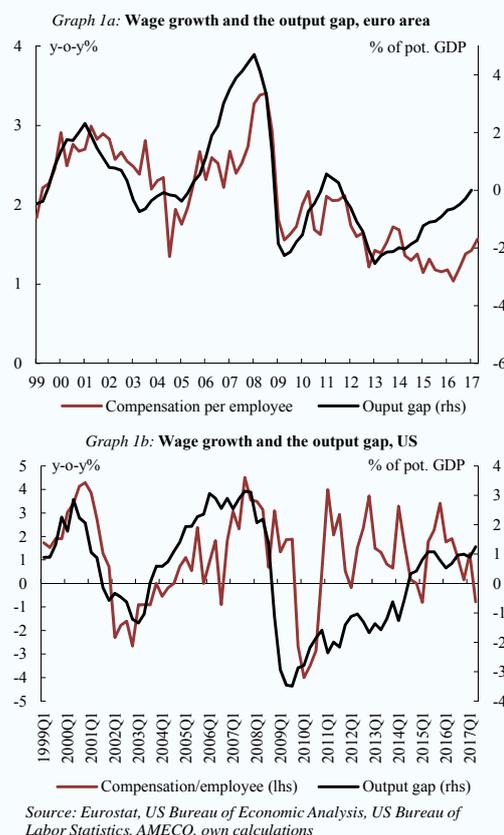


Box 1.2: What drives wage developments?

Despite strengthening recovery, wage growth remains subdued

The relationship between nominal wage growth and the output gap seems to have weakened in the past years and particularly in advanced economies. In the euro area, while the recovery of the economy since mid-2013 has led to a gradual closing of the output gap, wage growth (as measured by compensation per employee) has remained subdued, averaging 1.4% y-o-y since mid-2013 as compared to an average annual growth rate of 2.5% between 2004 and 2008. A similar pattern can be observed for the US which is ahead of the euro area in terms of the cycle: while the output gap has turned increasingly positive since its closure around 2014, compensation per employee grew at around 2% since 2012, well below the pre-crisis dynamics (3.5% in 2004-2008).



Subdued wage growth has been observed in a large number of euro area Member States and across different sectors of the economy. In particular, wage growth in Spain has been considerably lower in recent years than before the crisis, followed by

Italy and France, whereas German wage growth actually increased on average since mid-2013 as compared to before the crisis. With regard to sectors, while not surprisingly sectors that have seen employment losses over the past years such as construction and manufacturing displayed a slowdown in wage growth, so did also sectors which have expanded their labour force. Although job creation since the crisis has been unevenly distributed, being concentrated mainly in the low-productivity services and public sectors, sectoral shifts in employment have only made a modest contribution to wage moderation. A decomposition of euro area wage growth into weighted sectoral wage growth ('within effect') and those effects that are attributable to shifts in the sectoral composition of the labour force shows that while such sectoral shifts, e.g. over-proportional employment growth in low-wage sectors, have generally exerted a drag on wage growth for the most part of the past decade⁽¹⁾, the overall magnitude of this labour shift effect is small. Moreover, a significant post-crisis strengthening of these effects that could explain the slow wage growth relative to the output gap developments since mid-2013 is not visible.

Quantitative analysis suggests a flattening Phillips curve

A quantitative analysis tries to shed more light on the drivers of wage developments in the euro area. To this end, a new Keynesian wage Phillips curve (PC) calibrated for the euro area is estimated, using quarter-on-quarter wage growth as the dependent variable, which is explained by a slack variable, quarter-on-quarter labour productivity growth and backward as well as forward-looking inflation measures.⁽²⁾ As simple wage equations have a tendency to be unstable, a time-varying parameter version of the baseline model is estimated using the Kalman filter to account for parameter instability.

⁽¹⁾ On the euro area level, this pertains in particular to a lower employment share in the high-wage sectors manufacturing and financial and insurance activities, whereas low-wage sectors such as health and social work as well as accommodation and food services activities have grown relatively more.

⁽²⁾ The baseline model is defined as $\pi_t^w = const + \alpha gap_t + \beta prod_t + \gamma \pi_{t-2} + \delta E_t \pi_{t+4} + \varepsilon_t$, where π_t^w denotes quarter-on-quarter wage growth measured by compensation per employee and gap_t the level of the output gap based on trend real GDP published in DG ECFIN's AMECO database. $prod_t$ denotes quarter-on-quarter changes in labour productivity defined as real output per employee, π_{t-2} is the second lag of core inflation and $E_t \pi_{t+1}$ the 1-year ahead inflation expectations obtained from the ECB's Survey of Professional Forecasters (SPF). ε_t is an independently and identically distributed error term.

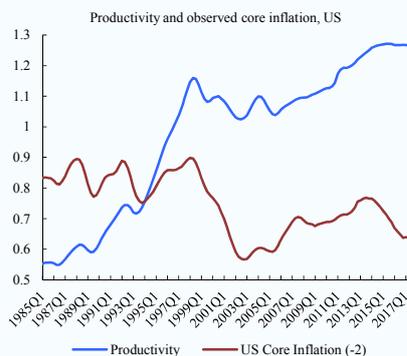
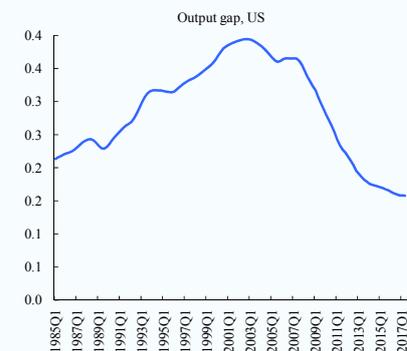
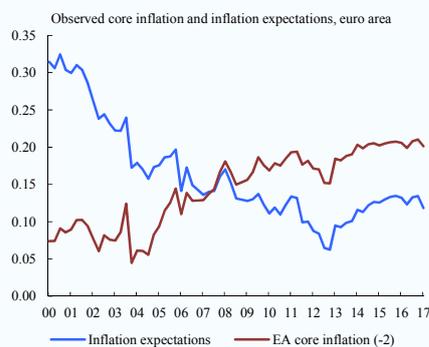
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Box (continued)

The results confirm the important role of standard measures of slack in explaining wage growth but also points to a significant flattening of the wage Phillips curve since about 2011, i.e. the estimated coefficient on the output gap has weakened over this period (Graph 2a). This flattening suggests a decreased sensitivity of wage growth to economic slack in recent years. Adding productivity growth on top of the output gap as an explanatory variable enhances the overall model fit, suggesting that the low level of productivity growth observed in the current recovery has been pushing wage growth down compared with the immediate pre-crisis period. However, this effect remains relatively small overall. By contrast, controlling for past inflation and inflation expectations leads to significant improvements in the model fit. Interestingly, the coefficients for backward and forward looking inflation measures show opposite trends (Graph 2b). Whereas the former increased continuously at least until the global financial crisis, the latter shows an opposite trajectory. This suggests a tendency towards a more backward looking wage formation system during the first decade of the euro. The trend appears to have stopped since the current recovery.

The quantitative analysis for the US based on a similar ⁽³⁾ model specification also points to a flattening of the curve starting already in the early 2000s (Graph 2c). Productivity seems to be a much more important factor driving wage developments in the US than in the EA, with its importance rising steadily over time as shown by the Kalman filter time varying model estimation (Graph 2d). Past inflation also weighs heavily on wage developments, with some moderation in the last fifteen years compared to the prior two decades. Contrary to the euro area, inflation expectations do not improve the model fit and introduce instability to the model instead, possibly reflecting the purely adaptive character of inflation expectations. Protracted low productivity coupled with stubbornly weak inflation seem to be the main factors dampening wage growth in the US.

Graph 2: Time varying coefficients for the euro area and the US



Note: the model specifications for the euro area and the US differ somewhat in terms of the endogenous variables included, notably inflation expectations are excluded in the US model, and with respect to the growth rates used, as for the US year-on-year growth is used whereas the euro area specification uses quarter-on-quarter growth rates. The results of the Kalman filter estimates thus cannot be directly compared across the two regions.

⁽³⁾ The baseline model is defined as $\pi_t^w = \alpha gap_t + \beta prod_{t5p} + \gamma \pi_{t-2} + \varepsilon_t$, where π_t^w denotes year-on-year wage growth measured by compensation per employee and gap_t the level of the output gap based on trend real GDP published in DG ECFIN's AMECO database. $prod_t$ denotes 5-quarter average of year-on-year changes in labour productivity defined as real output per employee, π_{t-2} is the second lag of core CPI inflation. ε_t is an independently and identically distributed error term. The year-on-year specification yields a more stable and robust model for the US. Richer data availability allows for estimating the model since 1961. A number of robustness checks have been conducted using alternative measures of all variables specified in the model.

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Box (continued)

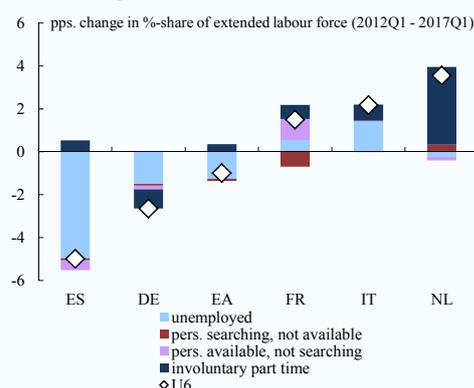
What other factors can explain wage moderation?

As usually found in the economic literature, however, the overall fit of the wage Phillips curve regression is relatively low suggesting the need to look beyond the simple wage model presented above. Particularly, the current phase of wage moderation may also reflect changes in the labour market structures and in wage setting processes. Recent research has stressed the possible role of changes in the labour market and wage bargaining processes in explaining persistent wage moderation in advanced economies. Two types of argument have, in particular, been put forward. First, traditional measures of labour market slack such as the unemployment rate may not appropriately capture the extent of underemployment in the post-crisis world. Discouraged workers, workers looking for a job but not immediately available and underemployed part-time workers are not included in traditional unemployment measures. To account for this, a broader measure of unemployment (the so-called U6 measure) can be constructed by adding these various forms of unemployment or under-employment to standard unemployment. Changes in the broader measure seem to be following relatively closely changes in the standard unemployment rate but U6 suggests a considerably higher level of slack which could explain lower wage pressures. There is some empirical evidence that the U6 measure of slack on the labour market can improve the fit of Phillips curves in the euro area.⁽⁴⁾ However, the additional explanatory power provided by this labour market measure is generally rather low regarding current wage developments. For the US, the U6 measure of slack is of less relevance since both U6 and the traditional unemployment measure have come back to pre-crisis lows recently. A recent study by the IMF⁽⁵⁾ reports a negative impact of involuntary part-time employment (which is a component of U6) on wage growth in advanced economies although the effect across the entire country sample is relatively modest.

Second, there may have been structural changes in wage bargaining processes due to structural reforms in the labour market, a deterioration of the quality of employment (e.g. changes in the share of

temporary employment) and changes in trade union behaviour. These structural changes could account for the flattening of the wage Phillips curve. For example, trade unions in some countries seem to have broadened the focus of trade negotiations with pay rises being just one element in a wider package. Demands regarding e.g. working-hour flexibility, training conditions or conditions for workers under fixed-term contract or part-time work for older workers seem to have gained in importance. Globalisation, outsourcing and the proliferation of global value chains may also have hampered unions' negotiation power. This is also confirmed by empirical work of the BIS⁽⁶⁾, in which a measure of pricing power is included in a panel Phillips curve estimation to account for a possible trend decline in workers' pricing power (notably due to labour market reforms). Indeed, the parameter is found to be positive and significant, indicating that the lower pricing power of workers is one of the possible explanations of the flattening of the curve.

Graph 3: Euro-area labour market situation



Source: Eurostat, own calculations

The quality of jobs in terms of contract and working time has indeed deteriorated in the euro area. Between the beginning of 2012 and Q1 2017, 4.2 million jobs have been created in net terms in the euro area. However, the impressive employment creation has come on the back of a shift in the quality of jobs, i.e. in the form of an increase in temporary contracts and/or in part-time work. In fact, 60% of total net job creation over that period were part-time jobs (2.5 million), 34% (1.4 million) were temporary contracts.⁽⁷⁾ Over the same period, the share of involuntary part time in job creations remained roughly constant. The

(4) See for example European Commission, DG Employment (2017). *Labour Market and Wage Developments in Europe. Annual Review 2017* and Ciccarelli, Matteo, and Osbat, Chiara (editors) (2017). "Low inflation in the euro area: Causes and consequences." ECB Occasional Paper Series No 181.

(5) International Monetary Fund (IMF). 2017. *World Economic Outlook*. Washington, DC: IMF, October.

(6) BIS (2017), 87th Annual Report, p.67.

(7) Note that these are not disjoint categories, i.e. jobs can be qualified as both part-time and temporary.

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Box (continued)

employees' bargaining power and thus might have led to more cautious wage demands.

Summing up, the analysis shows that euro-area and US wage growth can to a significant degree be explained by a standard wage equation. A low inflation environment and a backward looking expectation formation process together with low productivity growth (particularly for the US) have weighed on wage growth despite the simultaneous closure of the output gap. In addition there is evidence that the wage Phillips curve for both the euro area and the US has been flattening, i.e. it has become less responsive to cyclical conditions and that wages have become more dependent on past inflation. Finally, the low quality of employment creations in this recovery (e.g. a high share of temporary employment) and the existence of a large pool of workers not captured by standard unemployment measures may also, to some degree, have weighed on wages. If anything, this effect appears, however, to be rather small at the current juncture in the euro area as a whole and in the US.

Looking ahead, the model results suggest that the gradual increase of core inflation in past months should feed into the wage bargaining system, further supporting wage growth. However, the process can be expected to be rather slow due to the stickiness of the wage formation process in the euro area. Significant and structurally higher wage growth would require a trend reversal in low labour productivity growth. Additional factors could also weigh on inflation pressures in the short to medium run. Broader measures of the slack on the labour market like U6 point to a large pool of potential workers that could boost the labour supply in the years to come. For example, discouraged workers which are not captured by official unemployment rates might want to return to the labour market given the on-going recovery and together with a still significant share of involuntary part-time workers could contribute to keep a lid on employees' wage claims. In the US, lifting the wage growth from its current lows will crucially depend on the sustained rebound in productivity. On the other hand, the gradual tightening of the labour market is set to trigger a considerably weaker pass-through to wages compared to the pre-crisis period.

Structural differences in wage formation between Member States

While the baseline specification for the euro area overall explains relatively well recent wage developments at the euro-area level, it does not have the same explanatory power across all

Member States. Applying the euro-area baseline wage specification to selected Member States (DE, FR, IT, ES and NL) points to large country differences in the explanatory power of the model both over the entire sample and for the most recent past. This suggests that there is room for further research including country-specific wage equations with idiosyncratic factors. In this respect, the overall relatively-low correlation of additional measures of labour market slack with wage growth for the euro area aggregate might mask significant differences across Member States. For instance, the above-mentioned IMF study finds that in advanced economies with unemployment rates still considerably above pre-crisis levels, involuntary part-time employment has weighed significantly on post-crisis wages. Furthermore, the quality of recent job creations has been more an issue in some euro area Member States than in others. For example, while temporary contracts are now more common than in the pre-crisis period in most advanced economies (WEO, 2017), Spain's labour market currently stands out in the euro area in terms of workers subject to temporary contracts, both in terms of levels and the contribution to employment growth. This might partly explain why the rapid fall in unemployment in Spain since 2014 has not brought about higher wage growth, as temporary contracts are more likely to weigh on wage levels than permanent or part-time contracts. Similarly, the role of labour market reforms for wage developments in specific Member States might also warrant further research. In several Member States, significant reforms of employment protection systems were implemented introducing more flexible wage formation processes and affecting the shape of the wage equation. Finally, differences in integration in the global economy may also have contributed to country differences in wage growth. The possibility for multinationals to outsource part of the production abroad might be an additional factor constraining wage bargaining for trade unions. For instance, there is some empirical evidence that combines offshoring and labour market reforms to explain the German experience with wage developments, suggesting that German firms have relocated the labour intensive stages of production to low-wage countries, particularly Central European countries, with this relocation being much more pronounced in Germany compared to other European countries.⁽⁸⁾

⁽⁸⁾ See Beissinger, T., Chusseau, N., & Hellier, J. (2016). Offshoring and labour market reforms in Germany: Assessment and policy implications. *Economic Modelling*, 53, 314-333.