NEW OUTPUT GAP ESTIMATES FOR THE EURO AREA AND ELSEWHERE

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Output gaps (OG) identify economic cycles. A new simple method for estimating them is presented, giving results that are more transparent than those published by the leading economic policy institutions. The retroactive changes to the OGs as such do not indicate that they would have been incorrect. Instead, they depend on what happened afterwards, including changes in the policies implemented. After the Great Crunch of 2008-09, fiscal policy was tight, notably in 2011-13 in the euro area, contributing to an unexpected fall in GDP, which led to large retroactive corrections of the OG estimates for earlier years. A more nuanced interpretation is that the retroactive corrections stemmed from the unduly tight fiscal policy followed in 2011-13. The new OG estimates explicitly based on an assessment of the possible changes in the long-term growth prospects provide the rudiments for a fiscal policy that both rationally copes with short term disturbances and underlines the policy measures necessary for long-term sustainability. This could help to avoid pro-cyclicality of fiscal policy in the euro area in future.

Keywords: Euro, fiscal policy, output gaps.

Distinguishing the cyclical and more persistent changes in macroeconomic development by estimating output gaps (OGs), together with their projections a few years forward, has become a dominant

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feature in designing and assessing fiscal policy. In particular, they are used for identifying the cyclical and structural components in government budget balances and indirectly in assessing the sustainability of government debt. This way they provide crucial data for policy making in the euro area and in the European Union (EU) more generally, as well as for the surveillance work of the International Monetary Fund (IMF) and the OECD also on other countries.

The OG is defined as the percentage difference between the GDP (data for the past and a forecast for the future) and the reference level in each year that is estimated to represent the underlying "trend" or "potential", with the term depending on the method used.

For comparing the OG estimates produced by different institutions, it is not sufficient to compare only the OGs, but as the main interest is about the current and next years and the forecasts for the GDP itself also differ, it is indispensable to examine the estimates for the reference levels as estimated by each institution, including because those estimates are interesting also for other purposes.

In the present paper we present a new application of the Hodrick-Prescott (HP) filter for estimating the "trend" and the results are compared to the estimates of the three main institutions mentioned above.[2]

In the present paper we cover the years from 2002, with special emphasis on the Great Crunch of 2008-09 and how it led to a "new normal" as estimated in real time, and as a further issue, on how the policies in the subsequent years shaped the developments, affecting the retrospective estimates of the "trend" or "potential" GDP before and after the Great Crunch.

It will be shown that our new application of the HP filter seems a useful and reasonably simple method for distinguishing the short-term movements from the more long-term trends, producing the results for

2. While the work on the new HP application reported here was underway, Hamilton (2017) published an article entitled "Why you should never use the Hodrick-Prescott filter". The advice "never say never" seems appropriate here. It seems that Hamilton (2017) is promoting replacement of HP filter-based short-term forecasts for some variables and cases with a simple projection based on the most recent data, say, over the past four years. However, in estimating the "normal" level of GDP for the current and next years for calculating the OG, we are not producing a forecast for the GDP. The short-term forecasts we refer to are produced by each institution separately (using conventional practices based on a bulk of relevant data and judgement). Estimating the "normal" or "potential" GDP obviously benefits from using data from the more distant past, and in our new HP application, also from assessing the growth potential in the more distant future than just over the usual short-term GDP forecast.

the "new normal" over those years. There is no need to accept it as the only method for estimating the OGs. On the contrary, using several parallel methods may be useful for complementing the picture. The HP as a single variable method, using only the GDP series, is a viable alternative, as it is simple, relatively easily understood and does not rely on macroeconomic theories that are always controversial.

Also, the HP filter does not pretend to produce the only correct estimate on the "trend" of any variable, as the result depends on the value set by the user for a certain smoothing parameter for which there is no unique objective basis. Here, we use for our annual time series the commonly applied value of 100. It distils the short-to-medium term cycles from the possible underlying deceleration of the growth and possible long-term fluctuations extending over 19.8 years on average (Casey, 2018, 19).

While the Hodrick-Prescott filter (HP filter) developed in the 1990s was the first common method for estimating the trend of GDP, data on the stock of capital and the labour market was supplemented to estimate the reference level. The IMF and the OECD shifted to the new method, calling it the production function approach (PF) and labelling the result as "potential GDP" rather than "trend". In 2002, the European Commission (EC) introduced its own PF estimates and gave them a dominant role, though continuing to produce also the HP estimates until today (Havik *et al.*, 2014).

The competing OG estimates have spurred quite heated controversies, as they are at the same time vitally important in designing fiscal policy and problematic to define and measure. The debate has only intensified recently, particularly due to the difficulty in judging the causes and consequences of the Great Crunch of 2008-09 and onwards.

In this paper we shall mostly work on the data on the aggregate of the 11 EU member states that formed the euro area in 1999 (EA11), adding observations on its four largest members (Germany, France, Italy and Spain) and the US.[3]

3. We use a fixed composition of the 11 member states to avoid any effects of new members coming in. The EA11 accounts for 96% of the GDP in the euro area (EA19) in 2017. As our real time data on the OGs will start from 2002, we could have included Greece, which became a euro member in 2001. However, as it is a special case, it is left out. Its share of the EA11's GDP peaked at around 2.5% in 2009 and it was 1.7% in 2017, so including or excluding it from our aggregate hardly affects our results. In 2017 the four largest members accounted for 79% of GDP in the EA11 and 76% of the full euro area of 19 members.

Short critical survey of previous studies on OG estimates

Deutsche Bundesbank (2014) launched a fierce attack on the OG estimates of the IMF and the OECD. It proclaimed that they are biased towards loose fiscal policy and an unintended increase in public debt and that the large retrospective revisions of these estimates disqualify their use for policy recommendations. Largely to reduce the retrospective revisions, the Bundesbank promotes an HP-filter application with a smoothing parameter of 6.25 for estimating the "trend" of GDP.

The issue of retrospective revisions of the OG estimates is most relevant, but minimising the retrospective revisions in the way that the Bundesbank proposes also reduces the OG estimates in real time by feeding into the "trend" estimate part of the cyclical movements. Thus, the purpose of identifying and measuring the cycles is partly dismissed.[4]

To avoid this, the revisions of the OG estimates should be accepted as natural consequences of their character: it is obvious that the OG for any given year will be revised even several times according to developments taking place after the year in question. One should not be surprised that even the sign of the OG sometimes changes, as the estimates are often not far from zero. This may happen especially if a major shock hits the economy. Thus, the revisions are not comparable to revisions of economic data in general, but they provide interesting information about what was in real time understood to be normal and what then happened.

Mc Morrow *et al.* (2015) complement the Bundesbank analysis by assessing also the performance of both PF and HP estimates published regularly by the EC, as these were not covered by the Bundesbank. They conclude that the EU's PF method has performed better than the HP filter and the PF estimates by the IMF and the OECD.

Mc Morrow *et al.* (2015) discredit the HP method referring, especially to its poor performance in the estimates of the EC for the HP trend of GDP in spring and autumn 2009. Their judgement turns out to be dubious, caused by failed mechanical statistical procedures in dealing with the well-known end-of-the-sample bias in the HP estimates: the HP formula gives a high weight to the latest observations of the original data series, which tends to bend the end of the estimated

4. The graphs in the Technical appendix of Oksanen (2018, 29) illustrate that the value of 100 for the smoothing parameter applied on the GDP series seems a reasonable presumption as compared to the value of 6.25 promoted by Deutsche Bundesbank (2014).

HP-filtered trend upwards or downwards depending on the latest data. As the main interest is usually exactly in those years, i.e. in the current conditions and one-to-two years ahead, the statisticians have attempted to find operational solutions to deal with this. However, no mechanical solution would work well in all cases. The HP estimates of the EC in the year 2009, when the direness of the economic situation had emerged, turn out to be one such failed case, as the swings in the HP-based OG estimates by the EC in spring and autumn 2009 were in the mechanically produced extensions of the GDP forecasts rather than by the HP method itself (shown in the graphs in Oksanen, 2018, 31). Noting this, we can conclude that the HP filter can produce useful results when used carefully.

Several recent studies also compare the merits of the parallel and often competing estimates for the OG in terms of their stability in the short term and proneness to revisions when the economies progress. For example, Busse (2016) and Kuusi (2017) investigate the impacts of the revisions of the output gaps and cyclically adjusted budget balances under the fiscal framework in the EU. Also, recent IMF Working papers on improving the estimates for potential output and OG (Blagrave *et al.*, 2015, and Alichi, 2015) develop improvements to their PF methodology.

Practically all studies conclude that the OG estimates are indispensable for policy making—distinguishing the cycle from the trend (and identifying any specific factors) is both important and not straightforward. First, it is useful to admit that before the Great Crunch of 2008-09, the OG estimates used in policy making failed to guide policies to dampen the boom. Second, the retrospective revisions of the OG estimates for 2006-2013 are not an adequate reason to abandon them altogether. Instead, all the competing OG estimates should be looked at constructively, though critically.

Purpose, scope and outline of the present paper

The motivation of the present paper is that there is scope for improvement. While no perfect method will appear, we shall present new OG estimates produced with a new application of the HP filter. Special emphasis is given to the transparency and simplicity of the method so that the results can be understood also by non-experts and policy makers.

In Section 1 we present our new real-time estimates for the OGs based on the HP-filtered trend of GDP. "Real time" means here that we use the data and short-term forecasts available at the time. We focus on the estimates for the current year and the next. Our results are then compared to the estimates published by the EC, IMF and OECD in the context of their regular forecasts over the period 2002-2017.[5]

The novel idea in the present application is to make explicit that the estimates for the trend GDP and the OG for the current year and the next will always depend on the assumed path of the GDP in the consecutive years.

In Section 2 we shall discuss the main use of OG estimates for policy design, which is to separate the cyclical and structural components of government budget balances. Especially their projections based on planned fiscal policies obtain pivotal importance under the (complex) fiscal policy rules for the euro area (*Vade Mecum on the Stability and Growth Pact,* European Commission, 2017a). In this context we present the data on the retrospective revisions of the OG estimates and the real-time and retrospective estimates for the "new normal" level of GDP after the Great Crunch, covering the estimates of the three institutions as well as those based on our new HP trend estimates.

We are not interested in the OG estimates only for their descriptive usefulness, but also for their use in policy making, recognising an important simultaneity: the policies shape the economies and thereby affect the revisions of the OG estimates, and not only exogenous factors. This is the topic in Section 3. Regarding recent history, the question is to what extent were the policies responsible for the further fall in GDP in 2012-13 in the euro area and hence for the revisions to the OG estimates. We shall discuss the conflicting views on this, highlighting the evidence of the persistent pro-cyclicality of fiscal policy in the euro area.

In Section 4 we discuss two examples of the new OG estimates used as indicators of the cyclical position of the economy and in policy design. First, they can be used for designing a simple smoothing mech-

5. The data set required to perform these tasks is quite large: it contains all the forecasting vintages of the EC in 2002-2017 gathered from the original sources and made freely available by the FIRSTRUN (Fiscal Rules and Strategies under Externalities and Uncertainties) project; it contains data by EU member for several macroeconomic indicators, and the historical data goes back to 1960. We do not use all indicators but mainly those for the GDP, estimates of the potential GDP and the trend estimated by their HP application (and the implied OGs), the various budget balance indicators, etc. Similar data covering the real-time estimates by the IMF and the OECD are downloaded from their respective freely available data banks.

anism for country-specific asymmetric shocks, proposed by Oksanen (2016a), and second, the approach can be used for assessing a possible significant permanent downturn in GDP growth, supplementing the analysis of the consequences of the Great Crunch of 2008-09.

Section 5 gives a summary and concludes the paper.

1. New OG estimates generated by the HP method

1.1. Real-time OG estimates for the EA11 and others

The new OG estimates are the deviations of the observed (and forecast) data from a HP-filtered trend of GDP, which is derived using our new application: the GDP series as an object is based on the real-time data on GDP, including its short-term forecast by the respective institution (for the EA11 by the EC; for the US by the IMF) and its extension to future years. The extension is composed as follows: (1) the official forecasts of the respective institution for the current and coming years (t and t+1) are taken as given, (2) an *assumption* for the *underlying* long-term rate of GDP growth from year t+2 onwards is injected, and (3) the GDP from year t+2 onwards is additionally set to adjust so that the OG estimated for year t+1 will fade away by year t+5. Here, like in what follows, we only give the principles of constructing the new HP trend estimates and advise the reader to refer to the Technical appendix in Oksanen (2018).

The assumption on the future GDP is vital in our application. It is one source for tracking the revisions of the OG estimates afterwards: the OG will be revised due to the deviation of GDP from its previously assumed long-term path. Extending the GDP series into the future also allows us to cope with the possible end-point bias in the HP-filter applications. As the assumed underlying future growth is set by the user, any number of alternative results can be generated.

For the baseline, the underlying long-term growth rates for the EA11 countries are roughly based on the work of the Ageing Working Group (AWG) in the EU. In the AWG reports 2001, 2006 and 2009, the rough figure for EA11 GDP long-term growth was 1.5% pa. In the report 2012 it was lowered to 1.3%.[6] As the views of long-term growth

6. This coincides also with the projection by Mc Morrow *et al.* (2016, Table 1), who produce a no-policy-change medium-term projection for 2015-2024 of 1.3% average growth for euro area GDP, based on the negative fallout from the financial crisis and the emerging drag on growth emanating from ageing populations.

obviously started to change earlier, we set the figure at 1.4% for our calculations for 2010 spring and autumn forecasting vintages, and 1.3% from autumn 2011 onwards (the assumptions of the AWG report 2012 were published in 2011). For the four largest countries, the growth assumptions are similarly based on the country-specific assumptions in the AWG reports.

The assumption that the OG in year t+1 closes by year t+5 follows the conventional practice in the AWG work and elsewhere where long-term projections are constructed and used.

The GDP data used starts from 1960, and the extended data runs until 2040, long enough to feed into the calculation the assumed underlying growth rate in future. For estimating the HP-filtered trends, we use logarithmic series (as the GDP series normally grow exponentially) and 100 as the HP smoothing parameter, which is a conventional practice with macroeconomic annual data.

The new results are based on real-time data from the forecasting rounds over 2002-2017. They are then compared to the real-time OG estimates published by the three institutions (EC, IMF and OECD) for the EA11. Additional results for the US and the four largest member states in the EA are found in Oksanen (2018, 33-34). All autumn forecasting vintages over 2002-2017 are treated, together with the spring forecasting vintages over 2007-2010 (to cover the developments before and right after the crisis in more detail).

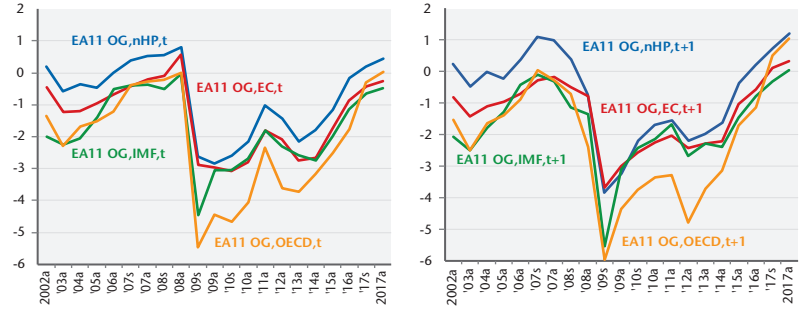
Figure 1 gives a broad picture, displaying the real-time OGs for the EA11 for the current year (t) generated by the new HP (nHP) method and those of the EC, IMF and OECD, and the corresponding results for the following year (t+1) in each case.

The charts show that, with one single exception, the real-time OG estimates of the three institutions were clearly negative or zero throughout the whole period 2002-2016. The only exception was the estimate (+0.6%) by the EC in autumn 2008 for 2008, and even in that case the forecast for the following year was a negative OG.

The OG estimates of the IMF and the OECD until 2009 are quite close to each other, and the EC estimate is also practically identical for 2006-2008, i.e. during the boom that was recognised only afterwards. After 2009 the estimates by the OECD are clearly the most negative ones, while those by the IMF and the EC are close to each other.

Our new HP estimates show slightly positive OGs for the boom period 2006-2008. They are consistently higher than any of the three estimates, but their average is also negative over the whole period since 2002. By construction, the average of the HP estimates should be close to zero if the period is sufficiently long and the fluctuations are reasonably regular. This is not the case here, as an exceptional crisis occurred (2009), followed by another fall in output (2012-13). Thus, our new HP method also produces a negative average for 2002-2016.

Figure 1. Output gap estimates for EA11 in real time forecasting vintages 2002-2017 for the current year (t) and for the next year (t+1)



Legend: OG = output gap; a = autumn forecast, s = spring forecast. nHP = new HP-based estimate based on real time data from the EC including forecasts for t+1; EC = European Commission OG estimate, IMF and OECD refer to their OG estimates, respectively.

The Great Crunch of 2008-09 is the most interesting episode. All real time estimates recognised it in spring 2009, including our new HP-based estimate. The change from earlier estimates was dramatic, the most negative OGs being presented by the IMF and the OECD.

Comparing our new OG estimates and those by the three institutions we need to note that the differences always come both from the differences in the estimates of the potential GDP and of the forecast for the GDP itself. It turns out that the more negative OGs by the IMF and the OECD partly stemmed from their more pessimistic GDP forecasts for 2009, which were subsequently revised upwards, while the not-so-negative OG estimate by the EC for 2009 partly reflects its comparable low estimate of the potential GDP (in the middle of the crisis), which was later revised upwards.

The large data published by the institutions together with our new estimates can be used for showing how the potential GDP estimated by the institutions and our new HP trend estimates developed over the

Great Crunch, from autumn 2007 to autumn 2013 and further to autumn 2017. These data provide an ample source for history writing as the real time data formed an important basis for economic policy. Omitting the details that can be found in the graphs in Oksanen (2018), a short summary is presented below.

In spring 2009 the downward revision for the potential GDP by the EC were significantly larger than in our nHP estimates or those of the IMF and OECD. The IMF followed with a significant revision in autumn 2009 and delivered the lowest estimates of all. The OECD kept its potential GDP estimates flat in 2009 and still in autumn 2013 its projection for potential GDP was higher than those of the other institutions. Only by the projections in autumn 2017 did its view converge to those of the others.

Our nHP-trend estimate in autumn 2017 for 2017 is a good one percentage point lower than the other three, consistently with its regular pattern.

The OG estimates for the four largest euro area countries show broadly the same patterns as for the EA11. For Germany the estimates of the institutions were mostly positive in 2007-08, but for all the other three countries almost consistently negative or zero, with the exception of the EC estimate in autumn 2008 for 2008. Their estimates for Spain were practically zero or negative throughout the boom 2005-07 while the new HP estimates are clearly positive (the issues concerning not identifying the boom in Spain in real time are not covered here).

The corresponding data for the US shows equally interesting developments over the Great Crunch. The steady growth of the US GDP from 2010 onwards, unlike the second recession occurring in the EA11, is reflected in the real time estimates and especially in their retroactive revisions (Oksanen, 2018).

1.2. Summary comparison of the real time OG estimates

We noted above that the real time OG estimates of the three institutions have been almost always negative for the EA11. There can be justified reasons for this. For example, as the OECD puts it, one of the factors behind their estimate for the unemployment gap is that the estimated equilibrium level of unemployment depends on the inflation rate (and expectations thereof). It is plausible that most of the time since 2002 unemployment has exceeded this reference level and therefore this factor tends to keep their estimate for the OG below zero. The

question nevertheless arises whether an OG estimate that is almost always negative can be interpreted as depicting a cycle; in ordinary language a cycle means that a variable fluctuates around its cyclically corrected level.

If we corrected the various OG estimates for the level over the whole period on average, the picture each of them would give of the fluctuations would not differ dramatically. Noting this, our new HP estimates have several merits. They are simple to be composed and explained, including the meanings of the relatively small number of assumptions put on top of the GDP data, and the sensitivity of the results using alternative assumptions can be easily worked out. This compares well with the PF estimates, which are based on numerous underlying assumptions, making them more complicated and less transparent.

The retroactive revisions of the OG estimates is a separate matter, significantly affected by developments after any given year. In several previous studies those revisions have been used for assessing the relative merits of the competing OG estimates. The adequacy and reasonability of those assessments is appropriate to be discussed in the context of the use of the OG estimates in policy design. This is where we turn next.

2. Using the OGs and structural balances for policy: a critical view

The primary use of the OGs is to identify the cyclical and structural components of government balances in each conjuncture. This is a centrepiece of fiscal policy making, originating from the work at the OECD since the early 1990s and fully rooted in the regular reports on all countries by all the three institutions (see Mourre *et al.*, 2014, for references).

The standard procedure is to estimate the cyclical component of the government budget balance by multiplying the estimated OG by the semi-elasticity of the budget balance (defined as the effect of movements in the GDP on the budget balance as a percentage of GDP). The latest estimate for the semi-elasticity for the EU countries is 0.50 for the EU on average, ranging from 0.31 to 0.65 across member states (Mourre *et al.*, 2014, 6). Removing the cyclical component gives the cyclically adjusted balance and subtracting one-off and temporary components gives the structural balance.

2.1. Use of structural balances in euro area policy making

The structural balances have gained a pivotal role in the fiscal policy rules for the euro area, explained in the most recent edition of the *Vade Mecum on the Stability and Growth Pact* (European Commission, 2017a, where presentation of the rules requires 224 pages).

The rules have become quite complex especially after the Great Crunch. The original Stability and Growth Pact (SGP) of 1997 focussed on the headline budget balances, but it became obvious that to be able to set sensible fiscal policy targets, the cyclical component had to be acknowledged.

As our new OG real time estimates for the period 2002-2017 are on average one percentage point higher than the ones by the three institutions, the cyclical components would be roughly 0.5 percentage points higher and the estimates for the structural balances correspondingly lower. These are the rough numbers over the whole period on average, while the corresponding figures for the differences in the OGs for the subperiods and institutions vary roughly between 0.3 and 1.8 percentage points.

Here, we do not enter into more detailed comparisons of the figures. Instead, the conceptual basis of the budget balance estimates should be clarified, questioning their usefulness and accuracy for policy design.

2.2. How to define a cyclical component in government balances?

What should we mean by the cyclical component of the budget balance? Consider a thought experiment: assume an economy in equilibrium is hit by an exogenous factor which moves cyclically; assume then that the government pursues a fiscal policy that completely eliminates the effect on the GDP; this means that the OG remains at zero through the whole cycle; obviously, the budget balance first moves in one direction and then in the other, and at the end of the cycle the equilibrium is restored. The problem is that according to the standard definition the cyclical component of the estimated budget balance is zero throughout, following from the zero OG over the whole cycle. Obviously, this does not make sense. It would be more reasonable to say that all the variation in the budget balance was cyclical as it stemmed from the specific joint effect of the exogenous cyclical factor and the countercyclical policy pursued.

This extreme example expresses a terminological conundrum. A more general concern is that the standard definitions of cyclical and structural components in government budgets ignore the effects of changes in fiscal policy on the GDP and via that to the measured OGs that are used to define and measure the cyclical components. The loop from fiscal policy to the GDP and further to the OG is missing, even though the existence of this loop is a core part of conventional economics.

2.3. Ex post revisions of the OG estimates obscuring policy

Additionally, we should recognise that the structural balance is not a reliable indicator of discrete policy actions because they are regularly changed afterwards as new data come in, leading to revision of the cyclical and structural components in government balances. Logically, a measure of a discrete policy action at any given time should not depend, even in retrospect, on what happened in the economy afterwards. The structural balance (or its change) does not fulfil this logic.

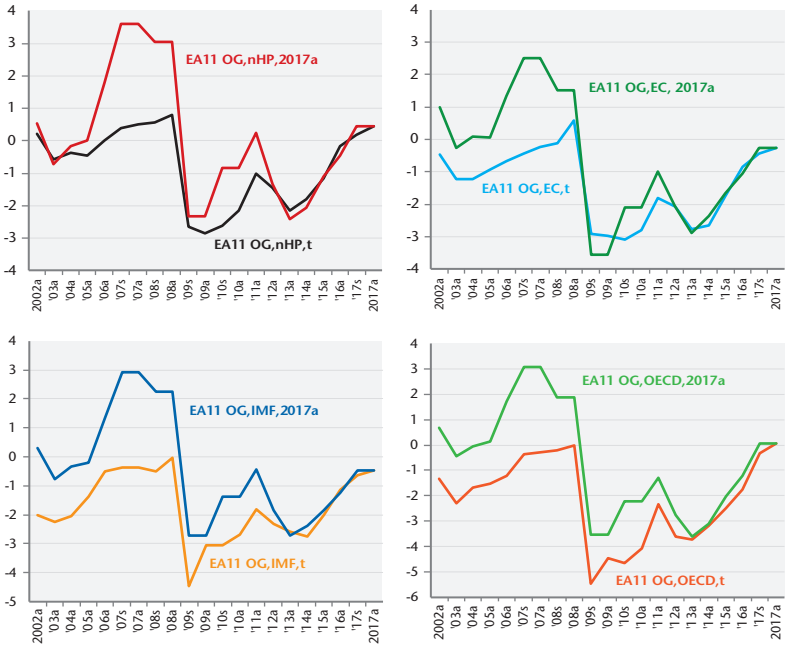
Anyway, as the structural balances are used in policy and as their revisions are directly derived from the revisions of the OG estimates, we next look at them.

Figure 2 presents the OG estimates for the EA11 for each year (t) in real time and ex post, the latter being the retrospective estimate from the data in autumn 2017. It shows that the revisions of all the OG estimates over the period 2002-2017 were indeed significant and roughly of the same magnitude (though on average greatest for the OECD). The largest revisions concern the years 2006-2008 in all of them.[7]

Our new HP estimates have the advantage that, by their construction, the main factors behind the revisions can be relatively easily tracked to the deviation of what happened to GDP growth since 2006 compared to the underlying growth rate assumed in 2006-07 when the real-time nHP estimates were calculated. The assumption on future growth in estimating our new HP trend for the EA11 was 1.5% until 2009. As the average 10-year growth fell to 0.6% by 2017, a significant retroactive revision of the OG estimates followed.

7. As we are focussing on the OG estimates for the current and next year, we should remember that the revisions come partly from replacing the forecasts for the GDP by their outcomes. However, the revisions in the OG estimates mainly stem from their intrinsic nature as measures of the cyclical phase. This is not a matter of updating the GDP data for each year, but results from what happened in the economy several years afterwards.

Figure 2. Output gap estimates for the EA11 in real time for the current year (t) and corresponding estimates in autumn 2017; new HP estimates and by institutions (European Commission, IMF and OECD)



Legend: nHP OG = new HP output gap estimate; a = autumn forecast, s = spring forecast. EC (=European Commission), IMF and OECD refer to their OG estimates, respectively.

Tracking the sources of revisions of the PF-based OG estimates of the three institutions would require going into the details of their estimation methods and parameters, including changes in them during the period investigated (as the estimates have been modified to improve their accuracy). As in almost all the previous literature, this major task is beyond the scope of the present paper.[8]

3. Did policies cause the further fall in EA11 GDP in 2012-13 and hence the revisions to the OG estimates?

As noted, the OGs for any given year, no matter how they are estimated, will always be revised retroactively. This happens irrespective of

8. Turner *et al.* (2014) study the various sources of the changes in the OECD estimates for potential output. Revisions of the OG estimates for the US and the four largest euro area countries are shown in Oksanen (2018, 39-41).

the causes of the new developments, but most importantly, the new developments include also the policies pursued and their effects, which can be significant and should in any case be of special interest for assessing those policies.

The recent Great Crunch and subsequent years is a most important episode for a study of fiscal indicators, notably the OGs. The key question is as to what extent the fall in EA11 GDP in 2012-13, which then came to be the major reason for the retroactive revisions of the OGs, was caused by fiscal policy itself.

3.1. Fiscal policy in the euro area after the Great Crunch

The crisis in 2009 was first followed by counter-cyclical fiscal policy as a combination of automatic stabilisers and discrete actions, but from 2011 onwards policy was strongly tightened (as confirmed by several sets of data, including those on discretionary fiscal measures published by the EC and Carnot and de Castro, 2015a and b, presented and reproduced in Oksanen, 2018, 43). A number of leading economists writing in Baldwin *et al.* (2015, 10-11) observe that "*[T]he Eurozone as a whole saw its 2010 primary [balance] move from about minus €350 billion in 2010 to €10 billion in 2014. This was a massive contractionary shock—equal to 4 percentage points of the monetary union's economy."* They consider that this triggered the fall in euro area GDP in 2012-13. Despite this, aggregate government deficits in the EA11 were cut over this period, while the US was growing at a rate of more than two percent in 2010-15, which was helped by running twice as large fiscal deficits as in the EA11 over 2011-14 (and in fact already in 2008-10).

The wide consensus that tight fiscal policy in the euro area in 2011-13 was harmful was later adopted also by the European Commission (2016, 2), although it added that this was at least partly inevitable as "*many Member States engaged in fiscal consolidation to preserve their access to the markets at the height of the sovereign debt crisis"*. This latter view is not the full picture. Baldwin and Giavazzi (2015, 47-48) showed that policy was strongly tightened also in countries that had access to the markets, with Germany's share of tightening being more than its relative share in the euro area. In spring 2010, Germany's government deficit was forecast at 5.0% of GDP, and it was pressed to zero by 2012 and subsequently to a surplus.

The reasons for fiscal tightness in 2011-13 are many, but from the angle of the OG estimates the short-term GDP forecasts are most relevant. They depend on a host of factors, including fiscal multipliers, i.e.

the effect of fiscal policy on GDP, perceived by the forecasters. The importance of the perceived fiscal multipliers was brought into discussion at the time by the IMF in its autumn 2012 forecasts, where it presented evidence that, early in the crisis, for the advanced economies, the multipliers were substantially underestimated. This meant that the planned fiscal consolidation led to GDP that was lower than expected by forecasters. This conclusion applied the most strongly to forecasts by the IMF itself and to a slightly lesser extent to those by the EC (Blanchard and Leigh, 2013; Mody, 2018, 371-3; Tooze, 2018, 429-30).

Later, Fatás and Summers (2018) contested the advisability of fiscal consolidation in the circumstances after the Great Crunch of 2008-09. According to them, consolidation was self-defeating, i.e. it did not decrease the deficits at all in most countries but caused a prolonged recession.[9]

3.2. Role of the OGs in designing fiscal policy

We should admit that our new HP estimates would not have revealed the strength of the boom before the Great Crash much better than the others: our new real-time OGs for those years are slightly less than one percentage point above zero. It is prudent to say that the factors behind the strength of the unsustainable boom were such that no foreseeable improvements to the OG estimation methods would convincingly prevent the repetition of the same ignorance in future.

Our discussion above of the underlying causes of the retroactive revisions of the OGs leads to the conclusion that the revisions do not necessarily disprove the use of the real-time OG estimates for policy. However, we should not underestimate the problems with the uncertainty of their level and changes from one year to the next. This uncertainty is demonstrated by the differences between the estimates from our four different sources (our nHP-based estimates and those from the three institutions), which feeds into the uncertainty of the structural balance estimates. Broadly expressed, those estimates then

9. For assessing their result correctly, we should note that the observed decrease in the deficit over the period 2011-2015 in the euro area (and elsewhere) does not disprove their conclusion. Instead, a plausible explanation is that other factors gradually turned supportive to growth and compensated for the negative effects of the fiscal consolidations (for a survey of estimates of the fiscal multipliers, see also Carreras *et al.*, 2016).

often vary in the range of +/- half a percentage point (ignoring here the much larger difference in the forecasting vintages of the year 2009).

For this reason, we should conclude that whatever improvements one could try and achieve, the accuracy of the rules set in the *Vade Mecum on the Stability and Growth Pact* (European Commission, 2017a) is an illusion. Also Busse (2016, 30-31), based on his detailed analysis of the revisions in the EC estimates for the OGs and the implied cyclically adjusted balances, considers that the errors may lead to ill-fitting policy advice and unwarranted sanctions. He adds, nevertheless, that the SGP, thanks to its political flexibility, is faring quite well in dealing with the uncertainty and revisions.

Busse's latter conclusion looks carefully balanced, but a critical eye on the complexity of the fiscal rules is still warranted. After all, is it appropriate that the rule book has become so detailed and thick, but still has to be implemented with political discretion to make sense economically? Political discretion always triggers disputes and deteriorates the reputation of all the actors as well as the rules themselves, as compromises always look bad from one angle or another. The complexity also poses a challenge to democratic decision making, as no finance minister should even try and explain them in front of their parliaments.

4. Possible use of the new OG estimates

The critical comments on using all OG estimates for measuring the structural balances apply also to the new OG estimates presented here. Therefore, they are not be promoted here as substitutes for the OG estimates currently produced by the institutions (and governments) and used in fiscal policy under the current euro area rules. However, as the new OG estimates give new useful insights into the cyclical position of the economy, they can be useful in several other ways in policy design.

4.1. Proposals for smoothing asymmetric shocks

Competing views on the need and possible means for smoothing country-specific asymmetric shocks have been proposed since the very start of planning the single currency for the EU. The US was always used as the reference, with an eye on different mechanisms dampening asymmetric developments across the US states (Oksanen, 2016a). Alcidi and Thirion (2017) summarise the studies, benefitting from the recent data covering the changes in dynamics after 2008.

One key finding is that in the US smoothing is larger than in the euro area mainly due to capital market integration, especially cross-ownership of capital across the states. The other is that, in the euro area, the smoothing effect *via* the government budgets is normally larger than inter-state fiscal transfers in the US federal budget (noting, in addition, that the state budgets in the US do not contribute to it due to the common balanced budget requirement). However, smoothing worked in the euro area in normal circumstance, while all smoothing practically ceased since 2010 in the periphery (Alcidi and Thirion, 2017, 15) as the Great Crunch turned into a fiscal crisis.

Proposals for smoothing mechanisms remained subdued for the first decade of the euro, but several initiatives have been presented recently (European Commission, 2017b, 8, 12; Bénassy-Quéré *et al.*, 2018, 14-16; Andor *et al.*, 2018). Without going into detail on each of them, several problems are faced: tackling only large asymmetric shocks limits their effectiveness; using unemployment as a key indicator is problematic as it is a lagged indicator of exogenous shocks; conditionality to compliance with other schemes and rules (which can be controversial) easily leads to disputes over implementing them; even though it is declared that they should not lead to permanent redistribution, this is far from being assured.

This topic is relevant here, as Oksanen (2016a) proposed an alternative scheme where payments in and paybacks depend on the relative OGs of the member states, being, for example, proportional to half of the percentage deviation of each member state's OG from the euro area average. Importantly, his proposal contains a rule that after an agreed period, say seven years, the net balances are recorded and netted out in constant instalments over the subsequent seven-year period. This would make sure that permanent redistribution would not emerge.

Oksanen (2016a) illustrated his proposal with historical data based on OG estimates by the EC. He considered that improving the real-time OG estimates would be advisable, though not indispensable for starting the new scheme as the details could be improved afterwards. Now, it seems that using the nHP OG estimates seems encouraging, as for the two opposite countries, Germany and Spain, these would have worked better than the EC estimates before the crisis (Oksanen, 2018, 43-44).

The proposed mechanism requires only a light administration. It would dampen the asymmetric shocks to an extent comparable to the US federal budget. Being non-distributive, this would leave redistribution to policy areas that are specifically tailored for it, including by limiting their size.

4.2. Illustration of the OGs if growth falls significantly

The novel feature of our new HP application is that it makes it explicit that the prescription of the current state of the economy takes into account the perspective of GDP growth in the long term. The latter is not known by anybody, but it is useful to work on freely varied assumptions and produce alternative scenarios. As an illustration, imagine that currently, based on the forecast in autumn 2017, it is perceived that long-term growth will soon go persistently to zero. The relevance of this simple vision could be argued on several grounds, not to be discussed further here.

Assuming zero for the underlying growth in the EA11 from 2018 onwards gives the result that the nHP OG estimate for 2018 would be +3.3%, which is considerably higher than the baseline result +1.2% (which is based on 1.3% growth) and the OG estimate +0.3% of the EC in autumn 2017. And it is almost exactly equal to the retroactive estimate for 2007, the peak of the overheated boom before the Great Crunch (shown graphically in Oksanen, 2018, 45).

The high OG for 2018 produced by this thought experiment does not imply that fiscal policy should be immediately tightened. However, the new dramatic result could serve as a wake-up call for thinking seriously about long-term challenges and the required policy responses (some key elements are discussed in Oksanen, 2016b, 385-387; and Oksanen, 2018, 16-19).

5. Summary and conclusions

We have presented here new output gap (OG) estimates based on a simple statistical method, the Hodrick-Prescott (HP) filter, to distinguish the cycle from a possible change in the trend of GDP.

We showed that the HP-based estimates have often been criticised on inadequate grounds. Using the method carefully can distinguish the cycle from changes in the trend in a way that compares well with the

results of other methods. A clear advantage of the HP method is that it is simple, based only on one single-time series, GDP. As the method is simple, the results and their limitations can be easily understood also by non-experts.

The contribution here is to present a new application of the HP filter, where we insert an explicit link to the view about the economy's underlying growth in future. This does not complicate the method unduly, but it is useful in two ways. First, it links the analysis to the question of what might be happening with respect to long-term growth prospects, allowing alternative assumptions on it; this question is encountered continually, especially when a major shock hits the economy. Second, it is obvious under all OG estimation methods that the phase of the cycle always depends not only on the current situation (supplemented by the short-term forecast) and the past, but also on changes further on in the future. Our new method makes this explicit. This helps us to understand that the results are always based on assumptions on unknowns and should therefore be treated with care and caution.

The same warning is valid also for the OG estimates regularly produced and published by the three main institutions, the European Commission (EC), IMF and OECD. Even if they are based on extensive data and more complicated theories of economic behaviour and markets, this does not make them more reliable than our simple HP estimates.

The OGs are an important input for designing policies, primarily but not only fiscal policy. They are of pivotal importance in the rule book of the euro area (and the EU as a whole) and underlie important procedures in the joint decision making.

The problem with the OGs produced in all the three institutions, the EC, IMF and OECD, is that their estimation methods are liable to criticism on several grounds. Some of the criticism is well-founded, like pointing out that the real-time OGs have been negative almost without exception. This has triggered doubt that this might have caused a bias towards increased public debt. Not taking a definite position on this possible causality, we consider that there is at least a terminological problem, as in ordinary language a cycle refers to fluctuations on both sides of a specified benchmark for which the average over a long enough period is a natural first choice. This is what the HP filter by its construction brings to the picture.

As the retrospective revisions in the OG estimates have been widely used as a criterion of their reliability, we emphasise that the revisions do not necessarily indicate weaknesses in their construction. The recent history before and after the Great Crunch of 2008-09 is a case in point. The revisions of all the OG estimates, extending backwards to 2002, were the consequence of the fall in EA11 GDP not only in 2009 but also in 2012-13.

The present paper remains critical towards using the OG estimates—old and new—for deriving the structural balances in government budgets and conducting fiscal and other policies based on them. However, the OG estimates based on the forward-looking HP filter can be useful in identifying and measuring the state of the economy and they give new elements for designing policies and adjustment schemes.

One example is to use the new OG estimates in designing a scheme for smoothing country-specific asymmetric shocks in the monetary union, an old topic that has emerged again after the Great Crunch. The reform proposals presented so far encounter several problems. They are not effective for smoothing and, most seriously, they fuel suspicion that they would lead to large permanent transfers, and thereby nourish mistrust and disputes. A quasi-automatic transfer mechanism based on relative OGs proposed here could be more efficient and help smoothing both large and small asymmetric shocks. The proposal contains a provision for reviewing the net transfers periodically so that no permanent transfers would take place.

Another broad contribution of the new HP filter presented here is that it allows for deriving new OG estimates that can reflect a wide range of views about future long-term growth prospects. This can be helpful for recognising the risks of permanent changes that are not incorporated in past data and short-term forecasts. This is useful for tackling in a constructive manner the long-term sustainability of public finances.

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