Analysis

Recent supply disruptions in the energy market have affected euro area inflation expectations

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The fluctuations in energy prices have had a significant impact on euro area inflation in the post-pandemic era. In this analysis, we examine how energy market supply shocks have affected market-based medium-term inflation expectations in the euro area in recent years. According to our findings, inflation expectations have reacted in particular to disruptions in the supply of crude oil and refined petroleum products caused by the war in Iran, but the impact has remained fairly limited given the scale of the supply disruptions.

Bullet point summary produced with the assistance of AI

- Over the course of the Iran war, the euro area's medium-term inflation expectations have been affected by three different energy shocks: an oil shock, a gas shock and a refining-margin shock.
- Medium-term inflation expectations in the euro area have been particularly susceptible to changes in the prices of crude oil and refined petroleum products.
- The impact of energy market disruptions on euro area inflation expectations has remained fairly limited relative to the extent of the supply disruptions.



The anchoring of inflation expectations to the central bank's target is the cornerstone of a credible monetary policy: the de-anchoring of expectations from the target makes it significantly more difficult to maintain price stability. Energy prices became a key factor behind the rising inflation in the euro area in 2021–2022, when the sharp increase in the price of natural gas, in particular, was broadly reflected in consumer prices (Casoli et al., 2024; Neri et al., 2023). However, the longer-term effects of energy shocks on inflation depend, above all, on how expectations of future inflation respond to shocks.

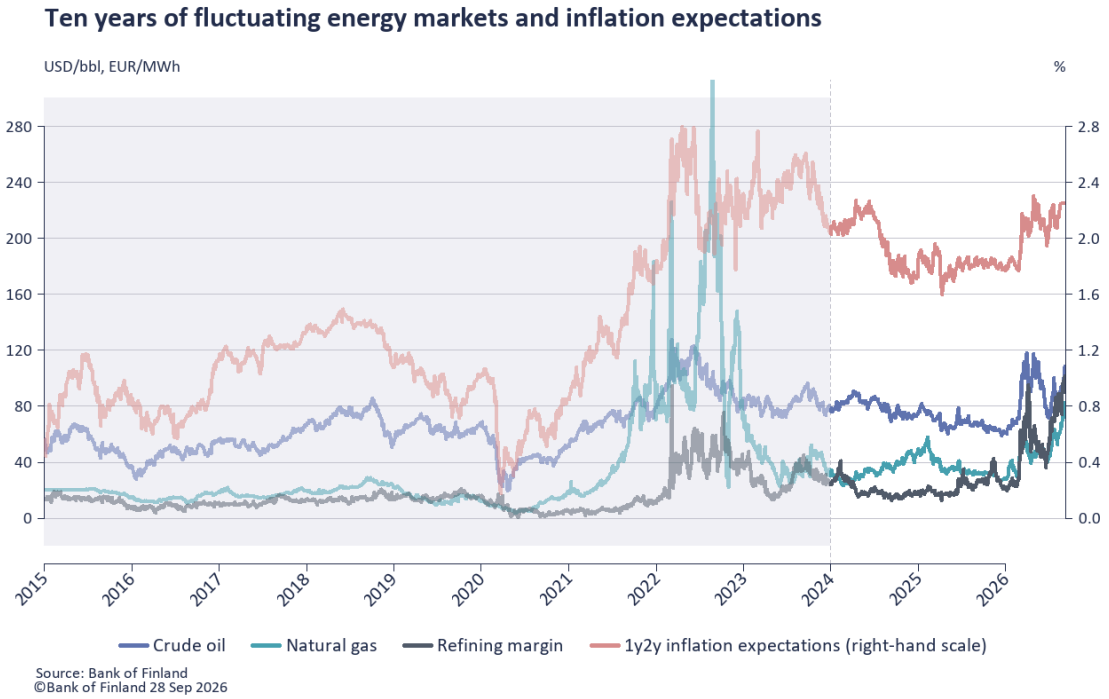
Findings in recent literature suggest that disruptions in the oil and gas markets are transmitted to euro area inflation in different ways. The differences are related to the structural disparities between the gas and oil markets and the historically strong gas dependency of the euro area economy. From a monetary policy perspective, the so-called second-round effects are of particular concern, as increases in energy prices can feed through to broader price increases via inflation expectations (Adolfsen et al., 2026). [1]

In this analysis, we examine the effects of recent supply disruptions in the energy market on the medium-term inflation expectations in the euro area. Our analysis uses daily changes in financial market prices from 2024 to 2026 to identify market surprises. We categorise market surprises into different types of economic shocks using statistical methods and discuss the interpretations. We identified three distinct energy market shocks (oil shock, gas shock and refining-margin shock), each of which affects medium-term inflation expectations in the euro area to a different extent.

As a measure of medium-term inflation expectations, we used inflation expectations derived from

market prices.[2] The energy variables used in the analysis consist of the prices of crude oil and natural gas and the average refining margin of the final products (fuels produced from crude oil). The use of daily financial market data allows for a more detailed study of the relationship between energy market disruptions and inflation expectations. Conventional measures of inflation expectations based on monthly consumer and business surveys exhibit less variation than the daily data used in this analysis. [3]

Chart 1.



Our analysis is focused on the events of 2026 and, in particular, on how the supply disruptions concerning energy commodities caused by the war in Iran have been reflected in the euro area. Our findings suggest that over the period of the study, medium-term inflation expectations have been driven primarily by changes in the prices of crude oil and refined petroleum products. In contrast, over the same period, changes in the price of natural gas did not have much of an impact on the examined inflation expectations, as markets have interpreted the changes in natural gas prices as mainly temporary phenomena.

Statistical model helps interpret the energy market

The model used in this study is based on an independent component analysis (ICA). [4] The input variables are the price of crude oil [5], the price of natural gas [6], the estimated average refining

margin of European oil refiners [7] and market-based medium-term inflation expectations. [8] Variations in the prices of crude oil and natural gas are affected by news concerning their supply and demand outlooks, whereas the refining margins are affected by the balance between the demand and supply of the final products (such as petrol and diesel).

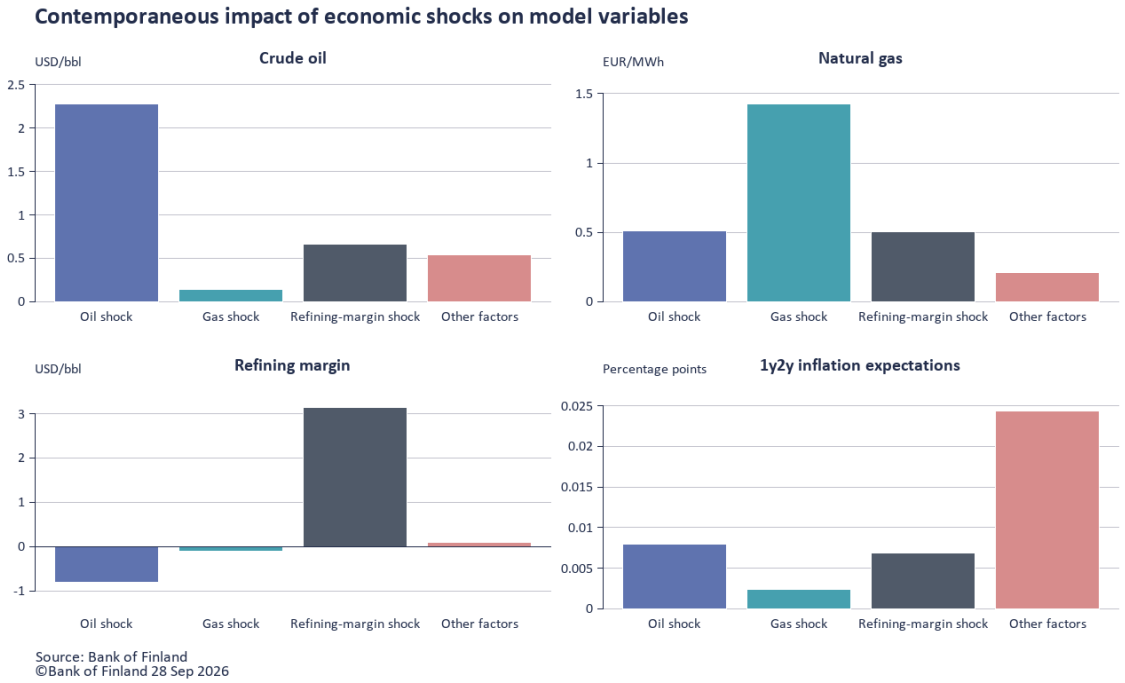
Before crude oil can be used for anything, oil refiners must turn it into petroleum products, such as petrol or diesel. Historically, refining margins and refining capacity have remained very stable and the main factor behind fuel price changes has been the price of crude oil. In recent years, however, the refining margins have occasionally reached historical peaks and their impact on the price formation for fuels (and, subsequently, consumer price inflation) has increased. International refining margins have widened particularly due to the closure of the Strait of Hormuz, which has isolated some refineries, and Ukraine's attacks on Russian oil refineries.

The model has been estimated using daily data from 2024 onwards.[9] By limiting the sample period to begin no earlier than 2024, we ensure that the model reflects the current structure of the economy as closely as possible. The findings should not be interpreted as timeless truths about the structure of the economy but rather be viewed as empirical observations on the relationships between euro area energy markets and inflation expectations in 2024–2026.

In this model, the economic interpretation of shocks is based on how strongly and in which direction the observed shocks affect the examined variables (impact matrix) and how the shocks have explained the changes in the historical data of the variables (historical decomposition). The impact matrix shows how each shock affects each variable. Chart 2 below illustrates the values in the estimated impact matrix.

The first shock identified by the model seems to account for a large portion of the variation in crude oil prices, but it has a lesser impact on the other variables. This shock is therefore referred to as the oil shock. To some extent, the oil shock also explains fluctuations in natural gas prices (upper-right chart) and changes in medium-term inflation expectations (bottom-right chart). The negative effect of the oil shock on the refining margins (bottom-left chart) can be explained by the price elasticity of demand for fuels. When the price of crude oil rises, refiners cannot typically pass on the higher production costs, in full, to the price of the final products, thus resulting in narrower refining margins. However, the closure of the Strait of Hormuz, for example, has limited the supply of both crude oil and refined petroleum products, which means that both the price of crude oil and the refining margins have risen sharply.

Chart 2.



Another notable finding is that the gas shock has a lesser impact on euro area inflation expectations than the oil shock. These findings differ slightly from previous literature, in which the effects of gas shocks on inflation have, as a rule, proved to be broader and longer-term than oil shocks (Alessandri & Gazzani, 2025; Corsello & Foschi, 2026). It is important to remember, however, that our findings only cover events in 2024–2026. The markets have interpreted the gas shocks of recent years as relatively short-lived and temporary phenomena and, as such, their impacts on medium-term inflation expectations have been less substantial.

The third shock identified in the model is referred to as the refining-margin shock, as it explains most of the changes in the refining margins for fuels. In practice, this shock explains the developments in the final product market for fuels, such as disruptions in the refining capacity or product demand that are not directly related to crude oil. As expected, the refining margin has a positive impact on both the price of crude oil and inflation expectations. Wider refining margins encourage higher refinery utilisation, thereby increasing demand for crude oil and pushing up its price. Higher prices for refined products, in turn, feed through to consumer price inflation.

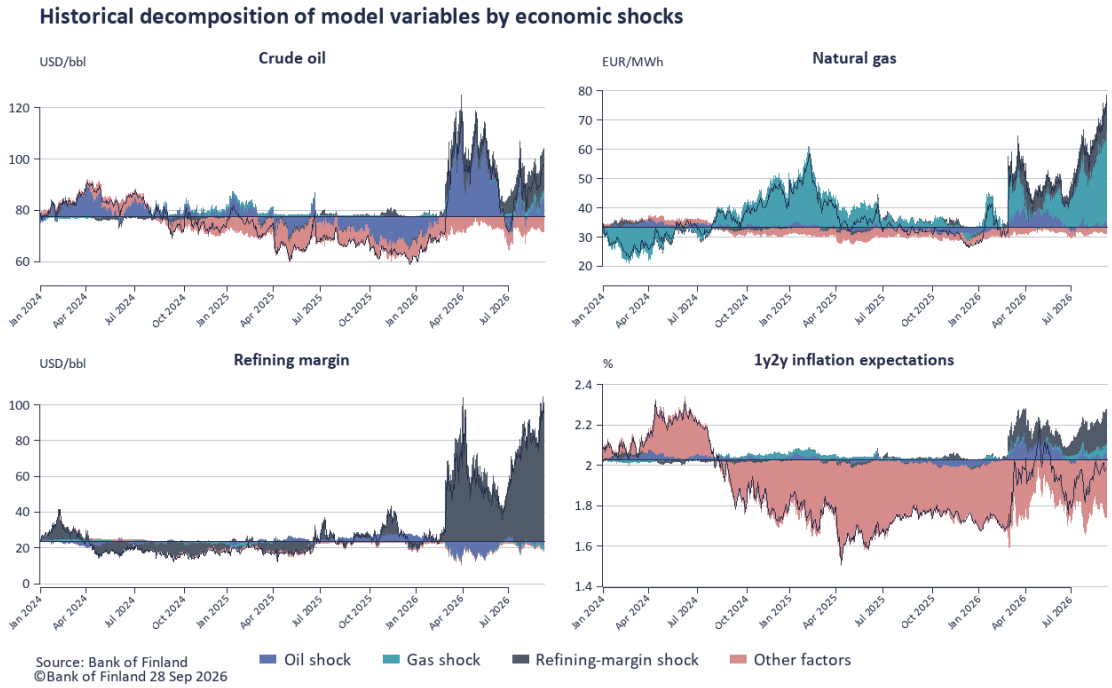
The model's fourth shock is referred to as the other factors shock, as it includes all factors that affect inflation expectations, such as international demand factors, that are independent of the energy market shocks described above. As expected, the impact of these demand factors on the refining margins is very close to zero, because when the refining capacity remains unchanged, the changes in demand are typically transmitted directly to the price of crude oil. It is, however,

challenging to describe all the factors affecting the energy market with only three shocks, so this fourth category may also include factors stemming from the energy market. In this model, for example, the oil shock only explains the price variation of the front-month futures contract for crude oil. If expectations regarding the price of oil two years ahead move unusually strongly (or weakly) relative to changes in the current oil prices, the fourth shock in our model (other factors) may reflect such shifts in energy market expectations.

The impact matrix allows us to assess which shocks have explained the movements in energy prices and inflation expectations at different points in time. Chart 3 below presents the historical decomposition of the variables examined into the shocks described above from 2024 onwards. The oil shock appears to capture the major crude oil supply disruptions in 2026, while also reflecting strong growth in global crude oil supply in 2025.[10] Both observations support our interpretation of the oil shock mainly as a supply shock. The effects of the natural gas shock on natural gas prices also align with the supply disruptions observed both in 2026 and during the winter of 2025.

Other factors, including demand and expectations about future developments in energy markets, appear instead to have explained the slower-moving price trends in both natural gas and crude oil. Our model appears to distinguish supply-driven price spikes well from slower demand-driven fluctuations. Overall, we have managed to provide a straightforward structural interpretation of all the shocks identified from the data, and their characteristics appear broadly consistent with our expectations. This provides a good basis for a more detailed analysis of the 2026 energy market disruptions in the next section.

Chart 3.



The Iran war caused major supply disruptions in the energy markets

We will next examine the energy market disruptions in 2026, which were largely related to the war in Iran, and their impact on medium-term inflation expectations in the euro area. Chart 4 presents the historical decomposition of the variables in our model since February 2026. During this period, the energy market has been subject to exceptionally severe disruptions, particularly due to the war in Iran and the closure of the Strait of Hormuz. At the same time, Ukraine's attacks on Russian oil refineries and China's measures to limit crude oil imports and exports of refined petroleum products have further contributed to the exceptionally challenging situation in the energy market.

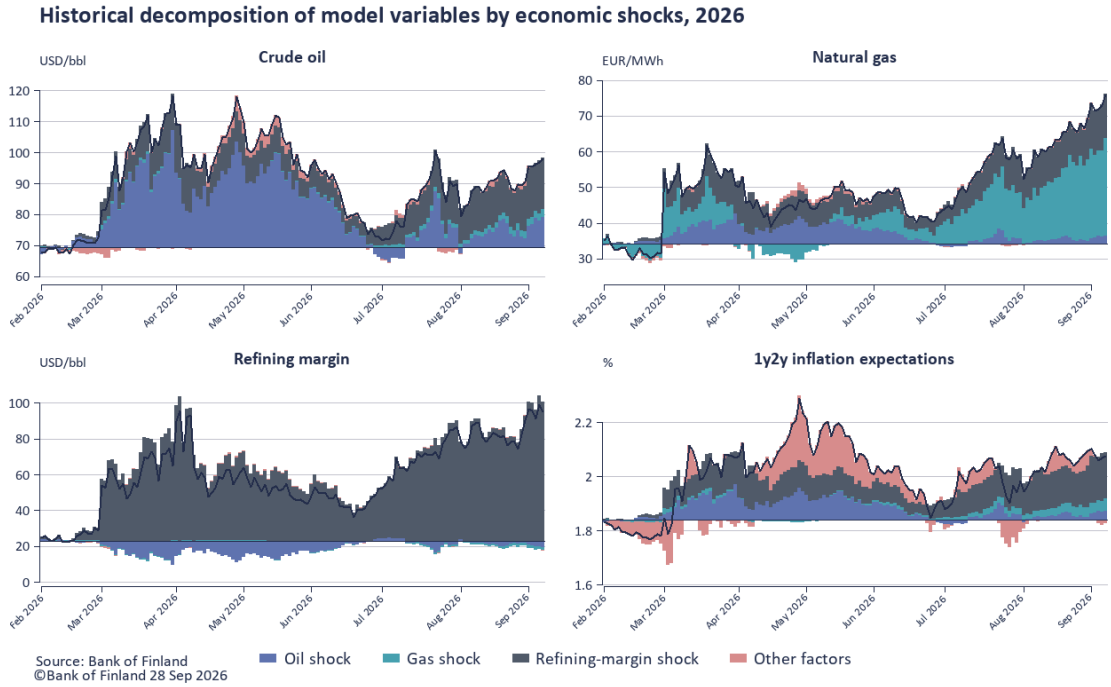
In April and May, the price of crude oil peaked at nearly USD 120 per barrel, up from its pre-war level of under USD 70 per barrel. In June, following the memorandum of understanding signed by Iran and the United States, a more permanent ceasefire and the normalisation of traffic in the Strait of Hormuz seemed more likely, which eased price pressures in the energy market, albeit only temporarily. Since the beginning of July, both the prices of energy commodities and refining margins have risen again, and no lasting solution to the conflict is in sight.

Chart 4 shows that in the first phase of the crisis, before the memorandum of understanding was

signed, the price of crude oil was pushed up mainly by oil shocks, which reflect particularly disruptions to the production and supply of crude oil. Our findings suggest that after the ceasefire agreement, most of the increase in the price of crude oil is explained by the renewed rise in refining margins rather than by oil shocks. In August 2026, the refining-margin shock accounted for almost the entire difference in the price of oil compared with its pre-war level.

According to our results, in the second phase of the crisis, after the memorandum of understanding was signed, the closure of the Strait of Hormuz therefore no longer appears to have caused a similar shortage of crude oil on international markets, at least so far. There are many explanations for this observation. Firstly, the temporary reopening of the strait in June suddenly released oil tankers that had been stranded in the Persian Gulf, which eased the immediate shortage of crude oil when the strait subsequently closed again. Secondly, market participants were considerably better prepared in the second phase of the crisis, and for example, the volume of so-called dark transits through the Strait of Hormuz has been significantly higher than in the first phase of the crisis. Ukraine's simultaneous increased strikes on Russian oil refineries may have contributed to both reducing international demand for crude oil and exacerbating the international fuel shortage, which may have been reflected in higher refining margins.

Chart 4.



The price of natural gas has also been affected not only by the gas shock (that is factors directly related to the supply of natural gas) but also by the oil shock and the refining-margin shock. The impact of the oil and refining-margin shocks on the price of natural gas is related to global price

formation in the oil market, which also influences the demand for natural gas in Europe. In the latter phase of the crisis, however, the price of natural gas in Europe has primarily been driven up by factors directly related to natural gas. Although most of the natural gas from the Persian Gulf has typically been sold to Asia rather than Europe, as the crisis persists, European market participants will have to compete with Asian participants in international markets, which will put upward pressure on natural gas prices in Europe as market participants seek to fill natural gas reserves ahead of the approaching winter.

Above all, developments in refining margins in 2026 have been highly unusual. Refining margins surged to record highs immediately after the outbreak of war in Iran and, following a temporary decline after the signing of the memorandum of understanding in June, began to rise sharply again, while the increase in crude oil prices remained more moderate. Refining margins are being pushed up by a number of factors related to the supply of refining capacity, the most significant of which are the loss of production in the Persian Gulf region, Ukraine's strikes on Russian oil refining capacity, and China's efforts to restrict its own refining activities and fuel exports. All these supply disruptions are reflected in the refining-margin shock in our model.

Above, we have used our model to analyse energy market dynamics since the outbreak of the war in Iran but, from the perspective of monetary policy, it is particularly interesting how the disruptions in the energy markets are transmitted to medium-term inflation expectations.

Chart 4 shows that disruptions in crude oil supply and higher refining margins increased medium-term inflation expectations in the euro area by a few tenths of a percentage point during the first phase of the crisis. In the latter phase of the crisis, by contrast, most of the increase in inflation expectations (around 0.2 percentage points) appears to reflect supply disruptions affecting refined petroleum products rather than crude oil supply disruptions.

Inflation expectations have also been affected by the fourth shock in our model, the so-called other factors shock. These factors include demand factors unrelated to the energy market, but also longer-term energy market expectations to the extent that the current prices of crude oil, natural gas and fuels do not reflect them. The role of other factors in the strong rise in inflation expectations in the first phase of the crisis is likely to reflect expectations of long-term disruptions in the energy market and, on the other hand, their broad-based transmission to euro area consumer price inflation. Since then, however, the role of these factors has declined and, in the latter phase of the crisis, inflation expectations in the euro area have settled close to the ECB's 2% medium-term inflation target.

Conclusions

The relatively simple model presented in this article captures well the severe supply disruptions that have recently been seen in the energy market. The analysis of daily financial market data and the statistical identification of structural factors provide a good indication of how price movements in crude oil, natural gas and refined petroleum products have been transmitted to medium-term inflation expectations that are relevant for monetary policy. Our analysis also helps in understanding the internal dynamics of the energy market and how supply disruptions in different energy commodities affect one another.

The outbreak of the war in Iran and the closure of the Strait of Hormuz in 2026 have been highly unusual events in the energy market, as they have directly affected the global supply of crude oil, natural gas and refined petroleum products. From the perspective of euro area monetary policy, however, our results are largely reassuring, as the impact of the above-mentioned supply disruptions on medium-term inflation expectations in the euro area seems to have been fairly limited so far.

Although the inflation expectations examined in this article have risen by a few tenths of a percentage point this year, they remain fairly well anchored given the extent of the supply disruptions and close to the ECB's 2% inflation target. Our results show, however, that fluctuations in energy commodity prices affect medium-term inflation expectations in the euro area, and that prolonged disruptions to energy commodity supplies may require monetary policy action to preserve the central bank's credibility.

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Notes

1. See also Lauri Vilmi's article 'The effects of energy shocks on inflation vary surprisingly widely over time', which examines findings over a far longer period of time (Bank of Finland Bulletin, 4/2026). ↑

2. In this analysis, we used so-called 1y2y inflation expectations. This refers to expectations of the average inflation rate over the two-year period starting one year from now, but the medium-term can be defined in different ways and is contextual. ↑

3. The approach in our analysis is comparable to the approach in Kilian and Zhou (2022), which examined the relationship between monthly petrol prices and household inflation expectations in the United States. The relationship between inflation expectations and petrol prices in the United States has also been documented by Binder (2018). ↑

4. The underlying assumption of the analysis is that the changes in the four *interdependent* variables used in the model are affected by four structural shocks *independent from each other*. The model does not require any other significant technical assumptions, as the statistical features of the data can be used to assess unobserved independent shocks. Technically speaking, statistical features refer to the deviation of the data from a normal distribution. ↑

5. The dollar price of the front-month futures contract of Brent crude oil. ↑

6. The euro price of the front-month futures contract of European TTF natural gas. Europe's most important reference price for natural gas. ↑

7. The refining margin is calculated using the 5:3:2 crack spread that assumes refiners will use five barrels of crude oil to produce three barrels of petrol and two barrels of diesel. This corresponds fairly well with the production structure of European oil refiners and is Europe's most common measure for calculating the refining margin. This indicator is derived from the futures contracts of crude oil, petrol and diesel. ↑

8. The so-called 1y2y inflation expectation, which is derived from the prices of 1- and 3-year inflation swaps. ↑

9. The underlying assumption is that the markets are so efficient that the best estimate of, for example, the next day's crude oil price is its current price. This gives the option of interpreting daily changes as surprises that are affected by, among other things, demand and supply shocks. In the case of daily changes in the energy market, this assumption is quite close to the truth but would not necessarily serve as a realistic assumption in all market conditions or, for example, for assessing monthly changes. The model also considers that the definition of the front-month futures contract changes at the turn of each month. ↑

10. The global supply of crude oil grew by nearly 10% during 2025 (IEA Oil Market Report, 12 February 2026). ↑

Keywords

energy markets, energy shock, euro area, inflation expectations