Analysis

The effects of energy shocks on inflation vary surprisingly widely over time

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In the euro area, changes in energy prices of the same magnitude have had very different effects on core inflation at different points in time. These differences emerge with a time lag as increases in energy prices spread more widely through the economy. When the central bank's inflation target is regarded as credible, inflation expectations are more stable. Inflation expectations in the euro area are currently more stable than at the onset of the 2022 energy crisis, and the effects of energy shocks on core inflation may therefore also be more moderate.

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- The effects of energy shocks on euro area core inflation have varied considerably over time.
- Increases in energy prices pass through to core inflation gradually, while moderate inflation expectations limit the pass-through.
- More stable inflation expectations may dampen the pass-through of the current energy shock to core inflation compared with the 2022 energy crisis.

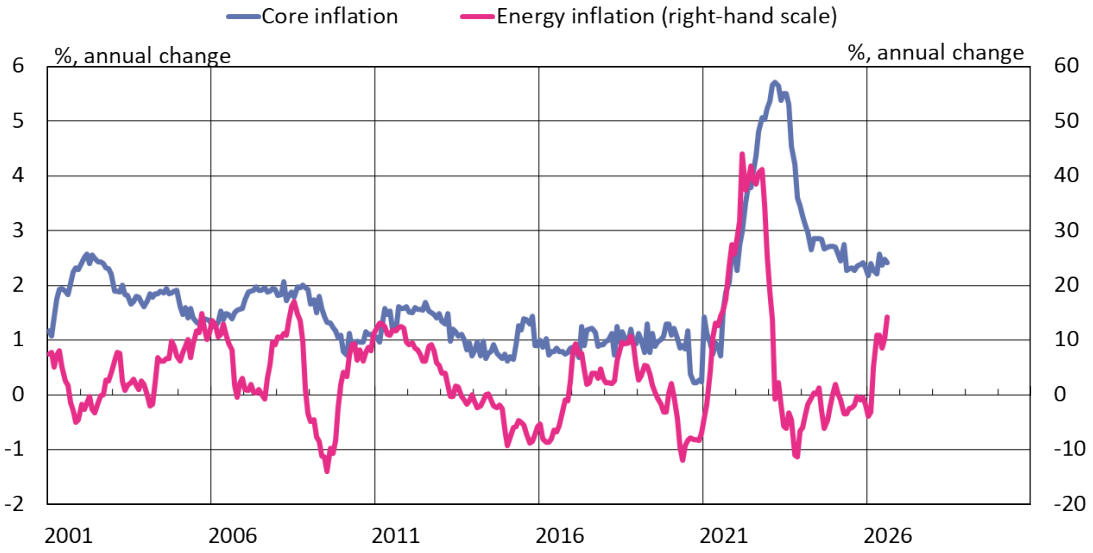


The Middle East crisis has also pushed up energy prices in the euro area. Since April, inflation in the energy component of the consumer price index has stayed above 10%. This increase is comparable in magnitude to, for example, the rise in energy prices before the global financial crisis and to the surge in energy inflation driven by higher crude oil prices in 2018. In 2014–2015, energy prices fell by a corresponding amount. The increase observed so far, however, has been considerably smaller than that seen in 2021–2022 during the COVID-19 pandemic and Russia's war in Ukraine. The risk of a more severe disruption to energy supply has nevertheless increased.

For monetary policy, the key question is what broader effects shocks have on price pressures and, through them, on medium-term inflation. Core inflation, measured as headline inflation excluding energy and food prices, is less affected by short-term volatility and therefore provides a better indication of medium-term inflation. Its relationship with changes in energy prices has varied considerably over time (Chart 1). Before the global financial crisis, core inflation responded only marginally to changes in energy prices, whereas in 2014–2015 the decline in energy prices had a clearer dampening effect. By contrast, core inflation rose sharply after the COVID-19 pandemic. In addition to higher energy prices, this reflected many other factors, such as widespread global supply disruptions and changes in the composition of demand brought about by the reopening of the economy.

Chart 1.

The relationship between inflation and energy inflation has varied over the past 25 years



Source: Eurostat.

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The relationship between energy prices and core inflation has therefore not remained constant over the past 25 years: changes in energy prices have passed through differently at different points in time to prices other than those of energy and food.

The largest effects of energy shocks on core inflation emerge with a time lag

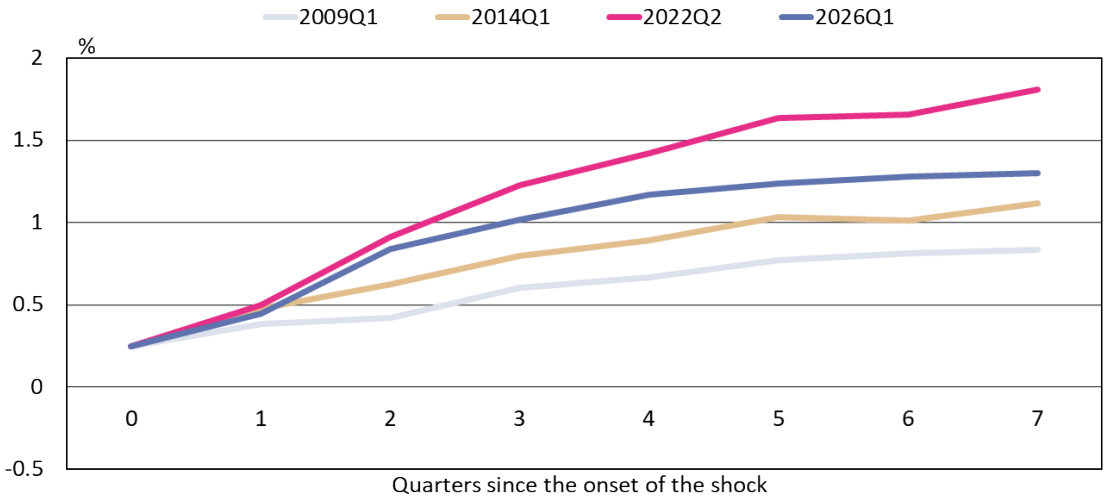
Changes in energy prices affect inflation through a number of channels. The direct effects are the most immediate, as higher energy prices directly raise the prices of energy items in the consumer price index. The indirect effects, in turn, emerge after a short time lag, as higher energy prices gradually feed through to food prices and also to the prices of many goods and services through increases in companies' production and transport costs.

From an economy-wide perspective, however, the most interesting effects are the so-called second-round effects. These arise when companies' pricing and wage responses to higher energy prices extend beyond the immediate effect of the increase. Ultimately, second-round effects determine how persistent and widespread the cost increases triggered by higher energy prices become. The crucial factors are how companies' and households' inflation expectations evolve and how these expectations are reflected in wage negotiations and pricing decisions.

Charts 2 and 3 show the effects of a 10% increase in energy prices on euro area core inflation at different points in time. The effects are estimated using a Bayesian time-varying parameter vector autoregression (TVP-VAR) model, which allows the transmission of energy shocks to be compared across different economic environments.[1] The results are presented separately for a shock in which the rise in energy prices is associated with an increase in natural gas prices (Chart 2) and for an energy shock that does not involve an increase in natural gas prices (Chart 3).

Chart 2.

Effect of a 10% increase in energy prices on core inflation, driven by natural gas prices



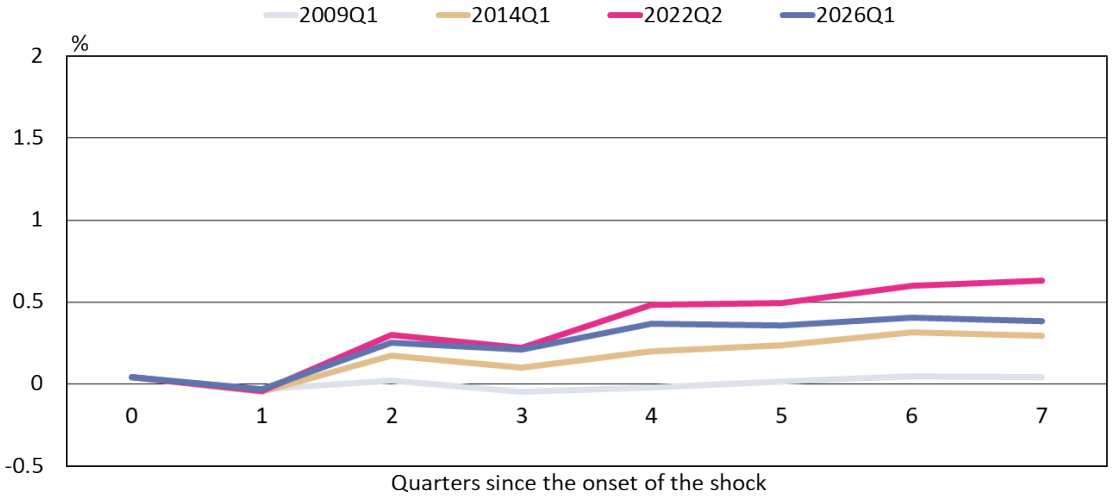
The chart shows the estimated response of euro area core inflation to a 10% energy price shock at different points in time. The estimates are based on a Bayesian time-varying parameter vector autoregression (TVP-VAR) model. The model examines the dynamics among global cyclical conditions, natural gas prices, energy inflation, wages and core inflation. Energy shocks are identified using a Cholesky decomposition.

Source: Bank of Finland calculations. 42692@energy_pass_through

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Chart 3.

Effect of a 10% increase in energy prices on core inflation without an increase in natural gas prices



The chart shows the estimated response of euro area core inflation to a 10% energy price shock at different points in time. The estimates are based on a Bayesian time-varying parameter vector autoregression (TVP-VAR) model. The model examines the dynamics among global cyclical conditions, natural gas prices, energy inflation, wages and core inflation. Energy shocks are identified using a Cholesky decomposition.

Source: Bank of Finland calculations.

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The charts distinguish four periods in euro area inflation developments. The largest differences between these periods emerge with a time lag of many quarters. This points specifically to differences in second-round effects. The first period represents the early 2000s, when inflation was relatively stable and the effects of energy shocks on core inflation remained limited. The second period covers the years following the global financial crisis, when energy prices fluctuated markedly but their effects on core inflation nevertheless remained relatively moderate. The third period is the energy crisis of 2021–2023, when the sharp rise in natural gas prices in particular had exceptionally large inflationary effects. The fourth period represents the current situation, in which energy prices have risen again, but the resulting inflationary pressures so far appear to be spreading through the economy more moderately than during the energy crisis. Given the uncertainties and time lags associated with the modelling, the estimated effects are effectively similar to those observed before the energy crisis.

Not all energy shocks are alike, however. The analysis distinguishes between two types of energy shocks. The first raises natural gas prices and, consequently, energy prices more broadly (Chart 2). The second has an immediate impact on the prices of energy products other than natural gas (Chart 3). Such shocks include changes in electricity and oil prices that are not reflected in natural gas prices. Somewhat surprisingly, natural gas price shocks appear, on average, to pass through to core inflation more strongly than other energy price shocks.[2] Although the importance of natural

gas in electricity generation has declined over time, it continues to play a significant role in industrial production processes and as a source of balancing power in the electricity market. Changes in natural gas prices can therefore feed through rapidly to the market price of electricity and, through this channel, to companies' costs. The 2021–2023 energy crisis was also accompanied by exceptional disruptions in the gas market, whose effects spread widely to companies' costs and ultimately to consumer prices. Together with factors such as strong demand, this may partly explain the pronounced inflationary effects observed at the time.

The immediate effects of energy shocks on core inflation during the first two quarters are surprisingly similar across the different periods. The largest differences emerge only later. Before the global financial crisis, the effects of energy shocks remained fairly limited, whereas in recent years similar energy shocks have had considerably stronger and more persistent effects on core inflation. The differences are particularly evident one year or more after the initial energy shock. A similar pattern can also be seen in the response of wages. This points in particular to the key role of second-round effects in explaining why an energy shock may sometimes remain temporary and moderate but at other times lead to broad-based and persistent inflation.

Changes in the response of inflation expectations may explain some of the differences in the transmission of energy shocks

A key factor shaping the second-round price effects of an energy shock is how households and companies respond to increased cost pressures in price-setting and wage formation. Employees seek to protect their purchasing power in wage negotiations, while companies take expected cost developments and competitors' pricing into account when setting prices. Expected inflation plays a major role in these decisions. If the rise in energy prices is regarded as temporary and is not expected to spread more widely through the economy, its effects on agreements concerning future wages and prices will, in principle, remain moderate.

The behaviour of inflation expectations is therefore one of the key factors that may explain the differences in second-round price effects discussed above.[3] Bernanke and Blanchard (2025) distinguish between the behaviour of short and medium-term expectations and that of long-term expectations. Short-term expectations have a direct impact on wage negotiations and companies' pricing. The sensitivity of long-term expectations to actual inflation and general economic conditions indicates, in turn, how firmly inflation expectations are anchored to the central bank's target. Expectations are stable when they are not strongly affected by either actual inflation or, for example, changes in energy prices. In such circumstances, they remain close to the central bank's

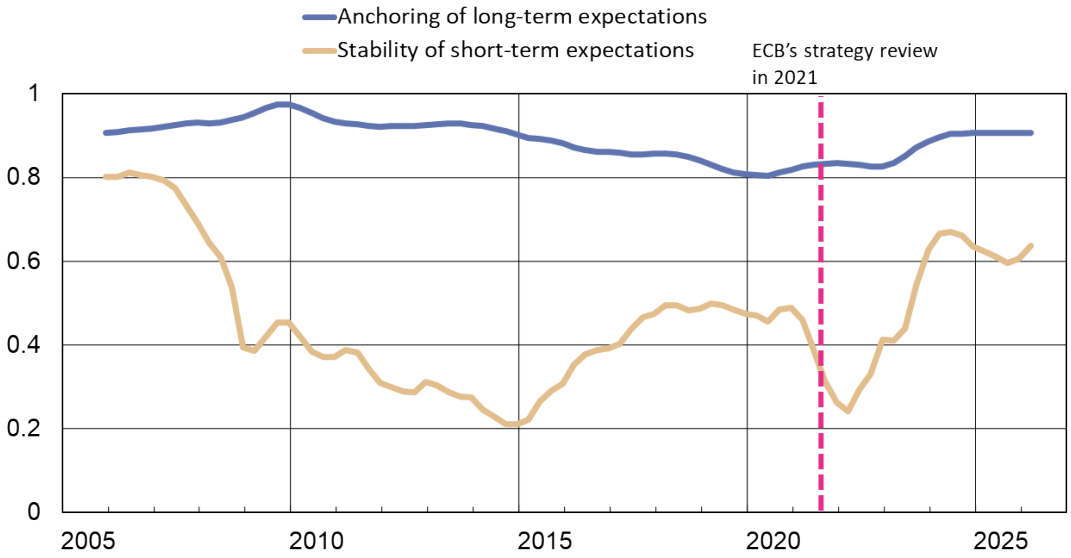
inflation target even when the economy is hit by large shocks.[4]

Chart 4 presents time-varying parameter estimates of the stability of short and long-term expectations around the inflation target, based on a semi-structural model similar to those of Bernanke and Blanchard (2025) and Oinonen and Vilmi (2024).[5] Short-term expectations are, in principle, more volatile than longer-term expectations, as the central bank is not expected to stabilise inflation over the short term. Many changes in the economy therefore affect expectations in the short term, causing the inflation outlook to fluctuate over a horizon of, for example, one or two years. Relevant factors include the magnitude of the shocks affecting the economy and whether their impact is greater on demand or supply. By contrast, the stability of long-term expectations depends more on confidence in the central bank's ability to return inflation to 2%.

Four distinct periods can be identified in the dynamics of expectations. During the first decade of the millennium, both short and long-term expectations were still very stable, and long-term expectations were firmly anchored. After the global financial crisis, short-term expectations appear to have become gradually more responsive to actual inflation. Between 2014 and 2022, the anchoring of long-term expectations also weakened slightly. In recent years, inflation expectations have stabilised again at both short and long horizons.[6] This suggests that confidence in inflation returning close to the ECB's target has strengthened despite the energy crisis.

Chart 4.

Stability of inflation expectations has varied across different periods



A higher value in the chart indicates more stable short or long-term inflation expectations. The estimates are based on a time-varying parameter version of the Bernanke and Blanchard (2025) wage-price model, estimated in a Bayesian state-space framework. The method allows the sensitivity of inflation expectations to actual inflation to vary over time.

Source: Bank of Finland calculations.

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The observed changes in the stability of inflation expectations may therefore partly explain the changes in the transmission of energy shocks. The limited pass-through in the early 2000s coincided with very stable expectations. By contrast, during the COVID-19 pandemic and at the onset of the energy crisis, stronger pass-through coincided with expectations that were clearly more sensitive than before to changes in actual inflation. At the time, the prolonged period of low inflation, very low interest rates and limited monetary policy space when interest rates were close to zero all contributed to weakening confidence that inflation would return to the target. Persistently weak aggregate demand also reinforced this development. The central bank has indeed been found to have responded more slowly to inflation below 2% than to inflation above 2%, suggesting that its reaction function was asymmetric at the time (Haavio et al., 2026).

In recent years, euro area inflation expectations appear to have stabilised considerably. The ECB responded to the surge in inflation in 2021–2023 by raising interest rates substantially and emphasising its commitment to the 2% inflation target. In its July 2021 monetary policy strategy review, the ECB Governing Council specified a symmetric inflation target of 2% over the medium term (Chart 4), and the concerns about the effective lower bound on interest rates also receded. At around the same time, market-based measures suggested that confidence in inflation returning close to 2% strengthened. In other words, high inflation did not ultimately cause expectations to become de-anchored from the target. This is an encouraging observation in terms of the current situation. Although energy prices have risen again, inflation expectations are more stable than at the onset of the energy crisis in 2022. If confidence in the restoration of price stability remains strong, energy shocks are less likely to generate broad-based wage and price pressures across the economy.

Numerous factors explain the strong transmission during the previous energy crisis

Changes in the behaviour of inflation expectations provide one explanation for the varying effects of energy shocks, but cannot alone account for the strong impact of the 2021–2023 energy crisis on core inflation. The impact of an energy shock therefore appears to depend on both the nature of the shock and the economic environment, including demand conditions. Inflation expectations are one part of this overall picture, but during the energy crisis many factors that amplified inflation were at work simultaneously.

The energy shock at the time was exceptionally large. Large price shocks may feed through to the economy differently from small ones. Companies may, for example, pass higher costs on to prices more readily when the increase in costs is exceptionally large and affects a substantial part of the economy.[7] In addition, Russia's invasion of Ukraine led to an unprecedented disruption in the

European gas markets, pushing energy prices up considerably more than in most previous episodes of rising energy prices. Our findings suggest that natural gas price shocks generate stronger upward price pressures than other shocks. Companies were also facing other cost pressures at the time. Supply chain disruptions, higher raw material prices and the rapid recovery in demand increased price pressures broadly across different sectors.

Could a new energy shock generate inflation similar to that experienced in 2022?

Energy prices have risen again as a result of the Middle East crisis, raising the question of whether the euro area could once more experience a surge in inflation similar to that seen in 2022.

At present, however, the situation appears to differ in many respects from that of four years ago. The rise in energy prices has been considerably more moderate than in 2021–2022, and prices in the European natural gas market have not, at least so far, risen as sharply as they did at the start of Russia's war in Ukraine. Neither aggregate demand nor labour market conditions are as exceptional as they were after the COVID-19 pandemic. Our findings indicate that inflation expectations have now clearly stabilised around the inflation target, reflecting confidence in the central bank's ability to achieve its medium-term objective. This confidence may have been strengthened both by the central bank's commitment to the symmetric 2% inflation target during the period of high inflation in 2021–2023 and by inflation's rapid return close to the target after the shock.

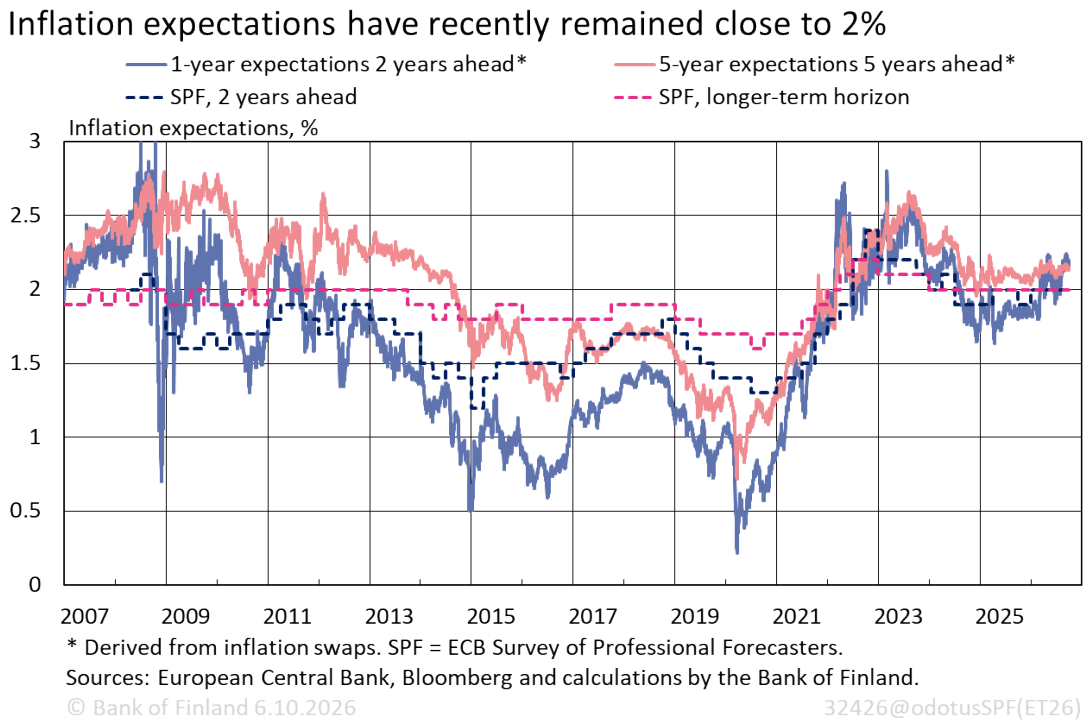
This does not mean, however, that a new energy shock could not, in principle, push inflation higher again. The risk of inflation becoming more broadly based would increase particularly if inflation expectations were to move more closely in line with energy prices than they currently do. The scale and duration of any disruption to energy supply are key determinants of this risk. At the same time, the central bank's commitment to achieving its price stability objective and its prompt response to developments such as shifts in inflation expectations help contain these risks.

Stabilising inflation expectations helps achieve price stability

Central banks cannot prevent fluctuations in global energy market prices. They can, however, influence the extent to which the effects of energy shocks spread to other prices in the economy.

Stable inflation expectations reduce the risk that a temporary energy shock will develop into a more persistent inflation problem. If households, companies and financial markets are confident that inflation will return close to the central bank's target over the medium term, the effects of higher energy prices are more likely to remain limited.

Chart 5.



Inflation expectations have recently remained stable at close to 2% (Chart 5), supporting the stabilisation of core inflation. Central banks' commitment to the medium-term target is essential to keeping long-term inflation expectations anchored and core inflation stable.

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Notes

1. The impact estimates are based on the research paper by Vilmi (2026). ↑

2. A similar observation has also been made by Alessandri and Gazzani (2025). ↑

3. The Bank of Finland Bulletin article 'Recent supply shocks in the energy market have affected euro area inflation expectations' by Lehmus, Jokiluoma and Anttonen (2026) examines the recent effects of different energy shocks on euro area inflation expectations. The article finds that inflation expectations have responded particularly to supply disruptions affecting crude oil and refined petroleum products, but that movements in inflation expectations have remained moderate. ↑

4. The stability of long-term expectations in particular is referred to as the anchoring of expectations. Further discussion on the anchoring of inflation expectations can be found in Oinonen, Lehmus and Vilmi (2023), 'Monetary policy measures have strengthened the anchoring of inflation expectations', Bank of Finland Bulletin. ↑

5. The results and a more detailed description of the method are presented in Vilmi (2026). ↑

6. Previous literature has also found similar trends in the anchoring of long-term inflation expectations (Ambrocio et al. (2022; 2023); Corsello et al., 2021; García and Werner, 2021 and Łyziak and Paloviita, 2017). ↑

7. See the discussion in section 2.2 of the paper published in connection with the ECB's 2025 monetary policy strategy assessment (ECB, 2025). ↑

Keywords

anchoring, core inflation, energy shock, euro area, inflation expectations