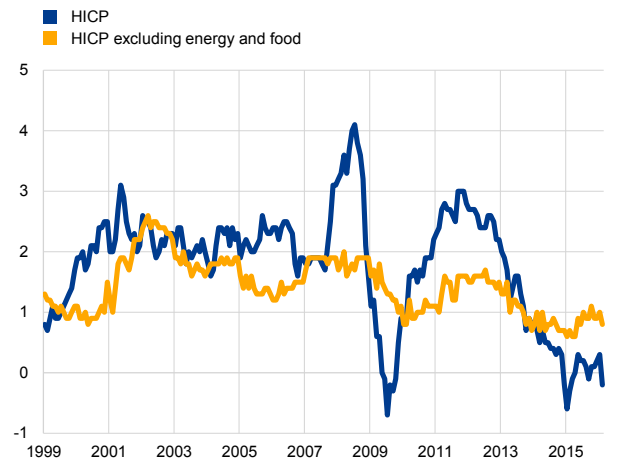
# Box 7
# The relationship between HICP inflation and HICP inflation excluding energy and food

**Chart A**

Euro area HICP inflation and HICP inflation excluding energy and food

(annual percentage changes)

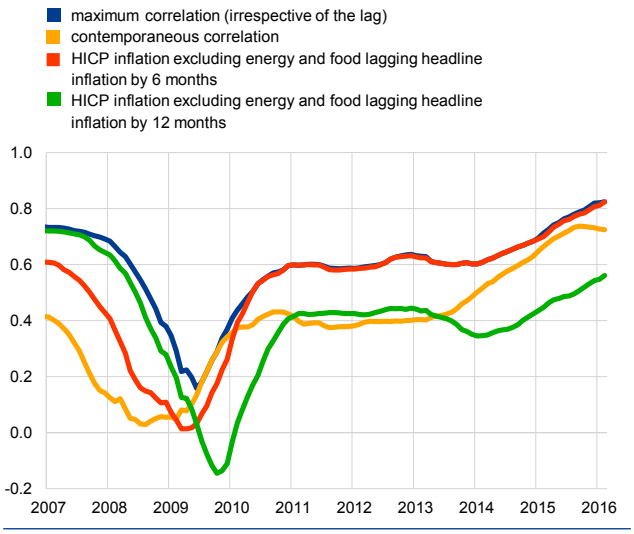



Source: Eurostat.
Note: The latest observations are for February 2016.

**Chart B**

Correlations and lag structure between headline inflation and HICP inflation excluding energy and food

(coefficient of correlation)




Sources: Eurostat and ECB calculations.
Note: The correlations are computed over an eight-year rolling window; results are qualitatively similar when looking at other horizons, such as a five-year rolling window.

**While euro area HICP inflation has been very low or even negative since the end of 2014, HICP inflation excluding energy and food has hovered at levels close to 1% over the same period** (see Chart A). The presence of a large difference between headline inflation and HICP inflation excluding energy and food is not unprecedented, although in the past the opposite pattern (with headline inflation being higher) has been observed more often. With headline inflation dipping below HICP inflation excluding energy and food since 2014, interest in the relationship between the two inflation measures and in the role of the latter measure in the economic analysis of the ECB's monetary policy strategy has reignited.

**HICP inflation excluding energy and food and headline inflation typically co-move quite closely, with the former lagging the latter.** The lag with which HICP inflation excluding energy and food is most closely correlated with headline inflation has become shorter since the financial crisis. To illustrate this, Chart B shows that after the crisis the co-movement with a six-month lag (red line) became stronger than the co-movement with a 12-month lag (green line). The fact that HICP inflation excluding energy and food lags headline inflation in the short run is mainly related to differences in the speed of transmission of commodity price shocks to the various HICP components. For instance, an oil price shock is passed through almost immediately to the HICP energy component, and thus to headline HICP inflation, but there is a lag in its pass-through to other HICP components, via indirect and, possibly, second-round effects. The shorter lag with which the maximum correlation has occurred in recent years may point to a somewhat faster pass-through, but could also simply capture simultaneity in the timing and direction of oil price shocks and other shocks that affect non-energy HICP components.

**HICP inflation excluding energy and food is a poor predictor of developments in headline inflation over short horizons, but it can be more informative than headline inflation itself for medium-term inflationary trends.** This poorer performance of HICP inflation excluding energy and food as a predictor in the short term is due to the fact that it lags headline inflation. The table shows the root mean squared error (RMSE) for predictions of headline inflation 3, 6, 12 and 24 months ahead for both headline inflation and HICP inflation excluding energy and food. At shorter horizons, such as 3 and 6 months, current headline inflation provides more accurate forecasts than current HICP inflation excluding energy and food, whereas the latter performs better at predicting headline inflation 12 and 24 months ahead. This is consistent with a situation in which one-off shocks to the price level stemming from a change in commodity prices affect the headline inflation rate only for the next 12 months, but not over a longer horizon. The statistical finding that HICP inflation excluding energy and food has better predictive power for medium-term inflationary pressures derives from the fact that it is less "noisy" than headline inflation, as borne out by all the measures of volatility presented in the table. HICP inflation excluding energy and food is thus useful for looking beyond short-term shocks.

**Table**

Mean, volatility and predictive power for headline inflation, January 1999-February 2016

| | Mean | Volatility | | | Predictive power for headline inflation at various horizons | | | |
|---|---|---|---|---|---|---|---|---|
| | Average inflation rate | Standard deviation | Coefficient of variation | Mean absolute change | RMSE 3 months | RMSE 6 months | RMSE 12 months | RMSE 24 months |
| Headline inflation | 1.79 | 0.95 | 0.53 | 0.18 | 0.50 | 0.75 | 1.18 | 1.36 |
| HICP inflation excluding energy and food | 1.43 | 0.46 | 0.32 | 0.11 | 0.91 | 0.95 | 1.02 | 1.14 |

Sources: Eurostat and ECB calculations.
Notes: The coefficient of variation is the standard deviation divided by the mean. The mean absolute change is the average of the absolute value of the monthly first difference of each inflation measure. The RMSE is the square root of the average squared difference vis-a-vis the future headline inflation rate 3, 6, 12 and 24 months ahead. The statistics are computed based on annual growth rates.

**HICP inflation excluding energy and food is not an "ideal" measure of underlying inflation.**[1] There is no widely accepted definition of underlying inflation, but in practice any such measure should capture the more persistent components of inflation and should thus track inflation trends. However, the HICP excluding energy and food may at any point in time be affected by temporary factors that have no implication for the medium term (e.g. indirect effects of commodity price changes, changes in administered prices, indirect taxes or calendar effects). Moreover, the excluded energy and food components can themselves have more persistent dynamics, for example owing to trends in commodity prices, as was observed in the early 2000s. These dynamics could have implications for inflation in the medium term and should therefore be captured by a measure of underlying inflation. The fact that food and energy prices can have a persistent component is reflected in HICP inflation excluding energy and food being a biased indicator of headline inflation over the medium term, as its long-term average has been below that of headline inflation. Energy prices have increased by an annual average rate slightly below 4% since 1999, driving a gap between average headline inflation and average HICP inflation excluding energy and food.

[1] For a more in-depth discussion on this topic, see the box entitled "Are sub-indices of the HICP measures of underlying inflation?", *Monthly Bulletin*, ECB, December 2013.

**The ECB has formulated its price stability objective in terms of headline inflation mainly on account of its relevance for measuring citizens' purchasing power.** The preservation of the purchasing power of the currency, as measured by the most representative price index, including energy and food (which account for about 30% of the consumption basket), is what matters for consumers. In addition, any measure of inflation that excludes some of the items in the consumption basket suffers from a certain degree of arbitrariness, which could undermine the credibility of the policy objective.

**The medium-term orientation of the ECB's monetary policy ensures that there is no undue emphasis on short-term inflation developments.** The very imperfect degree of control that central banks can exert over any measure of inflation in the near term is a key reason why the ECB's monetary policy strategy has been articulated in terms of medium-term inflation stabilisation. The medium-term orientation of monetary policy makes it possible to look through transitory developments and focus on underlying inflation trends. While, under some circumstances, the central bank can extend the length of the medium-term horizon over which it is committed to bringing inflation back into line with its aim, this horizon cannot be stretched to such a length that citizens can no longer verify in any meaningful way whether the central bank's objective has been achieved or not.

**In line with these considerations, all central banks in the major industrialised economies focus on headline inflation when formulating their price stability objectives.** However, many central banks, including the ECB, monitor a wide range of underlying inflation measures, which abstract from short-term volatility, to gauge inflationary trends. In addition to HICP inflation excluding energy and food, the ECB monitors various exclusion-based measures and model-based measures of inflation, as well as developments in long-term inflation expectations.[2]

[2] See the box entitled "Has underlying inflation reached a turning point?", *Economic Bulletin*, ECB, July 2015; and the article entitled "Inflation expectations in the euro area: a review of recent developments", *Monthly Bulletin*, ECB, February 2011.