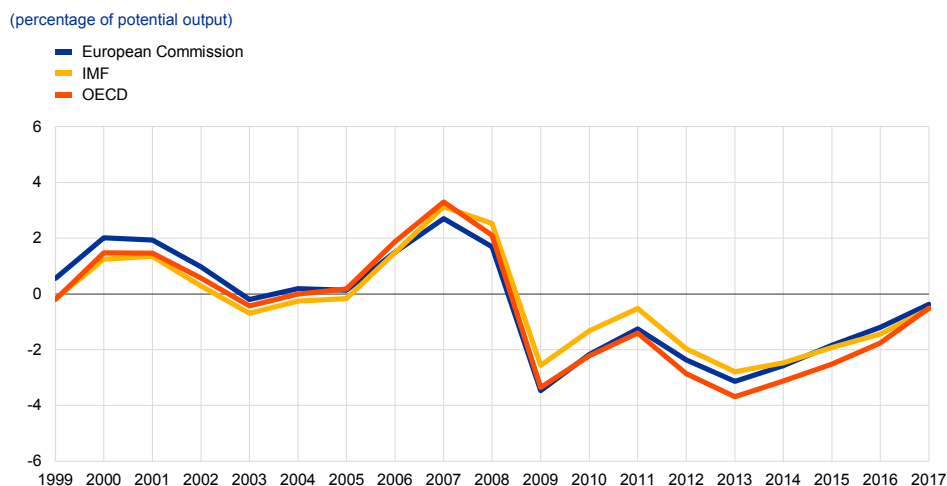


Prepared by Béla Szörfi and Máté Tóth

**This box aims to illustrate the difficulties in measuring slack in the euro area economy and the high uncertainty surrounding the estimates.** Although recent estimates of potential output suggest that slack is diminishing (see Chart A), a number of factors suggest that such figures may underestimate the degree of slack remaining in the economy. For instance, inflation and wage pressures have remained subdued. In addition, labour supply, participation and productivity have increased, which may support an increase in potential output that has not yet been fully accounted for. Finally, elevated levels of the broad measure of labour underutilisation may also have suggested a larger degree of labour market slack than the headline unemployment rate.<sup>19</sup> On the other hand, survey indicators showing historically high levels of capacity utilisation and labour shortages point to emerging tightness in euro area labour markets.

### Chart A

#### Output gap estimates of international institutions for the euro area



Sources: European Commission autumn 2017 forecast, IMF April 2018 World Economic Outlook and OECD November 2017 Economic Outlook.

**Specifically, economic slack can be associated with the concept of the output gap.** The output gap is defined as the difference between the levels of real GDP (observable) and potential output (unobservable) as a percentage of potential output, which in turn is the underlying trend of real GDP, i.e. the level of production that can be achieved without raising inflationary pressures. It is worth noting that inflation developments are also influenced by factors other than the output gap, such as cost shocks (e.g. changes in oil prices), the formation of inflation expectations, changes in firms' pricing power, or in the medium to long run, by monetary developments. If real GDP is below potential output so defined, the output gap is negative. This means

<sup>19</sup> See "Assessing labour market slack", *Economic Bulletin*, Issue 3, ECB, 2017, and "Three indicators to complement the standard definition of employment and unemployment", *Monthly Bulletin*, ECB, June 2013.

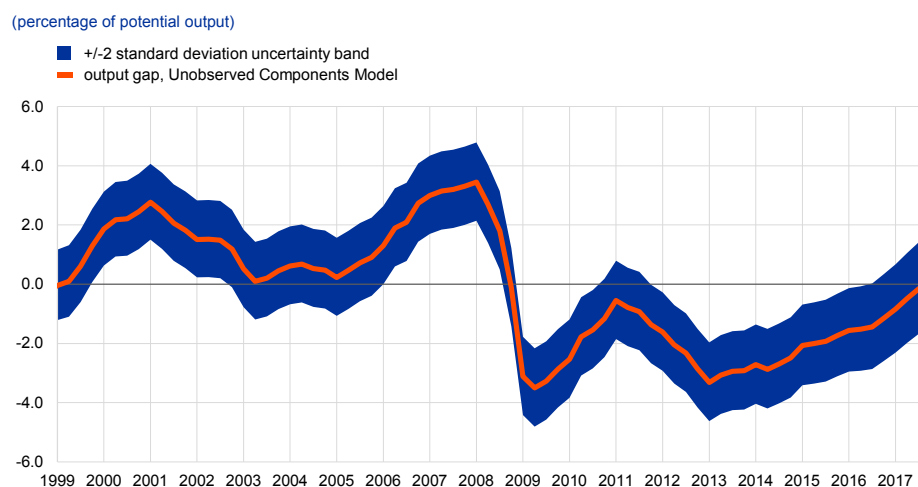
that there is slack in the economy and, *ceteris paribus*, inflationary pressures are more likely to be subdued. By contrast, if the level of real GDP exceeds potential output, then the output gap is positive and inflationary pressures are more likely to emerge. Although slack and the output gap can be seen as broadly equivalent, it is worth noting that the output gap is often seen as an aggregate concept, while slack can persist in some markets (for example in the labour market), industries or regions even when the output gap has been closed or is in positive territory.

**Since potential output and thus the output gap are unobservable, they can only be estimated with uncertainty.** The output gap has to be extracted from observable data, based on statistical or economic models. The choice of a specific model always implies judgement and introduces uncertainty. Since models are simplifications of reality, not all information that is possibly relevant for estimating the output gap can be processed. In addition, owing to the typically stochastic nature of these models, a degree of uncertainty inherently stems from the characteristics of the shocks that are assumed in them. Uncertainty also relates to the parameters of such models which can only be estimated with imprecision. In addition, economic relationships – such as the slope of the Phillips curve or the reaction of employment to economic activity – might change over time. Also the data, both historical and projected, on which the models are estimated is subject to revisions. Overall, due to these different and potentially interrelated types of uncertainty, any point estimate of the output gap has to be taken with a significant degree of caution.

**A model-based estimate illustrates the point by suggesting an output gap that is close to zero, although surrounded by a high degree of uncertainty (see Chart B).** For illustrative purposes, an Unobserved Components Model (UCM) is used to estimate potential output and its components for the euro area. The model uses a multivariate filter based on a Cobb-Douglas production function and includes some theoretical economic relationships, such as wage and price Phillips curves and Okun's law. According to the UCM, the euro area output gap is likely to have already closed towards the end of 2017. Yet, a plausible range covers an output gap that currently lies roughly between -1.5% and 1.5%.

## Chart B

### Output gap estimate of an Unobserved Components Model for the euro area



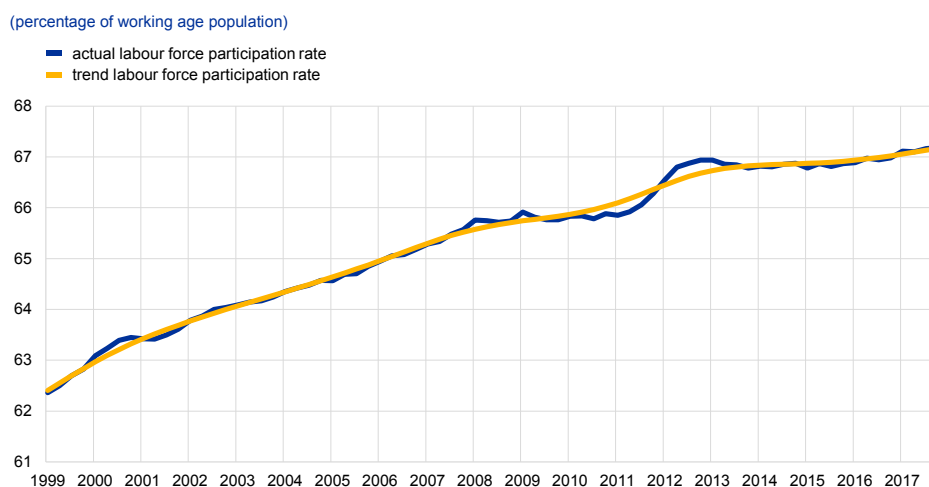
Sources: Eurostat and ECB staff calculations.

**Recent labour supply shocks are likely to be supporting the growth of both potential and actual output.** Labour force participation has been increasing in recent years in the euro area, driven by increasing participation of women and older people. This increase is mainly related to the increasing educational level of the working age population, as well as recent labour market reforms in many euro area countries, and it therefore appears to be largely independent of the business cycle.<sup>20</sup> This is confirmed by the estimated trend labour force of the UCM: cyclical variation of the labour force participation rate is rather limited, and most of the increase seen in the past is attributable to the trend. Importantly, this means that increased labour force participation points to increases in both potential and actual output, leaving the output gap largely unaffected (see Chart C). If, however, the impact of recent labour and product market reforms is not fully captured by model-based estimates, potential output might be higher and the degree of slack might be larger than presented in Chart B.

<sup>20</sup> See the article entitled “Labour supply and employment growth” in *Economic Bulletin*, Issue 1, ECB, 2018.

## Chart C

### Labour force participation rate for the euro area



Sources: Eurostat and ECB staff calculations.

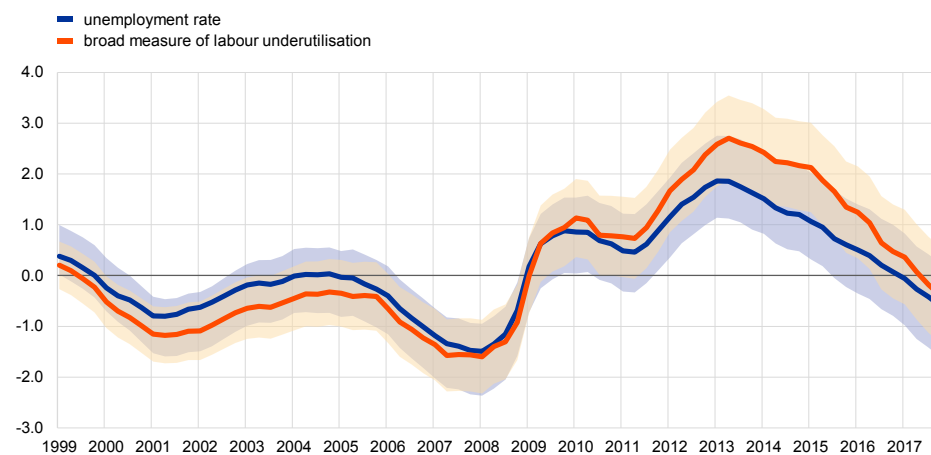
**The broad measure of labour underutilisation suggests that slack was larger during the financial crisis and over the recovery than indicated by the headline unemployment rate.** The broad measure of labour underutilisation covers underemployed part-time workers, those who are seeking work but are not available and those who are available but are not seeking work (this latter group includes discouraged workers). However, this may have been a temporary phenomenon that appears to be fading away. To examine whether broader measures of underemployment indicate a larger degree of slack, the headline unemployment rate is replaced with the broad measure of labour underutilisation in the UCM.<sup>21</sup> This is consistent with the assumption that the level of the broad measure of labour underutilisation cannot be considered as a pure measure of slack, and has to be assessed against its structural or trend component, as is the case for the unemployment rate. Between 2011 and 2016 the degree of labour market slack in the euro area appears to have been larger when looking at the broad measure of labour underutilisation. However, the difference started to fade in 2015, due to strong declines in the number of discouraged workers and the number of underemployed part-time workers (see Chart D).

<sup>21</sup> Underlying data to compute the broad measure of labour underutilisation are published starting from the first quarter of 2008 only. For the period prior to 2008, the broad measure of labour underutilisation was backcasted by ECB staff, using annual data based on a similar concept, as well as a Dynamic Factor Model consisting of more than 50 labour market variables.

## Chart D

### Labour market slack according to different measures

(percentage of the labour force; broad measure of labour underutilisation as a percentage of the potential additional labour force)



Sources: Eurostat and ECB staff calculations.

Notes: The shaded areas denote +/-2 standard deviation uncertainty bands. The blue shaded area relates to the unemployment rate and the cream shaded area relates to the broad measure.