Gauging (dis)inflationary pressures: comparing tools and current findings

João Sousa

SUERF, 10 February 2023

Monitoring inflation: available tools

Monitoring inflation: available tools - a non-exhaustive overview

| Tools	Examples
• Data on prices and costs	HICP; HICP breakdown; Producer Price Indices; wages; surveys of inflation expectations
• Decompositions and statistical transformations of data	Indicators of underlying inflation; Heatmaps; measures of inflation compensation
• Time Series Models	ARIMA; Factor models; VARs; BVARS; Machine Learning (e.g. Random Forest, Regression Trees, Neural Networks)
• Semi-Structural models	ECB BASE model; Philips curve;
• Structural models	DSGE models. E.g.: New Area Wide Model (NAWM)
• Projection exercises	ECB/Eurosystem Macroeconomic Projection Exercises (quarterly)

Inflation momentum for HICP and sub-components
(annual percentage change; annualised 3m-o-3m percentage change)
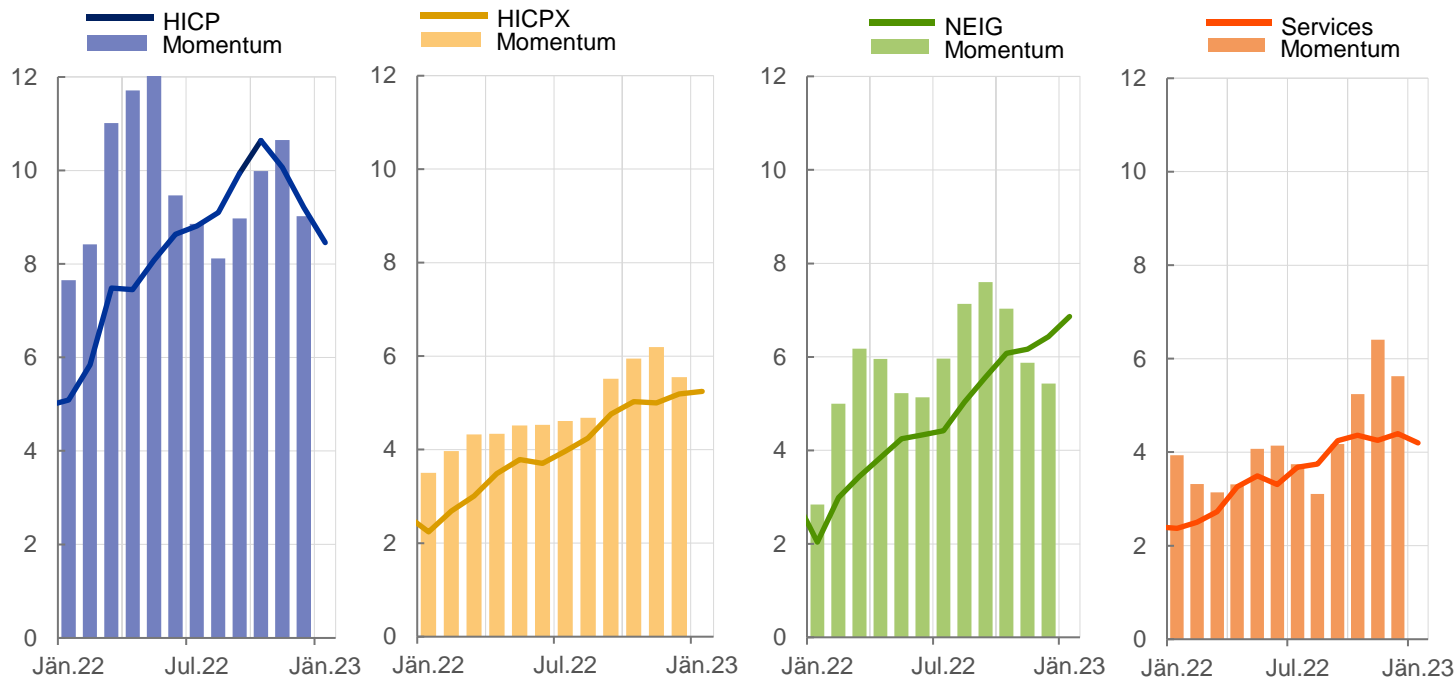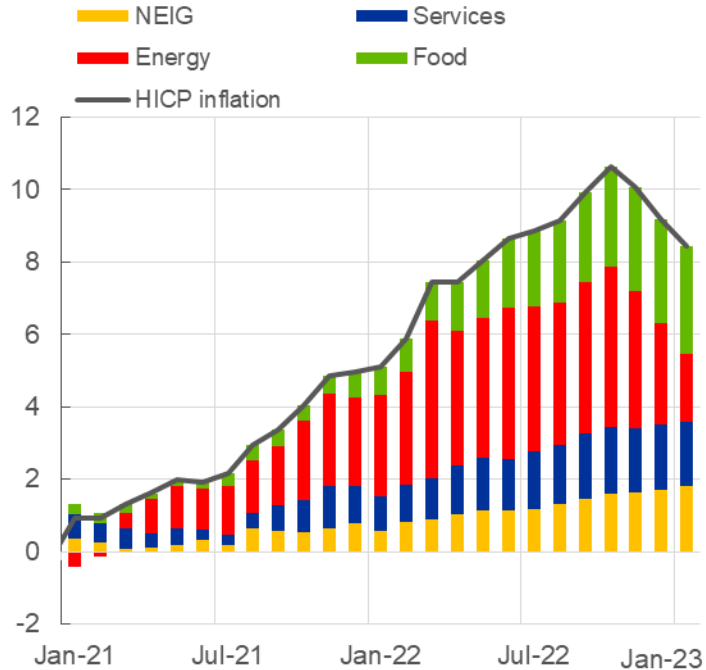

Sources: Eurostat and ECB calculations.
Note: Seasonally-adjusted data. NEIG: Non-Energy Industrial Goods. HICPX: HICP excluding food and energy.
Latest observation: January 2023 (flash).

Energy price changes spill over to other inflation components
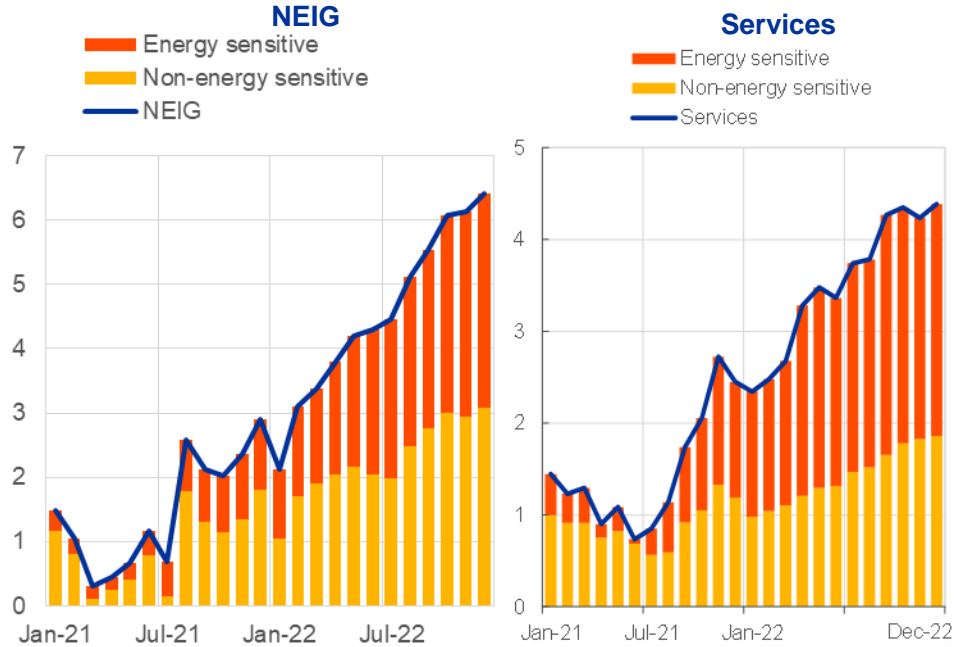
Headline inflation
(annual percentage changes and percentage point contributions)

Sources: Eurostat and ECB staff calculations.
Latest observations: January 2023 (flash).

NEIG and services inflation
(annual percentage changes and percentage point contributions)

NEIG

Services

Sources: Eurostat and ECB staff calculations.
Note: Energy sensitive component based on items with a share of energy in direct costs above the average energy share across all NEIG/services items. Latest observation: December 2022.

A consistent signal of inflationary risks across many measures

Indicators of underlying inflation

Permanent Exclusion Measures

- HICPX
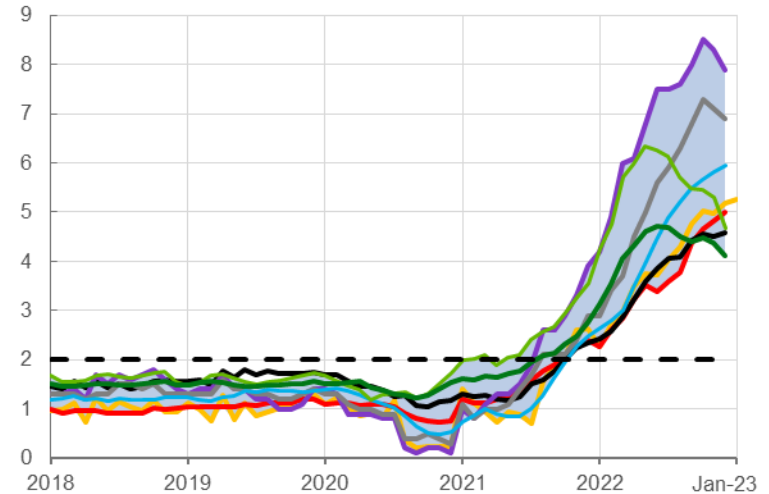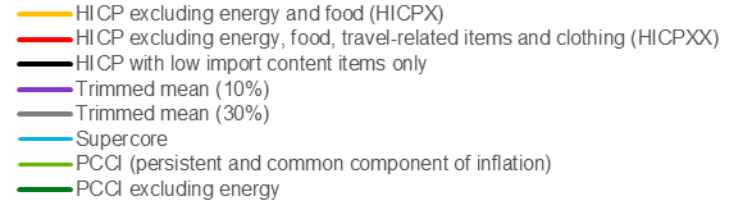- HICPXX

Temporary Exclusion Measures

- Trimmed Mean (10%; 30%)

Frequency Exclusion Measures

- **PCCI:** uses a dynamic factor model to capture the persistent and common component of inflation rates across euro area countries and sub-items.

- **Supercore:** picks out those items that are deemed sensitive to slack

Indicators of underlying inflation
(annual percentage changes)

HICP excluding energy and food (HICPX)
HICP excluding energy, food, travel-related items and clothing (HICPXX)
HICP with low import content items only
Trimmed mean (10%)
Trimmed mean (30%)
Supercore
PCCI (persistent and common component of inflation)
PCCI excluding energy

Sources: Eurostat and ECB staff calculations. .
Latest observation: January 2023 (flash) for HICPX, December 2022 for the rest.

Inflation Drivers Heatmap
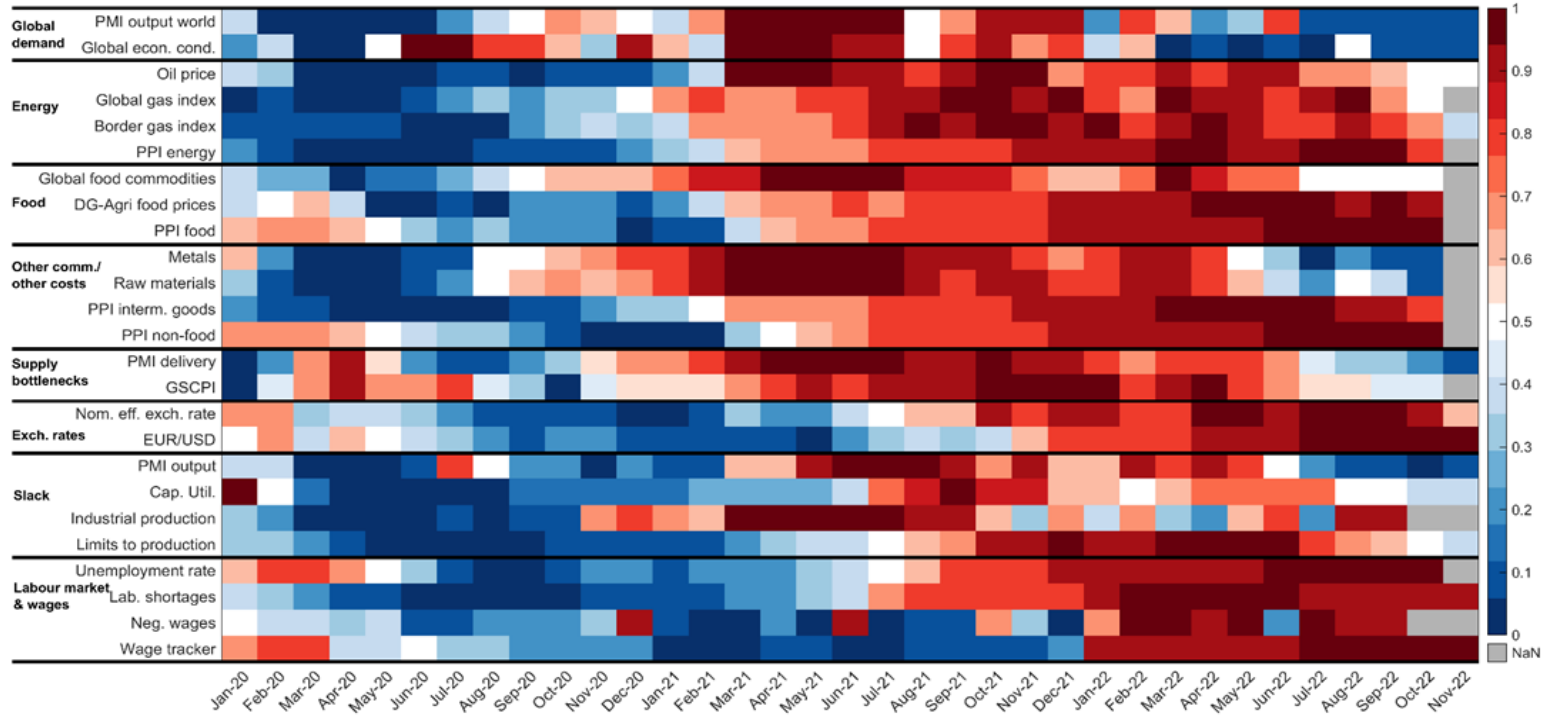
Source: Eurostat, World Bank, SDW, Haver Analytics and ECB staff calculations. Notes: Red can be associated with the risk of high inflation, blue with the risk of low inflation, grey with no data. The colours have been assigned based on where each indicator lies in comparison to past readings starting 2018 (the historical distributions were split into 11 areas with equal empirical probabilities). Most of the variables are expressed in annual growth rates. The exceptions are PMIs, unemployment rate, the Global Supply Chain Pressure Index (GSCPI) from the NY Fed, negotiated wages, the wage tracker, Global economic conditions, EC Limits to production (insufficient demand), capacity of utilisation and labour shortages, where no transformation is applied.

Despite the recent increase in inflation, longer-term expectations remain around 2%
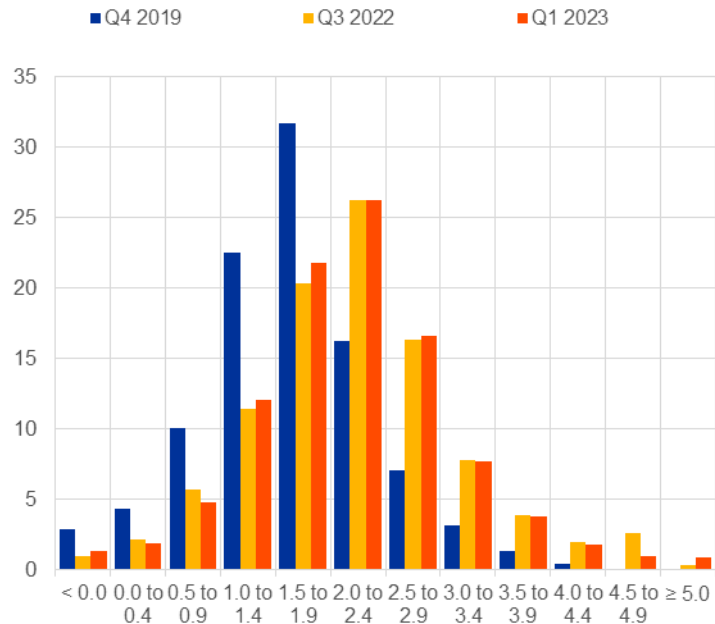
SPF inflation expectations profile
(annual percentage changes)
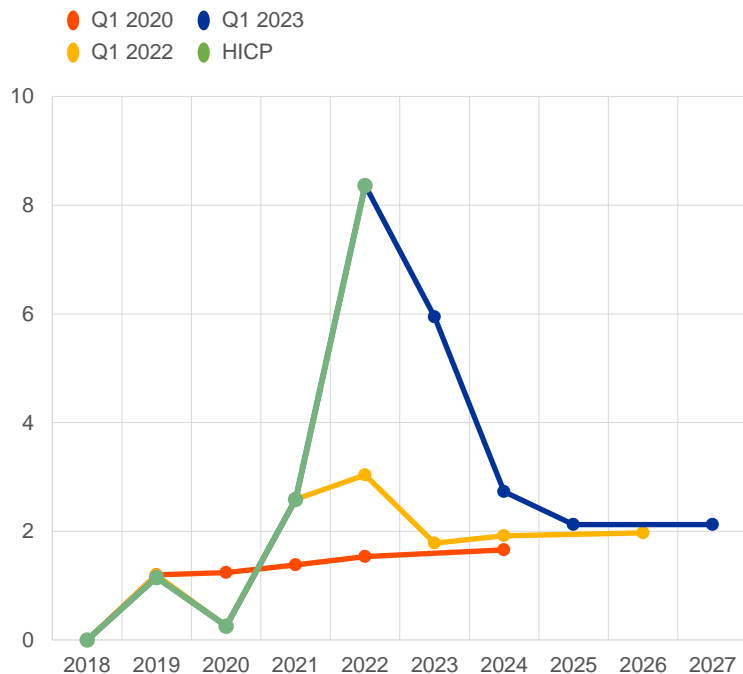
Sources: Survey of Professional Forecasters (SPF), Eurostat
Latest observation: 2027.

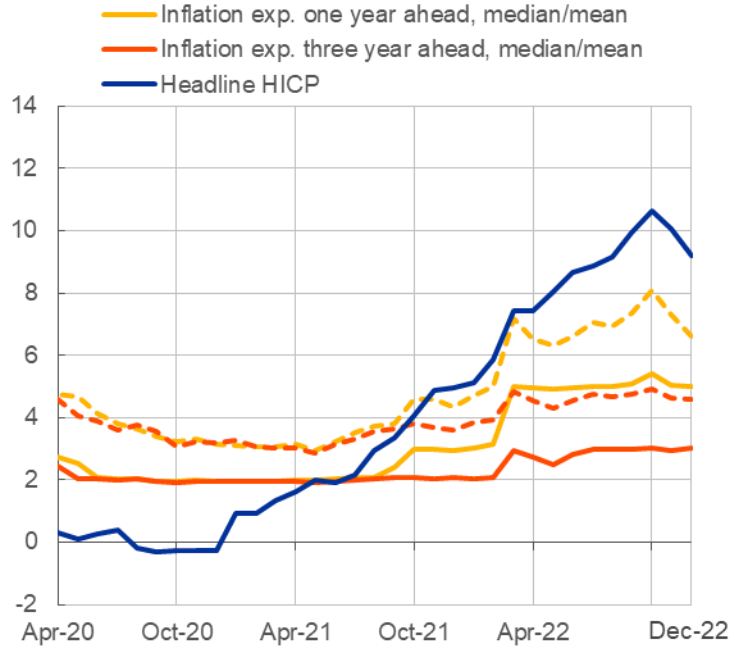## Aggregate probability distribution for SPF longer term inflation expectations
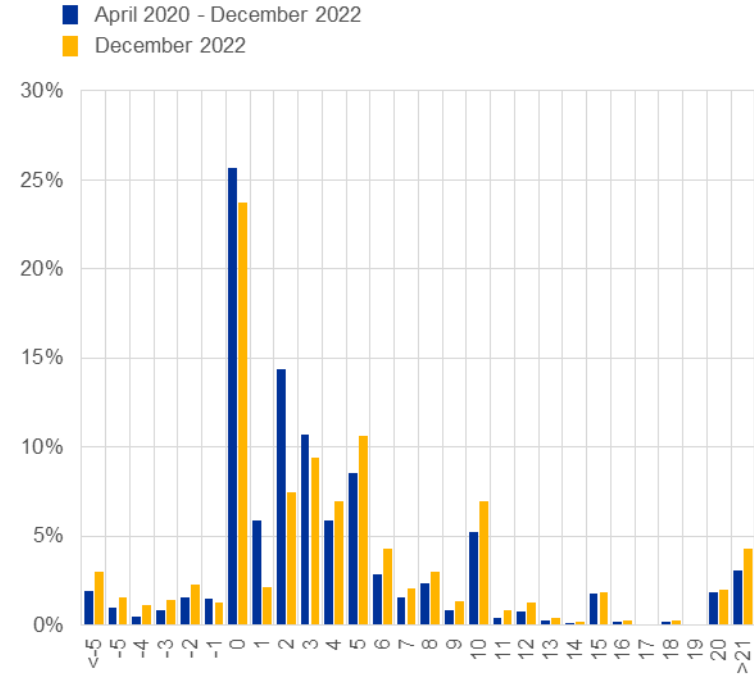### (Probabilities)

Sources: SPF

Consumer inflation expectations are higher than professionals' but slope downward

ECB consumer expectations survey
(annual percentage changes)

Legend:
- Inflation exp. one year ahead, median/mean
- Inflation exp. three year ahead, median/mean
- Headline HICP

Source: ECB CES.
Note: Solid/dashed lines represent the median/mean.
Latest observations: December 2022.

Distribution of consumer inflation expectations 3-year ahead
(percent of responses)

Legend:
- April 2020 - December 2022
- December 2022

Source: ECB CES.
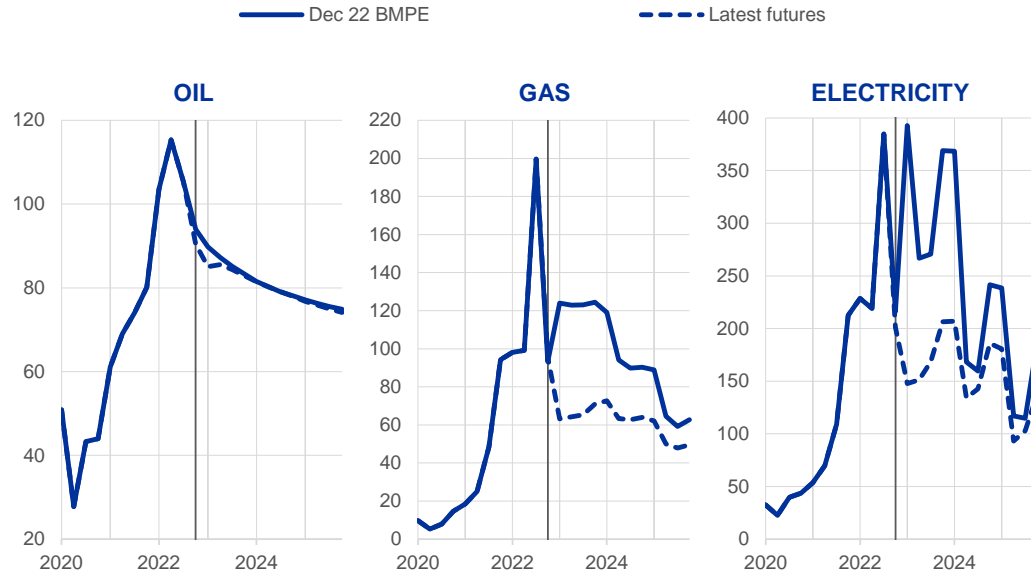Latest observations: December 2022.

How has the toolkit changed?

A more granular approach to modelling energy inflation

Energy commodity prices
(oil price in USD/barrel, gas and electricity price in EUR/MWh)

—— Dec 22 BMPE   - - - - Latest futures

**OIL**

GAS

ELECTRICITY

Source: Refinitiv and ECB staff calculations.
Notes: Technical assumptions for energy commodity prices are based on futures prices averaged over the ten working days preceding the cut-off date.
The cut-off date for assumptions of the December 2022 BMPE was 23 November 2022, latest futures refer to 24 January 2023.

Energy inflation decomposition
(annual percentage changes; percentage point contributions)

Other
Gas
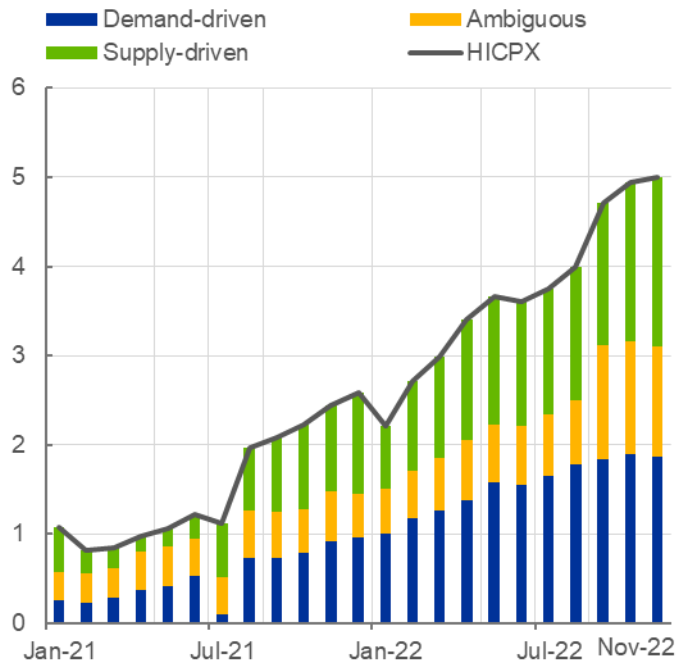Electricity
Fuel
—— Energy
- - - Energy long-term average
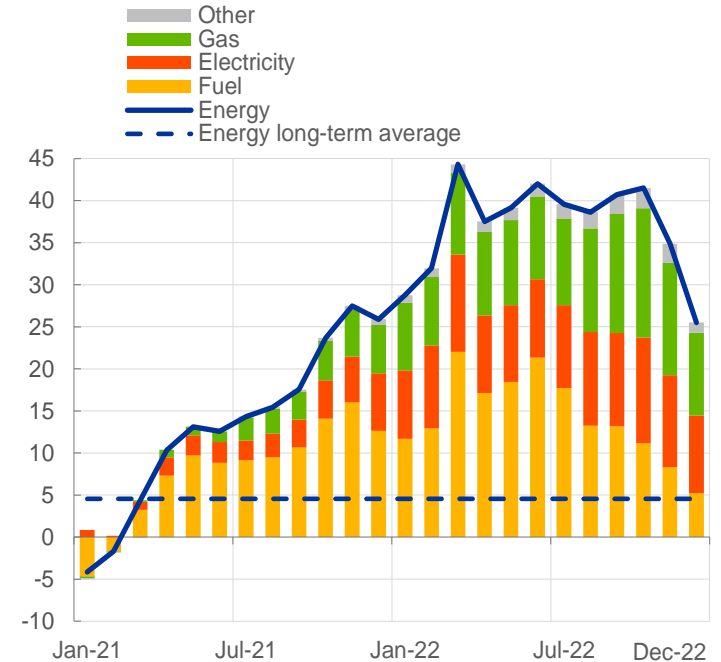
Sources: Eurostat and ECB calculations.
Latest observations: December 2022

The nature of shocks and the sources of inflation persistence matter

HICPX inflation — decomposition into supply and demand-driven contributions

(annual percentage changes and percentage point contributions)

Sources: Eurostat and ECB calculations.
Notes: Seasonally adjusted data. Decomposition based on Shapiro, A.H. (2022). HICPX inflation is the sum of demand-driven, supply-driven and ambiguous components, calculated as the trailing sum of the last 12 monthly contributions. The recent increase in the "ambiguous" component is due to the series "combined passenger transport" and can be linked to the end of the 9 euro ticket in Germany. While price data are available for December 2022, the latest observation is for November 2022 as the turnover series used as a proxy for activity are published with some delay. Latest observation: November 2022.

HICPX inflation — decomposition into wage-intensive and non-wage-intensive items

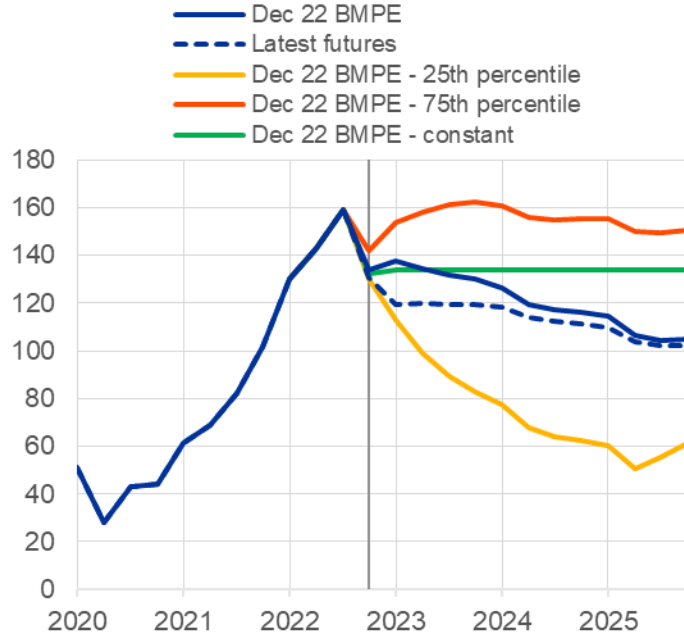(annual percentage changes and percentage point contributions)
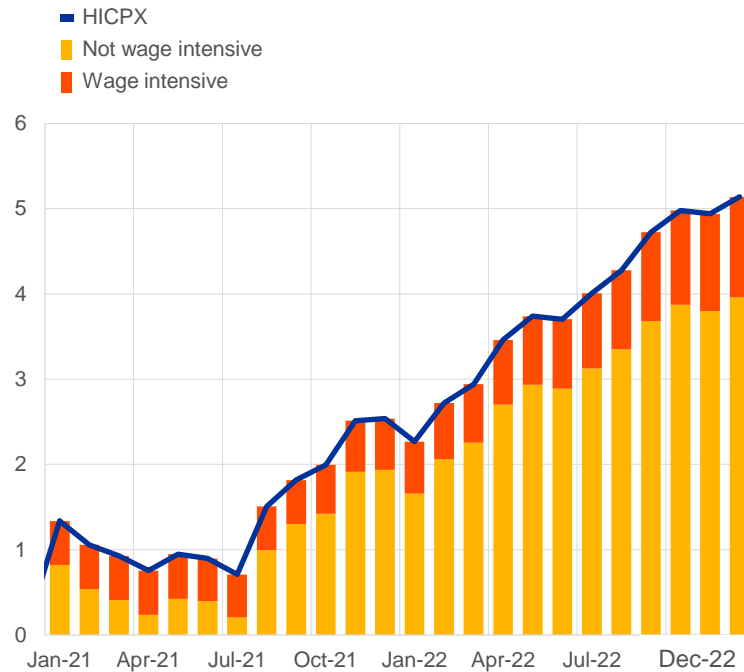
Sources: Eurostat and ECB staff calculations.
Note: HICPX wage sensitive items are a composite measure based on items with a share of wages in direct costs above 40%.
Latest observation: December 2022.

Enhanced sensitivity analysis for energy prices

Synthetic energy commodity index
(USD/barrel)

Legend:
- Dec 22 BMPE
- Latest futures
- Dec 22 BMPE - 25th percentile
- Dec 22 BMPE - 75th percentile
- Dec 22 BMPE - constant

HICP inflation projections conditional on alternative synthetic energy index paths
(y-o-y % change)

Legend:
- December 2022 BMPE
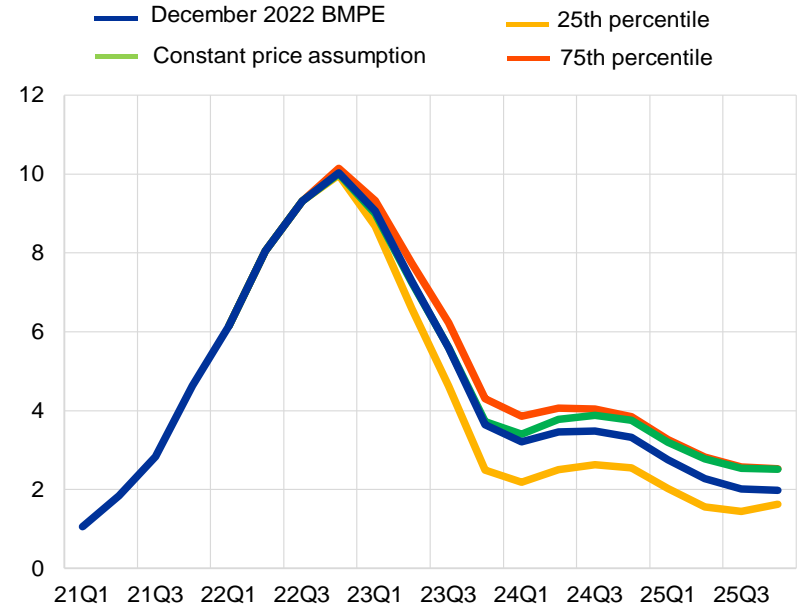- Constant price assumption
- 25th percentile
- 75th percentile

Source: Refinitiv and ECB staff calculations.
Notes: Technical assumptions for energy commodity prices are based on futures prices averaged over the ten working days preceding the cut-off date.
The cut-off date for assumptions of the December 2022 BMPE was 23 November 2022, latest futures refer to 24 January 2023.

Sources: ECB calculations.
Note: The results are reported as averages of the standard elasticities from the Eurosystem macroeconomic projection models, the ECB-BASE model and the NAWM II model.

Scenarios help decision makers when uncertainty is driven by uncertain future states of the world
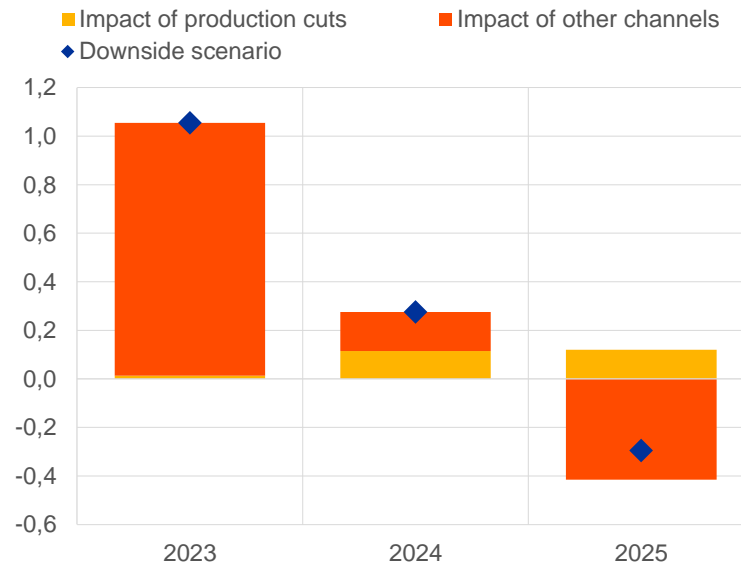
Impact on real GDP growth
(deviations from the December 2022 baseline projections, in percentage points)

■ Impact of production cuts ■ Impact of other channels
◆ Downside scenario
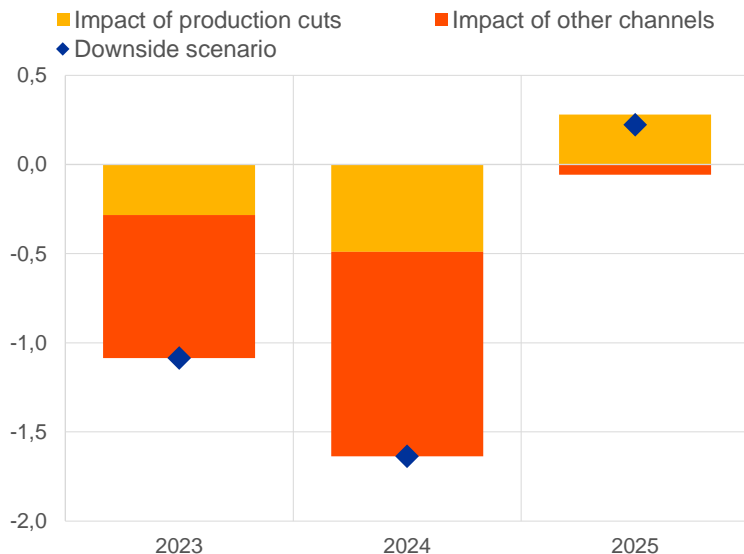
Impact on HICP inflation
(deviations from the December 2022 baseline projections, in percentage points)

■ Impact of production cuts ■ Impact of other channels
◆ Downside scenario

annual percentage changes	December 2022 baseline projections			Downside scenario		
	2023	**2024**	**2025**	**2023**	**2024**	**2025**
Real GDP	0.5	1.9	1.8	-0.6	0.2	2.0
HICP	6.3	3.4	2.3	7.4	3.6	2.0
HICP excluding energy and food	4.2	2.8	2.4	4.3	3.0	2.4

Source: Eurosystem staff projections and ECB calculations. December 2022 Eurosystem staff projections article, Box 3.
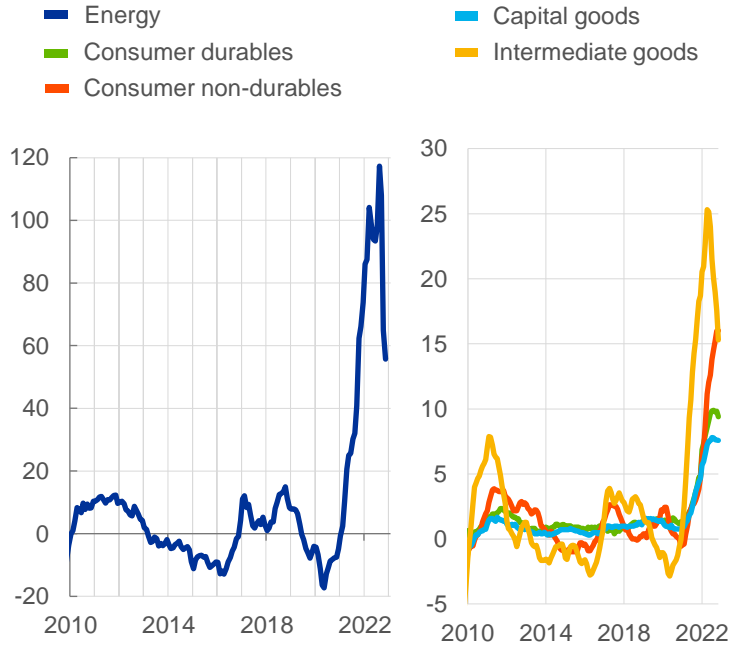
What do the tools suggest on sources of inflation going forward?

# An updated model of pass-through of pipeline pressures

PPI developments
(annual percentage changes)

- **■ Energy**
- **■ Consumer durables**
- **■ Consumer non-durables**
- **■ Capital goods**
- **■ Intermediate goods**

Sources: Eurostat, ECB calculations.
Latest observation: November 2022.

IPPI for Food and NEIG
(annual percentage changes)

- **— IPPI for food (PPI to Dec22)**
- **— IPPI for NEIG (PPI to Dec22)**
- **— HICP food**
- **— HICP NEIG**
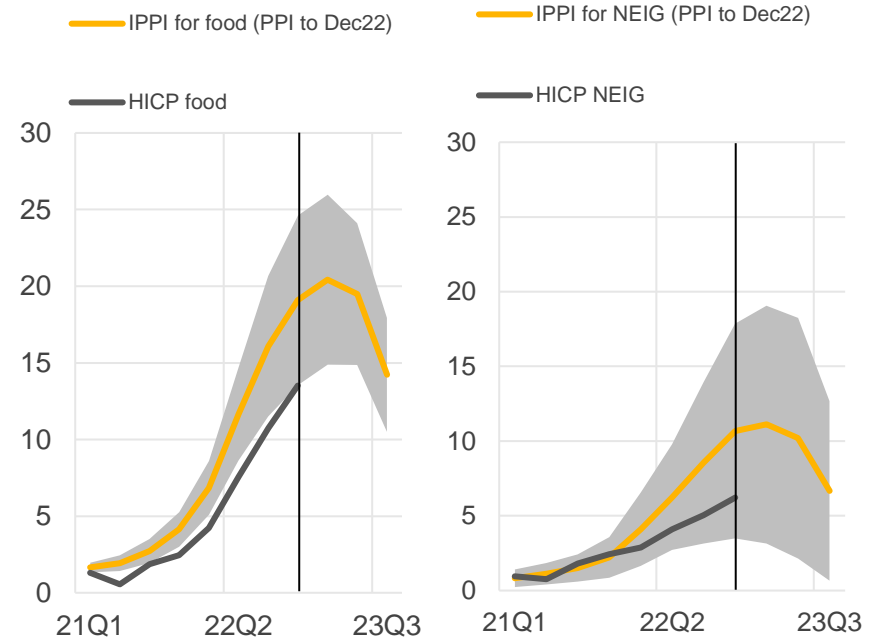
Source: ECB staff estimates.
Notes: Shaded area shows the 95% confidence interval for the IPI. Computed based on G.Koester, I.Rubene, E. Gonçalves and J. Nordeman (2021), Economic Bulletin Issue 5, Box 7.
Latest observation: 2023Q3 for the December NIPE and the IPPI. IPPI is based on the latest actual PPI data until November 2022; Food and NEIG HICP for 2022Q4 refer to the December outcome.

A wage tracker based on granular information helps to monitor 2nd round effects

ECB and *Indeed*/CBI wage trackers, and negotiated wage growth
(annual percentage changes)

Forward-looking wage tracker: wage growth in 2023 in agreements signed in 2022
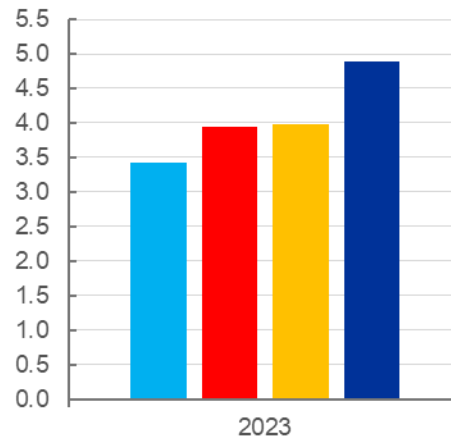(annual percentage changes)
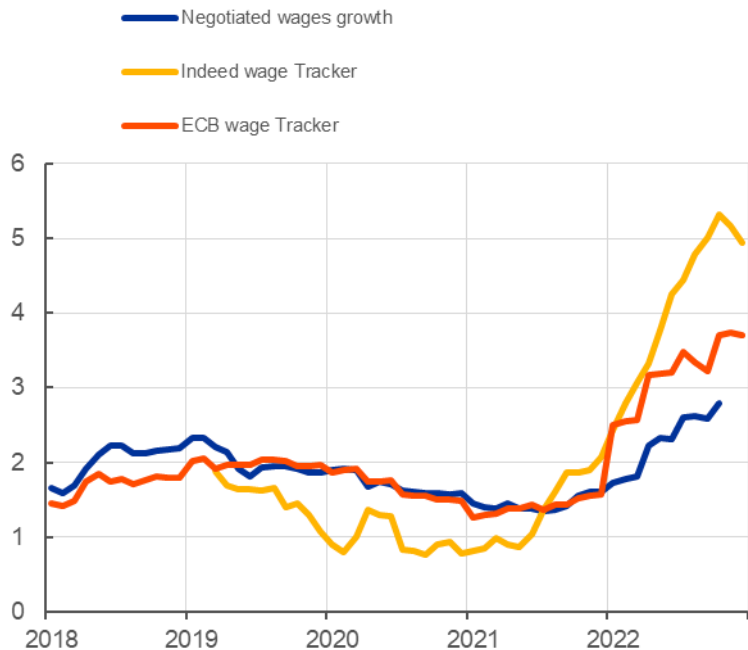
Sources: Eurostat, ECB, national sources. See note RHS chart for ECB wage tracker. The difference between the ECB wage tracker and negotiated wage growth series in 2022 is mostly due to different series of negotiated wage growth for France, with the ECB euro-area tracker using wage growth in sectoral negotiations in France (see: https://webstat.banque-france.fr/en/#/node/5385335). For data on Indeed wage trackers see: https://github.com/hiring-lab/indeed-wage-tracker.
Latest observation: November 2022 for negotiated wages (excluding NL), 22Q4 for the wage trackers."

Sources: Calculated based on micro data on wage agreements provided by Bundesbank, Banco de España, the Dutch employer association (AWVN), Oesterreichische Nationalbank, Bank of Greece, Banca d'Italia and Banque de France. Data for FR based on an updated version of: Gautier, E. (2022): "Negotiated wage rises for 2022: the results so far". Notes: EA aggregate based on ES, IT, GR, AT, DE, NL and FR.

# Fiscal energy measures reduce inflation but increase it once removed

Euro area budget support in response to high energy prices and inflation

■ December 2022 Eurosystem staff projections
● September 2022 ECB staff projections
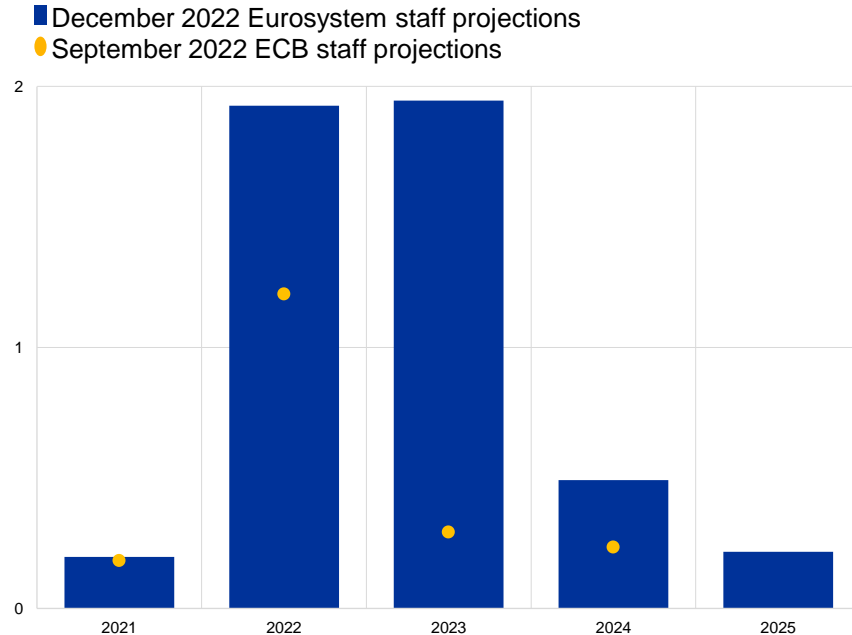
Sources: ECB calculations and staff macroeconomic projections

Impact of discretionary fiscal measures on inflation outlook
(percentage points)

■ Total impact of discretionary fiscal policy measures
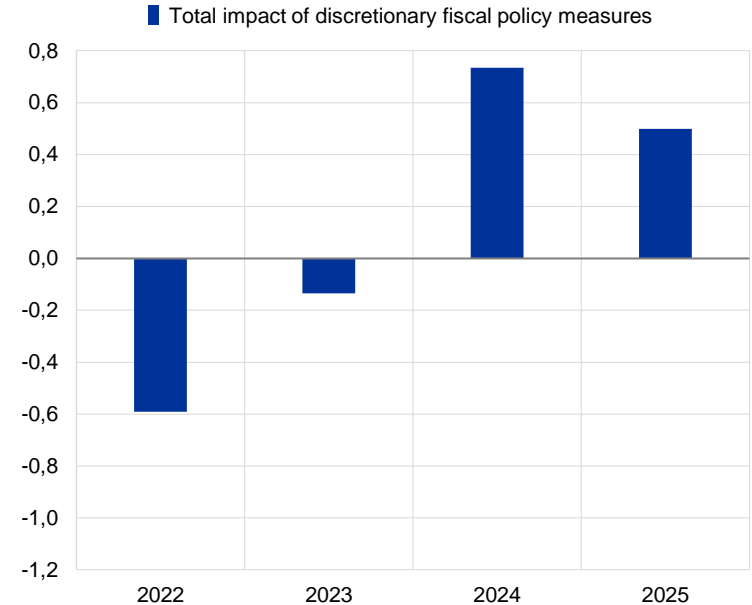
Source: ECB calculations based on structured questionnaire of Working Group of Forecasting
Notes: The bars show the impact of all discretionary fiscal measures included in the December 2022 BMPE baseline.

Thank you!