

## BRIEFING

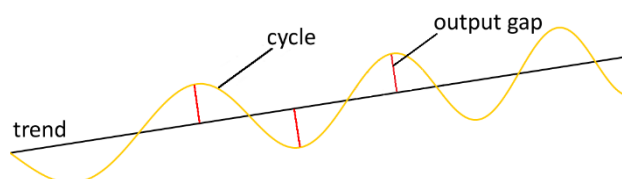
# Potential output estimates and their role in the EU fiscal policy surveillance

*The surveillance of fiscal policies of EU Member States makes extensive use of estimates of the potential output and related concepts, including output gap and structural budget balance. This note provides an overview of these concepts, of their use and of some related issues.*

### 1. The concepts of ‘potential output’ and ‘output gap’

**Potential output** is a concept used to measure the highest level of production that an economy can reach without generating inflationary pressures. The **output gap** is the difference between real and potential output.

From a methodological point of view, the concepts of potential output and output gap enable to separate the real output of an economy into a long-term trend (identified with the potential output) and a short or medium economic cycle.



A **positive output gap**, i.e. when real output is above potential output, depicts a system producing more than its equilibrium capacity: as a result, unemployment decreases and inflation increases. A **negative output gap**, i.e. when real output is below potential output, describes a system producing less than its equilibrium capacity: as a result, unemployment increases and inflation decreases (*ceteris paribus*).

The role of output gap estimates in economic analysis and fiscal policy is twofold:

- to quantify the nature of the economic cycle and identify the actual economic situation within the cycle, and
- to suggest counter-cyclical economic policies aimed at influencing the length and the effects of the cycle itself.

While the objective of using potential output estimates and related concepts is to enable a counter-cyclical economic policy (i.e. avoiding further inflationary pressures in boom times and support demand in contractionary periods), weaknesses exist, linked to uncertainties regarding the measurement of the potential output and of related indicators, as presented in Section 3 below.

The **potential output is not observable**, but instead is estimated on the basis of models and assumptions (see Annex 2 to this briefing for a synthetic methodological overview and Annex 3 for selected bibliographic references). This means that different models and assumptions produce different estimates. Economists evaluate the performance of the applied methodologies by looking at revisions of the estimated values over time. The size of output gap revisions applied to past years, in particular after the recent economic crises, has generated discussions on the weakness of output gap models and the fragility of the fiscal measures based on them.

Table 1 below presents recent estimates of the output gaps for the euro area as a whole, as published by the European Commission (COM), the IMF and the OECD. It shows that all institutions identify an economic performance below its potential for the period 2011-2017. However, it can be noted that, there are rather large differences between the output gap estimates of different institutions (and that

persist over time) indicating a high degree of uncertainty (see Annex 1 for Commission estimates of potential output for EU Member States, the EU and the EA for the period 2014-2018).

**Table 1: Estimates of euro area output gaps for 2011-2017 by different institutions**

Institution	2011	2012	2013	2014	2015	2016	2017
<a href="#">COM - Autumn Economic Forecast 2016</a>	-1.1	-2.2	-2.9	-2.4	-1.6	-1.0	-0.7
<a href="#">IMF - World Economic Outlook October 2016</a>	-0.6	-1.9	-2.7	-2.5	-1.8	-1.2	-0.8
<a href="#">OECD - Economic Outlook, November 2016</a>	-1.4	-2.9	-3.7	-3.2	-2.6	-1.9	-1.2

## 2. Potential output estimates and related indicators in the EU fiscal surveillance

The Stability and Growth Pact (SGP, see the EGOV [overview](#)) and related secondary law (including the [Vade Mecum on the SGP](#)) widely refer to the concepts of potential output, output gap and structural budget balance. The fiscal targets set in the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union ([TSGC](#)) also are expressed in terms of structural budget balances.

The [Output Gap Working Group](#), a specific body of the Economic Policy Committee, discusses and agrees the common methodologies to be applied by the Commission and the Member States; it is composed of experts and representatives from Member States, as well as from the IMF and the OECD.

### 2.1 The Structural budget balance

The general government budget balance is the difference between government revenues and expenditures (including interests on debt).

The **cyclically-adjusted budget balance** (CAB) is the budget balance corrected for cyclical effects.

In the current EU fiscal framework, it is calculated with a two-step methodology:

- The cyclical component of the budget, consisting of expenditures and taxes that vary according to the economic situation, is calculated as the product of the output gap and a so-called ‘semi-elasticity parameter’, which captures the reaction of the budget to cyclical changes in GDP<sup>1</sup>.
- This component is then subtracted from the actual budget.

The CAB corresponds to the budget balance that a country would have if the economy were running at its potential, i.e. without spare capacity and excessive inflationary effects. In case of a negative output gap, the indicator can take into account the ‘automatic stabilisers’, which include higher expenditures due to unemployment benefits and reduced tax revenues due to the negative situation of the economy.

The **structural budget balance** (SBB) is the budget balance corrected for both cyclical effects and one-off or other temporary measures.

Table 2 presents the values of the structural budget balances of the euro area as a whole for years 2011-2017 estimated by the COM, the IMF, the OECD and the European Central Bank (ECB). As Table 1 for the potential output gap, Table 2 shows that the estimates for the structural budget balance presented by the four institutions vary quite significantly<sup>2</sup>.

<sup>1</sup> The cyclically-adjusted budget (CAB) balance formula is:  $CAB = B/Y - \varepsilon * OG$ , where B is the general government budget balance in nominal terms,  $\varepsilon$  is the semi-elasticity parameter, and OG is the output gap.

<sup>2</sup> The ECB does not publish estimates of the potential output nor not of the output gap (see the Annex 2 for further details).

**Table 2: Euro area structural budget balances for 2011-2017 relative to potential GDP (%)**

Institution	2011	2012	2013	2014	2015	2016	2017
<a href="#">COM - Autumn Economic Forecast 2016</a>	-1.1	-2.1	-1.4	-1.1	-1.0	-1.2	-1.3
<a href="#">IMF - World Economic Outlook October 2016</a>	-3.8	-2.1	-1.3	-1.1	-0.9	-1.2	-1.1
<a href="#">OECD - Economic Outlook - November 2016</a>	-3.3	-1.5	-0.7	-0.6	-0.5	-0.7	-0.7
<a href="#">ECB - Economic Bulletin - December 2016</a>	-	-	-	-1.7	-1.6	-1.8	-1.8

## 2.2 The Medium-Term Objectives

In the context of the SGP, the fiscal medium-term objective (MTOs) that each Member State should achieve and maintain is expressed in terms of the SBB. The MTOs for euro area Member States (and Member States belonging to the Exchange Rate Mechanism – ERM II) are specified to lie within a range between -1 % of GDP and a balance or surplus. MTOs are updated every three years, or in case of major structural reforms.

- Countries under the **preventive arm** of the SGP, not having achieved their MTOs, should define and maintain an adjustment path of their SBB towards it, with an annual improvement of 0.5 % of GDP per year as a benchmark;
- Countries under the **corrective arm** of the SGP (those in excessive deficit situations<sup>3</sup>) should improve their SBB of at least 0.5% of GDP per year as a benchmark.

## 2.3 The expenditure benchmark rule

In the preventive arm of the SGP, the **expenditure benchmark rule** has been introduced to complement the MTOs. According to this rule, a spending growth rate beyond the medium-term potential economic growth rate must be compensated by additional discretionary revenue measures. The rule is defined in terms of potential output estimates, and limits the growth rate of government spending.

At its meeting of December 2016, the [ECOFIN Council](#) (p.11) endorsed an agreement reached in the Economic and Financial Committee and aimed at improving the predictability and transparency of the SGP. *“The agreement, on how to simplify the assessment of compliance with the pact's rules, covers both in the preventive and corrective arms of the pact. No change to legislation underlying the pact is envisaged. **Stronger focus on an expenditure-based indicator is envisaged for setting and assessing fiscal policies, reducing complexity in the fiscal surveillance framework. The indicator involves setting an upper limit for the growth rate of government expenditure. It is considered an operational and easy-to-measure target that can guide member states in the preparation and monitoring of their budgets. The structural balance indicator will remain an essential part of the fiscal surveillance framework.**”*

## 2.4 The output gap in the flexibility clauses

In its January 2015 communication [‘Making the best use of flexibility within the existing rules of the SGP’](#), the Commission introduced the output gap in one of the **flexibility clauses** used to assess the adherence of a Member State to the SGP. This clause allows account to be taken of ‘good’ and ‘bad’ economic times: to this scope, the Commission defines five ‘output gap intervals’ in order to assess the annual fiscal adjustments towards the MTOs. Table 3 shows the fiscal adjustments that Member

<sup>3</sup> In this context, it is interesting to note that, while the entry or exit of the Excessive Deficit Procedure (EDP) is based on nominal criteria, i.e. nominal deficit exceeding 3% of GDP or public debt exceeding 60 % of GDP, the assessment of ‘effective action’ by a Member State subject to an EDP is based on structural criteria, i.e. SBB changes and some other indicators.

States are expected to make in order to keep or reach their MTOs, taking into account their respective ‘cyclical position’.

**Table 3: Annual fiscal adjustments towards the MTOs under the preventive arm of the SGP**

Required fiscal adjustment (pp of GDP)						
Economic Cycle	Output gap and real growth levels	Debt < 60 % and no sustainability risk		Debt > 60 % or sustainability risk		
		Growth < Potential	Growth > Potential	Growth < Potential	Growth > Potential	
Exceptionally bad	Output gap < -4% or real growth < 0	No adjustment needed				
Very bad	$-4\% \leq \text{output gap} < -3\%$	0		0.25		
Bad	$-3\% \leq \text{output gap} < -1.5\%$	0	0.25	0.25	0.5	
Normal	$-1.5\% \leq \text{output gap} < +1.5\%$	0.5		> 0.5		
Good	Output gap $\geq +1.5\%$	> 0.5	$\geq 0.75$	$\geq 0.75$	$\geq 1$	

Source: COM Communication ‘[Making the best use of flexibility within the existing rules of the SGP](#)’

## 2.5 The structural budget balance in the TSCG

The objective of a structural budget balance was also included as the main element of the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union (the “Fiscal compact”):

*‘The budgetary position of the general government of a Contracting Party shall be **balanced** or in **surplus** if the **annual structural balance (SBB)** of the general government is at its country-specific medium-term objective (MTO), as defined in the revised Stability and Growth Pact, with a lower limit of a structural deficit of 0.5% of the gross domestic product at market prices. The Contracting Parties shall ensure rapid convergence towards their respective medium-term objective. The time-frame for such convergence will be proposed by the European Commission taking into consideration country-specific sustainability risks. Progress towards, and respect of, the medium-term objective shall be evaluated on the basis of an overall assessment with the **structural balance as a reference**, including an analysis of expenditure net of discretionary revenue measures, in line with the revised Stability and Growth Pact’ (Art. 3).*

All signatories<sup>4</sup> of the TSGC with a debt ratio well below 60%, and/or facing low risks to the sustainability of public finances, are committed to set a MTO of at least **-1.0 % of GDP**, while signatories from the euro area with a debt ratio above 60%, or facing risks to the sustainability of their public finances, are committed to set a MTO of at least **-0.5 % of GDP**. Under the terms of the TSGC, all signatories are committed to approving national binding law rules that reflect the provisions of the preventive arm of the SGP intended to limit their structural deficits, and including a correction mechanism that would be triggered automatically, at national level.

<sup>4</sup> All EU Member States, except the Czech Republic, the UK and Croatia.

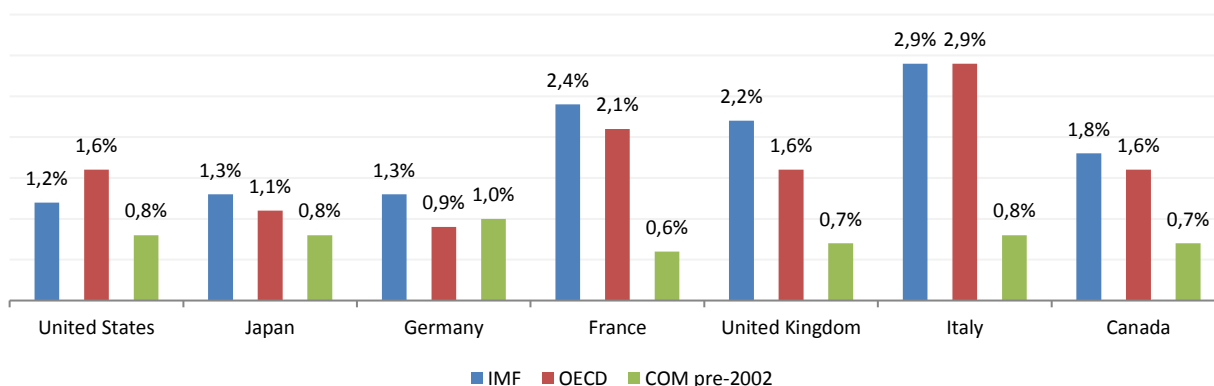
### 3. Recent developments and criticisms on the estimates of potential output and related indicators

Recently, the concept of structural balance and related indicators, and the methodology used to estimate it, have been subject to some criticisms, in particular as regards their reliability and transparency.

#### 3.1 Recent criticism on reliability

In April 2014, the [Deutsche Bundesbank](#) published a study, focussed on G7 countries, giving warning of the high degree of uncertainty of output gap estimates, and expressing doubts on the suitability of such estimates in economic policy. The criticism was based on the magnitude of the revisions of the output gaps estimates, on the relatively frequent changes of output gap signs, on the need for output gaps corrections for distant years in the past, and on the considerable overestimation of all major economies' potential outputs in the years immediately preceding the global financial crisis. Figure 1 shows the size of the revisions to the estimates of output gap made by the IMF, the OECD and the COM.

**Figure 1: Output gap average absolute revisions to the initial estimates across G7 countries during the period 1998-2010, in percentage points**



Source: Deutsche Bundesbank, 2014

In July 2014, the [CPB Netherlands Bureau for Economic Policy Analysis](#) pointed out that the structural budget balance: (1) is highly dependent on volatile and often biased output gap estimates; (2) can give wrong signals, with substantial budget adjustments for a year despite no fiscal policy change, or significant policy changes offset by output gap revisions; and (3) is subject to different estimates by different institutions, leading to confusion and different assessments of the national economic policies. It noted that: *'The volatility of the structural balance is especially problematic because the indicator is used in the EU as a basis for the recommendations for a country. Volatile estimations could, for example, cause a government to be obliged to undertake significant additional fiscal consolidation in order to meet the structural balance requirement – only to be confronted with a structural balance that does not change at all, because of revisions in potential growth.'*

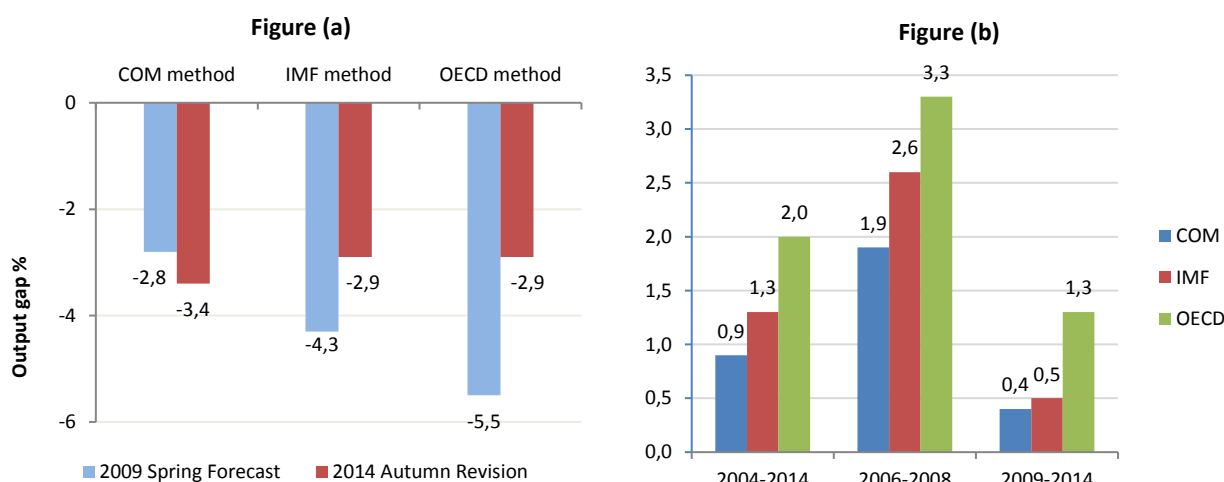
In September 2014, the [European Central Bank](#) mentioned the problem posed by the stability of output gap estimates and of their revision, by comparing the estimates of 2007 output gaps made at different points in time: *'For all countries for which the 2007 output gap was estimated at the time to be negative – Portugal, Cyprus, Italy, Ireland, Malta, Spain, the Netherlands, France and Belgium – it was subsequently, in 2014, estimated to have been positive'*.

In October 2015, the [Commission](#) assessed the long-term reliability of its estimates of output gaps, highlighting the new methodology introduced in 2002. It recognised that errors were made in the

estimates of output gaps for the years preceding the crisis, but showed that errors were much smaller than those made by the IMF and the OECD. In September 2015 the Commission had also organised a [conference](#) on the same subject.

Figure 2(a) presents the estimates of the output gap for the Euro Area as a whole according to the 2009 Spring forecasts and their values reassessed in the 2014 Autumn forecasts (according to the COM, the IMF and the OECD). Figure 2(b) compares real-time and ex post (made in autumn 2014) output gap estimates for the euro area during the 2004-2014 period, and for the two subsets periods pre-crisis (2004-2009) and post crisis (2009-2014). It shows that the real-time reliability of the estimates produced by the EU is better than the IMF and OECD estimates, as they are subject to much lower revisions. This holds for the three periods considered, but especially for the post-crisis time-span.

**Figure 2: (a) Euro area output gap in 2009: estimate in 2009 spring forecast compared with 2014 autumn estimate; (b) Estimates of euro area output gap: difference between real time and figures revised in 2014 (percentage points).**



Source: [European Commission](#), 2015

In March 2016, the **ministers of finance of eight Member States** (Italy, Spain, Latvia, Lithuania, Luxembourg, Portugal, Slovenia and Slovakia) sent a [letter](#) to the Commission expressing their concerns regarding the estimation of potential output. They asked the Commission to extend the length of its forecast horizon from two to four years, while noting that: *‘More substantial doubts have been raised about the commonly agreed methodology and it has also been suggested to complement the output gap with other indicators. While these concerns are not the topic of this letter, we support an intensification of the technical work on the matter’*.

A [note](#) drafted by the **Dutch Presidency** for the informal ECOFIN meeting of the 23 April 2016 focused on possible ways to improve the functioning of the SGP. It noted that *“Substantial efforts have been made to improve the structural balance estimates, but it remains highly doubtful whether fine-tuning this highly complex indicator will yield sufficient improvements. As a result, Member States are held accountable for an indicator which to a crucial extent lies beyond their control”*. It therefore requested EU Ministers of Finance to express an opinion on the possible use of a single indicator, identified in the *“expenditure benchmark”*. The informal ECOFIN requested the Commission that improvements be made to the commonly agreed methodology for the estimation of potential growth and the output gap; paragraph 3.3 below summarises the agreements reached upon this request.

### 3.2 Recent criticism on transparency

In its [statement of 23 November 2015](#), the Eurogroup called on the Commission to increase the transparency and predictability of the SGP procedure.

In its [Economic Bulletin 8 December 2015](#), the ECB analysed the increased complexity and lack of transparency of the fiscal surveillance framework.

In its [EU Presidency 2016 programme](#) for the Presidency of the Council of the European Union, the Netherlands declared its intent to seek to improve the functioning of the SGP and to support steps towards a simpler and more transparent SGP as regards economic and financial affairs.

In its [special report](#) of 19 April 2016, the European Court of Auditors examined the Commission's implementation of the EDP between 2008 and 2015, focusing on six Member States, and recommended to the Commission to improve its transparency.

### 3.3 Recent "follow-up" work on output gap

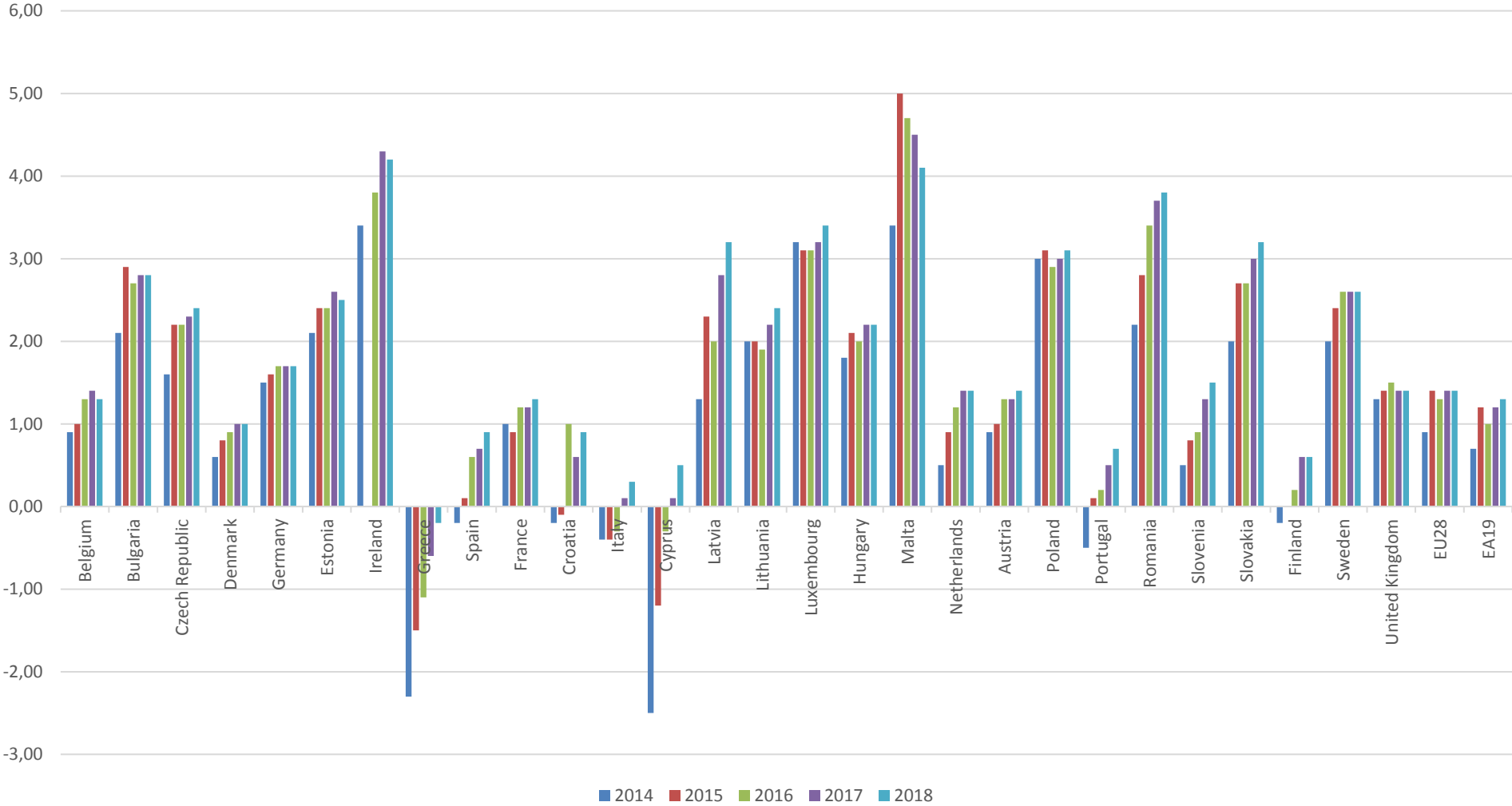
In November 2016, the Commission [published](#) (Box 1 - page 12) some information on the agreement reached within the Output Gap Working Group (OGWG) regarding:

- the revision of the methodology for the estimation of the potential output and
- the implementation of the "Agreement to examine the plausibility of output gap estimates".

The output gap used in the Commission [autumn forecast](#) of November 2016 was estimated by applying a **revised methodology** for a relevant indicator measuring the non-cyclical component of unemployment, the "non-accelerating wage rate of unemployment" (NAWRU).

It was then agreed that a new "plausibility tool" for the output gap could be used to signal cases where the results of the agreed methodology could be interpreted as being economically counter-intuitive. The plausibility tool provides an **alternative country-specific estimate of the output gap** for the current year, based on a statistical assessment methodology discussed in the OGWG. "*When the difference between the alternative estimate and the estimate on the basis of the common method exceeds a certain threshold, this indicates that the output gap based on the common method may be "counterintuitive"*". In this case, the range between the two estimates constitutes a plausibility range, within which a plausible level of the output gap can be identified by the Commission and used as an additional qualitative factor to be considered (only) in the context of the Commission's fiscal assessments.

### Annex 1: Estimates of potential growth in EU Member States, EU and EA - 2014-2018



Source: [COM - Autumn Economic Forecast 2016](#). The estimate for Ireland in 2015 is not included in the figure.



## Annex 2: Potential output and structural budget balance methodologies

Estimates of potential output are essentially based on two classes of models:

- **Time series observations:** the cyclical component is identified and subtracted from the real GDP time series to obtain the trend component by means of extrapolation.
- **Production function:** the output of the economy is considered as the outcome (function) of its human capital, investments and productivity. The potential output is obtained on the basis of estimates of these components and their developments, and is less subject to short-term variations than the actual output.

Often, the two classes of models are combined.

The [Commission](#), the [IMF](#) and the [OECD](#) estimate potential output via a production function approach, as function of trend capital, labour and total factor productivity:

- **Capital** depends on past capital stock, investments, and depreciation rate, ranging from 1 % for computer hardware and equipment to 30% for housing. Owing to its smoothness and stability, capital is identified with trend capital. It is assumed that there are no cycles for capital stock: any increase in investment enters directly in the production function and increases potential output.
- **Labour** is defined in terms of hours worked, and is calculated as a product of population projections, participation rates, hours worked and the non-accelerating wage or inflation rate of unemployment. Trend labour is the product of its trend components.
- **Total factor productivity (TFP)** measures productivity growth independent from capital and labour, such as technology improvements, as a difference between output and input components. The trend is obtained by [filtering](#) its time-series. As the TFP is a doubly-indirect indicator, expressed as a residual of unobservable quantities, it is very difficult to estimate.

The main differences between the three methodologies are the following:

- The OECD labour component is calculated on the basis of the non-accelerating inflation rate of unemployment (NAIRU), which is the level of unemployment below which prices rise;
- The Commission labour component is calculated on the basis of the non-accelerating wage rate of unemployment (NAWRU), which is the level of unemployment below which wages rise;
- The IMF methodology differs from country to country, but a production function approach predominates for advanced economies.

All three international institutions compute the cyclically adjusted balance (CAB) as the product of the output gap and a budget coefficient known as a sensitivity or semi-elasticity parameter. As a result, the cyclical budget balance varies in accordance with the output gap, with the structural budget balance reproducing the behaviour of the real balance when the economy is at its full potential.

### The ECB structural budget balance methodology

The [ECB disaggregated](#) methodology estimates the CAB directly **from its main components**, such as revenues (taxes) and expenditures. In this respect, it differs from the Commission, IMF and OECD methodologies, as it does not make use of the concept of output gap. The ECB methodology defines the cyclical components of each item as the difference between the real and the potential component, as well as separate corresponding elasticity factors. The total cyclical component of the budget balance is obtained in two ways: by summing the cyclical components of each budget item and by computing it on the aggregated GDP time-series; the difference between the two definitions is known as composition effect. The ECB methodology allows for an interpretation in terms of tax and expenditure.

### Annex 3: Selected bibliographic references

The literature about potential output, output gap and their computation methodologies is extremely wide. Here some of the most recent or relevant source references on the subject, in addition to those referred to in the note:

- A.M. Okun, *Potential GNP: Its Measurement and Significance*, Proceedings of the Business and Economic Statistics Section, American Statistical Association, pp 98–104, 1962.
- [N. Girouard, C. André, \*Measuring Cyclically Adjusted Budget Balances for OECD Countries\*, OECD Economics Department Working Papers, No. 434, OECD Publishing, 2005.](#)
- [Fedelino, A. Ivanova, M.A. Horton, \*Computing Cyclically-Adjusted Balances and Automatic Stabilizers\*, IMF Technical Notes and Manuals No. 2009/05, December 02, 2009.](#)
- [G. Mourre, G.-M. Isbasoiu, D. Paternoster, M. Salto, \*The cyclically adjusted budget balance used in the EU fiscal framework: an update\*, COM, European Economy, Economic Papers 478, March 2013.](#)
- [S. Jahan, A.S. Mahmud, \*What Is the Output Gap?\*, IMF Back to Basics, Finance & Development, Vol. 50, No. 3, September 2013.](#)
- [Deutsche Bundesbank, \*On the reliability of international organisations' estimates of the output gap\*, Monthly Report, Volume 66, No 4 \(2014\), April 2014.](#)
- [J. Hers, W. Suyker, \*Structural Budget Balance: A love at first sight turned sour\*, CPB Netherlands Bureau for Economic Policy Analysis, July, 2014.](#)
- [K. Mc Morrow, R. Raciborski, W. Roeger, V. Vandermeulen, \*An assessment of the relative quality of the EU output gap estimates\*, European Commission, Quarterly Report on the Euro Area, Volume 14, No 3 \(2015\), COM, Institutional Paper 010, pp 19-28, October 2015.](#)
- [K. Havik, K. Mc Morrow, F. Orlandi, C. Planas, R. Raciborski, W. Roeger, A. Rossi, A. Thum-Thysen, V. Vandermeulen, \*The Production Function Methodology for Calculating Potential Growth Rates & Output Gaps\*, COM, European Economy, Economic Papers 535, November 2014.](#)
- [R. Anderton, T. Aranki, A. Dieppe, C. Elding, S. Haroutunian, P. Jacquinot, V. Jarvis, V. Labhard, D. Rusinova, B. Szörfi, \*Potential Output from a Euro Area Perspective\*, ECB Occasional Paper Series, No 156, November 2014.](#)
- [C. Cottarelli, F. Giammusso, C. Porello, \*Perché la crisi complica la stima del Pil potenziale\*, lavoce.info, 11 November 2014.](#)
- [C. Cottarelli, \*Il metodo conta: crescita potenziale e regole fiscali\*, lavoce.info, 03 March 2015.](#)
- [K. Mc Morrow, W. Roeger, V. Vandermeulen, K. Havik, \*An assessment of the relative quality of the Output Gap estimates produced by the EU's Production Function Methodology\*, COM Discussion Papers 20, December 2015.](#)

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