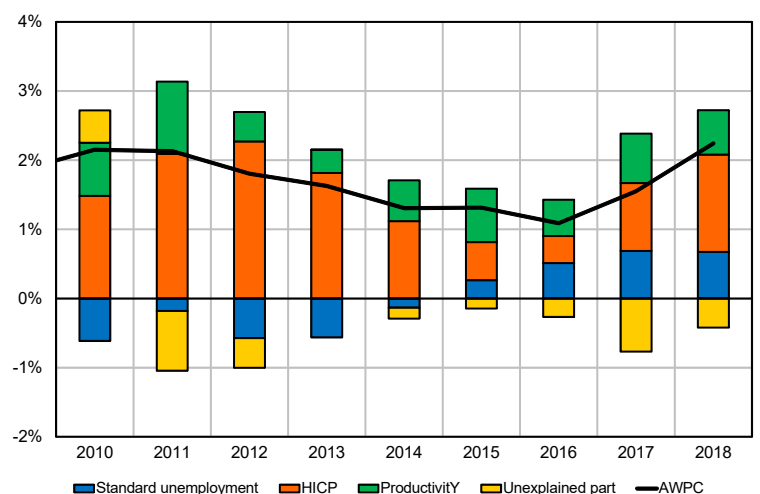


Unemployment and wages in the United States and in the euro area

Jean-Alain Andrivon, Pauline Callec

- Although unemployment had declined since the 2008 crisis, wages were still less dynamic in 2018 than before the crisis in the euro area and the United States. A number of factors (such as weaker unions, the composition of the workforce, etc.) have been put forward to explain this loosening of the relationship between unemployment and wages (Phillips curve). It might also be that the traditional unemployment measure no longer adequately reflects labour market tensions since the emergence of atypical types of employment.
- In addition to standard unemployment, a broader measure of unemployment (hereinafter "broader unemployment"), which encompasses underemployed and discouraged workers, as well as surveys of hiring difficulties, could also provide insight into wage momentum in the post-crisis period.
- Prior to the financial crisis, in the euro area's "Northern" countries (Germany, the Netherlands, Belgium, Austria, Finland and Luxembourg) wages were less dynamic than may have been suggested by their determinants. Wages have followed a more usual pattern over the past three years but have still not increased enough to offset the previous restraint.
- In the "South" of the euro area (Spain, Italy, Portugal, Greece, Cyprus and Malta), the sharp rise in unemployment during the crisis (2012-2013) put a significant drag on wages. Support for wages brought about by the more recent decline in unemployment is being undermined by wage restraint policies introduced in recent years which are reflected in weak unit labour cost growth.
- The difference in core inflation between the euro area and the United States after the end of the financial crisis reflects the dynamics of unit labour costs on both sides of the Atlantic.

Contributions to changes in the average wage per capita (AWPC) in the euro area



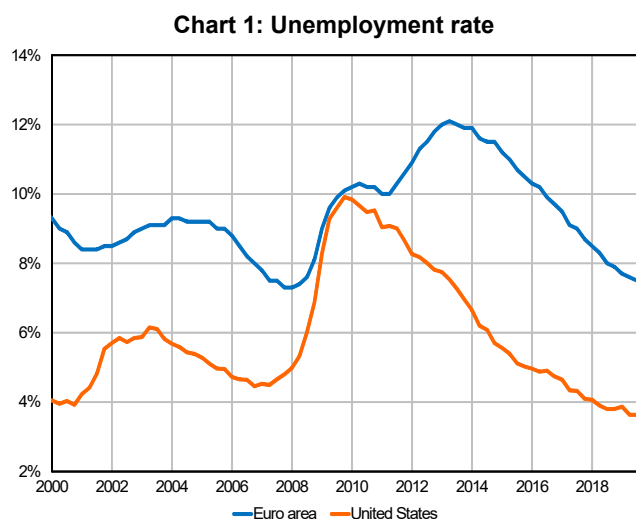
Source : AMECO database, DG Trésor calculations.

NB: These are weighted averages of country-specific effects estimated using panel data.

1. The relationship between wages and unemployment appears to have been disrupted since the 2008 crisis¹

1.1 Despite declining unemployment rates, wages have barely picked up since the crisis in the United States and even less so in the euro area

Unemployment rose significantly in advanced countries during the 2008 financial crisis. In the United States, the rate jumped from 4.5% in early 2007 to almost 10% at the start of 2010. Since then, it has been on a constant downward spiral and stood at less than 4% in early 2018. In the euro area, unemployment increased from 7.3% at the start of 2008 to over 10% in 2010 and to 12% with the euro area crisis (see Chart 1). It started falling from the end of 2013 and represented 7.5% in November 2019.



Source: Eurostat, BLS (Bureau of Labor Statistics).

These changes were stronger in the United States where the increase in unemployment was faster and more significant during the crisis as was its decline once it was over. In the euro area, the slower rise in unemployment could be partly explained by the fact that workers were kept on under short-time work arrangements² in a number of countries.

Despite this fall in unemployment, which was close to, or even less than, its pre-crisis level at the end of 2019,

wages have scarcely risen. The growth in the nominal average wage per capita (AWPC) in the euro area was 1.7% on average between 2010 and 2019 compared to an average of 2.7% between 2000 and 2008. In the United States, the AWPC rose by an average of 2.5% between 2010 and 2019 as against 3.7% on average per year between 2000 and 2008.

1.2 This trend leads to questions as to the relationship between wages and unemployment

The very limited response of wages to lower unemployment rates has caused observers to invoke a "flattening" of the Phillips curve, namely a weakening or (disappearance) of the relationship established in the past between labour market tensions and price momentum.

Although there is no consensus in the literature as regards this phenomenon, several trends have emerged: (i) the Phillips curve "is thought to" still exist but may have relatively little explanatory authority (compared, inter alia, to supply shocks on prices), (ii) the flattening of the Phillips curve may not be a recent occurrence and might have mainly taken place between the 1970s and 1990s, (iii) the relationships between inflation (or wage growth) and unemployment may have been stable since the 2000s, especially if a broad definition of unemployment is used, (iv) this relationship might nevertheless be weak at the current time and (v) the curve may be more flattened for inflation than for wage growth which could be down to an imperfect transmission of wages to prices. Lastly, the Phillips curve could contain nonlinearities:³ its slope may be more pronounced during times of economic expansion than during recessions.

A number of studies have sought to explain low wage momentum by structural changes to the labour market or the major trends in advanced economies.⁴ These include firms' bargaining power with respect to

- (1) This issue of Trésor-Economics was written prior to the COVID-19 health crisis and draws no assumptions as to resulting behaviours.
- (2) Short-time working involves an employer cutting back or suspending its activity without lay-offs, with workers' wage losses being partly offset by allotting partial working hours. In May 2009, 1.5 million German workers were subject to short-time working (3.6% of the total labour force). These arrangements are thought to have cost the German public purse €4.6bn in 2009.
- (3) See also Fed (2017), "Nonlinearities in the Phillips Curve for the United States: Evidence Using Metropolitan Data." *Finance and Economics Discussion Series*.
- (4) See G. Stéphan (2016), "The shift in US wage share", *Trésor-Economics* no. 216.

employees,⁵ impacts of labour force composition (more senior workers on the labour market,⁶ low-skilled workers entering and leaving the labour market), and the "hysteresis"⁷ effects of the 2008 crisis.

For the United States, Abdih and Danninger (IMF, 2018) consider, with a productivity-augmented Philips curve model as an explanatory variable, that wage growth could have been low since the 2000s as a result of weakening trend labour productivity growth and the decline in the share of income that accrues to labour. They argue that these effects override the positive impact on wages of the diminishing of labour market slack⁸ since 2010. A similar examination of euro area

wage dynamics, which was also conducted by the IMF (2018),⁹ posits that the reduction of labour market slack has contributed to wage growth but that its impact is thought to be minimal compared to the influence of past and expected inflation.

Lastly, labour market tensions over the period may have been insufficient to have had significant effects on inflation as they are time-lagged. In addition, the traditional measurement of unemployment might no longer satisfactorily reflect the actual amount of tensions on the labour market following its shift towards more atypical forms of employment (part-time working whether voluntary or not, self-employed workers).

2. Wages continue to react to slack, especially if it is measured in terms of broader unemployment

2.1 Slack is still putting a drag on wages in the United States and in the euro area

With equations that explain wages on the basis of unemployment, prices and productivity (see Box 1), the relationship between the labour market and wage growth is clear: lower unemployment continues to play a major role in nominal wage growth, both in the euro area and the United States (see Chart on the cover page and Chart 4).

Euro area unemployment rose during the 2012 crisis and this put a drag on wage growth until 2014. Between 2015 and 2018, lower unemployment markedly bolstered wages. In the United States, it is estimated

that unemployment stopped weighing on wage growth after 2012, following a significant adverse effect in 2010 when it peaked in the wake of the financial crisis.

Besides the impact of slack, wage equations flag up a major contribution from prices and productivity. In the euro area, nominal wage momentum may be principally determined by changes to inflation, while the contribution of short-term shifts in consumer prices is less pronounced in wage equations for the United States (see Box 1). Productivity may contribute significantly to wage determination in the United States, as well as in the euro area. Its larger contribution to US wages following the crisis compounds the US labour market's greater sensitivity to the economic cycle.¹⁰

Box 1: Wage equation estimation method

In order to estimate the relationship between labour market tensions and wage momentum, we are using an error correction model which authorises nominal wage momentum to temporarily diverge from its fundamentals (inflation, productivity and the labour market tension indicator selected), modelled by a so-called long-term equation, whilst disturbances are represented by a "short term" equation.

A number of labour market tension indicators were tested so as to best capture changes on the market: standard unemployment, broader unemployment (see 2.2) and surveys of hiring difficulties (see Box 2). The long term equations that are set out here considered variables in levels, meaning that unemployment (or broader

(5) See Azar *et al.* (2017), Krueger (2018) and Benmelech *et al.* (2018).

(6) See Mojon and Ragot (2019), "Can an ageing workforce explain low inflation?"

(7) See Blanchard *et al.* (2015) and Yagan (2016), "Ces effets proviendraient d'une baisse pérenne de capital humain."

(8) Slack corresponds to unused resources on the labour market.

(9) See IMF (2018), "European Wage Dynamics and Labor Market Integration."

(10) See also De Waziers D., Kerdrain C. and Y. Osman, (2019), "The change in the labour share in value added in advanced economies", *Trésor-Economics* no. 234.

unemployment) in levels has an impact on the level of real wages. This differs from traditional Phillips curves where inflation is connected to the gap between (current/real) unemployment and its structural level (and the gap between real and potential GDP).

Wage equations for the United States are estimated from quarterly data for the period 1995-2018. Those for the euro area are estimated from annual panel data^a in two steps taking data from the nineteen euro area countries^b.

Amongst the notations used below, AWPC represents the average wage per capita, the deflator is that of consumption and the HICP is the Harmonised Index of Consumer Prices. Variables are indexed by country (index *i*) and by period (index *t*). The variable I_T12000 corresponds to an indicator for Q1 2000.

The specifications chosen for the US are as follows:

$$\begin{aligned} \Delta \log(AWPC_t) = & 1,03 \\ & -0,19[\ln(AWPC_{t-1}) - \ln(Deflator_{t-1}) - 0,80 \ln(Productivity_{t-1}) \\ & + 0,80(Standard\ unemployment_{t-1})] + 0,43\Delta \ln(Productivity_{t-1}) \\ & - 0,33\Delta \ln(Deflator_{t-2}) + 0,02I_{T12000} + 0,02I_{T12007} \\ & - 0,14\Delta \ln(AWPC_{t-1}) + \varepsilon_t \end{aligned}$$

$$\begin{aligned} \Delta \log(AWPC_t) = & 1,07 \\ & -0,19[\ln(AWPC_{t-1}) - \ln(Deflator_{t-1}) - 0,83 \ln(Productivity_{t-1}) \\ & + 0,77(Broader\ unemployment_{t-1})] + 0,60\Delta \ln(Productivity_{t-1}) \\ & - 0,38\Delta \ln(Deflator_{t-2}) + 0,01I_{T12007} - 0,16\Delta \ln(AWPC_{t-1}) + \varepsilon_t \end{aligned}$$

Les spécifications retenues sur la zone euro, estimées en panel, sont les suivantes :

$$\begin{aligned} \Delta \log(AWPC_{i,t}) = & -4,61 \\ & -0,15[\ln(AWPC_{i,t-1}) - \ln(HICP_{i,t-1}) - 0,87 \ln(Productivity_{i,t-1}) \\ & + 0,98 Standard\ unemployment_{i,t-1}] + 0,53\Delta \ln(HICP_{i,t}) + 0,41\Delta \ln(Productivity_{i,t}) \\ & - 0,56\Delta (Standard\ unemployment_{i,t}) + 0,34 \Delta \ln(AWPC_{i,t-1}) + \varepsilon_{i,t} + \eta_i \end{aligned}$$

$$\begin{aligned} \Delta \log(AWPC_{i,t}) = & -3,76 - 0,24[\ln(AWPC_{i,t-1}) - \ln(HICP_{i,t-1}) - 0,66 \ln(Productivity_{i,t-1}) \\ & + 0,65 Broader\ unemployment_{i,t-1}] + 0,50 \Delta \ln(HICP_{i,t}) \\ & + 0,44\Delta \ln(Productivity_{i,t}) - 0,39\Delta (Broader\ unemployment_{i,t}) \\ & + 0,39\Delta \ln(AWPC_{i,t-1}) + \varepsilon_{i,t} + \eta_i \end{aligned}$$

a.À l'instar du Comité Lime de la Commission européenne, dans "Labour market and wage developments in Europe" (2018).

b.Ces estimations sont faites sur la période 1995-2018 pour le chômage standard et 2005-2018 pour le chômage élargi.

2.2 Broader unemployment allows for a good understanding of wage momentum in the post-crisis period

In the United States, the Bureau of Labor Statistics (BLS) issues a measurement of broader unemployment (U6) including, besides the standard unemployment

indicator (U3), the underemployed, discouraged workers and people who are marginally attached to the labour market.¹¹

A similar indicator has been established for the euro area using Eurostat data, which has been available since 2005.¹² It factors in standard unemployment,

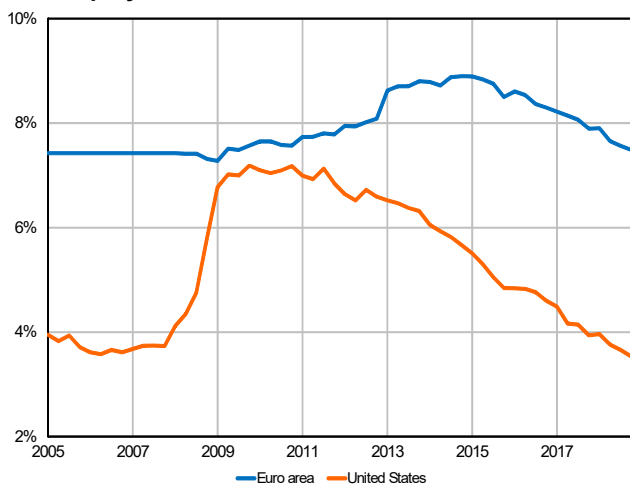
(11) Persons who are not working and who are not active jobseekers but who state that they are available for work and have looked for work during the last 12 months.

(12) As the data for part-time underemployed workers was not available prior to 2008, the broader unemployment series has been backcast on the basis of changes to standard unemployment between Q1 2005 and Q4 2007.

persons available for work but who are not jobseekers, those who are jobseekers but are temporarily unavailable and part-time underemployed workers.

In both the euro area and the United States, the level of broader unemployment is much higher than standard unemployment but they broadly follow the same trajectory. For both zones, it seems that the former is more responsive to crises than the latter (see Chart 2).

Chart 2: Differences between unemployment and broader unemployment in the euro area and the United States

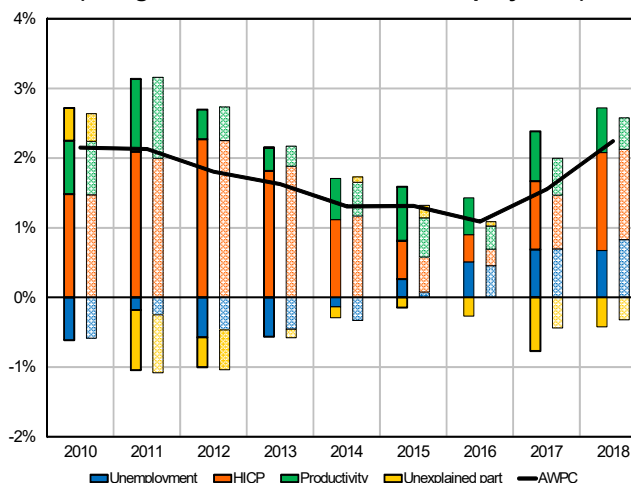


Source: Eurostat, BLS; DG Trésor calculations.

Broader unemployment and standard unemployment provide a good explanation of changes to wages in the post-crisis period. To wit:

- In the euro area, the unexplained part of wages is lower with broader unemployment for the period 2016 to 2018 (see Chart 3). Wage momentum seems to be generally well explained by its fundamentals (labour market scenario, productivity and price dynamics), but for 2017 and 2018, wages appeared to have had less momentum than suggested by their fundamentals.

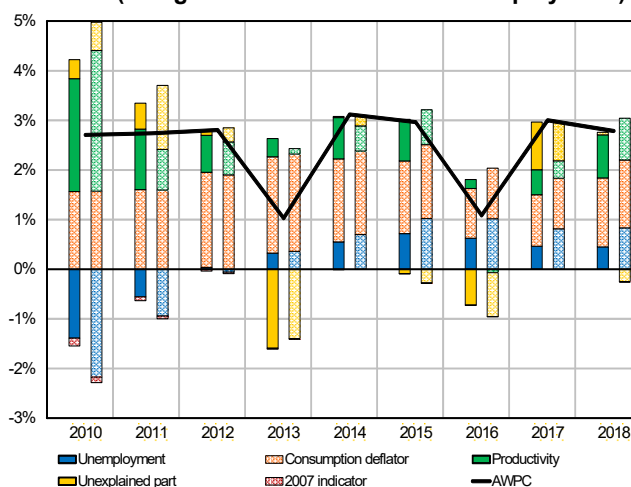
Chart 3: Contributions to wage growth in the euro area (using standard and broader unemployment)



Source: Eurostat, AMECO database; DG Trésor calculations. How to read this chart: The coloured-in bars represent contributions calculated with standard unemployment and those with dots with broader unemployment.

- In the United States, the unexplained part for 2017 and 2018 is comparable whether standard unemployment or broader unemployment is used (see Chart 4).

Chart 4: Contributions to wage growth in the United States (using standard and broader unemployment)



Source: BEA (Bureau of Economic Analysis), BLS; DG Trésor calculations.

How to read this chart: The coloured-in bars represent contributions calculated with standard unemployment and those with dots with broader unemployment.

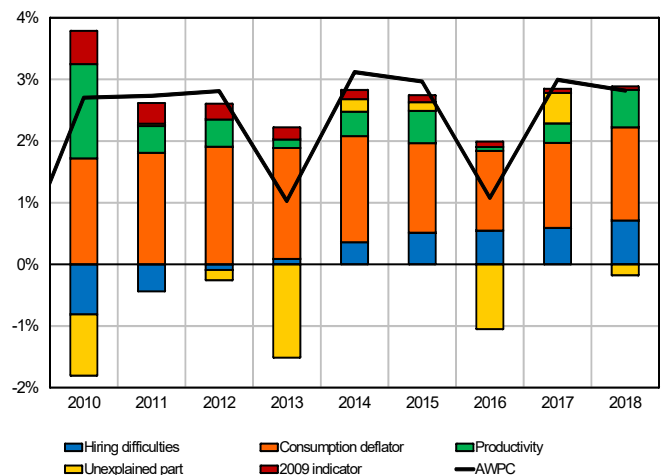
Box 2: Surveys of hiring difficulties

When labour market tensions rise, businesses should look to appeal to talented individuals by increasing wages. This can justify a wage equation using these surveys as an indicator of labour market slack. In the United States, the National Federation of Independent Business (NFIB) produces survey data on small business owners' difficulty finding qualified workers. In the euro area, the European Commission also issues survey data on labour shortages in the various sectors of the economy.

In the United States, these surveys provide an explanation for wage momentum (see Chart 5) but this is no better than the explanation using broader unemployment: slack appears to represent a weaker "restoring force" than broader unemployment, which could suggest that US wage momentum is more responsive to the latter.

In the euro area, surveys of hiring difficulties do not seem to capture the impact of slack on wage momentum. When the "unemployment" variable is replaced by surveys in the wage equation, the latter's coefficient ends up with a negative sign, which is the opposite of the expected outcome, since an increase in tensions should be reflected by wage hikes.

Chart 5: Contributions to wage growth in the United States (using surveys of hiring difficulties)



Source: BEA, BLS; DG Trésor calculations.

3. Labour costs in the euro area have also reflected domestic policies

3.1 Wage restraint policies have dampened wages in the euro area

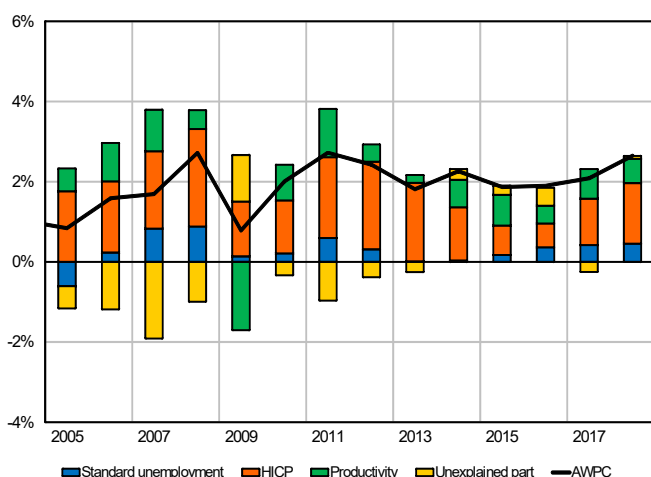
Over the past two decades, wage momentum in the euro area has varied significantly depending on the country. A distinction can be made between two groups of countries:¹³

- Northern countries: Germany, the Netherlands, Belgium, Austria, Finland and Luxembourg
- Southern countries: Spain, Italy, Portugal, Greece, Cyprus and Malta

In the North, the growth of nominal AWPC has remained at an average of around 2% per year during the post financial crisis period (see Chart 6) whereas in the South, the impact of the euro area crisis was quite pronounced with a contraction of nominal AWPC in 2012 followed by a very weak recovery (see Chart 7). Wage equations provide clarification of both the extreme changes in wages during the crisis and their sluggishness in the post-crisis period, in both the North and South of the euro area.

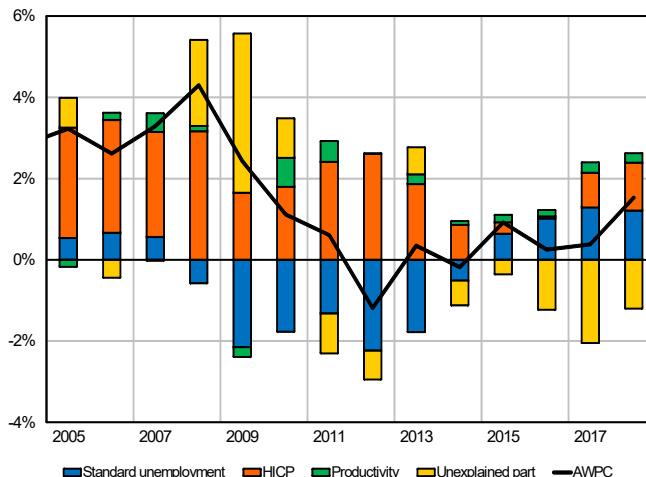
(13) For the euro area, estimates, using panel data, enable a review to be conducted for each country. By taking a weighted total of contributions by country, the changes affecting a sub-set of countries can also be reviewed. We chose not to include France in either of these groups. In addition, we did not include the Eastern countries of the euro area (Estonia, Latvia, Lithuania, Slovenia, Slovakia) nor Ireland in these groups.

Chart 6: Contributions to wage growth in the North of the euro area



Source: BEA, BLS; DG Trésor calculations.

Chart 7: Contributions to wage growth in the South of the euro area



Source: BEA, BLS; DG Trésor calculations.

By applying the estimated wage equation at euro area level to these two groups of countries, two wage dynamics clearly stand out.¹⁴ Prior to the financial crisis, wages in the North had less momentum than suggested by their fundamentals (markedly negative contributions of the unexplained part). This could be explained by Germany's wage restraint policy. Above all, up until 2013, wages may never (except during the crisis in 2009) have had more momentum than implied by their determinants, as demonstrated by the minimal contributions of the unexplained part over the entire period. It was only between 2015 and 2020 that wage momentum appears to have been aligned with its fundamentals, or even slightly higher without this offsetting the previous wage restraint.

Conversely in the South, and despite ballooning unemployment, wages had more momentum than suggested by their fundamentals up until the euro area crisis. Looking at the unexplained part series, it is apparent that wages continued to increase faster than expected up until 2010 in spite of higher unemployment and that wage rises were slower than expected following the crisis, despite the fall in unemployment.

On the basis of estimated wage equations, it is possible to assess the contributions of the chosen explanatory variables to changes in unit labour costs (ULCs), which connect the development of AWPC to that of per capita productivity. In the post-crisis period, the Southern countries have in turn been characterised by wage restraint policies, which clearly stand out when the ULCs of the North and South of the euro area are compared (see Table 1). The unexplained part made a major contribution to the fall between 2014 and 2018 which implies that, owing to the sharp decline in unemployment, ULCs should have had, with no policy changes, much more momentum in the Southern countries than was actually the case. In Spain, against a backdrop of a dramatic rise in unemployment during the euro area crisis, a number of labour market reforms introduced between 2010 and 2012¹⁵ fostered wage restraint. Similar policies were rolled out in Portugal and Greece during the crisis.

ULC gaps that accumulated in the euro area in the post-crisis period adjusted asymmetrically with Southern countries making significant restraint efforts after the crisis whilst wage momentum in the Northern countries remained more aligned with its determinants.

(14) The outcomes shown here originate from the wage equation estimated with standard unemployment which provides data from the more distant past. The results are similar with broader unemployment.

(15) See Anne-Braun J., Bogue M., Gouardo C. and R. Mathieu (2016), "Spain's labour market reform: an initial assessment", *Trésor-Economics* no. 174.

Table 1 : Change in the various ULC components in the euro area

Average 2013-2018	Euro area	Northern Europe zone	Southern Europe zone
Δ log (ULC)	1.2%	1.6%	0.7%
of which consumer prices	1.0%	1.2%	0.7%
Productivity	0.1%	0.0%	0.3%
Broader unemployment	0.2%	0.2%	0.3%
Unexplained part	-0.1%	0.3%	-0.7%

Sources: Eurostat, AMECO database, BLS; DG Trésor calculations.

NB: The "North" of the euro area includes Germany, the Netherlands, Belgium, Austria, Finland and Luxembourg, and the "South" encompasses Spain, Italy, Portugal, Greece, Cyprus and Malta.

3.2 Inflation also reflects businesses' mark-up behaviour

ULCs are a determining factor for businesses' selling prices and thereby inflation. They were fairly sluggish in the wake of the financial crisis in the euro area due to low wage momentum in the North and wage restraint in the South. This helps explain low inflation which, for several years, has remained below the ECB's 2% target. Core inflation stood at an average of 1.0% between 2013 and 2018 as against 1.9% in the United States.

A major part of these divergences can be explained by ULCs which grew by 1.2% in the euro area compared to 1.8% in the United States. Overall, between 2013 and 2018, the average core inflation gap between the US and the euro area was 0.9 points, with 0.6 points being possibly explained by the difference in ULC momentum. Prior to the crisis, US businesses' behaviour regarding mark-ups may also help explain the differences in inflation dynamics between the two zones: American firms substantially increased their margins whereas this was less the case in the euro area.

Publisher:

Ministère de l'Économie et des Finances
Direction générale du Trésor
139, rue de Bercy
75575 Paris CEDEX 12

Publication manager:

Agnès Bénassy-Quéré

Editor in chief:

Jean-Luc Schneider
(01 44 87 18 51)
tresor-eco@dgtresor.gouv.fr

English translation:

Centre de traduction des ministères économique et financier

Layout:

Maryse Dos Santos
ISSN 1962-400X
eISSN 2417-9698

Derniers numéros parus

August 2020

No. 264 Uniquel ligiting conditions under lockdown

Marie-Apolline Barbara

July 2020


No. 263 Energy transition issues within ASEAN

Clément Payerols

No. 262 The economic effects of climate change

Benjamin Carantino, Nicolas Lancesseur, Mounira Nakaa, Mathieu Valdenaire

<https://www.tresor.economie.gouv.fr/Articles/tags/Tresor-Eco>

 Direction générale du Trésor

 @DGTrésor

Pour s'abonner à *Trésor-Éco* : tresor-eco@dgtresor.gouv.fr

This study was prepared under the authority of the Directorate General of the Treasury (DG Trésor) and does not necessarily reflect the position of the Ministry of Economy and Finance.