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**429 Report** by Geraldine Dany-Knedlik

## A sustainable development of inflation in euro area requires continuously improving labor market

- Inflation has been high since mid-2018 mainly due to rising commodity prices
- Core inflation remains low
- Impact of wage dynamics on core inflation is modest

## LEGAL AND EDITORIAL DETAILS

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## AT A GLANCE

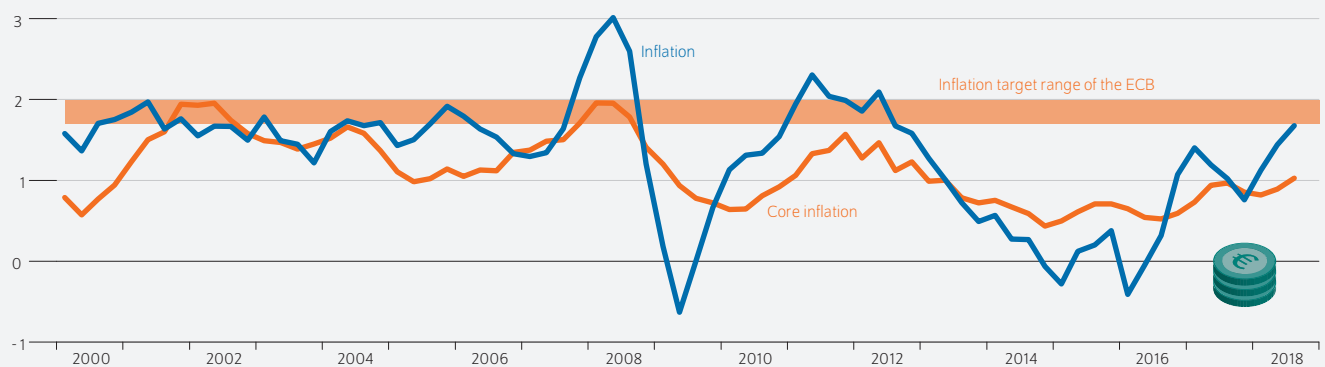
# A sustainable development of inflation in euro area requires continuously improving labor market

By Geraldine Dany-Knedlik

- DIW study examines reasons for long phase of low inflation in the euro area since the sovereign debt crisis
- Reasons for modest inflation are low inflation expectations, external factors, and factors related to the business cycle
- The rise in inflation since mid-2018 was primarily caused by energy price trends; core inflation is still low
- ECB expects continuing solid wage growth to impact core inflation
- German Institute for Economic Research calculations show that so far this effect has been relatively weak

## Rising crude oil prices are driving up headline inflation in the euro area, while core inflation rate remains low levels

Harmonized Index of Consumer Prices (HICP) with and without energy and unprocessed food components, percentage change year-on-year



Sources: Eurostat-database; author's own calculations.

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## FROM THE AUTHOR

*"A sustained increase in core inflation should be evident before the ECB raises interest rates with its medium-term monetary policy."*

— Geraldine Dany-Knedlik, study author —

## MEDIATHEK



**Audio Interview** with Geraldine Dany-Knedlik (in German)  
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# A sustainable development of inflation in euro area requires continuously improving labor market

By Geraldine Dany-Knedlik

## ABSTRACT

In the past five years, the inflation in the euro area has been well below the European Central Bank's (ECB) aimed inflation rate of close to but below two percent for achieving its objective of price stabilization in the medium term. The present analysis shows that expectations of low inflation, rising cyclical unemployment, and external factors such as low crude oil prices were responsible. In the middle of this year euro area price development picked up again. At its meeting in June this year the Governing Council of the ECB decided to end the asset purchase programme (APP) by December of this year and held out the prospect of a first rise in key ECB interest rates after the summer 2019. This necessitates a continuing, sustained inflation momentum. However, core inflation excluding energy and food prices has remained relatively low until now. The ECB is primarily relying on increasing wage momentum to drive core inflation in the near future. As DIW calculations show, this relationship exists but it is quantitatively rather weak. For core inflation to support the medium term price stability in the upcoming years, wages must continue to grow considerably.

In the past five years, inflation in the euro area—measured by the Harmonized Consumer Price Index (HICP)—was well below the ECB's aimed inflation rate of close to but below two percent for price stabilization in the middle term.<sup>1</sup> In 2015 and 2016, the rate of price increases in the currency union was even negative. The restrained development of consumer prices in the currency union opens up the possibility of various macroeconomic risks: for example, a higher probability of slipping into deflation (see Box 1). Inflation did not return to 1.8 percent until May 2018.

In the first seven years of the currency union, the inflation rate of the overall euro area—which is the average inflation rate of the individual member states weighted according to economic relevance—fluctuated around the two-percent mark (see Figure 1). However, price dynamics in the individual member states were quite heterogeneous. Until the beginning of the global financial crisis, the inflation rates of Ireland, Italy, Spain, and Portugal were significantly above the weighted euro area average. On the other hand, the price developments in member states such as Belgium, Germany, France, the Netherlands, and Finland were similar to or slightly below the inflation rate of the overall euro area.

Some studies indicate that the differences in inflation among euro area members are related to macroeconomic imbalances within the European currency union.<sup>2</sup> According to them, misallocation of capital within the currency union, plus increased unit labor costs and rising current accounts deficits in Ireland, Italy, Spain, and Portugal have led to changes in real exchange rates. The latter is reflected in heterogeneous rates of price increase among the currency union members.

<sup>1</sup> The ECB has the objective of price stability in the medium term for monetary union. In the pursuit of this objective the Governing Council of the ECB defined price stability as an inflation rate (as measured by HICP, year-on-year increase) below but close to two percent in the medium term. See the website of the European Central Bank.

<sup>2</sup> See Virginie Coudert, Cécile Couharde, and Valérie Mignon, "On currency misalignments within the euro area," *Review of International Economics* 21 (1) (2013): 35-48.

## Change in euro area inflation dynamics since the financial crisis

Since the beginning of the global financial crisis, the dynamics of inflation in both the overall euro area and most individual member states has changed. The European sovereign debt crisis that followed the financial crisis reinforced the macroeconomic imbalance among the euro area countries to some extent but had a mitigating effect as well. For example, inflation dynamics in the member states are much more homogeneous in comparison to the pre-crisis period. However, the inflation dynamics of the individual member states—and therefore, the entire euro area—have become more persistent and reveal increased fluctuations in comparison to the pre-crisis period. Despite low interest rates, unconventional monetary policy measures, and the ongoing economic recovery in the euro area, prices have risen at a low—and sometimes negative—rate since the beginning of the sovereign debt crisis. This raises many issues for monetary policy in the euro area.

### The three usual suspects: expectations, business cycle, and oil prices

As part of the traditional Phillips curve,<sup>3</sup> the macroeconomic theory that explains inflation developments basically submits three “usual suspects”, each of which has a different implication for monetary policy.

### Inflation expectations in the medium term

On the one hand, the expectations that businesses and households have of inflation are decisive for the price developments. Since the ECB’s inflation target is defined for the medium term, the inflation expectations for the same period are relevant for monetary policy in the euro area. They are also an indicator of how closely the inflation expectations of economic actors are tied to the central bank’s inflation target and in turn, of the strength of market participants’ belief that the central bank will comply with its inflation target. Since aggregate inflation expectations cannot be directly observed, three types of indicators are typically used survey-based, market-based, and empirically estimated indicators (see Figure 2).<sup>4</sup>

Most of the empirical results of scientific studies on inflation expectations in the euro area<sup>5</sup> indicate an occasional deviation from the ECB’s inflation target in medium to longer-term inflation expectations. This could be an explanation for inflation having plateaued at a low level for the past five

#### Box 1

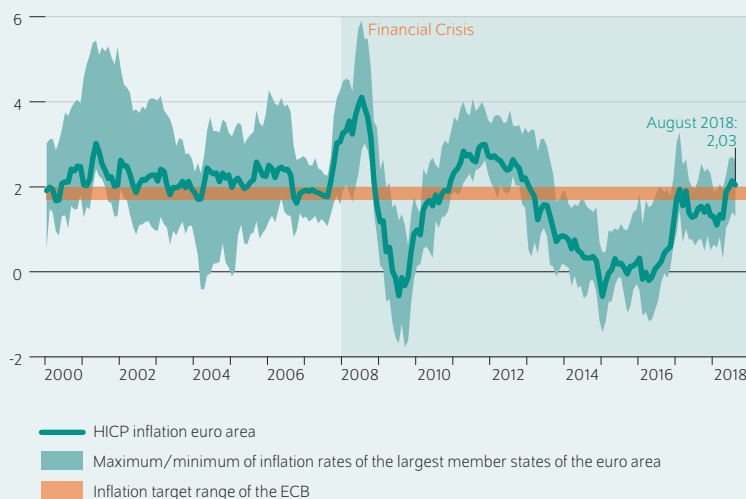
### The significance of inflation

There are mainly three reasons why central banks want to set positive inflation targets. First, errors in measurement while calculating inflation—particularly those that occur when recording product quality changes—generally lead to the measured inflation rate exaggerating the actual inflation rate. Second, companies have difficulty or are unable to implement nominal wage reductions in the face of rising inflation due to union resistance. However, a slightly inflationary environment generally permits companies to reduce labor costs in real terms by keeping nominal wages at a plateau instead of adjusting them as a result of the positive price developments. Third, slightly positive inflation can be a buffer for deflationary spirals triggered by macroeconomic shocks. When price levels fall—triggered by a sudden drop in demand, for example—market participants can postpone their purchasing decision in expectation of continuously falling prices, reining in demand even more and putting pressure on companies to further lower prices.

Figure 1

### Inflation development in the euro area and the largest member states

Harmonized Index of Consumer Prices (HICP), percentage change year-on-year



Sources: Eurostat-database; author's own calculations.

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Since the financial crisis, euro area inflation dynamics have changed.

<sup>3</sup> In general, the Phillips curve describes the short-run relationship between consumer prices or wages respectively and real economic activity or unemployment.

<sup>4</sup> For the disadvantages and advantages involved with examining each indicator of inflation expectations, see Dieter Nautz, Laura Pagenhardt, and Till Strohsal, “The (de-)anchoring of inflation expectations: New evidence from the euro area,” *The North American Journal of Economics and Finance* (40) (2017): 103–115.

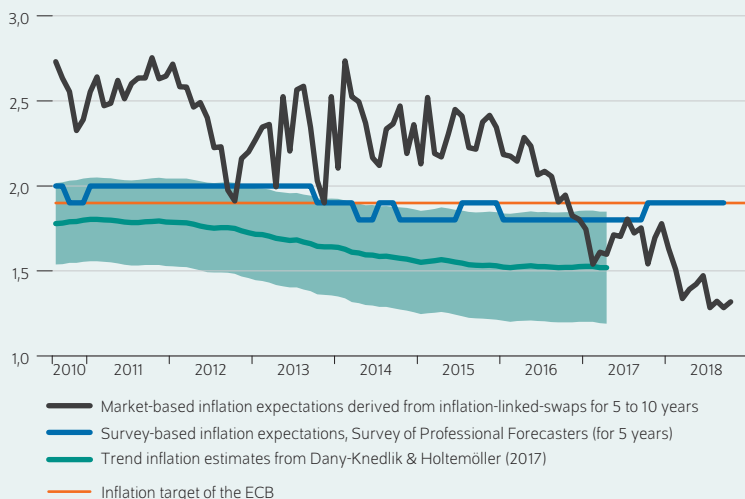
<sup>5</sup> See Nautz et al., “(De-)anchoring of inflation expectations” or Geraldine Dany-Knedlik and Oliver Holtemüller, “Inflation dynamics during the financial crisis in Europe: Cross-sectional identification of long-run inflation expectations,” *IWH Discussion Papers* 10/2017 (2017).



Figure 2

**Indicators of inflation expectations in the euro area**

Survey-based, market-based and empirically estimated, percentage change compared to the same month last year



Sources: Bloomberg; ECB Statistical Data Warehouse; author's own calculations.

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Various indicators suggest that longer-term inflation expectations divert from the ECB's inflation target.

years. Inflation expectations that are firmly tied to the ECB inflation target simplify the day-to-day business of monetary policy to a great extent, since market participants use it for orientation when setting prices for future contracts (collective bargaining agreements, for example). In this case, price increases equal the inflation target without external intervention. In the recent case, however, when inflation expectations significantly deviate from the inflation target, monetary policy must use its spectrum of instruments to create incentives for economic actors to set prices that conform to the inflation target. As soon as the inflation target is reached again, the ECB's perceived credibility with regard to upholding its monetary policy target also increases.

### Cyclical unemployment

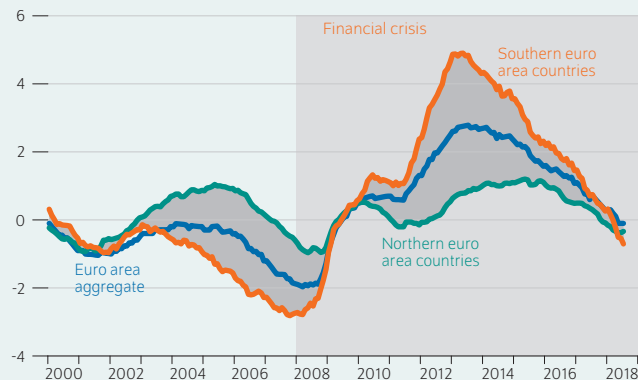
The traditional Phillips curve offers another explanatory factor for the restrained development of consumer prices, namely unemployment dynamics and resulting wage developments. The unemployment gap—the current unemployment rate minus the inflation-neutral unemployment rate<sup>6</sup>—is decisive for inflation dynamics in this case. The inflation-neutral unemployment rate is the unemployment rate

<sup>6</sup> The non-accelerating inflation rate of unemployment cannot be measured directly. Instead, it must be estimated based on a latent variable model. Hence, the calculated non-accelerating inflation rates of unemployment and the resulting unemployment gaps are always subject to statistical uncertainty. Different empirical methods and/or model specifications may result in distinct estimates of unemployment gaps and NAIRUs.

Figure 3

**Unemployment gaps in the euro area**

Current unemployment rates minus inflation-neutral unemployment rates, in percent



Sources: Eurostat and AMECO database; author's own calculations.

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Positive unemployment gaps after the financial crisis could be a reason for the low inflation of recent years.

that sets in when inflation is constant and is determined by structural factors in the labor market (NAIRU: non-accelerating inflation rate of unemployment).

During an economic upturn, the actual unemployment rate is typically lower than the NAIRU. This means the unemployment gap is negative. In contrast, the unemployment gap in the wake of a recession is positive since the actual unemployment rate is higher than the NAIRU. When cyclical unemployment is unusually high, the unemployment gap is well above zero. In this case, employed persons have less bargaining power when it comes to negotiating higher wages. As a result, slower price dynamics are probable in times of high cyclical unemployment, while the rate of price increases can also be above the inflation target under negative unemployment. The positive unemployment gaps that became much wider in the southern euro area countries in the wake of the sovereign debt crisis have slowly closed since 2014 (see Figure 3). But this has not exercised pressure on consumer price dynamics, since unemployment gaps have been positive until the beginning of this year

### Commodities prices

Alongside inflation expectations and the unemployment gap, the price developments of imported goods such as crude oil can directly impact domestic inflation. Changes in import prices can be directly reflected in price components of the

HICP or have an indirect influence via price adjustments in domestic goods. Accordingly, an additional reason for the long phase of low inflation in the euro area could be the crude oil price plunge in 2014 and 2015. Since monetary policy typically has little influence on price dynamics outside of its currency region, it must regularly accept import price-driven changes in the inflation rate—even if they undermine the aimed inflation target. This is why the ECB defines its inflation target in the medium term. And it is also why the central banks usually do not change its policy in response to short-term fluctuations in international prices, particularly those of crude oil.

Scientific studies on the low inflation in the euro area show that external factors—particularly oil price fluctuations—explain the inflation developments during the financial crisis and to some extent, also dampen euro area inflation since the sovereign debt crisis. However, the low inflation plateau since 2013 is primarily due to a wide unemployment gap and low long to medium term inflation expectations (see Figure 4). From a monetary policy viewpoint, this means that the continued recovery of the labor market is important for a sustainable price development in the coming years. On the other hand, a prolonged phase of inflation rates that conform to the ECB price stability target is required as a means of pinning inflation expectations at the medium term target level again.

### Finally back to two percent: Have inflation dynamics normalized?

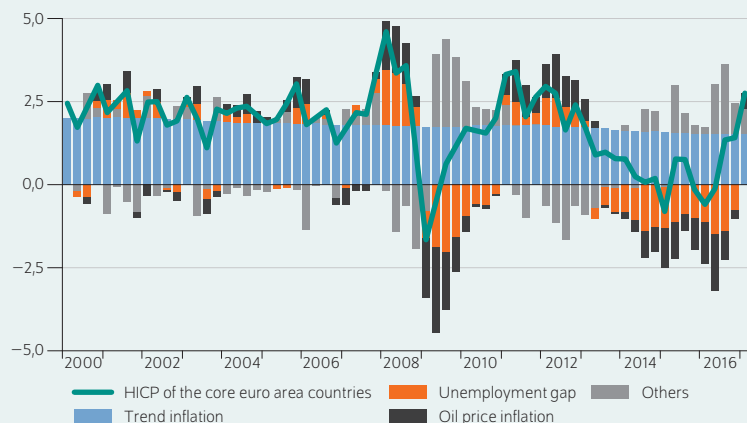
For the past five years, the inflation rate has been well below the two-percent mark in the currency union; it picked up in May of this year and since then has fluctuated within the ECB's target range (see Figure 5). For example, Germany's inflation rate in September was 2.2 percent in comparison to the same month in 2017 and the rate of price increases for the entire euro area was 2.1 percent.

In June 2018, the ECB Council announced that it would rein in the expansiveness of its monetary policy. Thereby, the ECB plans to terminate the asset purchase programme by December 2018 but for the time being the stocks of assets would remain constant as a result of replacement purchases for expiring bonds. The ECB Council also indicated that it could not foresee any increase of key interest rates before fall 2019.<sup>7</sup> The council's monetary policy decision is based on the ECB's outlook of continued solid economic growth and the fact that consumer price inflation in the euro area will continue its current development in the coming years that is in line with the price stability objective of just under two percent in the medium term.

<sup>7</sup> The ECB Council formulated an ambiguous date for the increase of interest rates, which led to divergent translations of the decision dated June 14, 2018. The date of the first interest rate hike was described as "...key ECB interest rates... expect them to remain at their present levels at least through the summer of 2019 and in any case for as long as necessary ...". See Transcript of the Press Conference (2018) (available online, accessed October 2, 2018).

Figure 4

### Factors explaining inflation dynamics in the euro area in percent



Source: Dany-Knedlik und Holtemöller (2017): a.a.O., figure 10.

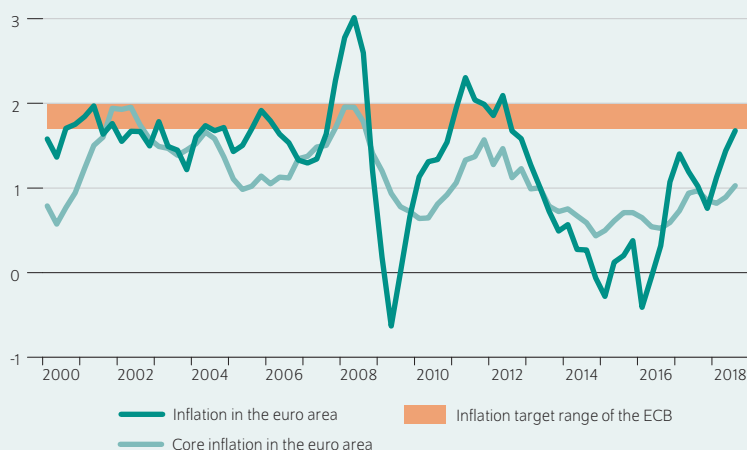
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Especially in recent years, unemployment had a strong influence on the inflation rate compared to the oil price development.

Figure 5

### Overall inflation and core inflation in the euro area

Harmonized Index of Consumer Prices (HICP) with and without energy and unprocessed food components, percentage change year-on-year



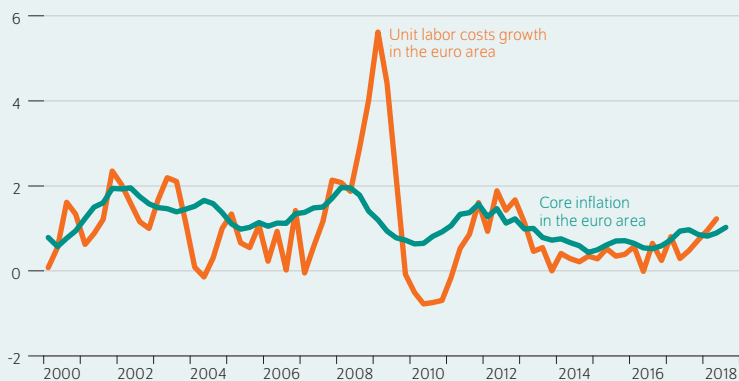
Sources: Eurostat; author's own calculations.

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Despite the increase in inflation since the middle of this year, core inflation has remained subdued.

Figure 6

### Unit labor cost growth and core inflation in the euro area in percent to the same month last year



Sources: Eurostat; author's own calculations.

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With economic growth plummeting during the financial crisis, unit labor costs skyrocketed in the short term. Since last year, they have been rising parallel to core inflation.

ECB defines its inflation target for the change to the same month of the previous year of the overall HICP but focuses on the medium term in order to be able to ignore short-term fluctuations in the volatile prices of goods, such as food or crude oil. For achieving price stability in the medium term, it is, therefore, important that the so-called core inflation rate—inflation excluding strongly fluctuating components such as energy and unprocessed food—approaches the medium term target range. Unlike the overall inflation rate, the euro area's core inflation rate remains at a lower level than before the beginning of the global financial crisis: in September of this year, it was 1.1 percent in the euro area.

The ECB Council repeatedly communicated that an increase of key interest rates is supported by a solid rise in core inflation. The current aggregate-level projections for the currency union by experts at the ECB assumes that the core inflation rate of 1.1 percent in the euro area this year will jump to 1.8 percent in 2020.<sup>8</sup> Despite the assumed slowdown in energy and commodities price dynamics, the ECB experts forecast annual overall inflation for the euro area of 1.7 percent between 2018 and 2020, which is within the lower limit of the inflation target range.

### The effect of wage dynamics on core inflation

The ECB reasoned that, based on the continuation of strong wage growth, core inflation dynamics would pick up in coming years. In the scientific community, whether or not an increase in nominal wages has a distinct effect on (core) inflation is a current topic in the debate about the explanatory

factors of inflation in the U.S. Unlike its behavior in previous crises, US inflation declined only slightly during the recent financial crisis, although it was a strong recession with a relatively strong increase in unemployment.<sup>9</sup> Some economists explain the modest decline of inflation by restrained drop in wage growth, even though unemployment rose significantly.<sup>10</sup>

In the euro area, nominal wage growth has developed very modestly in the past five years. On the one hand, this could be due to uncertainty about the future course of the business cycle. On the other hand, globally interconnected labor markets tend to keep wages low. In the wake of a continued economic boom, however, wages have jumped since the middle of last year. Nominal unit labor costs in the euro area amounted to 0.3 percent in the second quarter of 2017 and since then revealed a pick-up in growth rates to reach 1.2 percent by mid-2018 (see Figure 6).

The extent to which a rise in wage growth would affect core inflation in the euro area was examined here based on an empirical model (see Box 2). In particular, the study here looks at the effect of an exogenous increase of the wage growth gap and an exogenous decrease of the unemployment gap. The wage growth gap describes the difference between growth of unit labor costs and the long-term growth trend of labor productivity, reflecting the kind of wage growth realized in deviation from long-term expected wage growth in accordance with long-term labor productivity growth. A sudden decline of the unemployment gap could be interpreted as a positive demand shock. At a level of 0.1 percent, such a shock would significantly increase the unit labor cost gap and the core inflation rate after five quarters—by 0.1 and 0.04 percentage points respectively. Thus, the quantitative effect on core inflation is rather weak. Further, the core inflation rate would rise in comparison to the unit labor cost gap by a ratio of approximately 2:1 (see Figure 7).

The effect of an exogenous increase of the wage growth gap, which could reflect a sudden increase in the negotiating power of employees, is statistically significant but also quantitatively negligible (see Figure 8). If the wage growth gap unexpectedly rises to one percent, core inflation in the euro area would rise significantly by 0.05 percentage points. This may demonstrate the positive correlation between wage development and the core inflation rate due to a boom economy or an improvement in the bargaining power of employees, but quantitatively the relationship is not very strong. It is to be seen whether past and future positive economic stimuli also in terms of better labor market conditions are strong enough to raise core inflation to levels conform to the ECB's objective of price stability in the medium term.

<sup>9</sup> See Mark W. Watson, "Inflation persistence, the NAIRU, and the great recession," *American Economic Review* 104 (5) (2014): 31–36.

<sup>10</sup> See Mary C. Daly and Bart Hobijn, "Downward Nominal Wage Rigidities Bend the Phillips Curve," *Journal of Money, Credit and Banking* 46 (2014): 51–93.

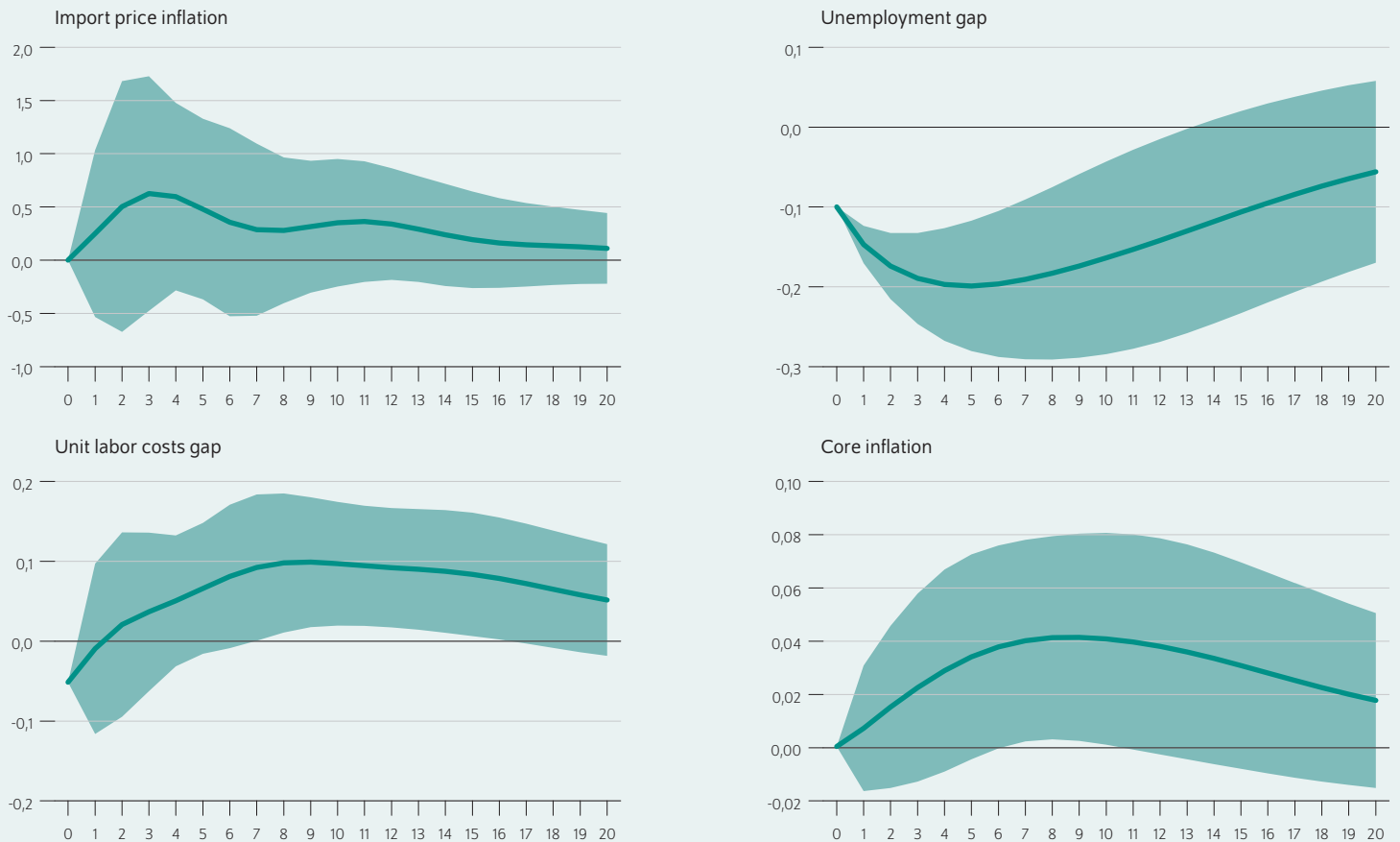
<sup>8</sup> See ECB Staff Macroeconomic Projections for the Euro Area (2018) (available online, accessed October 2, 2018).



Figure 7

**Impulse responses of an exogenous decrease of the unemployment gap**

Effect of a decrease by 0.1 percent, in percentage points each quarter



Source: Author's own calculations.

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A sudden reduction in the unemployment gap causes the unit wage gap to rise faster than core inflation.

**Conclusion: Interest rates should only be raised if the core inflation rate rises more sharply**

Lowering the ECB's key interest rates to zero percent and deploying a spectrum of unconventional measures have probably supported the business cycle since the financial and sovereign debt crisis and have led to a narrowing unemployment gap since 2014. Until now, this development has not stimulated the core inflation rate to rise to levels conform to the ECB's objective of medium term price stability. Both expectations of low inflation and sluggish wage dynamics—at least until mid-2017—are responsible. The inflation rate has now risen back to the ECB's aimed medium term inflation target,

but the developments of recent months was primarily driven by commodity price inflation. Since they are often subject to short-term fluctuation, the current inflation rate does not indicate that the medium-term inflation target has again been reached for the long term. In the face of more sharply rising wages, however, the ECB expects that consumer prices will also rise more sharply—independently of commodities prices. Our calculations find a significant relation between core inflation and wage growth, albeit the relation is quantitatively rather weak. For this reason, monetary policy targeted at the medium term should first detect signs of a sustainable increase in the core inflation rate before implementing further restrictive stimuli such as raising the interest rate.

## Box 2

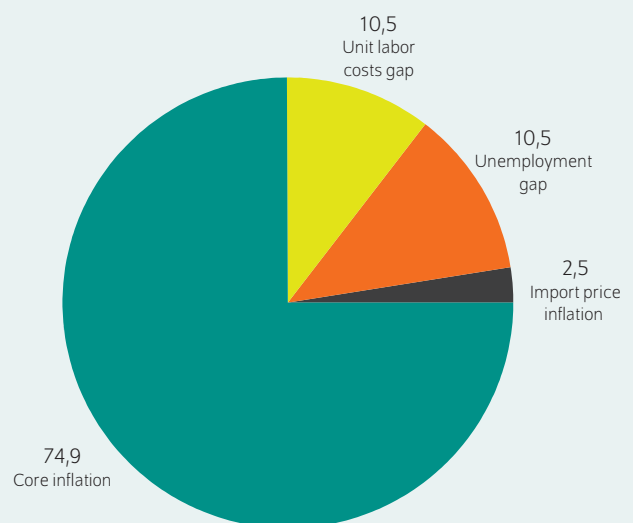
### Method of estimating the effect of an exogenous increase in wage growth on the core inflation rate

Based on current empirical studies on this subject,<sup>1</sup> a vector autoregression (VAR) with four variables and a lag order of two was used. The VAR model allows reciprocal effects among the individual variables to be reflected statistically. The variables consist of euro area data by quarter from the fourth quarter of 2000 to the second quarter of 2018. To map the mutual dependence of core inflation and wage growth, the model contains determinants of the Phillips curves for prices and wages.<sup>2</sup> They include **import price inflation** as an approximation of the influence of all the prices of international goods (such as crude oil) and consumer goods on domestic price and wage trends. CPB Netherlands Bureau of Economic Policy Analysis was the source of the data on import price inflation in the euro area. The model also included the **unemployment gap** as a variable. It was calculated based on the unemployment rate of the euro area (Eurostat) minus the wage inflation-neutral unemployment rate (estimate of the European Commission AMECO database). The unemployment gap is the core of the relevant Phillips curve: the short-term relationship between wages or the price of goods and the business cycle trend. Last but not least, the model contains the **wage growth gap** and the **core inflation rate**.<sup>3</sup> As described in the main text, the wage growth gap is calculated as the nominal unit cost of labor growth minus the growth trend of labor productivity.<sup>4</sup> Using the wage growth gap instead of simply unit labor costs takes into consideration that in the long term, unit labor costs develop in accordance with labor productivity. Both unit labor costs and labor productivity are based on hours of work and are taken from Eurostat database. The least squares method was used to estimate the model.<sup>5</sup>

A total of four shocks were identified. A decomposition of the variance of core inflation in the contributions of the individual shocks showed that over a period of five years, core inflation was mainly driven by the exogenous shocks of the unemployment gap, the unit labor cost gap, and unforeseen shocks. Import price inflation plays only a minor role (see figure). The exogenous rise in the core inflation rate can be interpreted as a supply-side productivity shock that caused the unemployment gap to widen and the core inflation rate to rise.

Figure

**Variance decomposition of core inflation rate**  
Share of the different indicators in core inflation, average over 20 quarters in percent



Source: Author's own calculations.

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In addition to their own contribution, the unemployment and unit labor cost gaps explain core inflation.

<sup>1</sup> See Ekaterina V. Peneva and Jeremy B. Rudd, "The passthrough of labor costs to price inflation," *Journal of Money, Credit and Banking* 49(8) (2017): 1777-1802.

<sup>2</sup> See Douglas Staiger, James H. Stock, and Mark W. Watson, "Prices, wages, and the U.S. NAIRU in the 1990s," in *The Roaring Nineties: Can full employment be sustained?* eds. Alan Krueger and Robert Solow, (New York: Century Foundation Press, 2001).

<sup>3</sup> All growth rates are based on the same quarter of the previous year.

<sup>4</sup> The growth trend of labor productivity was calculated using an Hodrick-Prescott filter.

<sup>5</sup> The exogenous shocks were identified recursively using a Cholesky decomposition in which the sequence of the variables is the same as the list above.

Figure 8

**Impulse responses of an exogenous increase in the unit labor costs gap**

Effect of an increase by 1.0 percent, in percentage points each quarter



Source: Author's own calculations.

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A sudden increase in the unit labor cost gap has a positive but rather weak effect on the core inflation rate.

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