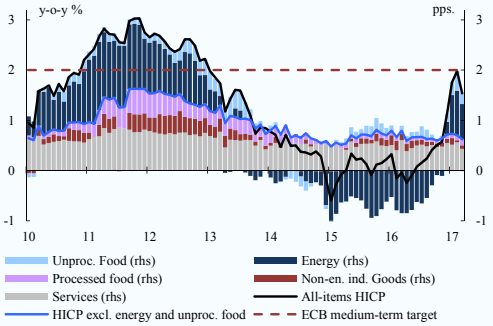
Box I.4: Inflation: between temporary effects and slow trends

In recent months, headline inflation has picked up strongly, while core inflation (consumer prices excluding energy and unprocessed food) has remained stable at a subdued level. This box examines the mainly temporary factors that have led to the uptick in inflation, as measured by the Harmonised Index of Consumer Prices (HICP) before turning to a more in-depth discussion of prospective drivers of core inflation. The role of base effects for the near-term inflation outlook is also highlighted.

Over recent months, euro area headline inflation rose rapidly due to temporary factors...

The rapid acceleration of euro area headline inflation – climbing to a three-year high in February 2017 (2.0%) before falling back to 1.5% in March – can mostly be traced to energy prices. As oil prices averaged about 55 USD/bbl. during the first quarter of 2017 (about 34 USD/bbl. in 2016-Q1) the contribution of the energy component to the inflation rate averaged about 0.8 pps. in 2017-Q1, compared to zero percentage points the preceding quarter. The effect of the recent rise in oil prices on energy inflation was compounded by base effects related to the fall in oil prices in 2015-Q4 and 2016-Q1. Moreover, unusual weather patterns around the Mediterranean in January and February caused fruit and vegetable prices to soar. Unprocessed food prices rose by 5.2% in February – their most since March 2002 – and contributed on average a rather large 0.3 pps. to headline inflation in 2017-Q1 (see Graph 1).

Graph 1: **Euro-area HICP inflation and its composition**



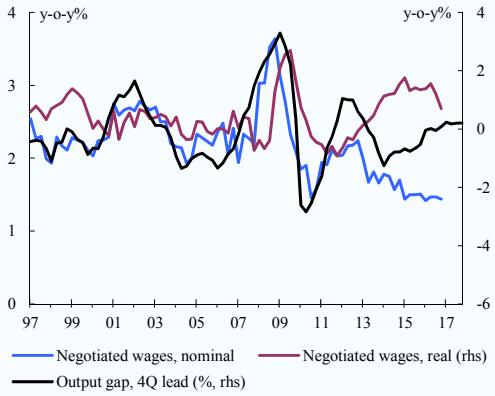
...whereas underlying inflationary pressures have remained rather low and stable since mid-2014.

At the same time, euro area core inflation, defined as HICP inflation excluding energy and unprocessed food, has remained broadly stable at about 0.8% for more than a year. A disaggregation underlines the absence of any dynamics in all major sub-components of core inflation. Services inflation, which accounts for more than half of the core inflation index, has been stable at about 1.2% since mid-2016. Non-energy industrial goods inflation has been broadly unchanged at around 0.3% since August 2016 despite a slight depreciation of the euro in nominal-effective terms. The pick-up in processed food price inflation, which started towards the end of last year has been very moderate (0.9% in 2017-Q1 compared to 0.7% in 2016-Q4).

Nominal wage growth well below past trends

The euro area economy has been on a steady recovery with most measures of economic slack, e.g. the output and unemployment gaps narrowing and a high level of capacity utilisation in industry and the services sector. Nevertheless, domestic cost pressures have remained modest since 2015. The annual growth of negotiated wages in the euro area averaged 1.5% in 2016, i.e. stable compared to 2015 but below the average annual growth rate of 2.4% reached during the 10 years preceding the crisis (1999-2008). The annual growth rate of compensation per employee did not show any clear dynamics during the year, either. The past relationship between euro area nominal wage growth and the output gap thus seems to have weakened, as the relatively high correlation which existed between the level of the output gap (with a four quarter lead) and annual nominal wage growth until about mid-2014, does not seem to apply as strongly in the current upswing. (see Graph 2)

Graph 2: **Euro-area output gap and wage growth**



In fact, weak annual labour productivity growth, which also is the corollary of relatively strong employment growth, particularly in rather low

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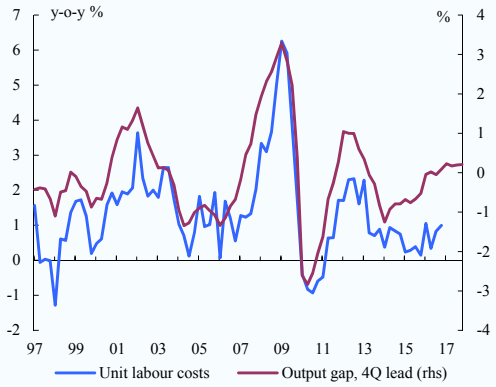
Box (continued)

productivity sectors (e.g. trade, business services or transportation) over recent years [1], may explain part of the 'decoupling' between nominal wage growth and the output gap. This is underlined by a stronger correlation between the output gap and unit labour costs also since mid-2014 (see Graph 3).

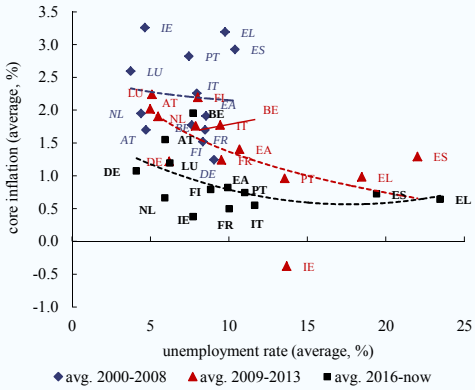
Graph 3: **Euro-area output gap and unit labour costs**



In real terms, the recent wedge between wage growth and the output gap has been less marked. This reduction in the wedge – once wages are adjusted for inflation – suggests that inflation expectations play a key role in explaining low nominal wage growth. Workers' inflation expectations for the wage formation process seem to have adapted to the current low inflation environment. [2] This argument is supported by the continuous downwards shift of classical Phillips curve relationships over different time periods (see Graph 4).

Regarding slow wage growth, other factors, which are more difficult to assess quantitatively, could be at play as well, including some compensation for downward nominal wage rigidities at the height of the crisis (wages did not fall as much as they could have given the drop in output), the abolition of wage-indexation schemes, or more fundamental changes to the labour market and wage-setting behaviour. [3] A number of them have been mentioned recently in the economic debate: i) employees now attaching a higher importance to job security than to rapid wage growth, ii) a loss of power and importance of trade unions, or iii) a rise in the number of firm-level wage agreements compared to previously predominant collective bargaining. In some Member States, muted nominal wage growth may also reflect the impact of global value chains, where the risk of outsourcing of specific sectors or of standardised tasks keeps a lid on wage demands. One cannot exclude either that, due to the legacy of the recent global recession and the euro area debt crisis, slack in the labour market is larger than suggested by output gap measures for the entire economy. For example, hours worked have not recovered since the double-dip recession, the share of discouraged workers has increased with the protracted crisis, and the share of part-time employment remains high compared to the pre-crisis period. [4] This situation also implies that in the short- to medium-term, wage and price pressures stemming from the labour market should remain limited given the sizeable potential labour supply that could be tapped as the economy recovers.

Graph 4: **Phillips curves for different time horizons**



As regards additional pipeline pressures, rising import prices could support higher headline inflation somewhat in the short- to medium-term, given the registered price increases in imported energy-related products and other industrial raw materials. If the increasing divergence in the US monetary policy stance vis-à-vis the euro area were to lead to a depreciation of the euro against the US dollar, it could pave the way for further increases in import price inflation. However, as underlined by earlier Commission analyses [5], the rate of pass-through from a euro depreciation in nominal effective terms to headline and core inflation rates is very small. Given the rather stable outlook for oil

(1) ECB, "What is behind the recent rebound in euro area employment?", *Economic Bulletin*, Issue 8 / 2015.

(2) "Monetary policy and the economic recovery in the euro area", speech by Mario Draghi, President of the ECB, at The ECB and Its Watchers XVIII Conference, Frankfurt am Main, 6 April 2017.

(3) European Commission, "Labour Market and Wage Developments in Europe", Annual Review 2016.

(4) European Commission, European Economic Forecast – Winter 2017, *Institutional Paper* 48.

(5) European Commission, "Member State vulnerability to changes in the euro exchange rate", *Quarterly Report on the Euro Area*, October 2014, Vol. 13, No. 3, pp. 27–33.

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Box (continued)

prices over the forecast horizon inferred from Brent futures markets, direct inflation pressures are likely to be limited as well. That said, research finds that a 10% increase in oil prices tends to raise euro area inflation by up to 0.4 pps. over five years. [6] Internal Commission estimates also show that the indirect effect of changes in energy prices on core inflation occurs with a lag of between three to four quarters and mostly passes via items of services inflation (e.g. transport, package holidays) and processed food. Overall, the effect is relatively small (0.04 pps.) based on an oil-price shock of 10%.

With muted upstream price pressures, headline inflation is expected to decelerate again

In light of subdued upstream price pressures and fading temporary phenomena (e.g. impact of higher energy prices, unusual weather conditions), euro area headline inflation is forecast to decelerate again somewhat over the remainder of this year and early 2018. Such a profile is broadly corroborated by a more structural approach for the euro area inflation outlook based on Phillips-curve estimates, which confirms the quarterly profile of the spring forecast, suggesting that headline inflation should peak in 2017-Q1 and decelerate gradually until mid-2018. [7]

The impact of so-called 'base effects' on the outlook for inflation in 2017 and 2018 should not be underestimated. Base effects occur when the change in the annual inflation rate can be attributed to an atypical movement one year ago, such as sudden and significant changes in energy prices, changes in tax rates or calendar effects (e.g. the timing of Easter). [8] Base effects illustrate by how much the change in the year-on-year inflation rate is influenced by the dropping out of an atypical factor. Although base effects are not actual inflation projections (they do not reflect changes in inflation trends), they are highly important for accurate short-term forecasting as they mechanically affect the inflation forecast and thus provide useful information for monthly or quarterly profiles.

The graphic representation for the euro area (Graph 5) emphasises that the inflation profile for 2017 will be influenced by large and fluctuating base effects for all major HICP components. Following a strong positive contribution at the beginning of 2017, energy base effects are expected to fade and even turn negative over the course of Q2, before picking up again in the summer months. In Q4 and around the turn of the year 2017-2018, energy base effects are expected to have a dampening impact on headline inflation, shaving off a total of about 0.7 pps. between October 2017 and February 2018. Headline base effects follow

(6) European Commission, European Economic Forecast – Winter 2015, *European Economy*, 1/2015.

(7) DG ECFIN's Phillips-curve model is a hybrid New-Keynesian Phillips curve augmented with oil price changes (a description of the model can be found in the Quarterly Report on the Euro Area, "Analysing euro-area inflation using the Phillips curve", published in June 2014). The latest estimates build on (i) the path of oil price futures as of end-April 2017, (ii) a fixed EUR/USD exchange rate of 1.08 over the horizon 2017-2018, (iii) the 2017 Q2 ECB Survey of Professional Forecasters (SPF) and (iv) levels of inflation swap forwards as of end-April 2017. Projections are based on a gradual closing of the output gap by the end of the forecast period.

(8) Inflation π, defined as the annual rate of change in price level P of the underlying index, can be approximated by equation 1:
$\pi_t = (\ln P_t - \ln P_{t-12}) * 100$
Changes in the annual inflation rate from one month to the next thus equal equation 2:
$\pi_t - \pi_{t-1} = [(\ln P_t - \ln P_{t-12}) - (\ln P_{t-1} - \ln P_{t-13})] * 100$,
which after rearranging yields equation 3:
$\pi_t = \pi_{t-1} + \mu_t - \mu_{t-12}$.
μ denotes the month-on-month rate of change in months t and t-12, respectively. To operationalise the concept of base effects, the month-on-month inflation rate μ can be decomposed into equation 4:
$\mu_t = \mu_M + \delta_t \Leftrightarrow \delta_t = \mu_t - \mu_M$
where μ_M is the "typical" month-on-month inflation rate common to all periods (e.g. a long-term average) and δ_t a deviation which is specific to month t.
After rearranging, the combination of equations 3 and 4, equation 5 yields:
$\pi_t = \pi_{t-1} + \delta_t - \delta_{t-12}$
The annual inflation rate in month t (π_t) is thus influenced by the month-specific deviation a year ago (δ_{t-12}) which drops out when moving from period t to t+1 but sets the scene for π_t irrespective of any other factors at play. δ_{t-12} is thus the "base effect" in period t.
Here, the base effect δ_t is calculated as the difference of the actual monthly rate of change 12 months earlier, μ_{t-12}, and the average monthly change of the seasonally-adjusted price index (headline, core, energy or unprocessed food price inflation) over the available data range (February 1996 – March 2017), i.e. μ_M.

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closely the path set out by base effects in the energy sub-component. In April 2017, HICP headline and core inflation are expected to also experience a positive base effect of almost 0.2 pps. due to the late timing of the Easter holiday.

In sum, near-term inflation dynamics will continue to be largely driven by energy prices and base effects, rather than by a durable and self-sustained momentum. The projected gradual increase of core inflation will depend on an intensification of cost pressures. The forecast of a pick-up of wage growth within the forecast horizon, in particular, is conditioned on a further reduction of labour-market slack as well as a normalisation of inflation expectations.

Graph 5: **Estimated base effects for headline inflation and main subcomponents**