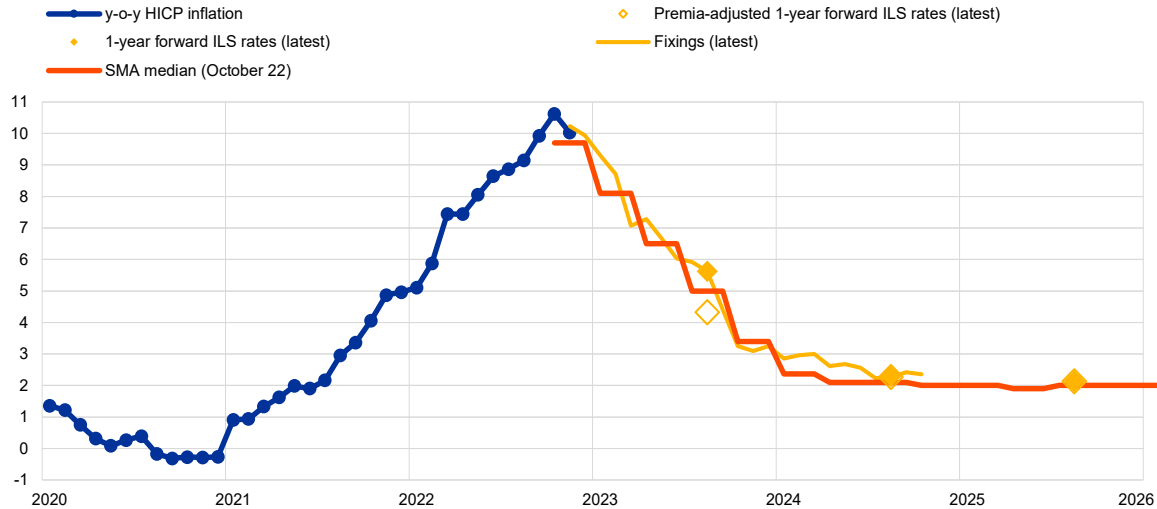
Sources: Bloomberg, Refinitiv, ECB Survey of Monetary Analysts (SMA) and ECB calculations.
Notes: Premia-adjusted forward ILS rates are average estimates from two affine term structure models as in Joslin, Singleton and Zhu (2011) applied to ILS rates non-adjusted for the indexation lag; see Burban, V. et al. (2022), ECB Economic Bulletin Issue 8, 2021, Box 4.
The latest observations are 29 November 2022.

Chart 30

Median consumer inflation expectations over time
(annual percentage changes)
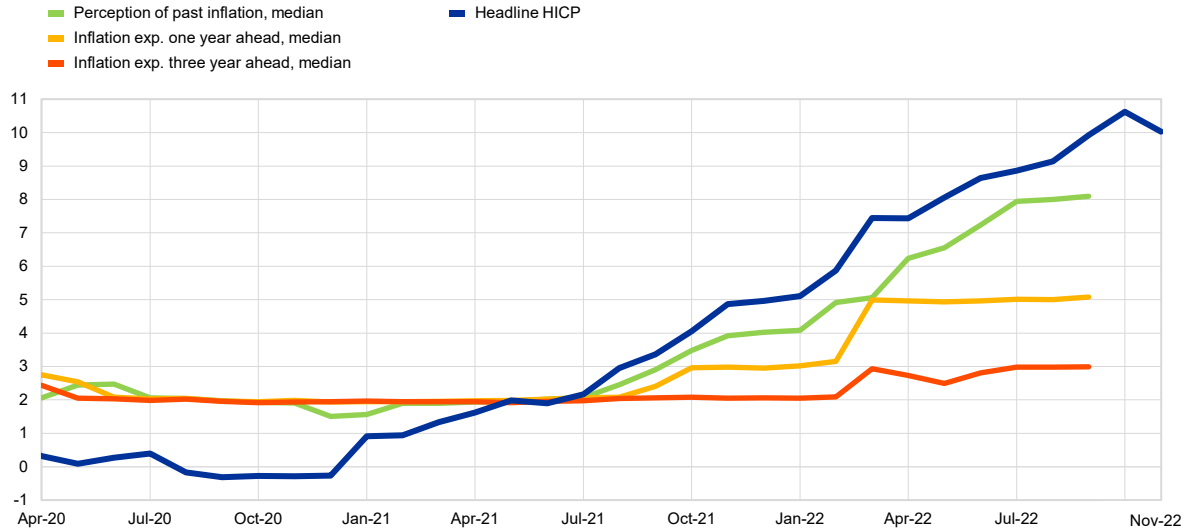
Sources: ECB Consumer Expectations Survey (CES) and Eurostat.
The latest observations are for November (flash) for HICP inflation and September 2022 wave for CES expectations.
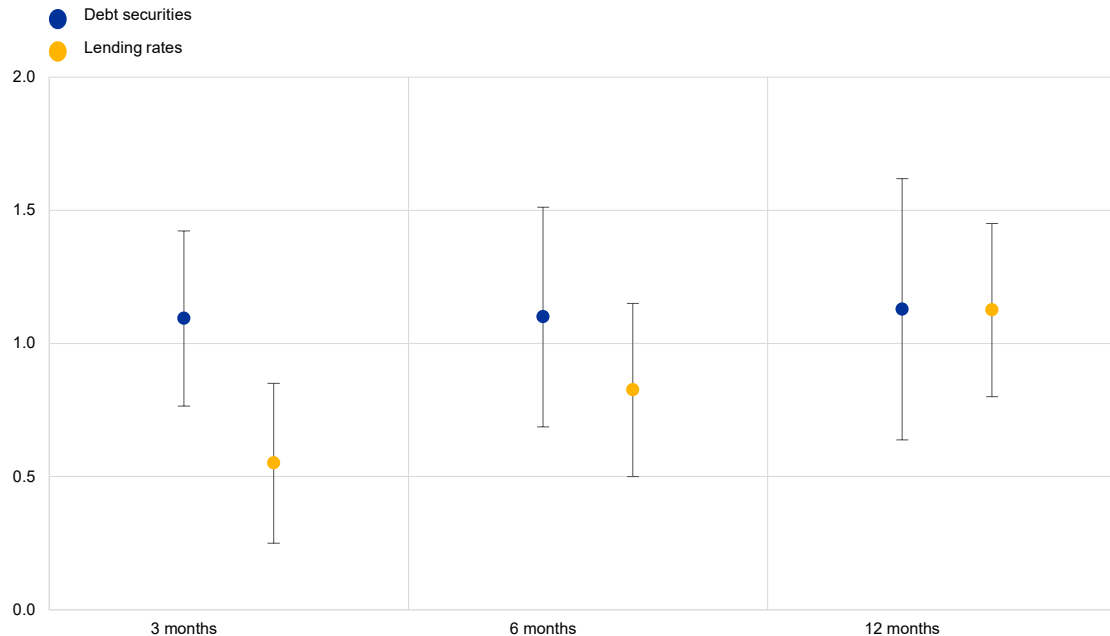
Chart 31

Distribution of consumer inflation expectations 3-year ahead
(annual percentage changes)

Sources: ECB Consumer Expectations Survey.

Chart 32
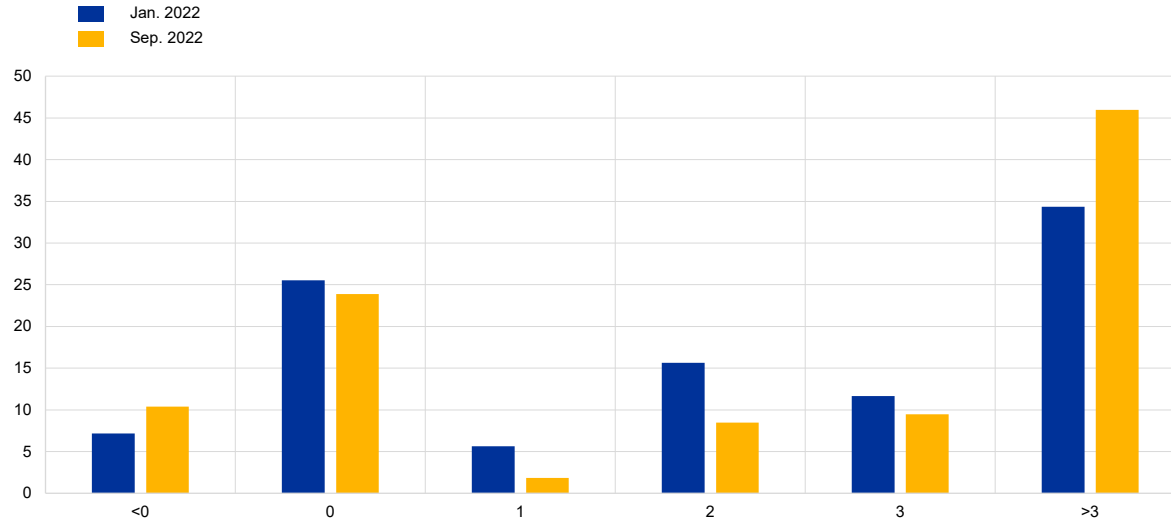
## Pass-through of changes in market rates to lending and debt securities rates over time

(x-axis: time horizon; y-axis: percentages)

● Debt securities
● Lending rates

Sources: ECB (MIR, BSI), IHS Markit iBoxx and ECB calculations.
Notes: Estimates of lending rates pass-through are from Altavilla, C, F. Canova and Ciccarelli M., Mending the broken link: Heterogeneous bank lending rates and monetary policy pass-through, Journal of Monetary Economics 2020, Volume 110, 2020, Pages 81-98.

Chart 33

Ratio between bonds and loans for firms in the euro area versus United States
(ratio of outstanding amounts)

- ■ June 2022
- ● Historical average
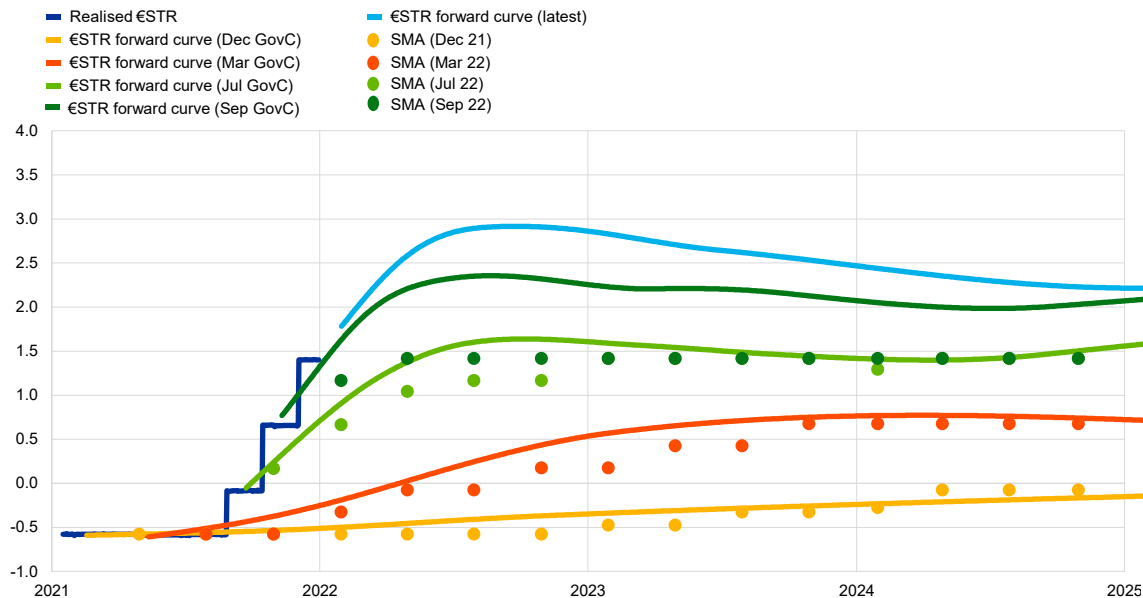- ● Pre-Global Financial Crisis average
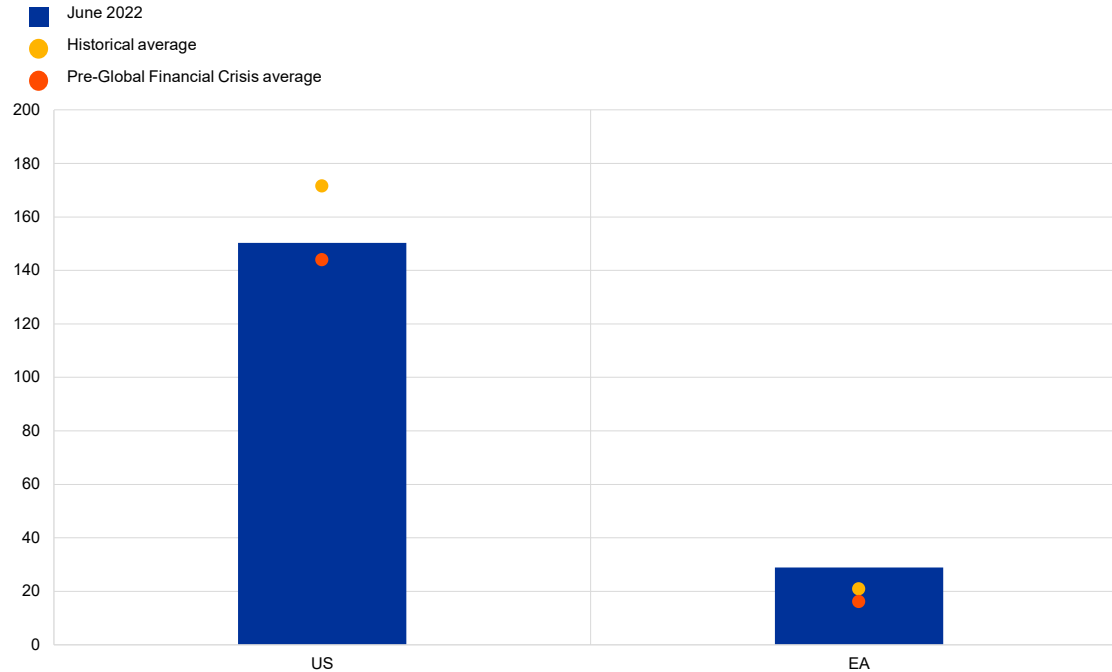
Sources: ECB and Federal Reserve Board.
Latest observation: 2022 Q2.

Chart 34

Household debt: Euro area versus United States
(percentage over GDP)

- ■ June 2022
- ● Historical average
- ● Pre-Global Financial Crisis average
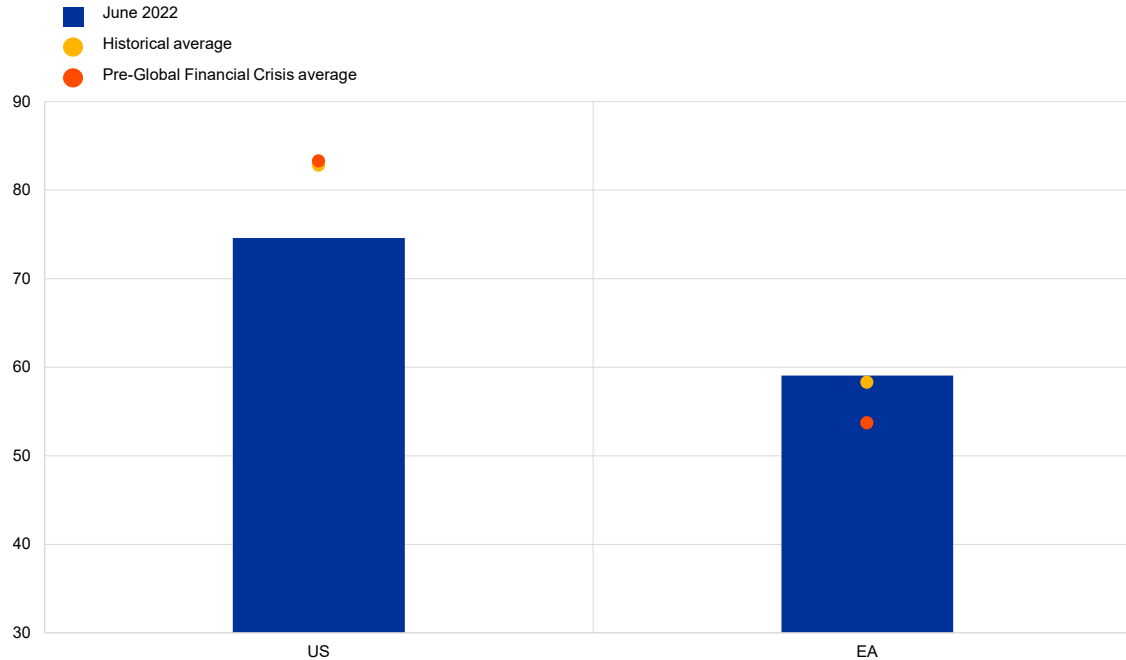
Sources: ECB, Federal Reserve Board and Bureau of Economic Analysis.
Latest observation: 2022 Q2.

Chart 35

€STR forward curve and survey expectations on the deposit facility rate
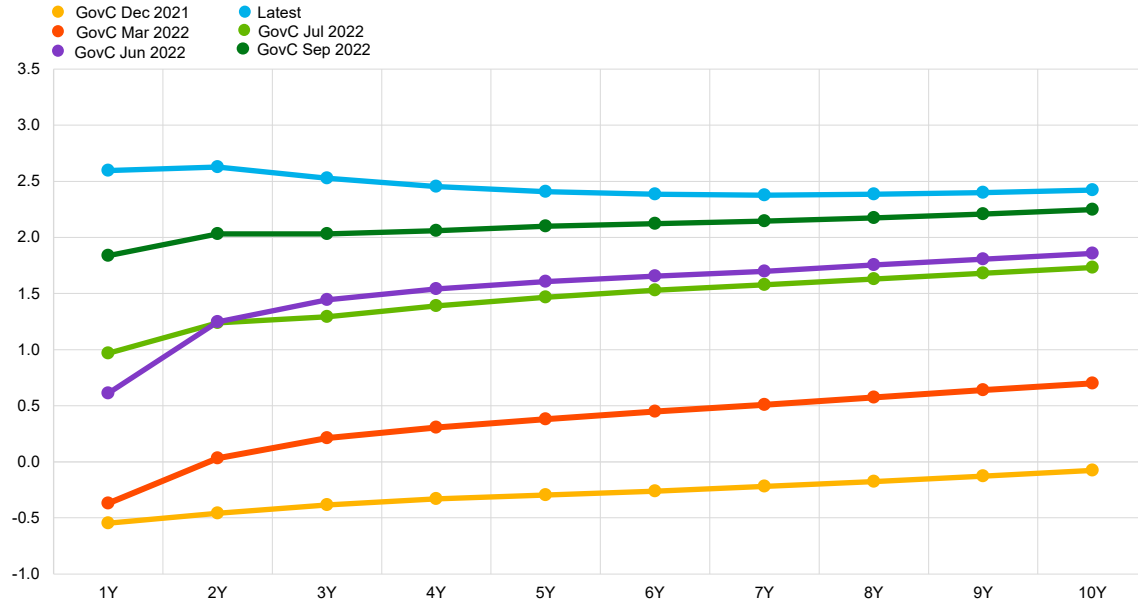*(percentages per annum)*

Legend:
- ■ Realised €STR
- ■ €STR forward curve (Dec GovC)
- ■ €STR forward curve (Mar GovC)
- ■ €STR forward curve (Jul GovC)
- ■ €STR forward curve (Sep GovC)
- ■ €STR forward curve (latest)
- ● SMA (Dec 21)
- ● SMA (Mar 22)
- ● SMA (Jul 22)
- ● SMA (Sep 22)

Sources: Bloomberg, Refinitiv, and ECB calculations.
Notes: The dots depict the median of responses to the SMA on most likely future deposit facility rates. Surveys are adjusted for the euro short-term rate (€STR) vs. deposit facility rate (DFR) spread.
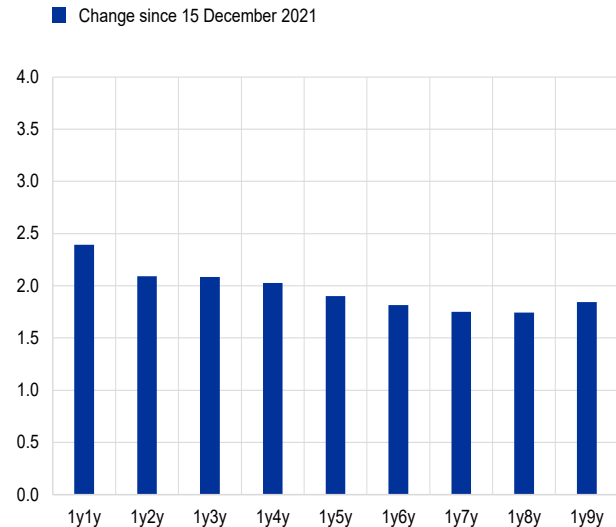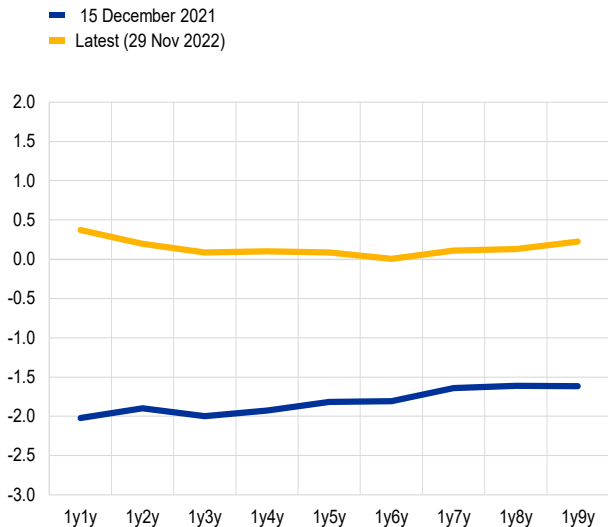Latest observation: 29 November 2022 for realised €STR.

Chart 36

OIS yield curves
(percentages per annum)

Legend:
- GovC Dec 2021
- GovC Mar 2022
- GovC Jun 2022
- Latest
- GovC Jul 2022
- GovC Sep 2022

Sources: Refinitiv, ECB calculations.
Latest observation: 29 November 2022.

Chart 37

Term structure of real forward rates
(percentages per annum)

Legend (left chart):
- 15 December 2021
- Latest (29 Nov 2022)

Legend (right chart):
- Change since 15 December 2021

Sources: Refinitiv and ECB calculations.
Notes: Real forward rates are calculated by subtracting the inflation-linked swap forward rates from the nominal OIS forward rates for each maturity.
Latest observation: 29 November 2022.

Chart 38

10-year sovereign yield spreads over OIS rates
(percentages per annum)

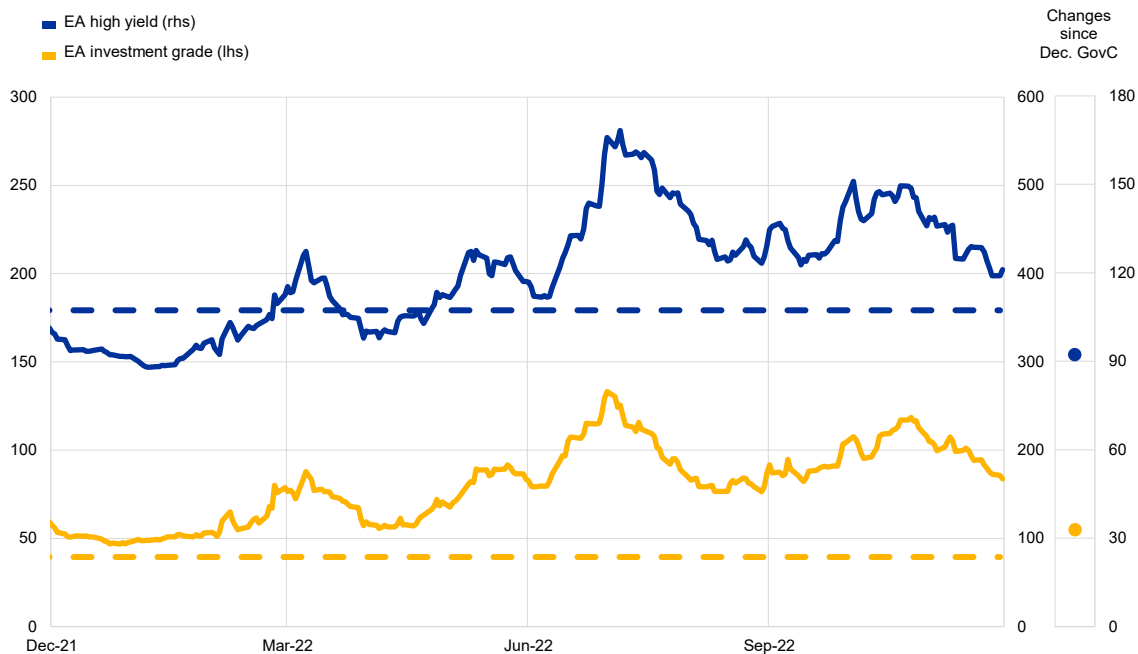Legend: DE, ES, FR, EA (GDP-weighted), IT
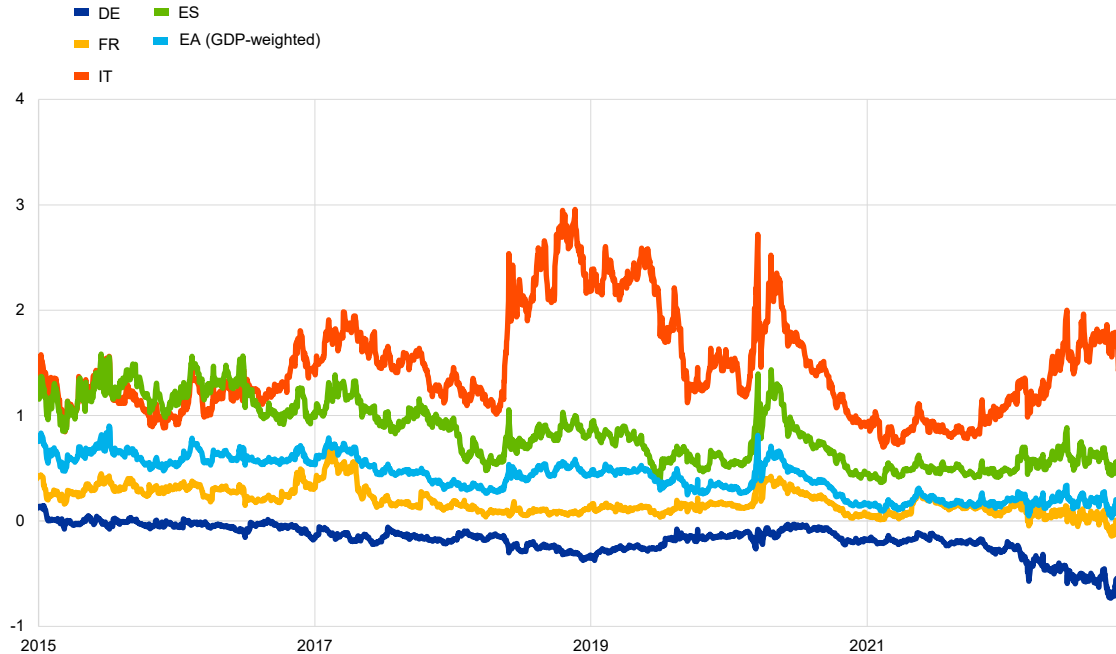
Sources: Refinitiv and ECB calculations.
Notes: The spread is the difference between individual countries' 10-year sovereign yields and the 10-year OIS rate.
Latest observation: 29 November 2022.

Chart 39

Euro area and US corporate bond spreads
(basis points)

- EA high yield (rhs)
- EA investment grade (lhs)

Changes since Dec. GovC

Sources: iBoxx, Refinitiv, and ECB calculations
Notes: The spreads are based on indices including companies that issue bonds in EUR, without strict restriction to their domicile and are calculated as weighted averages of bond spreads over Markit iBoxx swap curve (EA). The dashed lines show the long-term average between Jan 2015 and Nov 2021.
Latest observation: 29 November 2022.

Chart 40

Estimated semi-elasticities of house prices and housing investment to a 1 percentage point increase in the mortgage rate
(percentages)

a) House prices

b) Housing investment
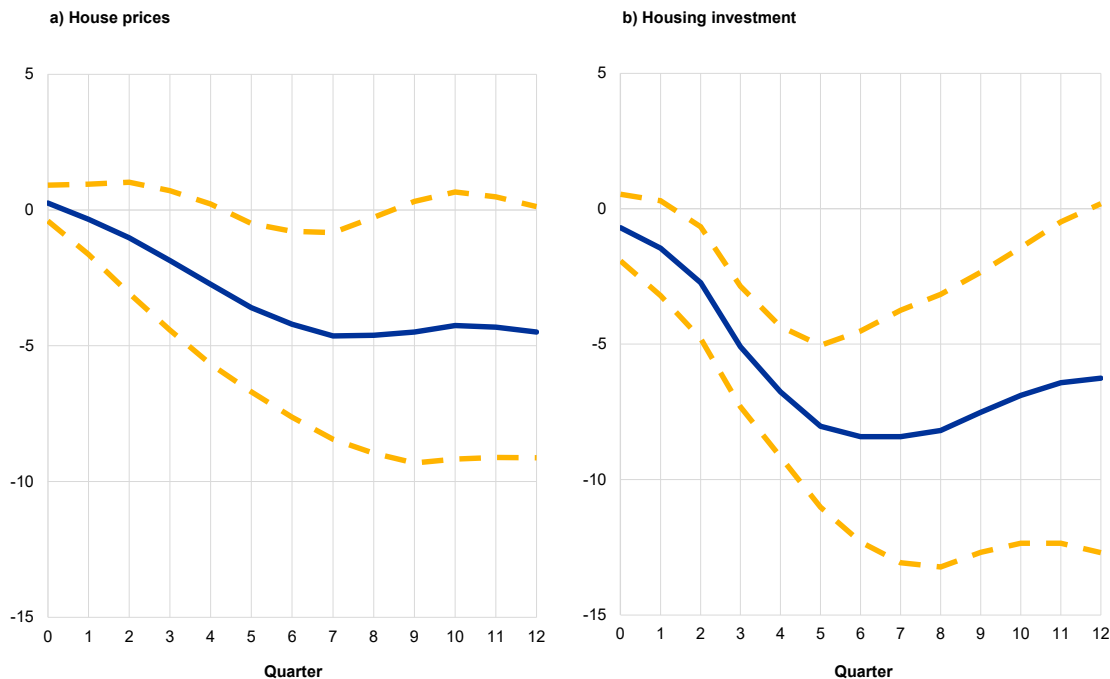
Sources: Eurostat, ECB and ECB staff calculations based on Battistini, Gareis and Roma (2022).
Notes: The charts show "smoothed" estimated semi-elasticities of house prices and housing investment to a 1 percentage point increase in the mortgage rate, using linear local projections. The projections include real GDP, the HICP, a short-term interest rate and housing loans as control variables and are estimated for the period running from the first quarter of 1995 to the last quarter of 2019 (i.e. excluding the period of the COVID-19 crisis). "Smoothed" refers to centred three-period moving averages of the estimated semi-elasticities, excluding the initial and final points. The dashed lines refer to the 90% confidence bands.

Chart 41

Average bank funding costs of euro area banks
(percentages per annum)
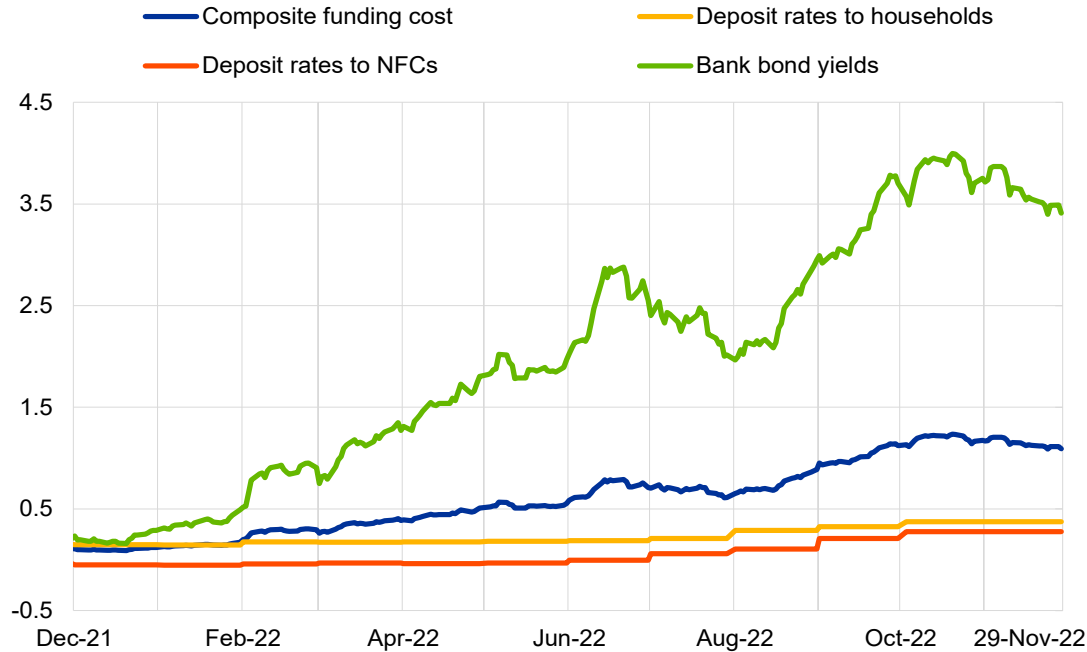
Sources: ECB (MIR, BSI), IHS Markit iBoxx and ECB calculations.
Notes: The composite funding cost is the weighted average of the cost of deposits and market debt funding, with the respective outstanding amounts on bank balance sheets used as weights. Deposit rates are on new business. The latest available data for deposit rates has been used, in order to extend the time interval of consideration up to the latest available date for bank bond yields. Latest observation: September 2022 for BSI and MIR; 29 November 2022 for iBoxx.

Chart 42

Developments in lending rates for new loans of euro area firms and households for house purchase
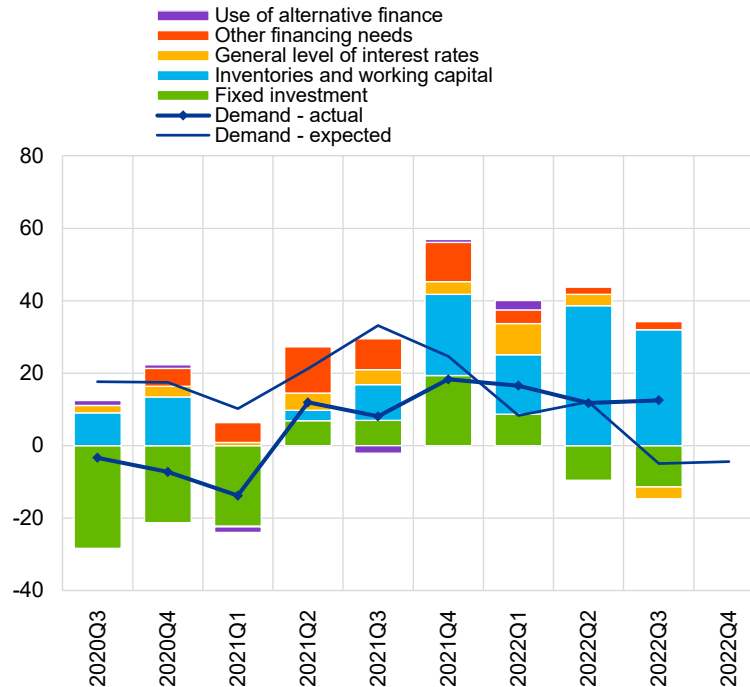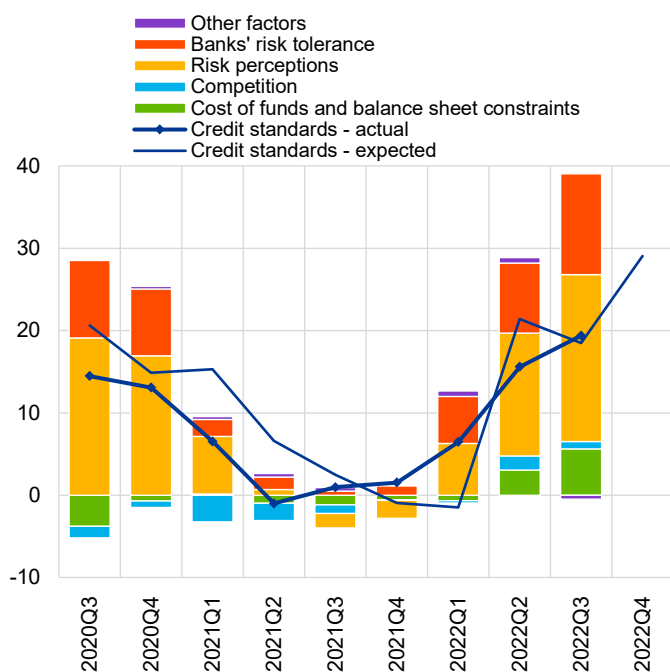*(percentages per annum)*
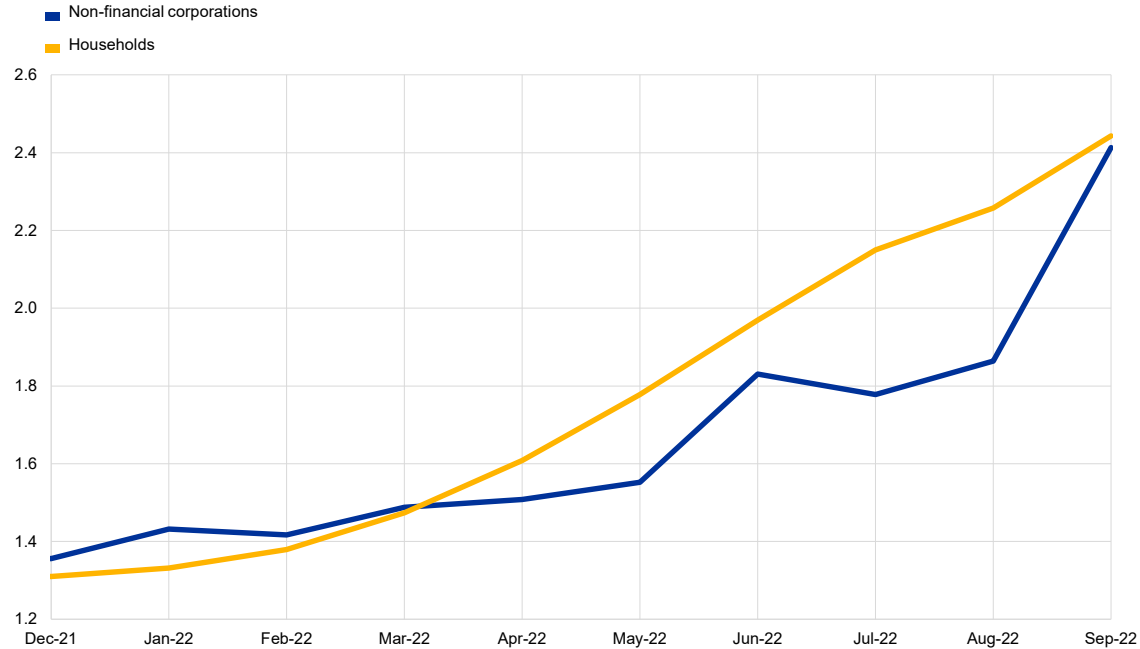
Sources: ECB (MIR).
Notes: The indicator for the total cost of borrowing for firms and for households for house purchase is calculated by aggregating short-term and long-term rates using a 24-month moving average of new business volumes.
Latest observation: September 2022.

Chart 43

Credit standards on loans to euro area firms (left panel) and demand for loans to firms (right panel) and contributing factors
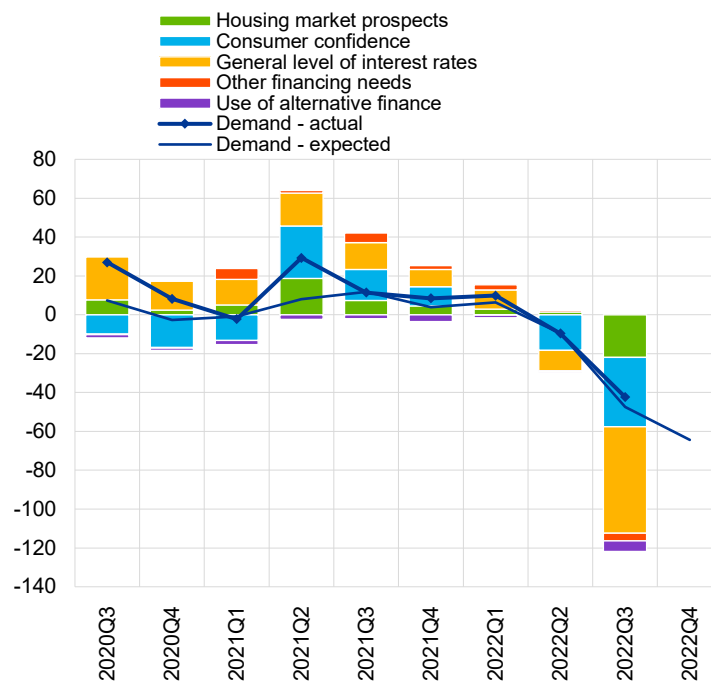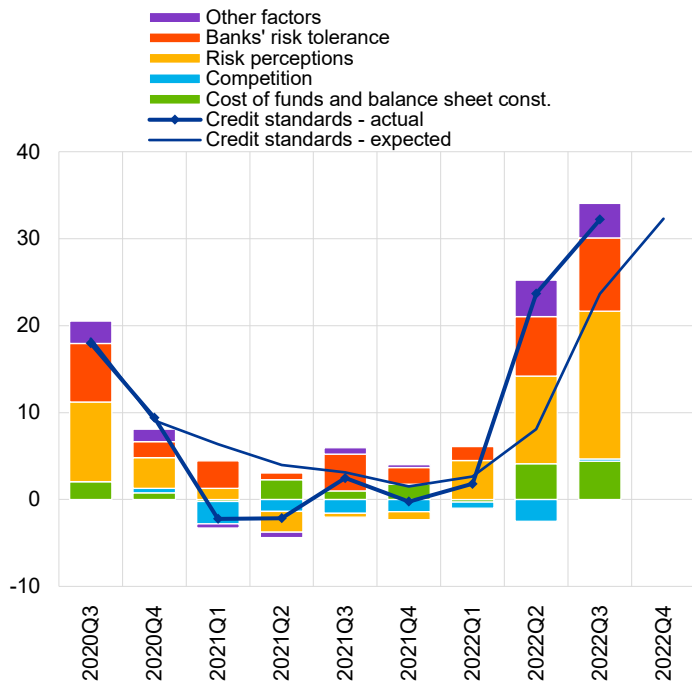*(net percentages)*

Source: ECB (BLS).
Notes: "Actual" values refer to changes reported by banks over the past three months, while "expected" values are changes anticipated by banks over the next three months. Net percentages for the questions on credit standards are defined as the difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat" and the sum of the percentages of banks responding "eased somewhat" and "eased considerably". Net percentages for the questions on demand for loans are defined as the difference between the sum of the percentages of banks responding "increased considerably" and "increased somewhat" and the sum of the percentages of banks responding "decreased somewhat" and "decreased considerably". The net percentages for "other factors" refer to further factors which were mentioned by banks as having contributed to changes in credit standards.
Latest observation: October 2022 BLS.

Chart 44

Credit standards on loans to euro area households for house purchase (left panel) and demand for loans to households for house purchase (right panel) and contributing factors

(net percentages)

Source: ECB (BLS).
Notes: "Actual" values refer to changes reported by banks over the past three months, while "expected" values are changes anticipated by banks over the next three months. Net percentages for the questions on credit standards are defined as the difference between the sum of the percentages of banks responding "tightened considerably" and "tightened somewhat" and the sum of the percentages of banks responding "eased somewhat" and "eased considerably". Net percentages for the questions on demand for loans are defined as the difference between the sum of the percentages of banks responding "increased considerably" and "increased somewhat" and the sum of the percentages of banks responding "decreased somewhat" and "decreased considerably". The net percentages for "other factors" refer to further factors which were mentioned by banks as having contributed to changes in credit standards.
Latest observation: October 2022 BLS.