



BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

There has been an awakening.
The rise (and fall) of inflation in the euro area

by Stefano Neri

March 2024

Number

834



BANCA D'ITALIA
EUROSISTEMA

Questioni di Economia e Finanza

(Occasional Papers)

There has been an awakening.
The rise (and fall) of inflation in the euro area

by Stefano Neri

Number 834 – March 2024

The series Occasional Papers presents studies and documents on issues pertaining to the institutional tasks of the Bank of Italy and the Eurosystem. The Occasional Papers appear alongside the Working Papers series which are specifically aimed at providing original contributions to economic research.

The Occasional Papers include studies conducted within the Bank of Italy, sometimes in cooperation with the Eurosystem or other institutions. The views expressed in the studies are those of the authors and do not involve the responsibility of the institutions to which they belong.

The series is available online at www.bancaditalia.it.

“THERE HAS BEEN AN AWAKENING”.
THE RISE (AND FALL) OF INFLATION IN THE EURO AREA

by Stefano Neri*

Abstract

In the summer of 2021, inflation woke up for the first time in many years. The period of low inflation in the euro area ended abruptly with the recovery from the Covid-19 pandemic and the energy crisis. Supply bottlenecks and energy prices played an important role in pushing up core inflation. Despite the rise in consumer prices, the ECB's monetary policy response helped to re-anchor long-term inflation expectations to the new symmetric 2 per cent target. With expectations well anchored, the risks of second-round effects limited and the downside risks to growth heightened, it is time to take stock of the effects of monetary policy so far and those still to come, and wait for the effects of past shocks on inflation to fade.

JEL Classification: C32, E31, E32, E37.

Keywords: inflation energy prices, supply bottlenecks, long-term inflation expectations, monetary policy.

DOI: 10.32057/0.QEF.2023.0834

* Economic Outlook and Monetary Policy Directorate, Banca d'Italia.

The views expressed in this article are my own and do not necessarily represent the views of Banca d'Italia or the Eurosystem. The article is based on various presentations on inflation and the ECB's monetary policy I made between 2021 and 2023 and borrows extensively from the many analyses by Banca d'Italia's staff. When I started writing the paper in August 2023, evidence in favour of the beginning of the disinflation was just emerging. For this reason, the title included a question mark in the parentheses. As more evidence started emerging, I removed the question mark. I would like to thank Marco Bernardini, Fabio Busetto, Michele Caivano, Martina Cecioni, Cristina Conflitti, Antonio M. Conti, Francesco Corsello, Alessandro Notarpietro, Claudia Pacella, Massimiliano Pisani, Marianna Riggi, Fabrizio Venditti, Eliana Viviano, Giordano Zevi and Roberta Zizza. I also thank Valentina Schirosi for proofreading the paper and Ivano Galli for helping me with the data and charts. E-mail: stefano.neri@bancaditalia.it.

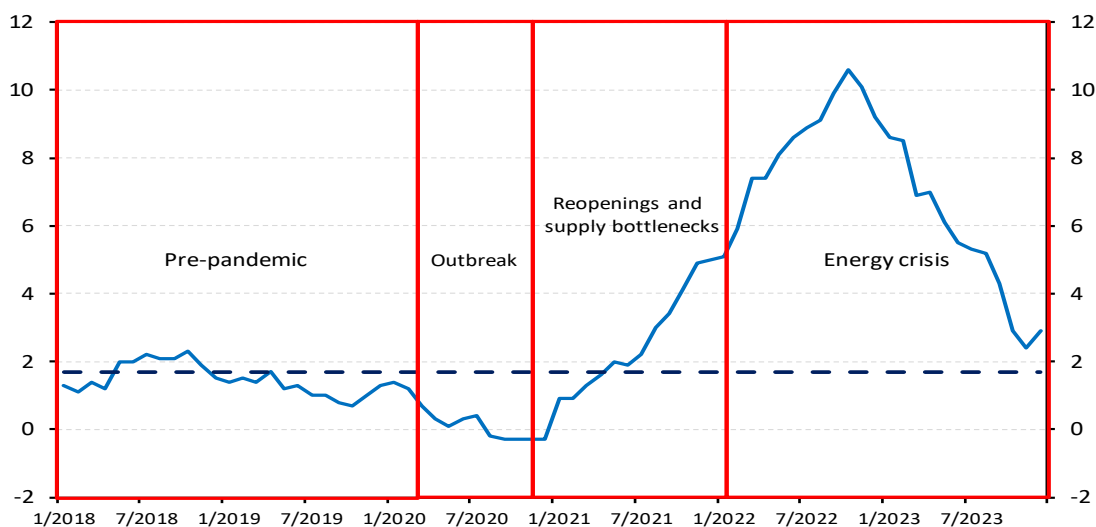
1. Introduction

“There has been an awakening. Have you felt it?”, Supreme Leader Snoke: Star Wars, The Force Awakens.

In all advanced economies, inflation has sharply increased since 2021. Between March and December 2022, inflation in OECD countries rose to an average of 10 per cent, up from 1.3 between April and December 2020. These developments can be attributed to several common factors, including the outbreak of the Covid-19 pandemic, the reopening of the economies resulting in global supply bottlenecks, and the energy shock that was exacerbated by the Russian invasion of Ukraine. Country-specific factors, such as the large fiscal stimulus in the United States, also played a role. In the euro area, inflation rose rapidly from the low levels reached during the height of the pandemic. Headline inflation, based on the Harmonized Index of Consumer Prices (HICP, henceforth) peaked at 10.6 per cent in October 2022, which is six times the average between 1999 and 2019 (1.7 per cent; Figure 1). In March 2023, core inflation was 5.7 per cent, four times the average between 1999 and 2019 (1.4 per cent).

After a long period of excessively low inflation due to weak aggregate demand (Rostagno et al., 2021), households and firms in the euro area have felt the awakening of inflation. Since mid-2021, households’ purchasing power substantially eroded by inflation, as nominal wages have increased less than consumer prices. Those with a variable rate mortgage have experienced a sharp increase in their monthly payments due to the European Central Bank’s (ECB) unprecedented pace of raising policy rates at an to “*break the back of inflation*” (Lagarde, 2023b). Lower-income households have been hit hard by rising energy and food prices, as these items make up a significant portion of their spending. Firms have passed on the higher costs of intermediate goods and energy to the prices of their goods and services to maintain their profit margins. The increase in energy costs has had a significant impact on industrial production in the energy-intensive sectors.

Figure 1. Headline inflation in the euro area
(per cent)



Source: ECB. Note: year-on-year changes in the HICP, monthly data. The dashed line represents the average over the January 1999 – December 2019 period. Latest observation: December 2023.

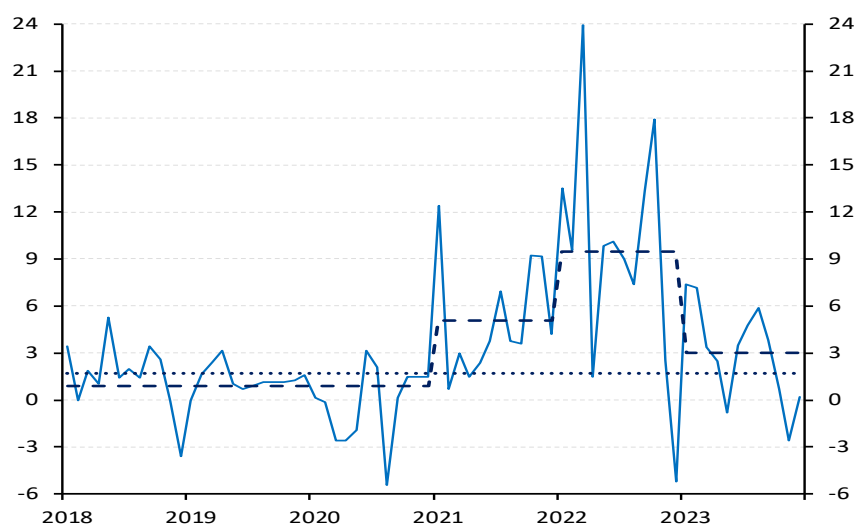
This paper reviews inflation developments in the euro area, distinguishing four phases: (1) the period just before the Covid-19 pandemic (Section 2.1); (2) its outbreak (Section 2.2); (3) the reopening of the economies (Section 2.3); (4) the energy crisis (Section 2.4). The four phases are highlighted by red boxes in Figure 1. The aim of this paper is to provide an overview of the factors that contributed to the inflation levels last seen in the early 1980s, rather than to quantify the role of specific factors. After reviewing inflation developments, Section 3 describes the measures taken by the ECB to counter the inflationary pressures and discusses the possible evolution of the key ECB interest rates in the short- to medium-term. Section 4 focuses on the onset of the disinflation, which took place against the backdrop of tighter financing conditions and deteriorating economic activity, and touches on the inflation outlook. Finally, Section 5 provides some concluding remarks.

The main messages are as follows. Supply bottlenecks and energy prices have played an important role in pushing up core inflation. The ECB’s monetary policy response contributed to re-anchoring long-term inflation expectations to the new 2 per cent symmetric target and to prevent their de-anchoring to the upside. The time has come to take stock of the effects of monetary policy achieved so far, and of those still in the pipeline, and wait for the effects of past shocks on inflation to fade away.

2. The awakening of inflation

Inflationary pressures in the euro area were very limited in the two years before the outbreak of the Covid-19 pandemic in March 2020. These two years marked the continuation of the period of low inflation that began in 2013, following the most acute phase of the sovereign debt crisis. The average annualised monthly change in the seasonally adjusted HICP between January 2018 and December 2020 was 0.9 per cent, while the average between 1999 and 2019 was 1.7 per cent (Figure 2).

Figure 2. Headline inflation: annualized monthly changes
(per cent)



Source: ECB. Note: annualized monthly changes in the seasonally adjusted HICP; monthly data. The dashed line represents the average over the pre-pandemic period (January 1998 – December 2019) and for each of the following calendar years. The blue dotted line is the average between 1999 and 2019. Latest observation: August 2023.

Looking the annualised monthly changes in the seasonally adjusted HICP, a reasonable starting point for the beginning of the inflation surge can be identified in the summer of 2021.¹ Since then, monthly (annualized) inflation has risen rapidly, averaging 9.5 per cent in 2022. After peaking in March 2022 (at 24 per cent), inflation has declined significantly, averaging 4.3 per cent between January and August 2023. This figure falls to 3 per cent when including data up to December.

2.1 Inflation before the Covid-19 pandemic

After the most acute phase of the sovereign debt crisis, the euro area experienced a period of persistently low inflation (Neri and Siviero, 2018; Rostagno et al., 2021). In the last quarter of 2019, headline inflation was 1.0%, while core consumer prices grew at 1.3% (see Figure 3, panel a).

The low inflation environment was caused by weak aggregate demand and expectations of low growth and low inflation (Koester, Nickel, Osbat and Smets, 2021) in the context of ECB's policy rates being close to their effective lower bounds.² Long-term inflation expectations became de-anchored in mid-2019 (Corsello, Neri and Tagliabracci, 2021). The inflation risk premium embedded in Inflation-Linked Swaps (ILS) turned negative (Cecchetti, Grasso and Pericoli, 2022 and Bulligan, Corsello, Neri and Tagliabracci, 2021).³ The decline in long-term expectations between 2013 and 2019 exerted a downward pressure on inflation (Neri, 2023). If the ECB had not responded to the fall in expectations by lowering the policy rates and starting the Asset Purchase Programme (APP), the decrease in inflation would have been larger and output would have declined.

In the December 2019 Eurosystem's staff macroeconomic projections, inflation and real GDP growth were foreseen to reach 1.6 and 1.4 per cent, respectively, in 2022, indicating a continuation of the low growth and low inflation environment. In September 2019, the ECB implemented a range of accommodative measures, such as reducing the official rates and restarting of the APP. In its December 2019 meeting, the ECB's Governing Council reiterated “[...] *the need for monetary policy to remain highly accommodative for a prolonged period of time to support underlying inflation pressures and headline inflation developments over the medium term.*”

2.2 The outbreak of the Covid-19 pandemic

In December 2019, the outbreak of a pandemic was unexpected. The first news about a pneumonia outbreak were released only on 31 December by the Wuhan Municipal Health Commission. The events unfolded rapidly worldwide. By the end of April 2020, approximately 4.2 billion people (54 per cent of the global population) were subject to complete or partial lockdowns.

Euro-area consumption and investment plummeted. In 2020:Q2, real GDP fell by 11.4 per cent but rebounded in the third quarter. The decline in employment was less severe (-2.9 per cent in 2020:Q2) due to government support measures, including job retention schemes and support for self-employed workers, aimed at preventing redundancies supporting self-employed workers.

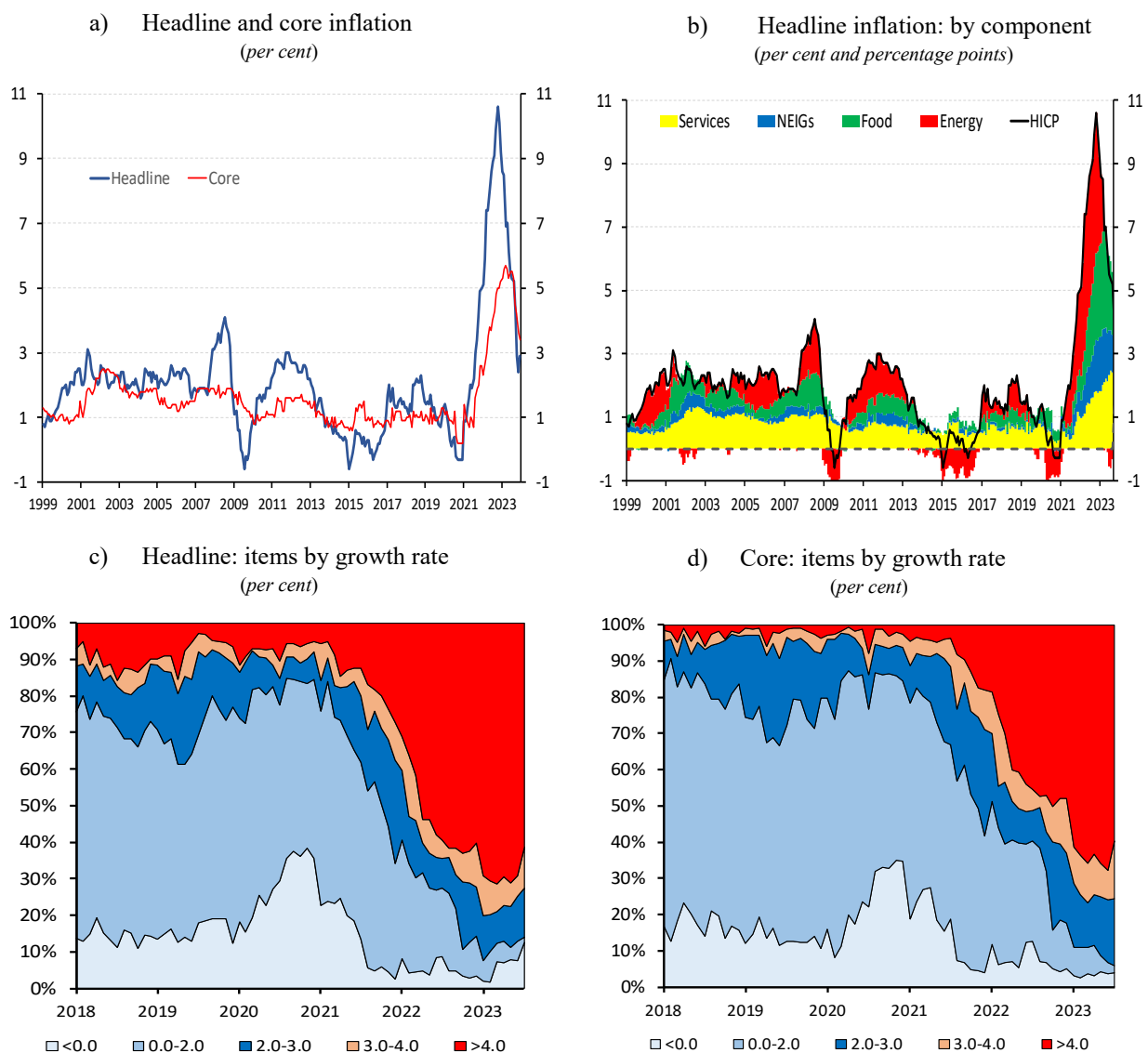
¹ The use of the monthly changes allows me to focus on the new information on consumer prices and avoid base effects.

² Structural factors have also exerted a dampening effect on inflation over the last decades.

³ Corsello, Neri e Tagliabracci (2021) document a first episode of de-anchoring in the last quarter of 2013.

The Governing Council of the ECB acted swiftly to support lending to households and firms by introducing new refinancing operations and reducing the pricing of existing ones. To enable banks to fully benefit from these operations, eligibility criteria and risk control measures for collateral assets were also relaxed. To counter the risks for economic activity and ensure the orderly transmission of monetary policy to all euro-area economies, the ECB’s Governing Council first strengthened the APP and then introduced a new extraordinary programme specifically designed to deal with the economic consequences of the health emergency (the pandemic emergency purchase programme, PEPP). For a detailed description of all the measures adopted by the ECB, see Lane (2020). In contrast with the APP, purchases within the PEPP were carried out flexibly. This flexibility proved to be very effective. The flexible implementation of the asset purchases substantially contributed to lowering sovereign bond yields during the most acute phase of the pandemic and raising inflation expectations (Bernardini and Conti, 2023).

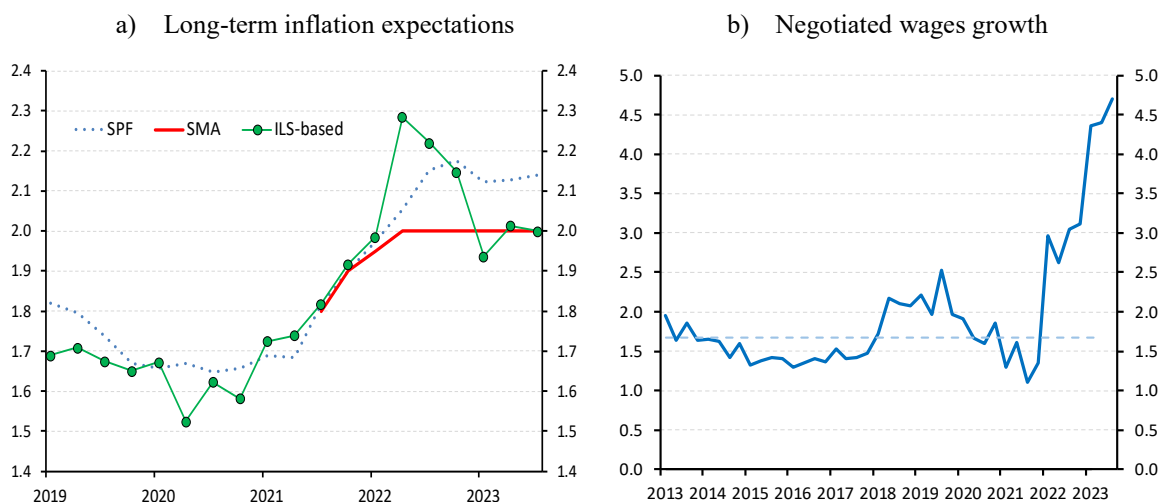
Figure 3. Headline and core inflation



Source: computations based on ECB data. Note: monthly data. Panels c) and d) shows the percentage shares of goods and services growing at annual rates as shown in the legends. Latest observations: December 2023 for panels a and b; July 2023 for panels c and d.

The persistently low inflation in the euro area led to a decline in both survey- and market-based long-term inflation expectations, which, despite some improvement in early 2015 after the ECB launched its APP, reached historical minima (1.65 per cent) in mid-2020 (Figure 4, panel a). These developments confirm the assessment that expectations long-term expectations had de-anchored from the 2 per cent target. It is worth noting that survey-based measures stood at 2 per cent in 2012.

Figure 4. Inflation expectations and negotiated wage growth
(per cent)



Source: ECB. *Note:* panel a) shows the (mean point) five-year ahead inflation expectations from the ECB Survey of Professional Forecasters (SPF), which are gathered four times a year (January, April, July and October), the long-run median expectations from the ECB Survey of Monetary Analysts and the (ILS) model-based “genuine” expectations estimated by Cecchetti, Grasso and Pericoli (2022). The dashed line in panel b) denotes the average between 2013 and 2019. Latest observations: July 2023 in panel a; 2023:Q3 in panel b.

Pressures from labour costs were contained before the outbreak of the pandemic, with a temporary and slight increase in 2018.⁴ Negotiated wages began to slow down after the outbreak, averaging 1.8 per cent in 2020 (Figure 4, panel b), which is close to the average between 2013 and 2019 (1.7) and significantly lower than the average before the sovereign debt crisis (2.7 per cent).

2.3 Reopenings and bottlenecks

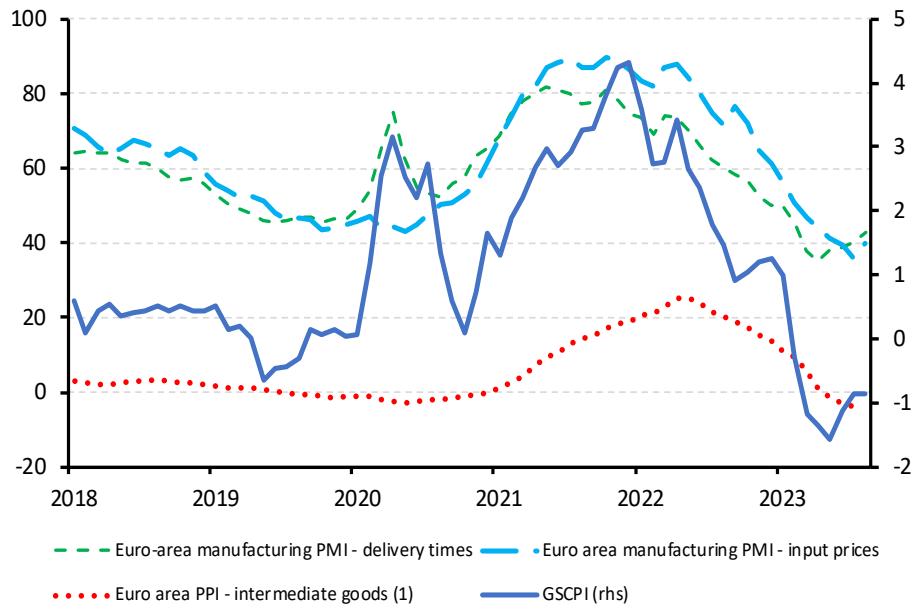
During the pandemic, consumers shifted towards purchasing goods as the consumption of high-contact and tourism services was severely affected by the containment measures. By late 2020, an imbalance between the demand and the supply of goods quickly emerged. As the global recovery gained momentum, albeit at different rates depending on the spread of the virus and the easing of containment measures, demand for raw materials, intermediate inputs and logistical services outstripped supply, resulting in rising prices and delivery delays.

The Global Supply Chain Pressure Index (GSCPI), produced by the Federal Reserve Bank of New York, reached unprecedented levels in late 2021, signalling increasing disruptions in the

⁴ The spike in the third quarter of 2019 was due to one-off payments, which contributed by 0.5 percentage point.

production and transportation of goods on a global scale.⁵ As delivery times, shipping costs and input prices started to rise, pressures mounted in upstream sectors, leading to higher prices for intermediate goods in the euro area (Figure 5).

Figure 5. Indicators of supply bottlenecks and producer prices



Source: ECB, Federal Reserve Bank of New York and S&P Global. Note: for the GSCPI, see <https://www.newyorkfed.org/research/policy/gscpi>. The index integrates transportation cost data and manufacturing indicators to derive a measure of global supply chain conditions. The PMI delivery times is shown in difference from 100, so that an increase identifies longer delays. (1) Annual percentage changes. Latest observations: August 2023 except for PPI intermediate goods and the GSCPI (July).

Bottlenecks were particularly severe in raw materials, semiconductors and other intermediate manufactured goods, as well as freight transport. The prices of raw materials increased sharply due to shortages and the increased demand for building up inventories surged. Shipping costs between Asia and North America soared and delivery times lengthened substantially. Cargos were forced to queue for days to access ports due to containment measures to counter the spread of the virus.⁶

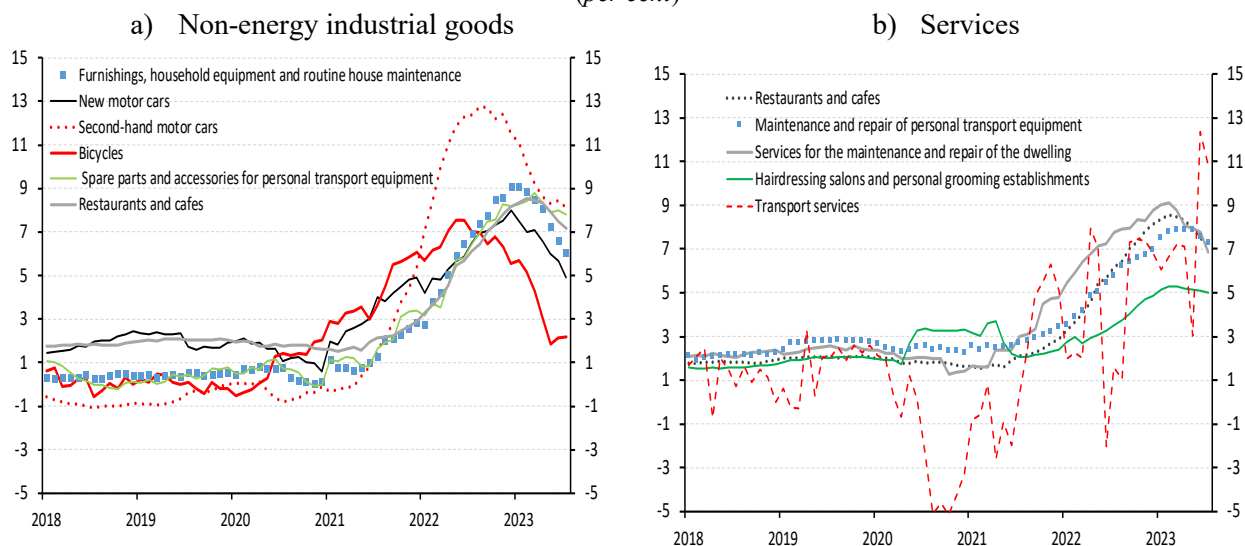
Three factors contributed to the severity of the bottlenecks (Rees and Rungcharoenkitkul, 2021). The first factor was the shift in demand towards manufactured goods during the lockdown measures adopted in many countries. The demand for IT-related goods was particularly strong also due to the sudden increase in remote working, which put the production of chips under severe strain. These goods rely heavily on supplies from other industries, resulting in significant demand spillovers. Manufactured goods are also more capital-intensive than services, which makes their short-term supply less elastic as it takes time to increase capacity. The second factor was the behaviour of firms

⁵ See <https://www.newyorkfed.org/research/policy/gscpi#/overview>.

⁶ On 23 March 2021, Ever Given, one of the largest container ships in the world blocked the Suez Canal. Hundreds of cargoes had to wait before crossing the Suez Canal. Bloomberg reported that the Ever Given alone transported \$1 billion worth of cargo (<https://www.bloomberg.com/news/features/2021-06-24/how-the-billion-dollar-ever-given-cargo-ship-got-stuck-in-the-suez-canal>). In early 2022, the lockdown of Shanghai to reduce the spread of the Omicron variant caused the disruption of logistics in the port.

in supply chains, which worsened the initial shortages as they began building up buffers and inventories. The third factor was related to supply chains to prioritise efficiency over resilience. In times of crisis, such as a pandemic, the lack of diversification in supply chains can exacerbate the transmission of shocks.

Figure 6. Inflation of selected goods and services
(per cent)



Source: ECB. Latest observations: July 2023.

During the most acute phase of the pandemic, the production of semiconductors declined sharply, leading to bottlenecks that severely affected the automotive industry. As a result, the price of new cars increased. The automotive industry is characterized by long supply chains across manufacturing sectors. As the production of new cars stalled, consumers turned to second-hand cars. The price of these cars also increased by almost 13 per cent on a yearly basis in September 2022, after falling at an average rate of 0.7 in 2018 and 2019 (Figure 6, panel a). The demand for car-related maintenance services also increased sharply in 2021 and 2022, as demand for cars increased sharply. Bottlenecks also affected the production of other goods such as bicycles. A shortage of gears from a well-known brand and the increased demand for bicycles due to people avoiding public transportation led to a surge in the prices of bicycles. In May 2022, prices increased by 7.5 per cent on an yearly basis, compared with an average increase of 0.1 in the period 2018-19.⁷

Finck and Tillmann (2023) show using a VAR model that a global supply chain shock leads to a decline in real economic activity and a significant increase in inflation in the euro area. The authors assume that the shock to supply chains occurred in March 2021, when Ever Given, one of the largest container ships in the world, blocked the Suez Canal takes a positive value. Supply chain disruptions originating in China significantly affect euro-area industrial production, while disruptions originating outside of China have a greater impact on inflation. Carrière-Swallow et al. (2023) show that sharp increases in global shipping costs substantial effects on import and producer prices, as well as

⁷ <https://www.reuters.com/breakingviews/shimano-is-too-scared-going-too-fast-2021-05-17/>

headline and core inflation across a wide range of economies. The impact of changes in shipping costs is similar to that in oil and food prices, although the former tends to have a more lasting effect.

As economies reopened, consumers turned back to services, increasing the demand for contact-intensive ones such as restaurants (8.5 per cent in February 2023, compared with an average of 1.9 in 2018 and 2019), accommodation and travel (Figure 6, panel b). The surge in energy prices also had a significant impact on service prices. Lane (2022a) shows that contact-intensive services have played an increasing role in raising services inflation between summer 2021 and spring 2022, as economies gradually reopened after the removal of the containment measures to combat the pandemic. The accumulation of savings during the most acute phase of the pandemic contributed to sustaining the demand for contact-intensive services.

A disaggregated analysis of the items included in the HICP basket shows that those with more persistent dynamics (based on the estimation of a univariate autoregressive model) and whose inflation began increasing in 2021 and 2022 contributed the most to core inflation until the beginning of 2023. These items include housing, vehicles and leisure.

2.4 The energy crisis

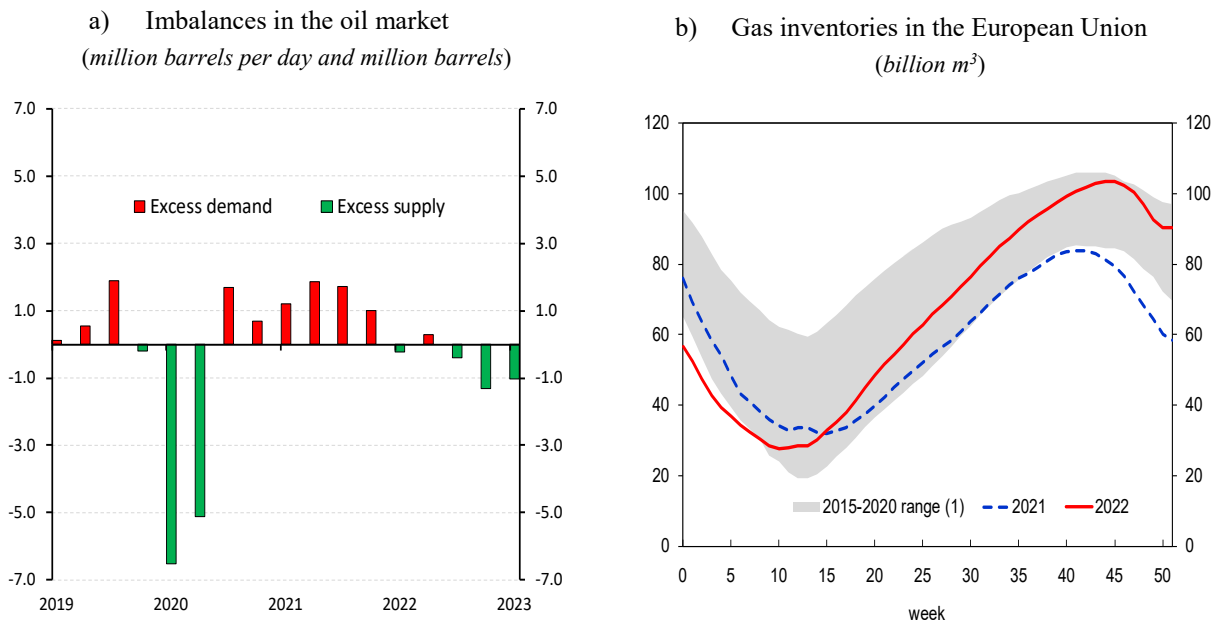
The recovery from has led to an increasing mismatch between demand and supply in the oil and gas markets (Figure 7). In the case of oil (panel a), there was an excess supply during the early stages of the pandemic, resulting in the highest inventory levels in the previous eight years. However, as economies reopened and economic activity began to recover, demand started to outstrip supply.⁸ Oil prices, which had dropped to a low of 20\$/b both for the WTI and Brent. By-mid 2021, they had risen to nearly 80\$/b.

In early 2021, gas prices began to rise and exceeded €100 by the end of the year. The increase was due to the cuts in gas supplies from Russia, initially on account of the weather conditions, and later as a form of political pressure related to the controversial opening of the Nord Stream 2 pipeline (Visco, 2023b).

The Russian invasion of Ukraine in February 2022 caused a significant increase in energy commodity prices, particularly gas prices in Europe, which reached unprecedented levels. In 2022, the average price of Brent oil was around 99\$/b in 2022, up from 70 in 2021. Between March and June, it repeatedly surpassed 120\$/b, before declining to below 90 after September as signals of a slowdown of the global economy intensified. Gas prices in Europe surged to €350 per megawatt-hour during the summer of 2022. This was due to European countries replenishing their stocks to secure minimum supplies for the winter and used gas to generate electricity for cooling systems amidst Europe's hot summer and reduced availability of hydroelectric and nuclear energy. Several factors contributed to bringing prices down to below €30, including a mild winter, reduced consumption due to the price increases, government cost-saving measures, and meeting gas storage targets.

⁸ The price of oil in the U.S. turned negative in 2020 for the first time in history as demand collapsed and oil wells continued extracting. Oil producers were paying buyers to take the commodity off their hands over fears that storage capacity could run out in May 2020. See <https://www.bbc.com/news/business-52350082>.

Figure 7. The oil and gas markets

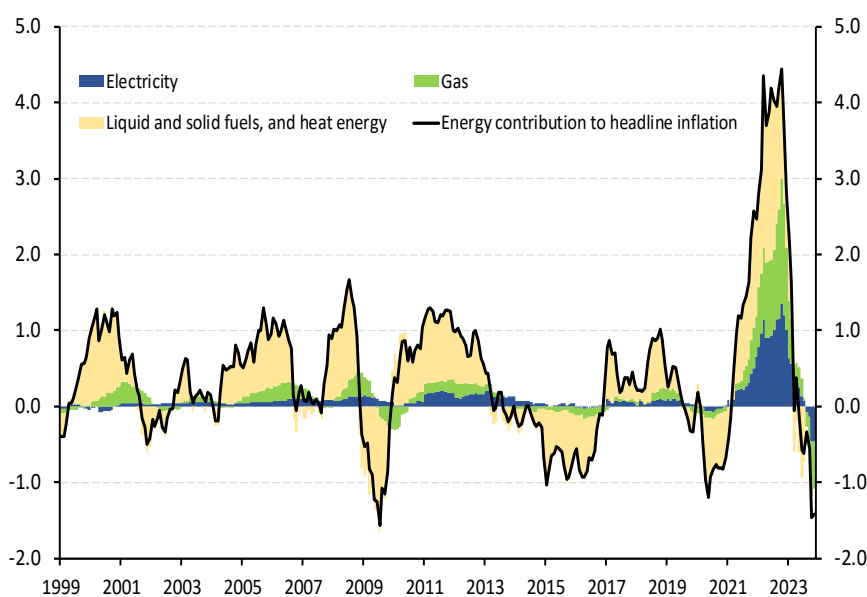


Source: Annual Report 2022, Banca d'Italia. *Notes:* (1) range computed over 2015-2020; the horizontal axis shows the weeks of the year. Latest observations: January 2023 in panel a; December 2022 in panel b.

The emergence of supply bottlenecks and the unprecedented and persistent increase in the prices of energy commodities led to a perfect storm. In autumn 2022, euro-area headline inflation reached double digits due to gas being used as the marginal resource for producing electricity (Figures 3, panel b, and 8). Between 1999 and 2019, the average contribution of electricity to HICP inflation increased from 0.07 p.p. to 0.59 over the period January 2021-June 2023, peaking at 1.35 in October 2022. Similarly, gas' contribution increased from 0.05 p.p. to 0.62, with a peak of 1.64 in October 2022. The contribution of liquid and solid fuels, as well as heat energy, also rose from 0.06 to 0.33, with a peak of 2.3 in June 2022. All these components increased their contribution from 0.3 p.p. to 2.1, with a maximum of 4.4 p.p. in October 2022, seven times the average between 1999 and 2020. These figures highlight the magnitude of the shock that hit the euro-area economy in 2022.

The impact of the energy shock was smaller and less persistent than the two oil shocks of the seventies. While the latter shocks had a global nature, those to the gas market in 2021 and 2022 mainly affected European countries. The institutional context has evolved considerably since the 1970s, reducing the risk of prolonged high inflation as seen in the 1970s. Corsello, Gomellini and Pellegrino (2023) show that the persistence and heterogeneity of inflation across advanced economies following the surge in oil prices caused by the Yom Kippur war in 1973 and the Iranian revolution in 1979 cannot be solely explained by the conduct of monetary policy, whether in the form of late tightening or early loosening. Other institutional factors, such as the lack of central bank independence and the structural features of the labour market, also played a role.

Figure 8. Energy contribution to headline inflation
(percentage point)

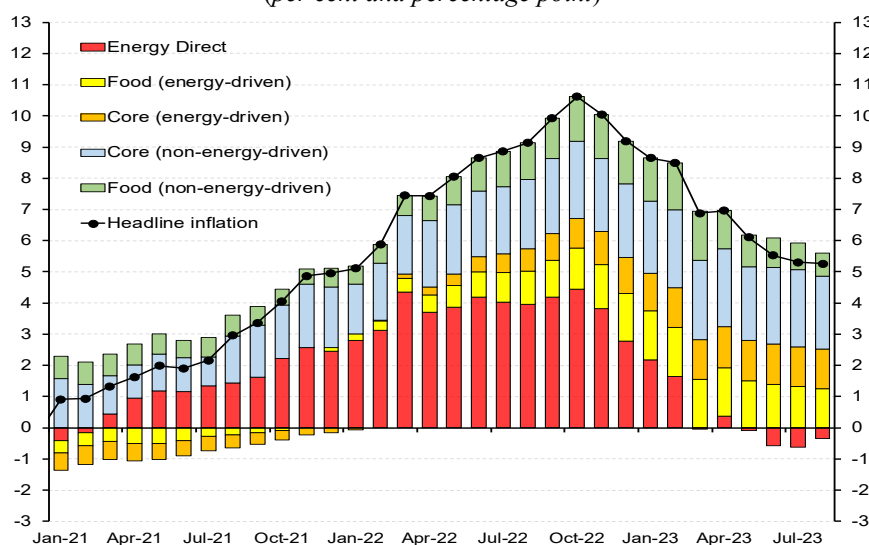


Source: ECB. *Note:* contributions to year-on-year changes in the HICP. The sum of the contributions amounts to the energy component of the HICP. Latest observation: November 2023.

In March 2023, core inflation reached an unprecedented levels of 5.7 percent during the energy crisis. On average, around 70 per cent of the prices of goods and services included in the core price basket increased by more than 4.0 per cent in the first five months of 2023 (Figure 3, panel d), indicating the broadness of the inflationary pressures. The unprecedented and broad-based increase in core inflation suggests that the surge in energy prices may have had substantial indirect effects. Lane (2022a) and Panetta (2023a) show that energy-intensive groups of items accounted for an increasing large fraction of non-energy goods and services inflation from mid-2021 to the first months of 2023, despite accounting for only 20 and 30 per cent of the goods and services basket, respectively.

Understanding the extent to which energy price increases have exerted indirect effects on headline and core inflation is essential to calibrate the appropriate response of monetary policy, both in terms of size and persistence. Evidence of significant indirect effects suggests that the impact of energy price shocks may have been persistent rather than short-lived. This would call for monetary policy to respond to prevent the de-anchoring of long-term inflation expectations and second-round effects. Neri et al. (2023) employed a suite of models, including Structural VARs, Phillips curve and Dynamic Factor models, to evaluate the direct and indirect effects of energy price shocks on inflation. Figure 9 shows the results of a historical decomposition of headline inflation (based on a structural VAR; see also Corsello and Tagliabracci, 2023) into the direct effects of energy prices (red bars) and the indirect effects through core (orange bars) and food prices (yellow bars). In the fourth quarter of 2022, shocks to energy prices have contributed to headline inflation by around 60 per cent, while for core inflation the contribution ranged between 20 and 50 per cent depending on the model. The indirect impact on core and food inflation started materializing in March 2022 and has been increasing since then, reaching a maximum of, respectively, 1.3 and 1.5 p.p. in February 2023.

Figure 9. Direct and indirect contribution of energy shocks to inflation
(per cent and percentage point)



Source: Neri et al. (2023). *Note:* The black solid line with dots represents the series for headline inflation while the bars measure the direct and indirect contributions of energy prices. The VAR includes energy, food and core inflation and negotiated wage growth, all measured as year-on-year percentage changes, and the unemployment rate. Energy shocks are identified using a Cholesky decomposition. Latest observation: August 2023.

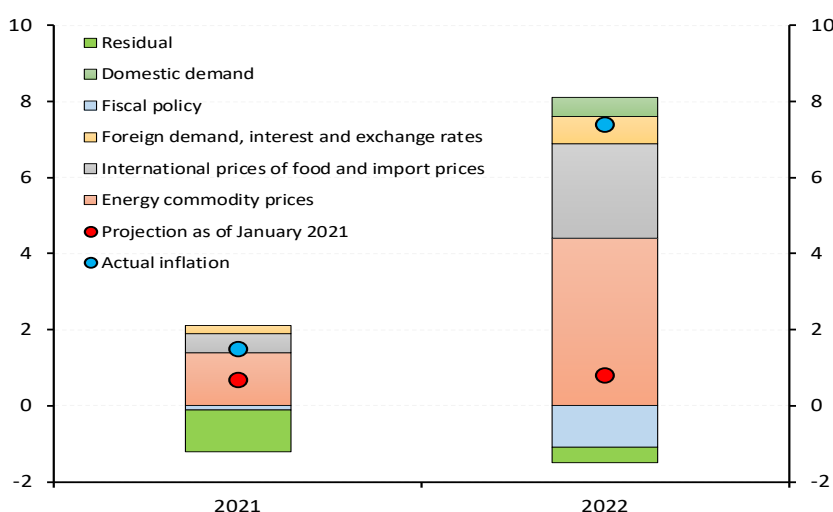
Pallara, Rossi, Sfregola and Venditti (2023) estimate a VAR model for the United States and the euro area and find that the impact of energy prices on core inflation was negligible in the former economy but large and persistent in the latter. The effects of energy price shocks are larger in the models estimated with data up to 2023 compared with those in the models estimated up to 2020, in particular for the euro area. A possible explanation is that the surge in energy prices induced a break in the relationship between core prices and energy input costs, in line with state-dependent pricing models (e.g. Cavallo, Lippi and Miyahara, 2023). Guerrieri, Marcussen, Reichlin and Tenreiro (2023) show that the responses of inflation and its components to a supply oil shock exhibit a rich dynamic heterogeneity in both the U.S and the euro area, which persists until all sectors have adjusted. However, the responses are more persistent in the latter economy. De Santis and Tornese (2023) use a Bayesian Threshold VAR model to assess non-linearities in the propagation of energy shocks to inflation and find that the transmission is stronger in high-inflation regimes. Alessandri and Gazzani (2023) show that negative shocks to gas supplies cause a decline in economic activity and a significant and long-lasting increase in the price of both energy and core goods. The pass-through to core inflation is gradual and persistent.

The estimation of a time-varying parameter Phillips curve shows that, while the persistence parameter and the slope of the Phillips curve have remained within the confidence bands constructed using data up to 2019 since 2020. However, the energy price coefficient and the long-run anchor have increased sharply, suggesting a non-linear relationship with core inflation (Neri et al., 2023). The impact of energy prices may have roughly doubled compared to before the pandemic. The increase in the underlying anchor reflects comparable trends in long-term inflation expectations based on

experts' opinion, such as those in the ECB SPF. This is consistent with the clarification of the inflation target that was decided by the Governing Council in July 2021.

Firms in the energy-intensive subsectors (such as chemical products, other non-metallic mineral products and basic metals) increased their prices more than those in the manufacturing sector, excluding energy-producing industries (Corsello, Flaccadoro and Villa, 2023). The importance of energy price shocks for inflation is also documented in a box of the Annual Report of Banca d'Italia for the year 2022.⁹ The Bank of Italy's econometric model is used to measure the contribution of the main drivers of the deviation between actual inflation and its forecast at the beginning of 2021 (Banca d'Italia Economic Bulletin, January 2021). The rise in international prices is estimated to have contributed to the unexpected increase in consumer prices in Italy by 1.8 p.p. in 2021 and almost 7 in 2022 (Figure 10).

Figure 10. Contributions to inflation in Italy in 2021 and 2022
(per cent and percentage point)



Source: Annual Report for 2022, Banca d'Italia. Note: inflation is measured by the implicit household consumption deflator.

Stronger domestic demand is estimated to have pushed up consumer prices by around 0.5 p.p., almost exclusively in 2022. The fiscal policy measures adopted to moderate the effects of energy prices increases and which had not yet been announced at the beginning of 2021, are estimated to have contributed to reducing inflation by 1.1 p.p. in 2022. Summing up, nearly 90 per cent of the higher-than-projected inflation in the years 2021 and 2022, can be attributed to the larger-than-anticipated increase in international commodity prices.

Despite the unprecedented rise in euro-area inflation, both market- and survey-based long-term inflation expectations have remained firmly anchored to the new 2 per cent symmetric target announced in July 2021 following the Strategy Review (Figure 4, panel a). Long-term inflation expectations have remained close to 2 per cent since October 2022. Neri et al. (2022) assess the anchoring of long-term inflation expectations in the euro area using various measures of inflation expectations and methods. Long-term inflation expectations in the euro area rapidly returned to 2 per

⁹ See <https://www.bancaditalia.it/pubblicazioni/relazione-annuale/2022/sintesi/2022-box/CH8-Box3.pdf>.

cent and have remained anchored to the target in a context of elevated inflationary pressures. Hoynck and Rossi (2023) estimate a Bayesian VAR for the euro area and the United States and identify a set of shocks using sign and magnitude restrictions. Throughout the 2021-23 period, market-based inflation expectations in the United States were driven by domestic demand, whereas in the euro area they were primarily driven by supply shocks. Monetary policy shocks played a role in lowering inflation expectations in both economies.

2.5 A quantitative joint assessment of the role of supply bottlenecks and energy prices

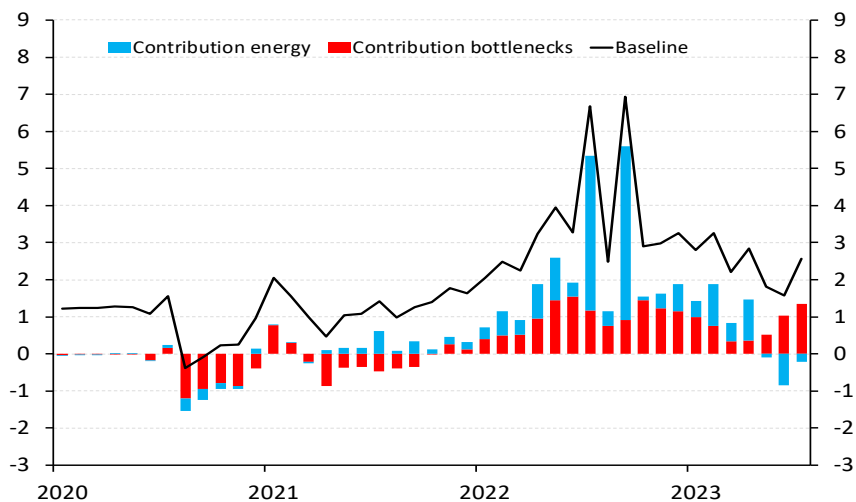
In this section, I provide a simple one-equation reduced-form quantification of the role of supply bottlenecks and energy prices for core inflation since January 2020. I refrain from using a constant-parameter VAR model as it may not be able to capture potential non-linearities that may have emerged with the pandemic and the energy crisis.

Core inflation is explained by a constant, their own first lag, an indicator of bottlenecks and energy prices, both lagged. The equation is:

$$\pi_t = \bar{\pi}_t + \rho_t \pi_{t-1} + \sum_{i=1}^N \beta_{t,i} SB_{t-i} + \sum_{i=1}^M \gamma_{t,i} EN_{t-i} + \varepsilon_t \quad (1)$$

where SB_t is the GSCPI and EN_t the monthly changes of energy prices. The error term ε_t is normally distributed with zero mean. I selected the number of lags using a general to specific approach. The equation is estimated separately using recursive least squares. The sample goes from January 1999 to June 2023. Once equation (1) is estimated, the contribution of supply bottlenecks and energy prices is assessed by simulating the full equation in-sample and by setting, respectively, β and γ to zero. The difference between the two paths measures the contribution of the two explanatory variables.¹⁰

Figure 11. The role of supply bottlenecks and energy prices
(per cent and percentage point)



Source: ECB. Note: the blue (red) dotted lines show the path of the inflation rates without energy prices (the impact of supply bottlenecks). The corresponding bars denote the contribution of the two exogenous variables. Latest observation: July 2023.

¹⁰ Yellen (2015) uses a similar exercise to quantify the contribution of the slack, import and energy prices to U.S. inflation.

Supply bottlenecks have been an important driver of core inflation (red bars; Figure 11) while energy prices have a less important role (blue bars). In 2022, both factors accounted, on average, for, respectively, 2.2 p.p. (1.2 and 1.0, respectively) of core monthly annualized inflation (5.2 per cent). On a yearly basis, the contribution of energy prices (13 per cent) is not far from the estimate in Neri et al. (2023) based on a recursive VAR, despite the large differences between the two approaches. Bańbura, Bobeica and Martínez Hernández (2023) find that supply shocks explain the bulk of the post-pandemic inflation surge. De Santis (2024) also findw that core inflation has been affected mostly disruptions to global supply chains and to a lesser extent by adverse energy supply shocks.

2.6 The role of firms' pricing and wage setting

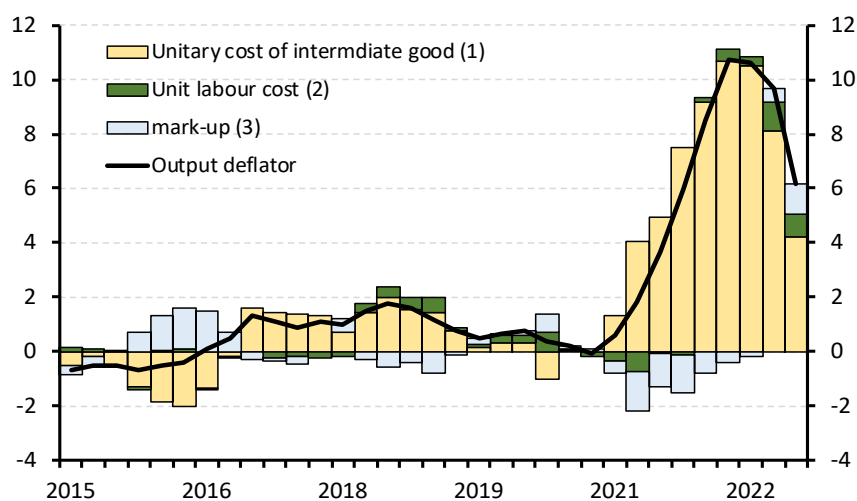
The energy shock had a significant impact on the euro-area economy acting as an unavoidable tax, as several countries depended on gas imports for energy production and heating. To evaluate the impact of the energy shock on the real economy and inflation, it is crucial to consider how the burden of this tax is shared between workers and firms through wage bargaining and price settings. It is also important to assess how government measures can mitigate the effects of the shock.

Firms' pricing strategies are crucial in determining inflation developments. To assess this role, it is necessary to examine at firms' markups (the ratio of output prices to marginal costs), which are, however, challenging to estimate due to measurement issues. In speeches and publications, policy-makers often show the decomposition of the rate of change in the GDP deflator by to assess the role of firms' pricing on inflation (e.g. Arce, Hahn and Koester, 2023, and Schnabel, 2023). These decompositions show that unit profits (defined as gross operating surplus per unit of real GDP) have played an increasing role along with unit labour costs in raising the GDP deflator-based inflation in 2022. However, it is important to note that unit profits can increase even if markups remain constant or decrease. Colonna, Torrini and Viviano (2023) show that this occurs when intermediate input costs increase at a faster rate than labour costs. This has been the case since the outbreak of pandemic first and the energy crisis after, due to the limited substitutability between energy and labour in the short-term.

In 2022, Italian firms experienced a slight decline in their markups, which has a negative impact on the dynamics of the output deflator (Figure 12). The increase in the output deflator-based inflation, averaging 9 per cent in 2022, is solely attributable to the rise in variable costs, particularly the prices of intermediate goods, including raw materials and energy. Labor income contributed by less than one percentage point to the overall dynamics of the output deflator. The decline in markups in 2022 was particularly strong in retail, accommodation and catering services, as well as in manufacturing (Banca d'Italia, Annual Report for 2022).

Corsello, Flaccadoro and Villa (2023) show, based on the results from the Bank of Italy's Business Outlook Survey of Industrial and Service Firms, that most firms that have been affected higher energy costs or supply bottlenecks have increased their prices in the second half of 2022. Some firms have also reduced profit margins and implemented energy-saving measures, while only a small share of firms have reported reducing or discontinuing production.

Figure 12. Output deflator and its contributors in Italy
(per cent and percentage point)



Source: Banca d'Italia Annual Report for 2022. Note: (1) The contribution is equal to product of the changes in cost of intermediate goods per unit of product and its share in total variables costs. (2) The contribution is equal to the product of the change in hourly cost of labor per unit of product and its share in total variable costs. (3) Ratio of the output deflator to unitary variable costs. Latest observation: 2023:Q1.

Regarding wage developments, in the June 2023 Eurosystem staff projections, compensation per employee was foreseen to increase from 4.3 per cent in 2022, to 5.3 in 2023, before falling to 4.5 per cent in 2024 and 3.9 in 2025. The increase above the pre-pandemic average of 2.4 per cent is expected to largely reflect the catch-up process following the decline in real wages caused by the inflation surge. The projections suggest that the recovery in real wages over the next two years is consistent with inflation converging to 2 per cent, considering aggregate demand and labor market conditions.

Due to the staggered, infrequent, and decentralized nature of wage setting, it may take several years for nominal wages to adjust to the unexpected inflation surge (Lane, 2023a). This adjustment may put upward pressure on consumer price inflation over the next two to three years, even if nominal wages and long-term inflation expectations were unaffected by the energy shock. Once the catch-up process is complete, nominal wages should grow in line with labour productivity and the inflation target.

The risk of a profit-wage-price spiral, also known as “tit-for-tat” dynamics (Lagarde, 2023a), is small in the euro area, despite tight labour markets in several euro-area countries, due to the limited presence of wage indexation mechanisms, the one-off nature of a large part of nominal wage increases, and the absence of widespread increases in markups. The empirical evidence on the relevance of second-round effects of energy shocks is very limited. Enders and Enders (2017) estimate a VAR for the euro area and Germany and find no strong evidence for second-round effects in the euro area, and even less so in Germany. The wage responses net of the movements caused by the changes in inflation are not statistically different from the baseline response, which is affected by the reaction of inflation to the oil shocks. The results, however, are limited to the pre-pandemic period and may not be applicable in a high inflation environment.

Looking forward, the primary challenge in lowering inflation is the materialization of second-round effects, particularly if wage negotiations become backward-looking (Visco, 2023a). To prevent such a spiral, firms can quickly pass on final price reductions in production costs that will eventually occur once the effects of the pandemic and the energy crisis subside.

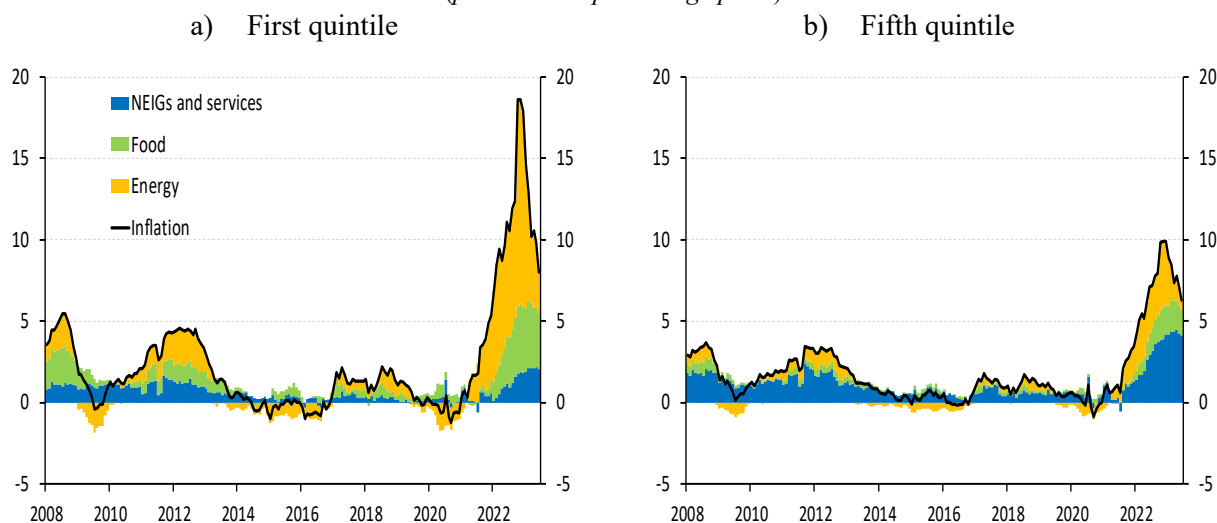
2.7 The unequal impact of inflation on households

The surge in inflation had a much larger impact on households in the lower end of the consumption distribution compared with those at the higher end, as the former are likely to consume a larger share of food and energy goods.

The impact of high inflation varies across European Union countries due to differences in consumption patterns, price changes, and national policies, but low-income households are generally the most affected (Claeys, McCaffrey, and Welslau, 2022). Bobasu, Di Nino and Osbat (2023) show that the expenditure channel has been particularly strong during the inflation surge in the euro area because low-income households are more vulnerable to increases in energy and food prices. The resilience of labour markets and fiscal support measures have helped to reduce the distributional effects of high inflation on households through the income channel.

In Italy, Istat produces quarterly inflation data for households based on their consumption expenditures. The inflation gap, which is the difference between the inflation rates for the fifth and the first quintiles, reached 8 p.p. in December 2022 (Figure 13). Energy goods and food make up half of the consumption of households in the bottom quintile, compared with 20 per cent for those in the top quintile. The sharp increase in energy and food prices had a disproportionate impact on lower-income households due to differences in consumption baskets. At the same time, the increases of service prices had a larger impact on higher-income households, who consume a larger share of recreational and transport services compared with lower-income households.

Figure 13. Inflation by quintile of consumption distribution in Italy
(per cent and percentage point)



Source: calculations based on data from Istat. Latest observation: June 2023.

Curci, Savegnago, Zevi and Zizza (2022) analyse the impact of the increase in inflation since mid-2021 on Italian households' purchasing power using microsimulation tools. The government measures supported households' incomes and lessened energy price hikes, thus mitigating the distributional impact of the inflationary shock. These measures attenuated inflation, on average, by slightly less than 2 percentage points and reduced the impact of the shock on households' purchasing power by approximately €32 billion. The most effective intervention was the strengthening of social bonuses for electricity and gas, which were aimed at lower-income households.

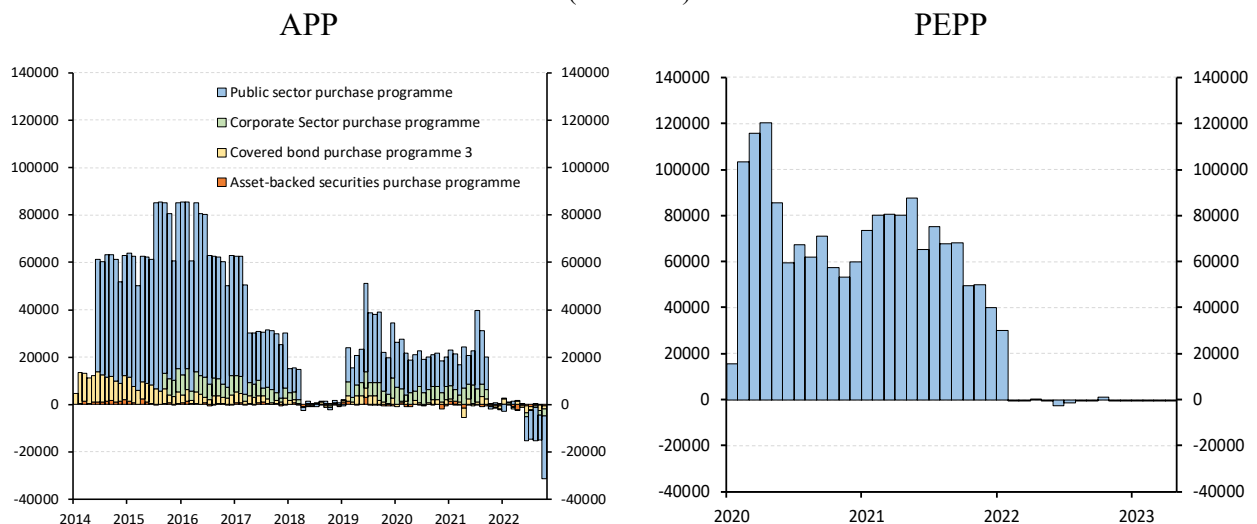
The impact of inflationary shocks on the macroeconomy is greater when they disproportionately affect households with lower levels of expenditure, as they have a higher marginal propensity to consume. Corsello and Riggi (2023) show that energy price shocks have a significant impact on inflation inequality, as measured by the difference between the inflation rates experienced by the bottom and the top quintiles of the consumption distribution. The authors develop a general equilibrium two-agent model with imported energy to rationalize the empirical results. The impact of an energy shock on the inflation gap is larger when monetary policy responds more aggressively to inflation due to the lower price elasticity of energy goods to the business cycle.

3. The ECB's monetary policy response to inflation

The large and sustained rise in inflation called for a strong and exceptionally swift monetary policy response by the ECB.

The process of normalizing monetary policy started in December 2021, when the Governing Council announced the end of the net asset purchases within the PEPP starting from March 2022 and the gradual reduction of those under the APP from the second quarter of 2023 (Figure 14).

Figure 14. Eurosystem's net asset purchases
(mln euros)



Source: ECB.

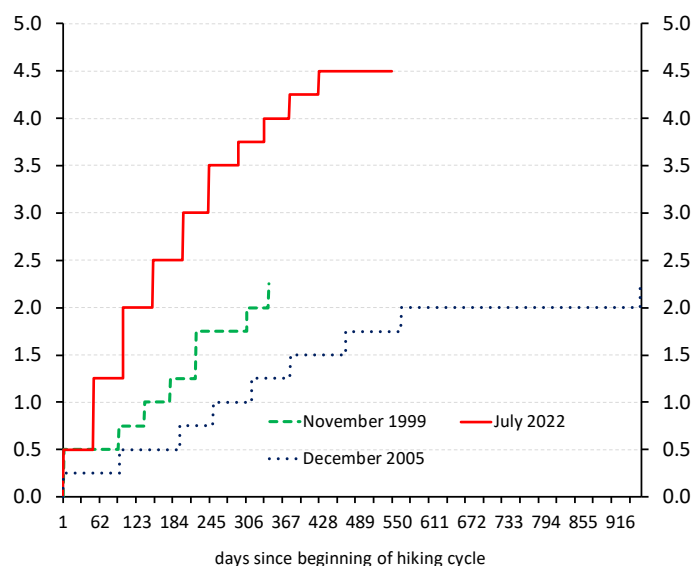
In December 2022, the assets held within the APP reached a maximum of 3.2 trillion euros, while those of the PEPP amounted to 1.8 trillion in June 2022. The decisions regarding the purchase

programmes exerted substantial upward pressure on risk-free long-term yields by reducing term premia and strengthening market expectations about the lift-off of the policy rates. Between the beginning of December 2021 and the end of June 2022, the 10-year rate on Overnight Interest Swap (OIS) increased by 2 p.p., from 0 per cent to 2.

3.1 The policy rate decisions

The ECB began raising the policy rates in July 2022. Since then, the pace and scale of the increases have been unprecedented (Figure 15), with significant effects on lending rates, and credit supply and demand. The Governing Council raised the three key ECB rates by 50 b.p. in July 2022, followed by an additional 75 b.p. increase in September and October. Prior to July 2022, there had never been a rate hike of this magnitude, with only a rate hike of 50 b.p. in November 1999 and June 2000.

Figure 15. Cumulative increase in the ECB policy rate during hiking cycles (per cent)



Source: ECB. Latest observation: 29 December 2023.

The Governing Council raised the policy rates by 50 b.p. in December 2022, February and March 2023, and then by 25 in May, June and July. Since the beginning of the hiking cycle in July 2022, the rate on the Main Refinancing Operations (MRO) and the other rates (on the Deposit and Marginal Lending facilities; DF and ML) have been raised by 450 b.p. by September 2023. This cumulative increase is more than twice the one since the beginning of the 2005 tightening cycle.

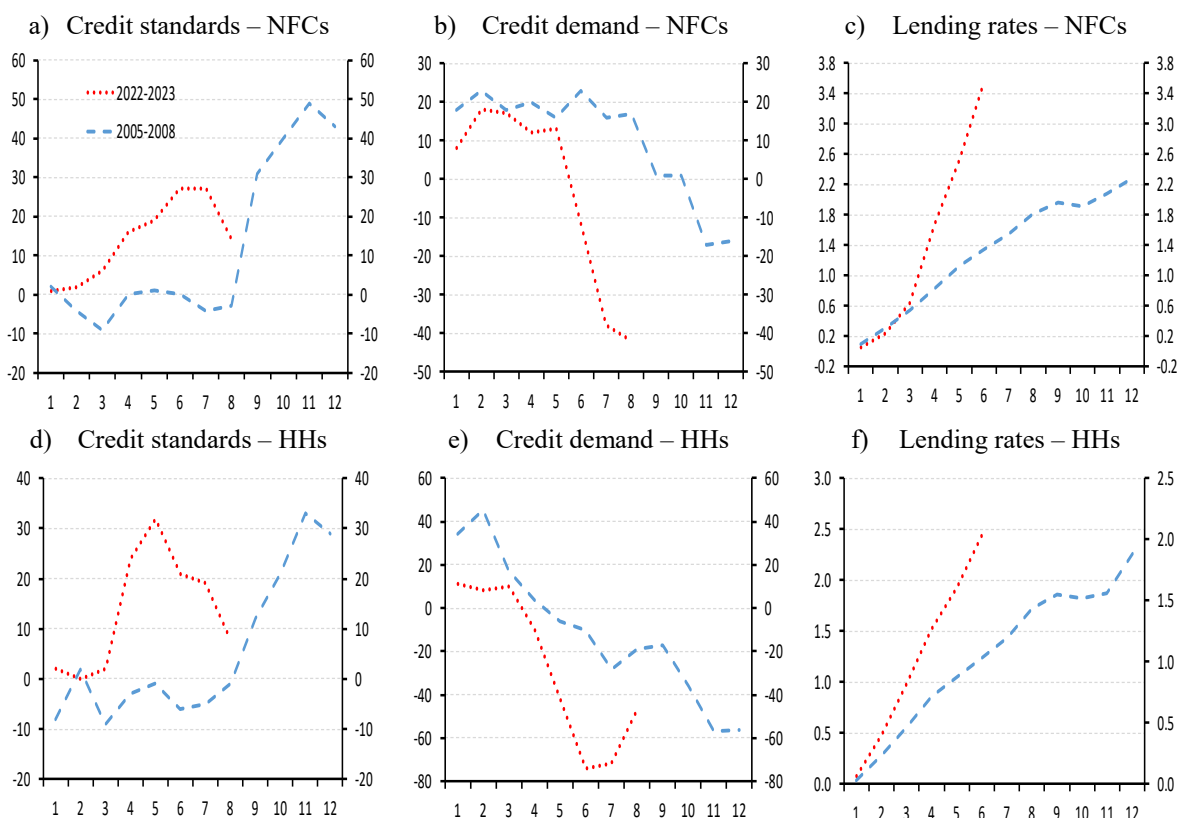
3.2 The impact on credit conditions

The unprecedented monetary policy tightening has led to a rapid increase in lending rates to non-financial corporations and households (Figure 16, panels c and f), also reflecting the unprecedented speed and scale of the policy rate increases (Lane, 2023b), and to a marked decline in credit. The weakness of lending is reflected in the sharp deceleration of the broad monetary aggregate M3, whose annual growth rate has fallen to values similar to or just below those recorded in the aftermath of the global financial crisis and the sovereign debt crisis in the euro area.

A comparison between the current tightening cycle and the one that started in December 2005 is purely illustrative, as the macroeconomic landscape differed significantly between the two periods. In the 2005-2008 cycle, credit supply conditions were initially loose and the credit demand from both non-financial corporations (NFCs) and households (HHs) was strong, supported by rapid house price growth in some euro-area economies. Banks only started to tighten lending standards in the last quarter of 2007, several quarters after the bursting of the housing bubble in the United States and the resulting tensions in global financial markets.

In the current tightening cycle, on the contrary, banks started to tighten credit standards at the beginning of the monetary policy normalisation, in a context of increasing uncertainty related to the rise in energy prices and the conflict that started after Russia’s invasion of Ukraine (panels a and b). Empirical analyses by the ECB (Lane, 2023b), find that both the reduction in TLTRO funds and the increase in bank bond yields have led to a significant reduction in loan supply, even when controlling for demand conditions. A year into the beginning of the monetary policy normalization, credit demand, as assessed by euro-area banks participating in the Eurosystem’s Bank Lending Survey (BLS), has declined sharply, particularly for households (Figure 16, panels b and e).

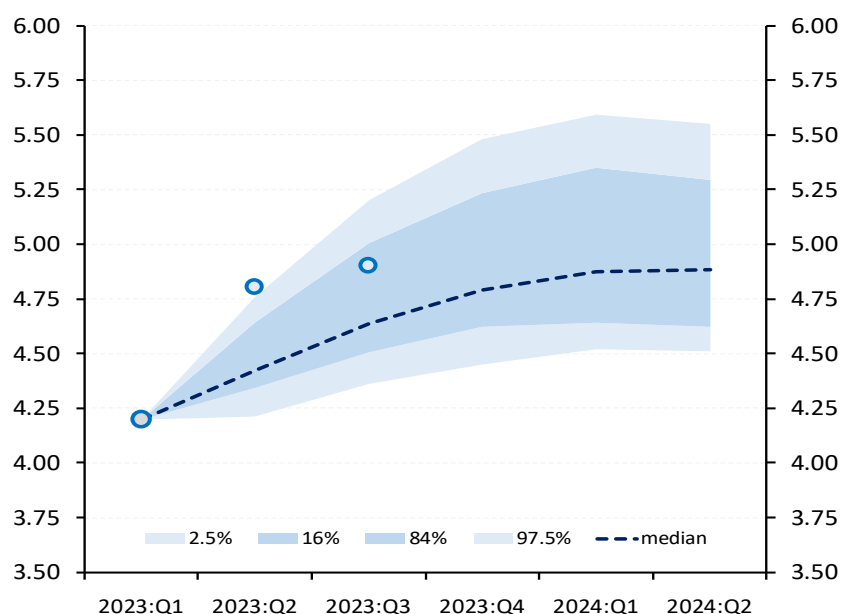
Figure 16. Indicators of credit supply and credit demand, and lending rates



Source: ECB and Eurosystem Bank Lending Survey. *Note:* The starting point of the 2005-2008 tightening cycle is December 2005; that for the current cycle is December 2021. The horizontal axis denotes the number of quarters since the beginning of the tightening cycle. Panels a) and d) show the net percentages of banks reporting a tightening of credit standards. Panels b) and e) show the net percentages of banks reporting an increase in demand. Panels c) and f) show the composite indicators of the cost of total loans (per cent). Latest observations: 2023:Q3 for the BLS indicators, July 2023 for the composite lending rates.

Current developments in the credit market, characterised by high lending rates, tight credit standards, and very weak loan demand, are likely to exert downward pressure on consumption and investment in the coming quarters. The ongoing tightening of credit standards, driven by banks' increased risk perception and reduced risk tolerance, may put additional upward pressure on lending rates. Bottero and Conti (2023) estimate a wide range of models for the composite cost of borrowing for NFCs using a thick-modelling approach. These models include short- and long-term market interest rates, economic activity and indicators of credit standards from the BLS, in addition to the lags of the lending rates. The main underlying assumptions are that policy rates will be raised by an additional 75 b.p. by early 2024 (including the 25 b.p. expected for the July Governing Council meeting), as implied by market prices, and that banks' marginal cost of funding will increase up to 3.2 per cent in 2024:Q1. The latter assumption is based on a smooth increase in deposit remuneration in line with historical patterns. According to the simulations, lending rates for euro-area NFCs could increase by an additional 80 b.p. by 2024:Q1 compared with a baseline in which lending rates are a function of short-term market rates and their own lags (Figure 17).

Figure 17. Rates on loans to non-financial corporations in the euro area
(per cent)



Source: Bottero and Conti (2023) based on MIR, ECB, Refinitiv data. Note: the blue dots denote the actual data. The data for 2023:Q3 refer to July.

The path of lending rates is subject to additional upward risks that stemming from unexpected tensions related to a stronger increase than currently observed in retail deposit remuneration and the reduction of the Eurosystem's balance sheet. Tensions in the deposit retail market could imply an additional impact on euro-area lending rates of around 90 b.p., while tensions in the wholesale markets would have a more limited impact (15 b.p.).

3.3 The risk of de-anchoring

All the Governing Council’s monetary policy decisions have helped to maintain long-term inflation expectations anchored and reduce the risk of de-anchoring in a context of unprecedented high inflation.

Between April 2021 and January 2022 (the round before the announcement of the revision of the strategy) (just before the Russian invasion of Ukraine), long-term (mean point) expectations from the ECB SPF have increased by 30 basis points to 1.97 per cent. The pace of upward revisions to long-term inflation expectations has been unprecedented since autumn 2021, in a context of rapidly evolving macroeconomic conditions and surging inflation. Since the Russian invasion of Ukraine, long-term inflation expectations in the ECB Survey of Monetary Analysts (SMA) have remained stable at 2.0 per cent. Both survey- and market-based inflation expectations are currently anchored to the target.

To assess the risk of de-anchoring going forward, I estimate the following equation over the sample period 2002:Q1 – 2023:Q3 using a rolling window of 28 quarters:

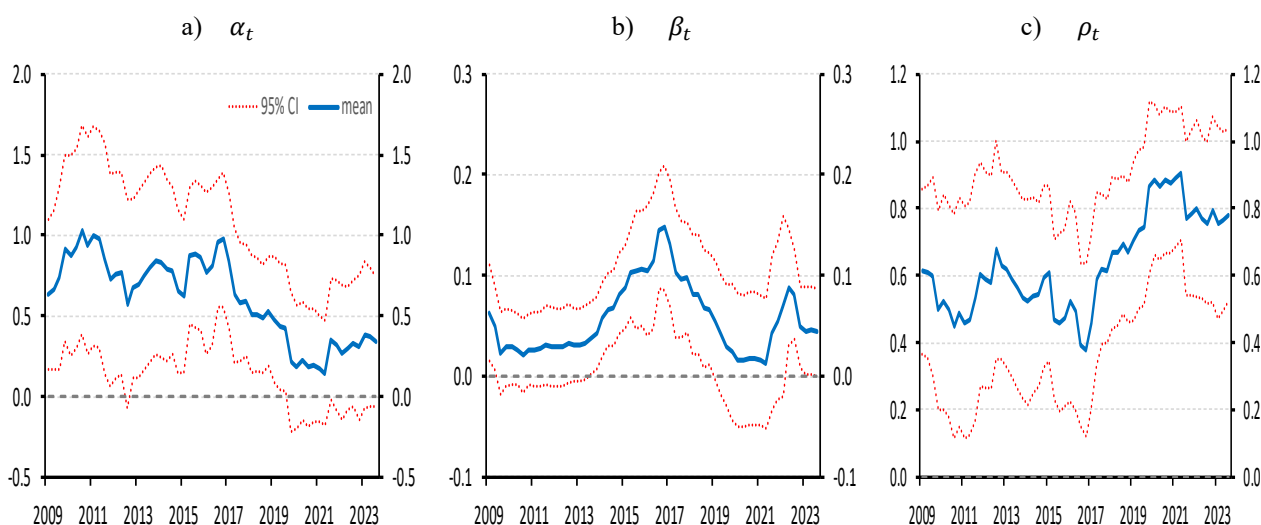
$$\pi_t^{e,L} = \alpha_t + \beta_t \pi_t^{e,S} + \rho_t \pi_{t-1}^{e,L} + \epsilon_t \quad (2)$$

where $\pi_t^{e,L}$ is the long-term inflation expectations and $\pi_t^{e,S}$ the short-term ones. The specification is taken from Corsello, Neri and Tagliabracci (2021).¹¹ A positive coefficient β is a sign of (shock) de-anchoring of long-term expectations (panel b), as forecasters revise them in response to changes in the short-term ones. The coefficient ρ measures the persistence of long-term inflation expectations. A persistent change in $\frac{\alpha_t}{\rho_t}$ identifies a level de-anchoring. The justification for using a rolling estimation is based on several factors. Firstly, the review of the monetary policy strategy after a long period of below-target inflation. Secondly, the unprecedented magnitude of the shocks to inflation since mid-2021. Thirdly, the on-going tightening of monetary policy. The equation used to project long-term inflation expectations forward for a given path of short-term ones, is consistent with an adaptive mechanism of expectation formation.

The estimation shows that the constant term has gradually declined during the pre-pandemic period of low inflation (Figure 18, panel a) and has since remained at low levels. At the same time, the persistence has increased (panel c), which suggests a high probability of prolonged low inflation extending into the long-term. This is consistent with Corsello, Neri and Tagliabracci (2021). In parallel, the sensitivity to short-term inflation expectations, which was not statistically significant before 2013, reached a maximum in mid-2016, when the risk of deflation was high. The recalibrations of the APP have reduced the sensitivity, making it statistically not significant until the second quarter of 2022. Since then, the sensitivity has marginally increased, but has again become not statistically significant since the first quarter of 2023.

¹¹ If α_t were a constant and β_t and ρ_t equal to zero for all t , long-term inflation expectations would be equal to the target.

Figure 18. SPF long-term inflation expectations: shock anchoring



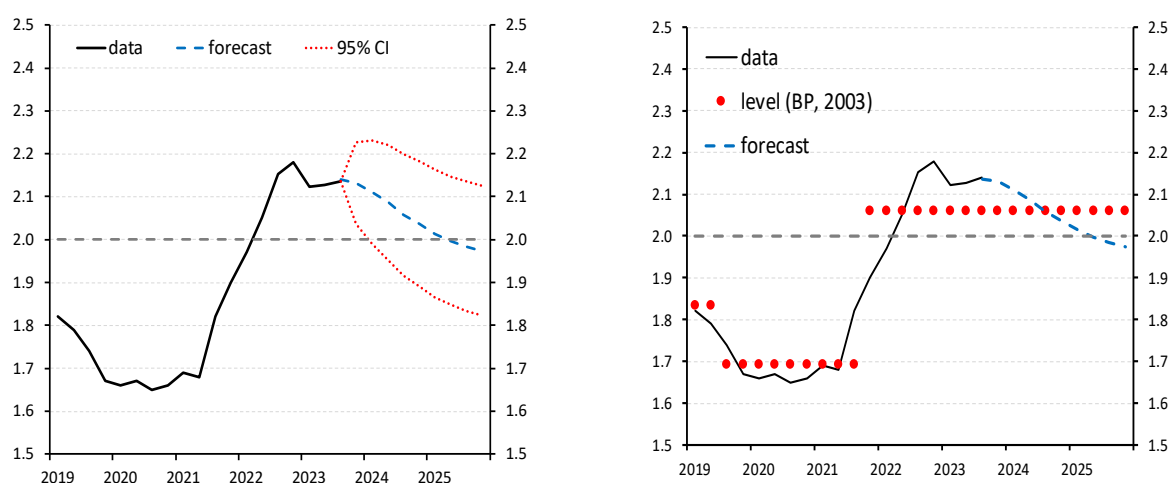
Source: author's calculations based on SPF data. The coefficients are estimated over a window of 28 quarters. The results are robust to using a window of 24 quarters. Latest observation: 2023:Q3.

To evaluate the possibility of long-term expectations becoming de-anchored in the coming years, I project the model in eq. (2) using the Eurosystem's staff June 2023 macroeconomic projections and the most recent set of estimated coefficients. I assume that the projected of inflation for 2023:Q4 is the one-year ahead expected inflation in 2024:Q4 and so on. Additionally, I assume that short-term inflation expectations converge to 2 per cent in 2025. Due to its univariate nature, the exercise cannot consider the impact of nominal wage evolution, energy prices, aggregate demand, and expectations regarding future monetary policy actions.

Based on short-term expectations, long-term inflation expectations would gradually decrease to 2 per cent (Figure 19, left panel). Applying the Bai and Perron (2003) methodology to the time series of long-term inflation expectations augmented with their projected path (Figure 19, right panel) would not detect an additional upward shift in their level over the forecast horizon. The results suggest that the mild shock-deanchoring that occurred in mid-2022 is not expected to cause a further upward shift in the level of long-term expectations (level de-anchoring).

Why have long-term inflation expectations remained anchored despite the unprecedented levels of inflation? Monetary policy has reacted swiftly to rising inflation, in contrast to the slow reaction during the 2013-14 disinflation (Corsello, Neri and Tagliabracci, 2021). As inflation was falling during that time, forecasters expected the ECB to keep the rate on the MRO rate unchanged, which was close to its effective lower bound, and even to raise it in 2015 and 2016. Importantly, the ECB started the APP only in the last quarter of 2014, with the purchases of public sector securities becoming more prominent after the first quarter of 2015. If the APP had been adopted earlier, the sharp decline in long-term inflation expectations and the increased risk of their de-anchoring observed until 2015 could have been prevented (Neri and Siviero, 2018).

Figure 19. SPF long-term inflation expectations: conditional projected path
(per cent)



Source: calculations based on SPF data. *Note:* the coefficients are estimated over a moving window of 28 quarters. The projected path of long-term inflation expectations is conditional on the Eurosystem’s June 2023 Broad Macroeconomic Projection Exercise. The level-anchoring analysis (right panel) is conducted using the methodology in Bai and Perron (2003; BP). Latest observation: 2023:Q3.

In the current inflation cycle, the Governing Council began raising the policy rates at an unprecedented pace in July 2022. Net asset purchases within the APP were terminated in February 2023, followed by those within the PEPP in June. APP reinvestment was halted in July 2023. These decisions first contributed to the normalization of monetary policy and then shifted the stance into restrictive territory, helping to preserve the anchoring of long-term inflation expectations. Cuciniello (2023) proposes a new methodology for estimating the markets’ perception of the ECB’s aggressiveness towards inflation and for assessing its impact on the central bank’s credibility. The analysis reveals a significant increase in the market’ perception of the ECB’s response to inflation since early 2022. The decisive monetary policy response reduced the sensitivity of long-term inflation expectations to short-term ones, which indicates a lower risk of deanchoring and improved credibility.

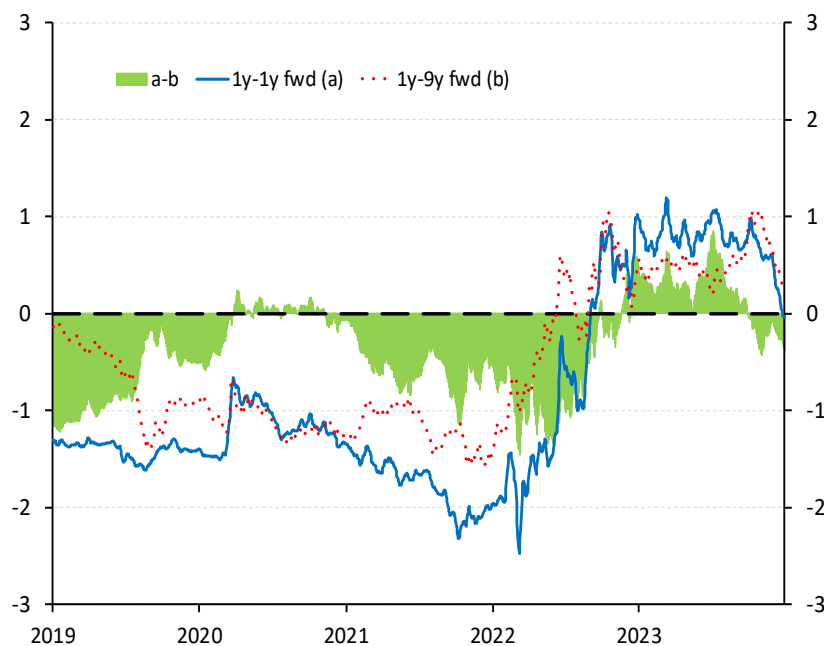
Visco (2023a) argues that the ECB’s Governing Council did not delay the normalization of its monetary policy. In the summer of 2021, inflation in the United States exceeded 5 per cent (core inflation was 4.5), with demand factors playing a larger role than in the euro area. In contrast, in the euro area, headline inflation was below 2 per cent, and core inflation was less than 1. According to the June 2021 Eurosystem’s macroeconomic projections, both headline and core inflation were expected to reach 1.4 per cent in 2023. However, since the jury is still out, a quantitative analysis using model-based counterfactual simulations may be necessary to assess whether the the normalization of monetary policy was delayed.

3.4 Monetary policy enters in contractionary territory

Measuring the stance of monetary policy is crucial for its calibration. However, establishing a benchmark for its measurement is not straightforward due to the various definitions and estimates.

A simple way to gauge the stance of monetary policy is to analyze the ex-ante real interest rates based on financial prices. The one-year one-year ahead real interest rate (Figure 20) has constantly increased from the low levels reached in late 2021 (-2 per cent) to almost 1 in the spring of 2023. These developments have been influenced by the rise in the policy rates and by the end of the net asset purchases and their reinvestments. Since late 2022, the one-year one-year real rate has exceeded the one-year nine-year ahead rate, which can be considered as the long-run equilibrium real rate perceived by markets. This suggests that monetary policy entered a contractionary phase at the end of November 2022. The long-run equilibrium rate increased from around -1.0 per cent in late 2022 to 0.5 in 2023:Q2.

Figure 20. Measuring the monetary policy stance with forward real rates
(per cent)



Source: Refinitiv. The forward rates are computed as the difference between the IRS and the ILS. Average of five business days. The green area denotes the difference between the one-year one-year ahead and the one-year 9-year ahead real rates. Latest observations: 29 December 2023.

In July 2023, the analysts surveyed by the ECB within its SMA expected a final 25 b.p. increase (median value) in all policy rates. A first cut in the policy rates was expected for June 2024. The long-term rate on the deposit facility rate in the SMA, which is an alternative measure of the equilibrium nominal short-term rate, increased from 1.0 per cent, which has prevailed since June 2021 when the first results of the SMA were published, to 2.0 in the July 2023 round. A first increase was recorded in April 2022 (by 25 p.b.), a second one in September (0.25) and in October (0.5). Understanding the drivers of the increase in the measures of the long-term equilibrium rate and whether they may be expected to be permanent, are important research questions. The policy rates were expected to remain above their long-run value until at least 2026.

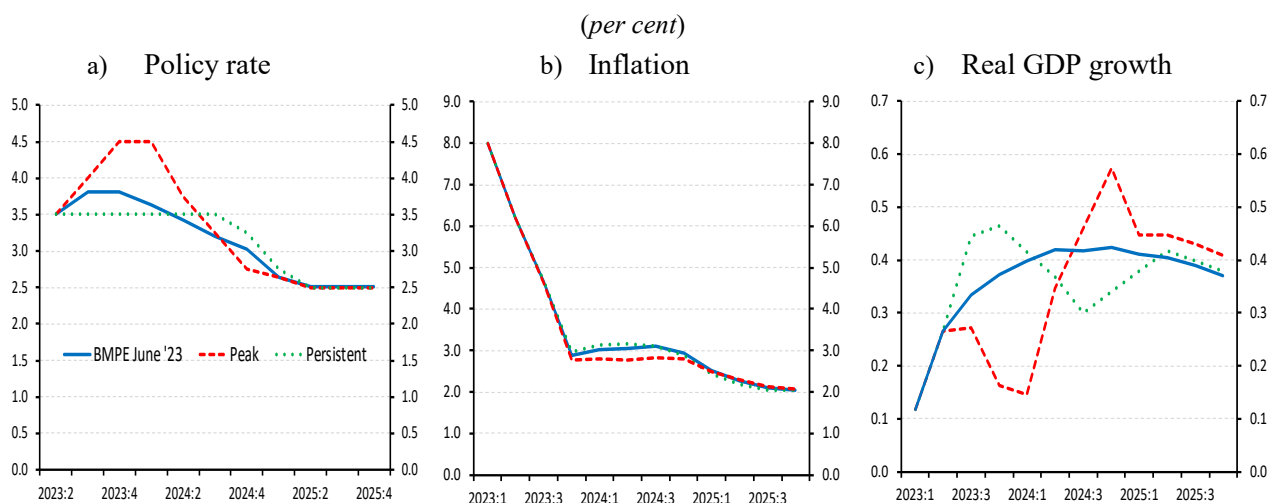
3.5 Higher for shorter or lower for longer?

Setting policy rates too high may result in an overly restrictive monetary policy stance, which could raise the likelihood of a recession due to an excessive tightening of financing conditions. Furthermore, a sudden reversal of the stance could damage the credibility of the ECB, which was frequently questioned during the period of low inflation.

The duration for which the policy rates are kept at sufficiently restrictive levels is a crucial factor in determining the monetary policy stance once the rates are their peaks (Panetta, 2023b). An approach that involves maintaining the policy rates at current elevated levels for an extended period may allow the ECB to adjust the monetary policy stance in response to changes in the inflation outlook, while also considering the risks of a recession and to financial stability.

Bartocci et al. (2023) employ a DSGE model of the euro area to evaluate the macroeconomic effects of two alternative and illustrative tightening paths for the ECB policy rates that aim to achieve a 2 per cent inflation by the end of 2025. In the first path, labelled “persistent”, policy rates are kept at current levels for an extended period before gradually reducing them. In the more proactive path (“peak”), policy rates reach a higher terminal level, but decrease more rapidly (Figure 21, panel a). The simulations show that, compared to the Eurosystem’s June 2023 projections, the persistent path would leave inflation largely unchanged in 2023-24 (panel b), while real GDP growth would benefit from the less restrictive stance in 2023 (panel c). The “persistent” path minimises the output cost.

Figure 21. Inflation and real GDP growth projections under alternative policy rate paths



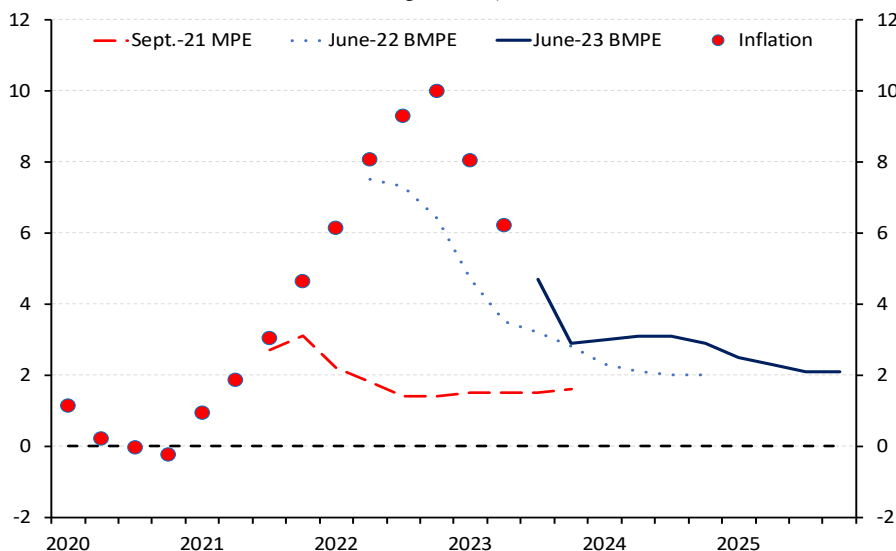
Source: Bartocci, Cantelmo, Cecioni, Hoynck, Notarpietro and Papetti (2023). The two alternative paths, which are chosen in order to ensure that inflation reaches 2 per cent in 2025:Q4, are meant to be illustrative.

According to the evaluation based on a loss function shows that the “persistent” policy rate path outperforms the “peak” path, resulting in a smaller loss. The “peak” path is only preferred in an extreme and unrealistic scenario where the central bank disregards output fluctuations.

4. The beginning of the fall of inflation

The June 2023 Eurosystem’s projections were foreseeing headline inflation reaching 2.9 per cent in the last quarter of 2023, remaining stable at around 3 per cent and then declining to 2.1 by the end of the projection horizon (2025:Q4; Figure 22). Core inflation was projected to fall to 4.2 per cent by the end of 2023 and to reach 2.2 in 2025:Q4.

Figure 22. Headline inflation projections: ECB and Eurosystem projections
(per cent)



Source: ECB’s Macroeconomic Projection Exercise (MPE) and Eurosystem’s Broad Macroeconomic Projections Exercises (BMPE).

The ECB was surprised by the rapid and significant rise of inflation. In September 2021, when headline inflation was at 3.4 per cent and core at 1.9, the ECB had forecasted headline inflation to fall to 1.6 per cent in the last quarter of 2023. The increase in energy commodity prices was not anticipated by the markets, although gas prices were already higher than at the start of 2021.

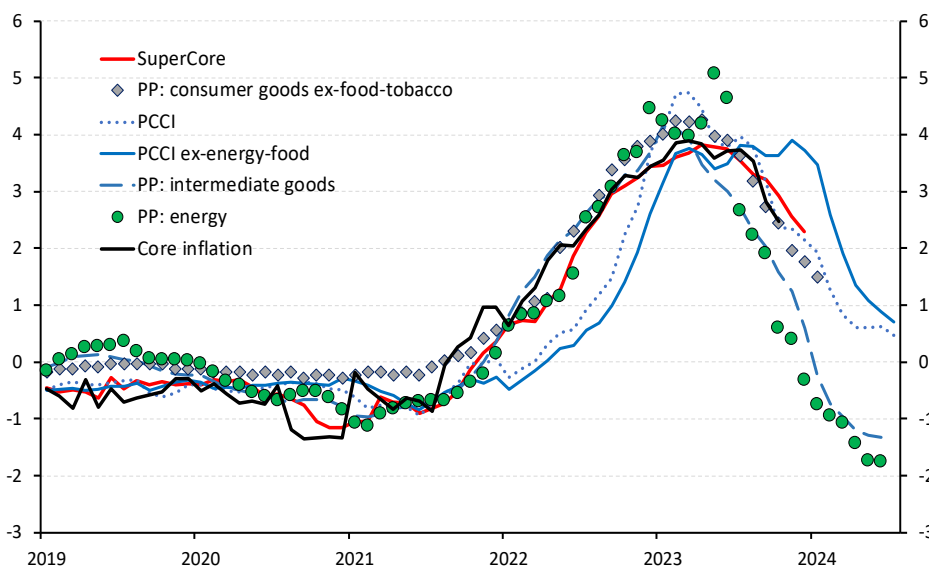
Recently, there has been significant attention given to the concept of underlying inflation (Lane, 2023a, and Panetta, 2023a). Underlying inflation is a measure of where headline inflation will settle in the medium term after temporary (“noise”) factors have dissipated (Ehrmann et al., 2018). Therefore, underlying inflation provides a means to cross-check the projected path of inflation and support the narrative behind it.

Various methods exist for constructing indicators of underlying inflation. Some of these methods exclude the most volatile items such as energy, food, travel-related items and clothing; (exclusion-based measure, e.g. HICPXX). Other methods exclude the items that show changes that are above certain percentiles of the distribution (distribution-based measures, e.g. 10 or 30 per cent trimmed inflation). Others select the items based on their correlation with measures of the slack or the persistence of the common component of the panel of individual goods and services (model-based measures such as the SuperCore and the “persistent and common component of inflation”, PCCI).

Additionally producer prices can provide insight into future developments of inflation. It should be noted that core inflation is not a leading indicator of headline inflation (Reichlin and Lenza, 2011; Guerrieri, Marcussen, Reichlin and Tenreiro, 2023).

Several indicators of underlying inflation have been moderating since early 2023. By exploiting the correlation between these indicators and the leads of core inflation, it is possible to project forward the latter over the next quarters. Figure 23 shows that, according to producer prices and the PCCIs, core inflation is expected to gradually decline from the peak reached in the spring of 2023. The SuperCore indicator is correlated with current core inflation and, therefore, does not help in assessing future inflation developments. Bańbura et al. (2023) show that several measures, including the PCCI measures, domestic inflation (inflation based on items with an import intensity below a certain threshold) and HICPXX, tend to perform well according to various forecasting criteria.¹² The developments in the indicators of underlying inflation provide support to the Eurosystem’s June 2023 projections, which foresee core and headline inflation to decline towards the end of 2023 and approach values close to 2 per cent by the end of 2025.

Figure 23. Core inflation and indicators of underlying inflation
(per cent)



Source: ECB. Note: each indicator is shifted forward on the basis of the leads at which the correlation with core inflation is maximum. Latest observations: December 2023.

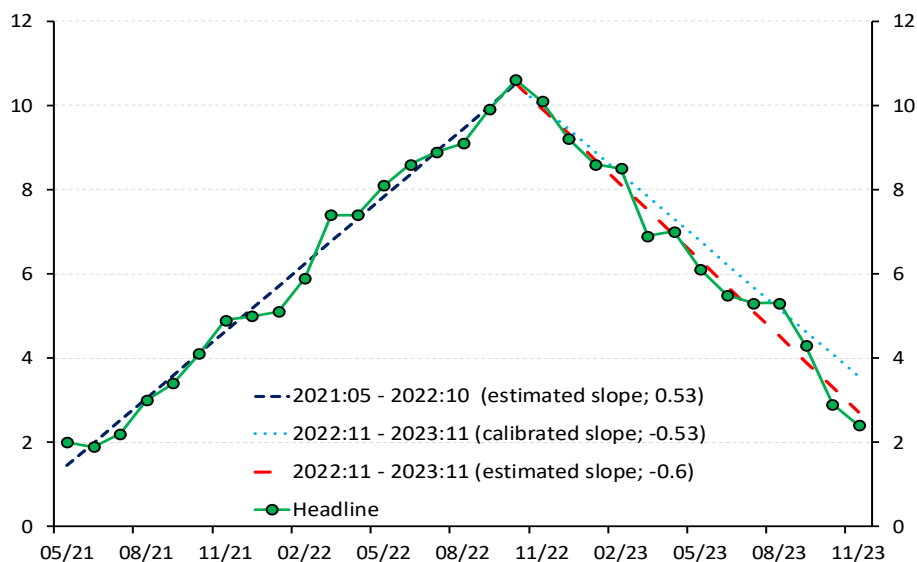
The disinflation observed so far has occurred prior to the full realization of the effects of the monetary policy restriction on aggregate demand. As these effects materialize, the convergence of inflation to the 2 per cent target will continue and strengthen.

According to a simple econometric exercise, the pace of the disinflation since the peak of headline inflation in October 2022 has been somewhat faster than its increase since spring 2021. The

¹² Conflitti (2020) proposes two measures of underlying inflation for the euro area. The first measure separates the price changes that respond to the economic cycle (pro-cyclical) from those that do not (acyclical). In the second measure, the items subject to strong idiosyncratic price changes are removed.

slope of the linear trend estimated using headline inflation between May 2021 and October 2022 (0.53) is larger in absolute value than the slope estimated over the period from November 2022 to November 2023 (-0.6; Figure 24).

Figure 24. The pace of the disinflation in 2023
(per cent)



Source: author's calculation based on ECB data. Last observation: November 2023. The green solid line denotes the headline inflation; the blue dashed line denotes the estimated linear trend over the period May 2021 – October 2022; the light blue dotted lines denotes the linear with the slope equal to the negative of the estimated trend over the period May 2021 – October 2022. Finally, the red dashed line denotes the linear trend estimated over the period November 2022 – November 2023.

The data for October and November 2023 are significantly below the trend whose slope is calibrated to the negative value of the slope estimated during the period in which inflation was increasing.

5. Concluding remarks

In the summer of 2021, inflation in the euro area woke up after many years below target. The period of low inflation that began in 2013 ended abruptly with the economic recovery from the pandemic and the energy crisis. By autumn 2022, inflation in the euro area had reached double digits. Around about two-thirds of the goods and services in the consumption basket were experiencing increases of more than 4 per cent. Despite the unprecedented rise in consumer prices, long-term inflation expectations have remained anchored at the 2 per cent symmetric target.

The monetary policy cycle has peaked and financing conditions are much tighter than at the beginning of the cycle, partly because banks have become less willing to take on excessive risks in lending. There are indications that monetary policy and the impact of the energy shocks on disposable income are affecting aggregate demand. The impact of the monetary policy tightening through the banking sector is may strengthen and affect aggregate demand over the next two years.

With long-term inflation expectations well-anchored and the risk of a wage-price spiral limited, the time has come to take stock of the effects of monetary policy achieved so far, as well as of those still in the pipeline, and to wait for the effects of past inflationary shocks to fade.

The need to maintain a sufficiently restrictive monetary policy stance for as long as necessary to support the disinflation is considered “*as important as the level of our policy rates*” (Panetta, 2023b). By maintaining a sufficiently restrictive stance, the ECB can bring inflation back to 2 per cent, while at the same time avoiding the costs associated with a deterioration of the economic outlook.

References

- Alessandri, P. and A. Gazzani (2023). “*Natural gas and the macroeconomy: not all energy shocks are alike*”, VoxEU <https://cepr.org/voxeu/columns/impact-gas-supply-shocks-europe>.
- Arce, O., E. Hahn and G. Koester (2023). “*How tit-for-tat inflation can make everyone poorer*”, ECB Blog 30 March 2023.
- Bai, J. and P. Perron (2003). “*Computation and analysis of multiple structural change models*”, Journal of Applied Econometrics 18.
- Bañbura, M., E. Bobeica, K. Bodnár, B. Fagandini, P. Healy and J. Paredes (2023). “*Underlying inflation measures: an analytical guide for the euro area*”, ECB Economic Bulletin, 5/2023.
- Banca d’Italia Annual Report for 2022.
- Banca d’Italia Economic Bulletin, January 2021.
- Bartocci, A., A. Cantelmo, M. Cecioni, C. Höynck, A. Notarpietro and A. Papetti (2023). “*Approaching the terminal rate and the way forward: a model-based analysis*”, Banca d’Italia Occasional paper 791.
- Bernardini, M. and A. M. Conti (2023). “*Announcement and implementation effects of central bank asset purchases*”, Banca d’Italia Working paper 1435.
- Blanchard, O. J. and J. Gali (2007). “*The macroeconomic effects of oil shocks: why are the 2000s so different from the 1970s?*”, NBER Working paper 13368.
- Bobasu, A., V. Di Nino and C. Osbat (2023). “*The impact of the recent inflation surge across households*”, article in ECB Economic Bulletin, Issue 3/2023.
- Bottero, M. and A. M. Conti (2023). “*In the thick of it: An interim assessment of the transmission of monetary policy tightening to credit conditions*”, Banca d’Italia Occasional paper 810.
- Bulligan, G., F. Corsello, S. Neri and A. Tagliabracchi (2021). “*De-anchored long-term inflation expectations in a low growth, low rate environment*”, Banca d’Italia Occasional paper 624.
- Carrière-Swallow, Y., P. Deb, D. Furceri, D. Jiménez and J. D. Ostry (2023). “*Shipping costs and inflation*”, Journal of International Money and Finance 130 102771.
- Cavallo, A., F. Lippi and K. Miyahara (2023) “*Large shocks travel fast*”, NBER Working paper 31659.

- Cecchetti, S., A. Grasso and M. Pericoli (2021). “*An analysis of objective inflation expectations and inflation risk premia*”, Banca d’Italia Working paper 1380.
- Claeys, G., C. McCaffrey and L. Welslau (2022). “*Does inflation hit the poor hardest everywhere?*”, Bruegel blog post, 28 November 2022. <https://www.bruegel.org/blog-post/does-inflation-hit-poor-hardest-everywhere>.
- Colonna, F., R. Torrini and E. Viviano (2023). “*The profit share and firm mark-up: how to interpret them?*”, Banca d’Italia Occasional paper 770.
- Conflitti, C. (2020). “*Alternative measures of underlying inflation in the euro area*”, Banca d’Italia Occasional paper 593.
- Corsello, F., M. Flaccadoro and S. Villa (2023). “*Quantity versus price dynamics: the role of energy and bottlenecks in the Italian industrial sector*”, Banca d’Italia Occasional paper 781.
- Corsello, F., M. Gomellini and D. Pellegrino (2023). “*Inflation and energy price shocks: lessons from the 1970s*”, Banca d’Italia Occasional paper 790.
- Corsello, F. and A. Tagliabracci (2023). “*Assessing the pass-through of energy prices to inflation in the euro area*”, Banca d’Italia Occasional paper 745.
- Corsello, F., S. Neri and A. Tagliabracci (2021). “*Anchored or de-anchored? That is the question*”, European Journal of Political Economy 69 102031.
- Corsello, F. and M. Riggi (2023). “*Inflation is not equal for all: the heterogeneous effects of energy shocks*”, Banca d’Italia Working paper 1380.
- Cuciniello, V. (2023). “*Inflation anchoring and markets’ perception about the ECB’s aggressiveness towards inflation*”, Banca d’Italia mimeo.
- Curci, N., M. Savegnago, G. Zevi and R. Zizza (2022). “*The redistributive effects of inflation: a microsimulation analysis for Italy*”, Banca d’Italia Occasional paper 738.
- De Santis, R. A. (2024). “*Supply chain disruption and energy supply shocks: impact on euro area output and prices*”, European Central Bank Working paper 2884.
- De Santis, R. A. and T. Tornese (2023). “*Energy supply shocks’ nonlinearities on output and prices*”, European Central Bank Working paper 2834.
- Ehrmann, M., G. Ferrucci, M. Lenza and D. O’Brien (2018). “*Measures of underlying inflation for the euro area*”, ECB Economic Bulletin, 4/2018.
- Enders, A. and Z. Enders (2017). “*Second-round effects after oil-price shocks: Evidence for the euro area and Germany*”, Economic Letters 159, 208-213.

- Finck, D. and P Tillmann (2023). “The macroeconomic effects of global supply chain disruption”, Institute for Monetary and Financial Stability, Goethe University Frankfurt Working paper 178.
- Guerrieri, V., M. Marcussen, L. Reichlin and S. Tenreyro (2023). *The arts and science of patience. Inflation and Relative Prices*, Geneva Reports on the World Economy 26.
- Koester, G., E. Lis, C. Nickel, C. Osbat and F. Smets (2021). “*Understanding low inflation in the euro area from 2013 to 2019: cyclical and structural drivers*”, European Central Bank Occasional paper 280.
- Höynck, C. and L. Rossi (2023). “*The drivers of market-based inflation expectations in the euro area and in the U.S.*”, Banca d’Italia Occasional paper 779.
- Lagarde, C. (2023a). “*The path ahead*” speech at “The ECB and Its Watchers XXIII” conference, Frankfurt am Main, 22 March 2023.
- Lagarde, C. (2023b). Press conference after the meeting of the Governing Council, 27 July 2023.
- Lane, P. R. (2020). “*The pandemic and ECB monetary policy*”, on-line speech at a SUERF conference, 14 October 2020.
- Lane, P. R. (2022a). “*The pandemic and ECB monetary policy*”, conference to mark the 20th anniversary of the creation of the Germán Bernácer Prize organised by Observatorio del Banco Central Europeo (OBCE), CEPR and Fundación Ramón Areces, 25 May 2022.
- Lane, P. R. (2023a). “*Underlying inflation*”, lecture at Trinity College Dublin, Dublin, 6 March 2023.
- Lane, P. R. (2023b). “*The banking channel of monetary policy tightening in the euro area*”, remarks at the Panel Discussion on Banking Solvency and Monetary Policy, NBER Summer Institute 2023 Macro, Money and Financial Frictions Workshop, 12 July 2023.
- Neri, S. (2023). “*Long-term inflation expectations and monetary policy in the euro area before the pandemic*”, European Economic Review 154, 104426.
- Neri, S., F. Busetti, C. Conflitti, F. Corsello, D. Delle Monache and A. Tagliabracci (2023). “*Energy price shocks and inflation in the euro area*”, Banca d’Italia Occasional paper 792.
- Neri, S., G. Bulligan, S. Cecchetti, F. Corsello, A. Papetti, M. Riggi, C. Rondinelli and A. Tagliabracci (2022). “*On the anchoring of inflation expectations in the euro area*”, Banca d’Italia Occasional paper 712.
- Neri, S. and S. Siviero (2018). “The non-standard monetary policy measures of the ECB: motivations, effectiveness and risks”, Credit and Capital Markets 51, 513-560.

- Pallara, K., L. Rossi, M. Sfregola and F. Venditti (2023). “*The impact of energy shocks on core inflation in the US and the euro area*”, VoxEU 14 Aug 2023.
- Panetta, F. (2023a). “*Everything everywhere all at once: responding to multiple global shocks*”, The ECB and its Watchers XXIII Conference, Frankfurt am Main, 22 March 2023.
- Panetta, F. (2023b). “*Getting disinflation right*”, speech at Bocconi University, Milan, 3 August 2023.
- Rees, D. and P. Rungcharoenkitkul (2021). “*Bottlenecks: causes and macroeconomic implications*”, BIS Bulletin 48.
- Rostagno, M., C. Altavilla, G. Carboni, W. Lemke, R. Motto, A. Saint Guilhem and J. Yiangou (2021). *A Tale of Two Decades: the ECB’s Monetary Policy at 20*, Oxford University Press: Oxford.
- Schnabel, I. (2023). “*Inflation in the euro area and the US - causes, persistence, outlook*”, speech at Stanford Graduate School of Business, Stanford, 20 April 2023.
- Visco, I. (2023a). “*Monetary policy and the return of inflation: questions, charts and tentative answers*”, CEPR Policy Insights 122.
- Visco, I. (2023b). The Governor’s Concluding Remarks for 2022.
<https://www.bancaditalia.it/pubblicazioni/relazione-annuale/2022/index.html>.
- Yellen, J. L. (2015). “*Inflation dynamics and monetary policy*”, speech at the Philip Gamble Memorial Lecture, University of Massachusetts, Amherst, Amherst, Massachusetts, 24 September 2015.