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Economic research

Why have strong wage dynamics not pushed up inflation in the euro area?

The recent weak core inflation in the euro area, despite a steady decline in unemployment since 2013, has led some analysts to doubt the existence of a Phillips curve. Wage developments, however, are consistent with their historical relationship with unemployment. This article proposes a novel decomposition of core inflation to explain the apparent absence of transmission of labour cost to inflation since 2017. We show that the increase in labour costs has been offset by a decrease in the margin rate and an improvement in the terms of trade excluding energy and food on the back of the appreciation of the euro. An increase in the price of construction investment relative to the price of consumption has also contributed to the apparent disconnection between labour cost and inflation: the dynamism of domestic prices thus concerns the price of construction more than that of consumption.

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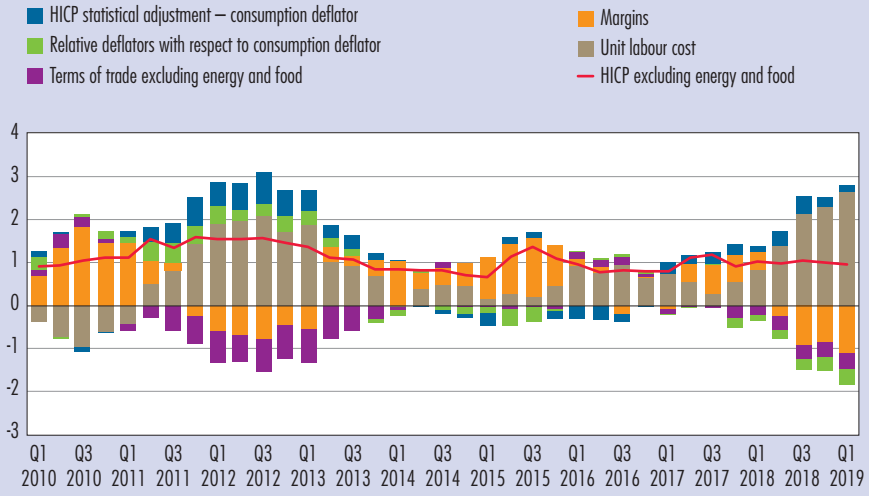
JEL codes
E31, E24,
F31

Between 0.7% and 1.2%
year-on-year core inflation since 2013

From 12.0% to 7.7%
decline in the rate of unemployment from March 2013 to March 2019

From 1.4% to 2.2%
increase in growth in average compensation per employee from 2014 to 2018

Breakdown of the year-on-year change in core inflation in the euro area
(in percentage points; in % and year-on-year change for HICP)



Sources: Eurostat and authors' calculations.

Why has inflation in the euro area remained so weak despite the dynamic upturn in activity since 2014? For several years, core inflation, measured by the Harmonised Index of Consumer Prices (HICP) excluding energy and food,[1] has hovered around 1%, a low level compared to the pre-crisis period. Core inflation, shown by the blue curve in Chart 1, has fluctuated between 0.7% and 1.2% year-on-year since 2013, whereas the 2000-07 average was 1.6%. This inertia contrasts with the dynamism of the economic recovery, which has resulted in a sharp reduction in unemployment since 2013, from 12.0% of the labour force in March 2013 to 7.7% in March 2019.

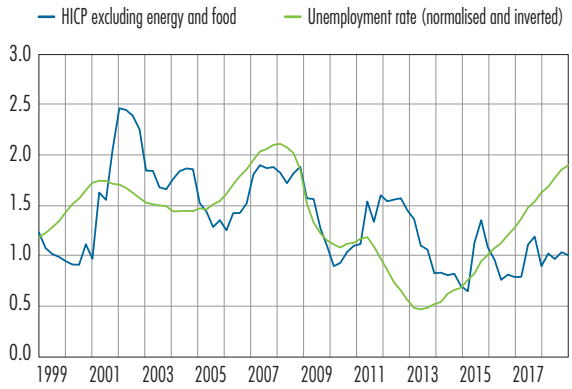
As Chart 1 shows, this disconnection between unemployment and core inflation is a recent phenomenon (the green curve shows the unemployment rate, using an inverted and normalised scale to facilitate comparison with the inflation rate[2]). This has led certain analysts to declare that the "Phillips Curve" – the historical statistical regularity between price movements and the level of economic activity – is dead. However, the economic upturn and the recovery in the labour market have led to a sharp acceleration of wages. Growth in average compensation per employee year-on-year thus accelerated from 1.4% in 2014 to 2.2% in 2018, in line with the historical relationship between unemployment and compensation shown in Chart 2.[3]

Why has this wage increase not been passed through to core inflation? This article proposes a novel decomposition of core inflation to shed light on the factors at work in the apparent absence of transmission.

We show that core inflation can be broken down algebraically into four main factors: (i) compensation per employee adjusted for productivity, or unit labour cost (ULC); (ii) margins; (iii) terms of trade excluding energy and food, or core terms of trade; and (iv) price differentials between household consumption and government consumption, investment and exports. The absence of an upturn in core inflation since 2017, despite a sharp ULC acceleration, is due to a series of factors. First, margins have shrunk, in line with a downward phase in the productivity cycle, which dampened the response of prices. Second, the core terms of trade improved on the back of the appreciation of the euro between the end of 2016 and the end

C1 Core inflation and unemployment in the euro area

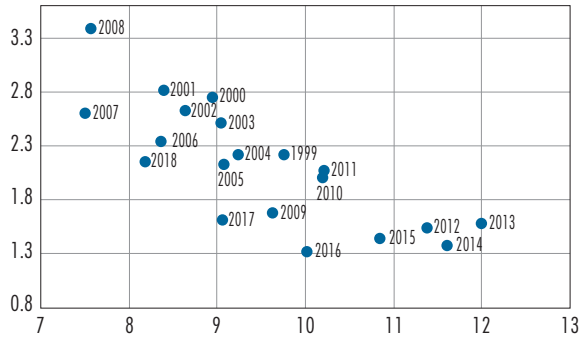
(in %; in year-on-year change for HICP)



Sources: Eurostat and authors' calculations.

C2 Growth in average compensation per employee and unemployment in the euro area

(in %; x-axis: unemployment rate, y-axis: growth in average compensation per employee)



Source: Eurostat.

1 When analysing the cyclical nature of inflation, it is preferable to exclude energy and food from the HICP. As these two components are linked to global commodity prices and are in large part imported, they are highly volatile and do not reflect domestic inflationary pressures.

2 Normalisation is an affine transformation to get the same standard deviation and mean as core inflation.

3 The euro area compensation, unit labour costs and margin series have been adjusted for the *crédit d'impôt pour la compétitivité et l'emploi* (CICE – Tax Credit for Competitiveness and Employment) introduced in France. The CICE is deducted from French compensation, and therefore from the unit labour cost, and added to corporate margins. This adjustment was made from the year it was incorporated into the national accounts in 2014 until 2018. It does not take into account the CICE collected in 2019 in order to avoid double counting with the direct cut in employer social security contributions that replaces it.

of 2018, which partly offset the increase in labour cost. Lastly, the price of construction investment has risen significantly faster than that of consumption, particularly in Germany: the increase in domestic prices thus concerns the price of construction investment more than that of consumption.

A similar paradox has been observed in Germany since the creation of the euro. In Germany, the absence of a statistical relationship between core inflation and unemployment is well established: unemployment has fallen steadily since 2005 without being reflected in the evolution of core inflation. Wages, however, have closely followed unemployment trends, with growth in average compensation increasing from 0.2% in 2005 to 3.0% in 2018. The divergence between core inflation and ULC growth is the result of substantial increases in margins prior to the crisis, and movements in relative prices – the core terms of trade and the relative price of investment – since then.

1 A decomposition of the transmission of labour cost to core inflation

We take a two-step approach to studying the transmission of ULC to core inflation (set out in Box 1), by analysing:

- the transmission of ULC to domestic prices measured by the GDP deflator;
- the transmission of the GDP deflator to core inflation.

In the first step, the transmission of ULC to domestic prices is affected by movements in the margin rate, defined in an accounting sense as the ratio between the GDP deflator and ULC.[4] A compression of margins can temporarily dampen the transmission of a higher ULC inflation to the GDP deflator.

In the second step, core inflation depends on domestic prices and also on the price of imported goods, whether they be directly imported consumer goods or intermediate products used in the production of consumer goods. One difference between core inflation (i.e. HICP excluding energy and food) and domestic price inflation therefore arises from a movement in the terms of trade, and more precisely the terms of trade excluding energy and food. We construct a proxy of the core terms of trade (see Box 1 for details) by adjusting the contribution of the traditional terms of trade (defined as the relative price of imports and exports) for the difference in inflation between total HICP and HICP excluding energy and food. As this difference measures fluctuations in the prices of energy and food, we thereby eliminate the variations due to these prices from the terms of trade.

A third factor stems from the heterogeneity of price formation between different types of goods and services. Indeed, domestic prices, measured by the GDP deflator, do not have the same coverage as core inflation: core inflation solely concerns consumer prices whereas the GDP deflator concerns all components of demand, as does ULC, which is allocated to all GDP items and not just the production of consumer goods. When relative prices change, this difference in coverage contributes to an apparent disconnection between ULC and the GDP deflator on the one hand and core inflation on the other. This is the case, for example, if the dynamism of domestic prices relates more to the price of investment than to the price of consumption. In this situation, core inflation is weaker, all else being equal, than that of the GDP deflator, which includes the price of investment: the increase in the relative price of investment appears from an accounting point of view as a negative contribution to the gap between core inflation and ULC inflation.

Finally, there is one last source of divergence, due to the difference between the statistical methodology used to construct the HICP and the methodology used in the national accounts, which produces the consumption deflator (as well as the GDP deflator and average compensation).[5]

4 It should be noted that the margin indicator constructed in this manner includes certain tax variations.

5 The national accounts data used in this article are taken from the quarterly accounts published by Eurostat. They are adjusted for seasonal and working day variations.

BOX

Algebraic breakdown of the year-on-year change in HICP excluding energy and food

The transition from unit labour cost (ULC) c to the GDP deflator p^y is simply expressed through the following accounting relationship which brings into play the margin rate τ:

$$p^y = c + \tau \quad (1)$$

where all variables are expressed as logarithms and year-on-year change. By construction, the margin rate is equal to the ratio of the GDP deflator to ULC: its logarithm is therefore equal to the difference between the logarithms of these two variables. In year-on-year terms, the (logarithmic) growth rate of the margin rate is equal to the difference between the inflation of the GDP deflator and that of ULC.

The GDP deflator is then one of the determinants of HICP excluding energy and food. The latter also depends on the deflator of GDP relative to that of consumption, on the inflation differential between the HICP and HICP excluding energy and food and on the statistical gap between the consumption deflator and the HICP:

$$\pi^* = p^y - (p^y - p^c) - (\pi - \pi^*) + (\pi - p^c) \quad (2)$$

where π is the HICP, π^* is HICP excluding energy and food, and p^y and p^c are the GDP and household consumption deflators. All variables are expressed as logarithms and year-on-year changes.

To find an expression for the relative deflator of GDP and consumption, we can use an approximation of the accounting definition of the GDP deflator. The GDP deflator, in year-on-year change, is expressed approximately as a function of the deflators of the components of GDP, using obvious notations (for example, g for government consumption, etc.):

$$p^y = \omega^c p^c + \omega^i p^i + \omega^g p^g + \omega^x p^x - \omega^m p^m$$

where the coefficients ω are the shares of the components of demand in GDP. We therefore have $\omega^c + \omega^i + \omega^g + \omega^x - \omega^m = 1$. Even though this expression is an approximation, it holds with a good degree of precision. We thus obtain the following expression for the relative deflator of GDP and consumption:

$$p^y - p^c = \omega^i(p^i - p^c) + \omega^g(p^g - p^c) + (\omega^x - \omega^m)(p^x - p^c) + \omega^m(p^x - p^m) \quad (3)$$

The last term $\omega^m(p^x - p^m)$ represents the contribution of the terms of trade, i.e. the relative deflator of exports and imports.

By plugging (1) and (3) into (2), we obtain the following algebraic breakdown of core inflation:

$$\pi^* = c + \tau - \omega^i(p^i - p^c) - \omega^g(p^g - p^c) - (\omega^x - \omega^m)(p^x - p^c) - T + \Delta \quad (4)$$

where $T = \omega^m(p^x - p^m) + (\pi - \pi^*)$ represents the contribution of the terms of trade adjusted for the inflation differential between HICP and core HICP, i.e. a proxy of the terms of trade excluding energy and food. The term $\Delta = (\pi - p^c)$ corresponds to the statistical difference between HICP inflation and consumption deflator inflation.

Thus, core inflation π^* is made up of five terms:

- unit labour cost c;
- margin rate τ;
- the relative deflators for government consumption, investment and exports with respect to consumption;
- the terms of trade excluding energy and food T;
- a statistical difference term for HICP and the consumption deflator Δ.

We thus obtain a breakdown of core inflation into a set of components. Aside from the statistical term of divergence between the household consumption deflator and the HICP, the factors likely to influence the level of core inflation for a given level of ULC inflation, are therefore (i) corporate margins, (ii) the terms of trade of the basket of core-HICP products (i.e. excluding energy and food), and (iii) the relative deflators for government consumption, construction investment, non-construction investment, and exports with respect to the household consumption deflator (hereinafter referred to as relative deflators).

2 Why does core inflation not pick up more quickly in the euro area?

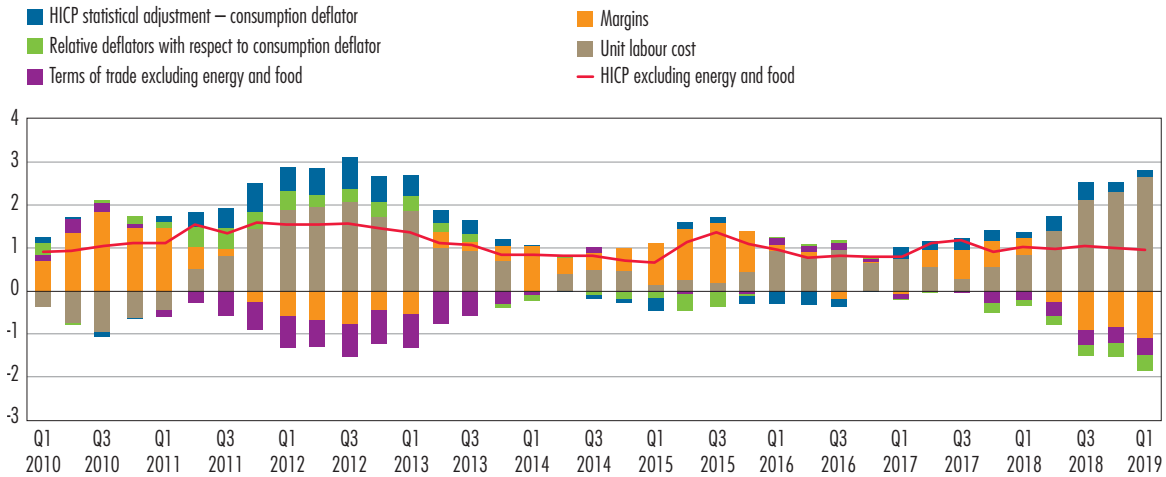
All else being equal, the economic upturn, as evidenced notably by job creations and the acceleration of compensation, should result in an increase in core inflation. However, during the first quarter of 2019, ULC increased by 2.6% year-on-year while core inflation was only at 1% – a difference of 1.7% (adjusted for roundings). Chart 3 shows our breakdown of core inflation and provides a simple explanation for the apparent absence of labour cost transmission to consumer prices.

As Chart 3 shows, the first factor is **the disinflationary role played by margins from mid-2018 onwards** (orange bars), which partially offset the impact of the increase in ULC and made a negative 1.1 percentage point contribution in the first quarter of 2019. This compression of margins is in line with the downward phase in the productivity cycle. Indeed, as can be seen in Chart 4 below, the increase in ULC inflation is due to both the acceleration of average compensation and the slowdown in productivity. Short-term fluctuations in productivity tend to be absorbed by the margin rate rather than by prices (see Chart 5 below). A similar development, though slightly smaller in scale, occurred in 2012 and early 2013.

The second factor is **an improvement in the core terms of trade** (see Chart 3, violet bars), which has weighed negatively on consumer prices since the end of 2017 and made a negative 0.4 percentage point contribution in the first quarter of 2019. This development follows the almost 10% appreciation of the euro between the beginning of 2017 and the end of 2018. To identify this it is important to look at terms of trade excluding energy and food. Indeed, the terms of trade as a whole deteriorated over the same period (the total exports deflator was less dynamic than the total imports deflator)

C3 Breakdown of the year-on-year change in core inflation in the euro area

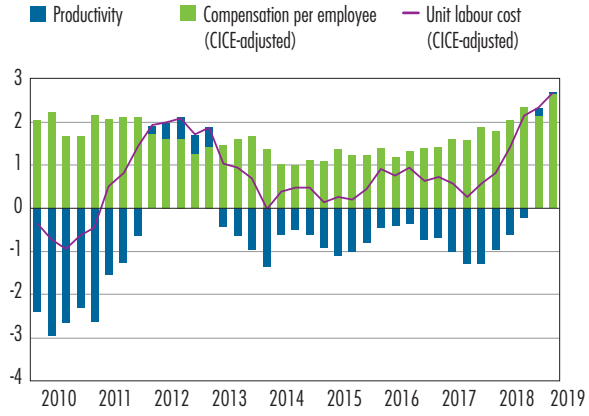
(in percentage points; in % and year-on-year change for HICP)



Sources: Eurostat and authors' calculations.

C4 Contribution of average compensation and productivity to ULC in the euro area

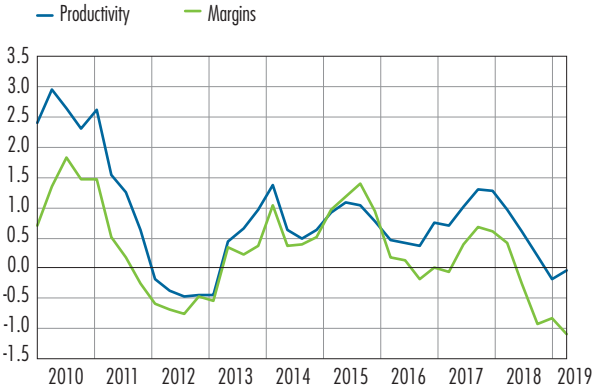
(in % and year-on-year change)



Sources: Eurostat and authors' calculations.

C5 Changes in margins and productivity in the euro area

(in % and year-on-year change)



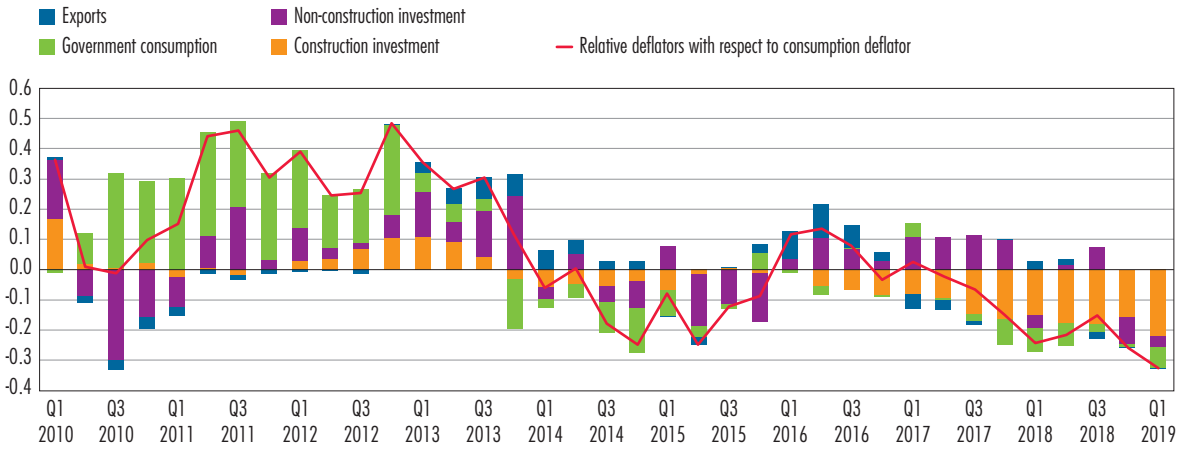
Sources: Eurostat and authors' calculations.

due to the rise in oil prices. But when they are adjusted for the increase in energy and food inflation relative to that of core-HICP products (manufactured goods and services), we find a decrease in the relative price of the basket of core-HICP goods, i.e. an improvement in the core terms of trade.

The third factor at work in the apparent disconnection between ULC and consumer prices lies in **a reduction in the relative price of household consumption with respect to other GDP item deflators**, with a negative contribution of around 0.3 percentage point in the first quarter of 2019. Chart 6 details this effect,[6] and highlights the major role played by **construction investment since 2017**, which made a negative 0.2 percentage point contribution in the first quarter of 2019. The dynamism of domestic prices relates more to the price of construction investment than to the price of household consumption. In particular, Charts 9 and 10 below show that a large part of the contribution of relative deflators has come from the acceleration of the construction investment deflator in Germany since 2011, reflecting the country's specific construction boom over recent years.

C6 Breakdown of the term of relative deflators with respect to the household consumption deflator in the euro area

(in % and percentage points; scale inverted to show the effect on year-on-year change in core HICP)



Sources: Eurostat and authors' calculations.

6 In Chart 6, non-construction investment corresponds to gross capital formation and therefore includes changes in inventory.

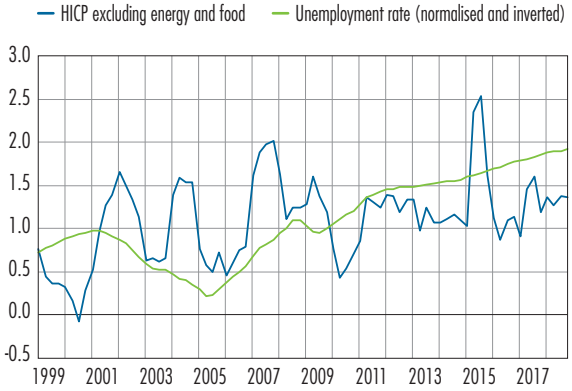
3 Two distinct sequences in the process of inflation in Germany since 1999

Since the creation of the euro, Germany has shown a similar paradox to that observed during recent years in the euro area, with an apparent absence of a relationship between core inflation and unemployment (see Chart 7), whereas average compensation growth and the unemployment rate remain well correlated (see Chart 8).

Charts 9 and 10 apply our breakdown to core inflation in Germany since 1999. Two distinct phases emerge. First, up to the 2007-08 crisis, changes to German core inflation seem to have been driven by movements in margins. During this phase, core inflation arises on average from a restoration of margins, while ULC increases very modestly and the share of wages in value added drops. Since 2011, core inflation has stemmed in large part from sustained growth in ULC with a broadly stable margin rate. The relative stability of core inflation at around 1.2-1.4% is due to a series of factors that temporarily offset the inflationary effects of ULC growth: one-off reductions in the margin rate in line with the productivity cycle in 2012 and 2018, and an improvement in the core terms of trade between 2012 and 2013 and to a lesser extent in 2018. In addition, since 2011 a significant factor in the apparent disconnection between ULC and core inflation has been the reduction in the relative price of household

C7 Core inflation and unemployment in Germany

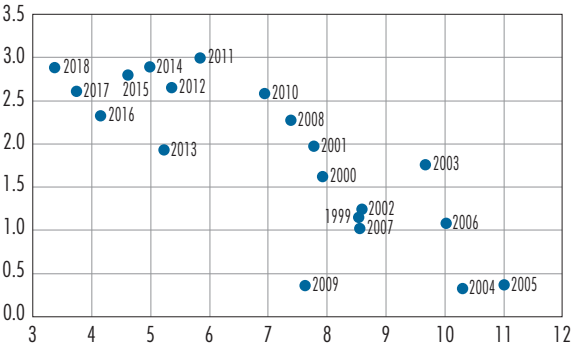
(in %; in year-on-year change for HICP)



Sources: Eurostat and authors' calculations.

C8 Growth in average compensation per employee and unemployment in Germany

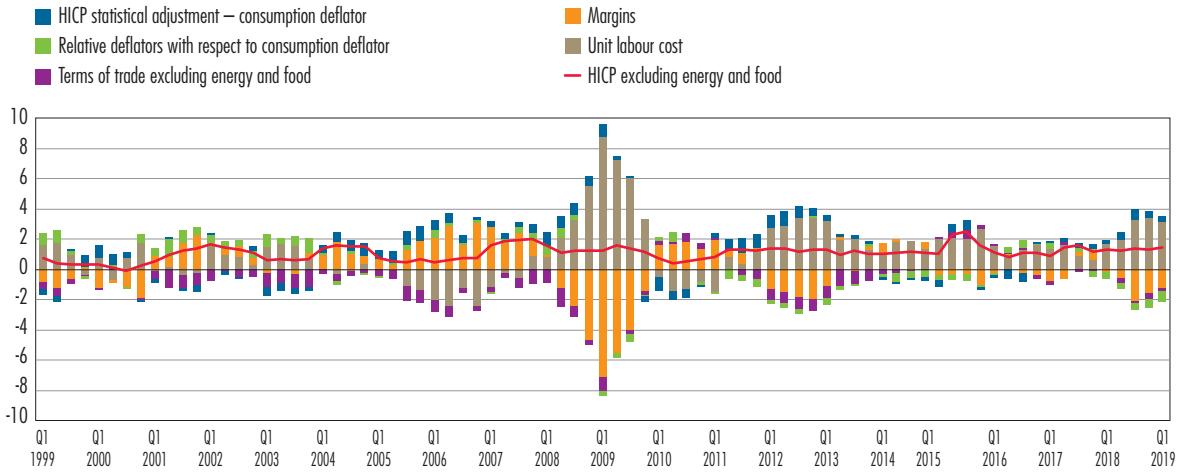
(in %; x-axis: unemployment rate, y-axis: growth in average compensation per employee)



Source: Eurostat.

C9 Breakdown of the year-on-year change in core inflation in Germany

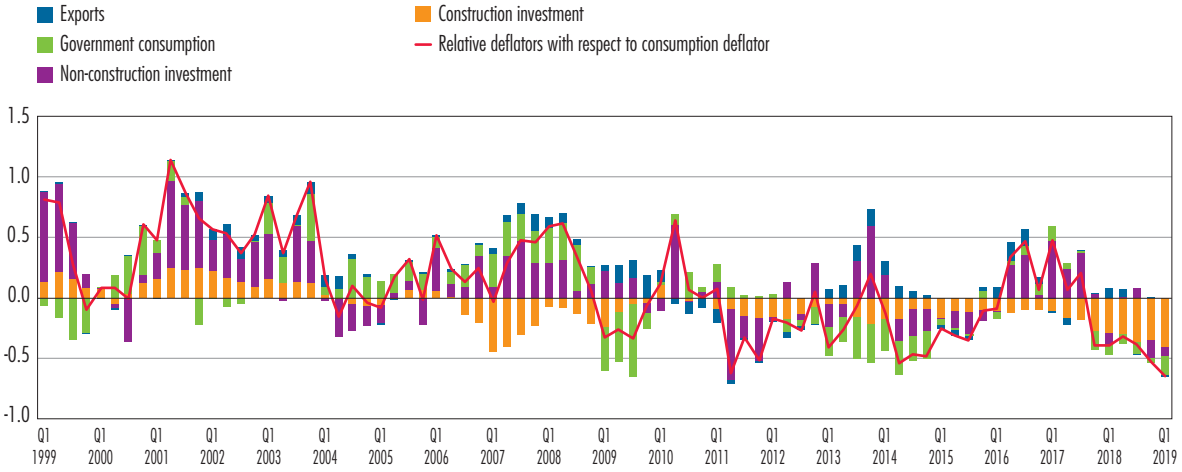
(in percentage points; in % and year-on-year change for HICP)



Sources: Eurostat and authors' calculations.

C10 Breakdown of the term of relative deflators with respect to the household consumption deflator in Germany

(in % and percentage points; scale inverted to show the effect on year-on-year change in core HICP)



Sources: Eurostat and authors' calculations.

consumption whose contribution in the breakdown of core inflation has become increasingly negative. As shown in Chart 10, this reduction mainly stems from a price of construction investment that has accelerated sharply compared with household consumption prices, reflecting the boom in the construction sector.

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