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ESTIMATING THE CYCLICALLY ADJUSTED BUDGET BALANCE

BOX 6: ESTIMATING THE CYCLICALLY ADJUSTED BUDGET BALANCE¹

In the wake of the financial crisis, there is broad recognition in the European Union on the importance of effective fiscal surveillance. Stringent regulations were enacted, looking beyond the headline budget balance ratio to GDP. Under the terms of the Treaty on Stability, Coordination and Governance, commonly referred to as the Fiscal Compact, Member States are required to achieve a balanced structural budget over the medium term. The structural budget is measured by adjusting the headline budget balance for the economic cycle and temporary fiscal measures. Consequently, policy makers' ability to assess where they stand in terms of this requirement hinges on the correct estimation of the cyclically adjusted balance (CAB).

The European Commission's approach to estimating the CAB is used to assess Member States' ability to comply with their medium-term objectives in terms of the excessive deficit procedure. However, alternative methodologies exist, such as the approach used by the European System of Central Banks (ESCB), which attempts to explain the development of the CAB from a different perspective. This Box provides a concise explanation of these two estimation methods. Both are then followed to estimate the cyclically adjusted budgetary position in Malta for the period 2000–13.

Introducing the CAB concept

The headline government budget balance fails to give a complete account of the country's underlying fiscal position since it is influenced by the economic cycle. When a country experiences growing demand and higher incomes during the upswing of the economic cycle, tax revenues tend to increase. In contrast, during an economic slump the Government collects less income and consumption taxes and spends more on social transfers, such as unemployment benefits. These developments dampen fluctuations in the economic cycle, and occur without any discretionary government action. For this reason, these mechanisms are known as automatic stabilisers. The objective of cyclically adjusting the budget balance is to observe the underlying fiscal position net of the automatic stabilisers and, hence, arrive at a fuller understanding of the extent and effectiveness of discretionary fiscal policy.

The two CAB estimation approaches assessed in this Box apply a two-step methodology. This consists in first computing the cyclical component of the budget and then subtracting it from the headline budget balance. Both approaches decompose government revenue and government expenditure to identify those components that are influenced by the economic cycle. On the revenue side, these include personal and corporate income taxes, indirect taxes and social security contributions. On the expenditure side, unemployment-related expenditure is the component that is most closely related to economic activity.

It is usually also assumed that only private employment and wages are affected by cyclical fluctuations and that public employment and wages are largely determined by discretionary government decisions. Thus, the cyclical component of the budget balance excludes

¹ Prepared by John Farrugia, who is a Senior Economist in the Bank's Economic Analysis Office. Any errors, as well as the opinions expressed in the article, are the author's sole responsibility.

taxes and social contributions paid by government employees and by the Government as an employer.²

The two-step approach is widely used due to its straightforward interpretation and ease of cross-country comparison. However, it is subject to uncertainty regarding the measurement of certain economic variables, such as potential output and fiscal elasticities. As a result, different methodologies were developed in an effort to overcome these shortcomings.

Estimating the CAB: the Commission's methodology

In the Commission's approach, the cyclical component of the budget balance depends on two inputs: a measure of the cyclical position of the economy relative to its potential level (the output gap) and a measure of the link between the economic cycle and the budget (which the Commission terms the budgetary semi-elasticity parameter).³ In algebraic terms, the cyclical component CC is denoted by:

$$CC = \varepsilon * OG$$

where ε denotes the semi-elasticity and OG represents the output gap. In the Commission's approach, CC is subtracted from the headline balance to derive the cyclically adjusted balance. The Commission expresses the CAB as a percentage of potential GDP.

The budgetary semi-elasticity is a weighted sum of the elasticity of each of the above-mentioned revenue components to GDP, weighted by their share in total revenue collected, less the elasticity of unemployment-related expenditure to GDP, weighted by its share in total expenditure. These elasticity values are derived from past observations. As a result, they need to be periodically updated to more accurately reflect recent developments and possible structural changes in the economy, which would alter the proportion of individual revenue and expenditure components in GDP.

The output gap is defined as the percentage deviation of actual GDP from its potential level. Both potential output and the output gap are unobserved and have to be estimated. Potential GDP is computed by the Commission on the basis of a Cobb-Douglas production function, in which output is specified on the basis of labour and capital inputs. These inputs are assumed to account for a fixed share of production and to generate constant returns to scale. A third parameter, called total factor productivity (TFP), measures the efficiency and utilisation of both factors of production. The potential output level is therefore estimated by deriving values for trend TFP and potential labour and capital inputs.⁴

Cyclically adjusted balances: the Commission's results

This section outlines the main developments in the CAB across the euro area and in Malta for the period 2000–13, as computed by the European Commission. Correcting the

² In this Box, the term "government" is taken to represent the general government sector as measured according to ESA 95 methodology, which includes not just Ministries and Departments but also local councils and extra-budgetary units. Extra-budgetary units are entities under public control producing goods and services where their sales in the market cover less than 50% of their production costs.

³ For more details, see Mourre, G. et al, "The cyclically adjusted budget balance used in the EU fiscal framework: an update", *Economic Papers* 478, European Economy, 2013.

⁴ For further details on how actual and potential GDP components are estimated, see Denis, C., Mc Morrow, K., and Röger, W., "Production function approach to calculating potential growth and output gaps – estimates for the EU Member States and the US", *Economic Papers* 176, European Economy, 2002.

headline government balance for cyclical effects would result in a more negative balance when the economy is operating above its potential level (positive output gap) and vice-versa. According to the Commission, the euro area economy was deemed to be operating at close to, or above, its potential level in the period 2000–08. The output gap was estimated to be positive between 2000 and 2002 and between 2006

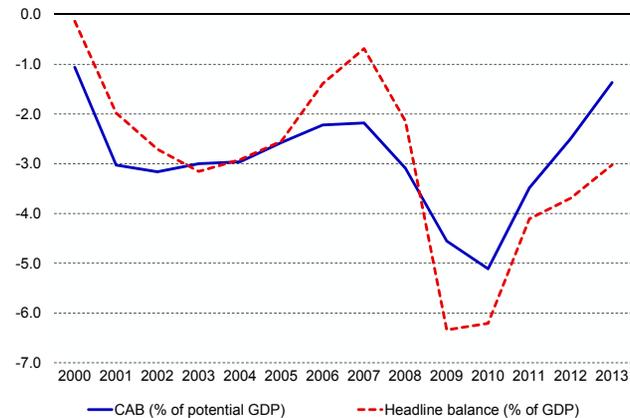
and 2008. As a result, the cyclical component in these two periods averaged just under 1 percentage point of potential GDP, implying that the cyclically adjusted deficit ratio was significantly larger than the headline deficit ratio (see Chart 1).

In contrast, as the global crisis intensified, output levels across the euro area remained below their potential throughout the period 2009–13. This implied that the cyclical component of the budget deficit was negative. Consequently, the cyclically adjusted deficit ratio for this period was around 1.3 percentage points smaller on average than the headline deficit ratio.

Turning to the domestic position, on average, Malta experienced a positive output gap in the early 2000s, until a slowdown in growth in 2004 pushed output below its trend level. Subsequently, GDP growth rebounded over the subsequent four years, so that significant positive output gaps were recorded in 2007 and 2008. In these two years, the cyclical component was large and positive so that the cyclically adjusted deficit ratio was about 0.9 percentage point higher than the headline ratio (see Charts 2 and 3).

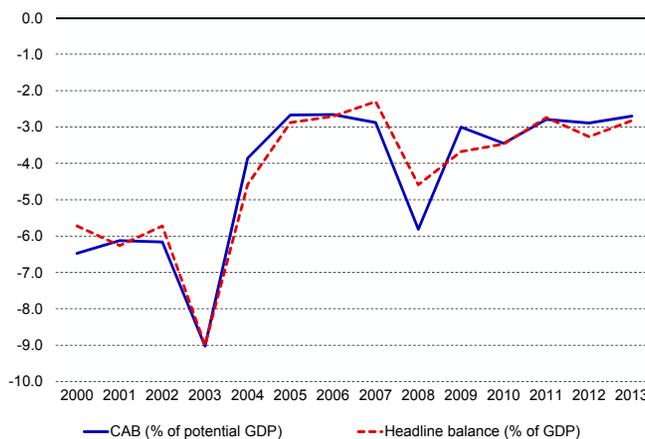
Since the onset of the recent crisis Malta experienced weaker economic growth

Chart 1
EURO AREA CYCLICALLY ADJUSTED BALANCE; COMMISSION'S APPROACH



Source: European Commission (AMECO Database).

Chart 2
MALTA CYCLICALLY ADJUSTED BALANCE; COMMISSION'S APPROACH



Source: European Commission (AMECO Database).

and the output gap turned mostly negative between 2009 and 2013. However, deviations from trend output were small compared with the past and with the euro area average, implying a relatively minor negative cyclical component; the cyclically adjusted deficit ratio was around 0.2 percentage point less than the headline deficit ratio.

An alternative CAB estimation methodology: the ESCB's approach

Apart from the Commission, other institutions, including the ESCB, also have an interest in monitoring Member States' fiscal developments. The ESCB, in accordance with economic theory, considers sound public finances as a fundamental prerequisite for a credible and effective monetary policy. In estimating the cyclically adjusted balance, the ESCB is interested in capturing the effect of changes in the composition of aggregate demand and national income on the budget balance. The ESCB utilises a different CAB estimation methodology than the one espoused by the Commission.

The ESCB's method is based on the approach developed by Bouthevillain et al, in which the cyclical component of revenue and expenditure items is derived on the basis of deviations of individual macroeconomic variables from their trends.⁵ Consequently, in this approach the CAB does not depend on the estimation of the overall output gap.

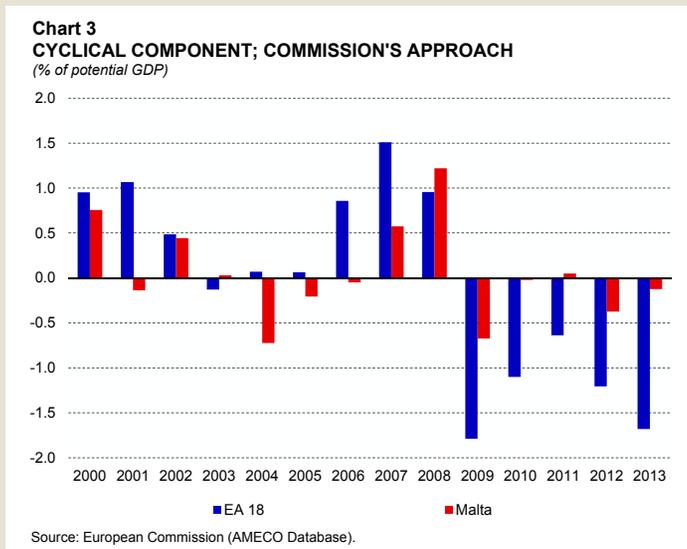
More specifically, the cyclical component of a budgetary item B_c^j is derived from the elasticity of the budget item to its respective macroeconomic base $\varepsilon_{B^j V^j}$ and the percentage deviation of the macroeconomic base from its trend, $(V^j - V^{j*})/V^{j*} = v_c^j$, such that

$$B_c^j = B^j \cdot \varepsilon_{B^j V^j} \cdot v_c^j$$

where B^j is the relevant budgetary item. The deviation of the macroeconomic base from its trend is obtained using the Hodrick-Prescott (HP) filter, while elasticity values are estimated by individual national central banks.⁶ A budgetary item may be related to more than one macroeconomic base and may also react with a lag. Should this be the case, budgetary items are linked to separate bases, each with their own elasticity values, which capture both contemporaneous and lagged responses to the deviation of each macro-base from its trend.

⁵ Bouthevillain et al, "Cyclically Adjusted Budget Balances: An Alternative Approach", WP 77, ECB, 2001.

⁶ The Hodrick-Prescott filter is a statistical tool which is used to estimate the trend of a particular series by decomposing it into its trend and cyclical components. The filter centres on the value of parameter λ , which determines the variations in the growth rate of the trend component.



The overall cyclical component of the budget balance is equal to the sum of the cyclical components on the revenue side, less the sum of the cyclical components of expenditure, principally unemployment benefits.

An assessment of estimation methods

The main advantage of the Commission's methodology, which is based on the production function, lies in the fact that changes in countries' potential output estimates can be explained with reference to economic concepts. The cyclical component, which depends on the output gap measure, is determined by applying concepts derived from standard economic theory and by using country-specific information about the structure of the economy. On the other hand, estimating the output gap using the production function is very complex and depends on an assessment of variables that are hard to measure, such as capital stock. A variety of modelling and estimation methods, as well as judgement, is often used to derive the level of potential GDP.

The cyclical component derived according to the ESCB's methodology is simpler to estimate and can be explained by deviations in individual macroeconomic bases from their trend. Therefore, unlike the Commission's approach, which is based on fluctuations in total output from potential, the ESCB's CAB captures the effects of changes in the composition of GDP, yielding a more detailed analysis. Moreover, the use of the HP filter ensures that the cyclical adjustment is conducted in a standardised manner and thus makes cross-country comparisons easier.

However, the HP filter is only a statistical tool. It also suffers from what is known as the "end point problem", in which the trend path of the series being filtered changes whenever a new data point is included in the sample. Unless the series is extended by introducing forecasts of the explanatory variables – which are by nature subject to uncertainty – the trend values for the most recent observations stand to be very volatile. In turn, this would negatively affect policy makers' ability to draw meaningful conclusions from the information at hand.

While the ESCB's method is wholly based on applying the HP filter to derive a measure of the cyclical component, the Commission makes limited use of this statistical tool in estimating some of the trend components of the production function, such as TFP.

In sum, there is no single ideal approach to estimating the CAB, as both approaches come with their particular strengths and shortcomings.

When analysing the composition of the cyclical component by breaking it down into revenue and expenditure components, the results obtained differ depending on the estimation method used. In the ESCB's method, the overall cyclical component is derived from the sum of the revenue components net of the expenditure components, or more specifically, the cyclical component of spending on unemployment benefits. As a result, the total cyclical component in the ESCB's method is shaped to a large extent by deviations of revenue items' macroeconomic bases from their trend values.

This differs from the Commission's approach, in which the size of the cyclical component depends on the value of the budgetary semi-elasticity parameter. One may recall that the latter is the weighted sum of individual revenue components' elasticity-to-GDP net of the weighted sum of expenditure components' elasticity-to-GDP. Consequently, the semi-elasticity parameter depends on the value of the revenue-to-GDP and expenditure-to-GDP ratios, which are used as weights.

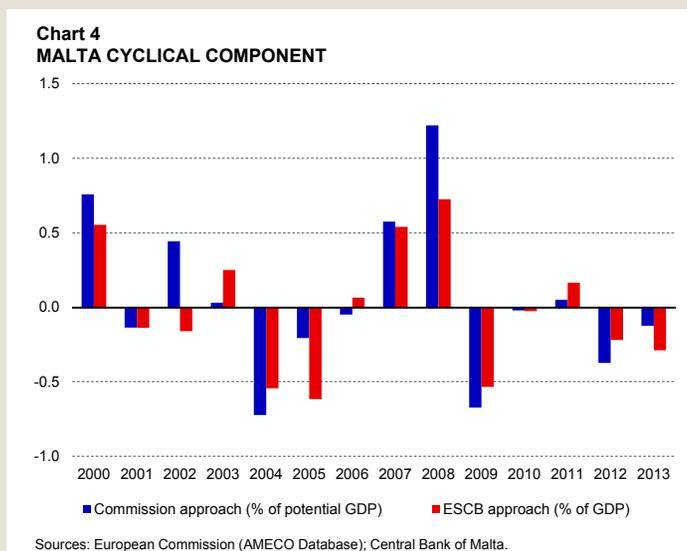
On the revenue side, since most items tend to follow the cyclical movements of GDP, any change in output will be matched by a change in the same direction in the revenue components, limiting the impact on the ratio between the two.⁷ However, given that on the expenditure side only unemployment benefits are influenced by the cycle, any changes in output lead to minor variations in the expenditure level. As a result, the expenditure-to-GDP ratio will vary more widely depending on the cyclical development in GDP. Thus, in the Commission's approach, the overall cyclical component is more sensitive to variations in the expenditure component.

Comparing CAB results: the case of Malta

This section compares the CAB series for Malta worked out using the ESCB's methodology with the balance obtained by the Commission as mentioned above. Euro area-wide comparisons are not possible since the ESCB does not publish its CAB estimates for Member States. Although for the most part the cyclical component derived from two approaches is similar, they can yield significantly different results (see Chart 4). It is important to keep in mind that the two methodologies can never be fully reconciled because the values of several key parameters, including the elasticities, are derived using different techniques. However, a large portion of this difference can be explained by the contribution of individual macroeconomic bases to the overall change in the cyclical component.

As explained above, the cyclical component derived using the ESCB's method is made up of the deviation from trend of specific macroeconomic variables, such as private consumption. As a result, it is not influenced by growth in certain GDP components, notably investment and net exports, which are omitted from the calculation. This differs from the Commission's approach, which bases its output gap estimate on GDP as a whole. For example, in 2002 the cyclical component in Malta was positive according

⁷ Mourre, G. et al, op. cit.



to the Commission's approach, led by a high contribution of net exports to GDP growth. However, this development does not feature in the ESCB's approach, which suggests that the cyclical component was actually negative in the same year. Similarly, the negative cyclical component in 2005 is significantly smaller using the Commission's approach compared with the ESCB's method, since the former is influenced by an increasing contribution of investment to output growth. For the purpose of the ESCB's method, investment – like net exports – does not yield significant tax revenues, and for that reason investment (as well as net exports) is excluded from the ESCB's approach.

Moreover, since the total cyclical component in the ESCB's method is derived mainly from the revenue items' cyclical component, it is significantly affected by deviations from trend in "tax rich" macro-bases – i.e. private sector wages and consumption. If these tax bases grow at a different pace from overall GDP, the cyclical component would differ from the one measured using the Commission's approach, which adjusts for deviation from trend in total output. This factor explains a significant part of the differences between the two cyclical component measurements throughout the period under review, and more particularly in 2003, 2006, 2008, 2011 and 2013.

Conclusion

This Box outlined the main developments in the cyclically adjusted budget balance, measured using the European Commission's approach, for the euro area and Malta for the period 2000–13. Until 2008, when output in the euro area and Malta was above potential, the cyclically adjusted deficit ratio was larger than the headline deficit ratio. In the period 2009–13 output levels across euro area countries remained below their potential. Consequently, the cyclically adjusted deficit ratio was lower than the headline deficit. This effect was much less pronounced in Malta compared with the euro area as a whole.

This Box then compared the CAB for Malta computed by the Commission with an alternative approach used by the ESCB. Although for the most part the cyclical component derived from two approaches is similar, at times these yielded different results owing to their treatment of macroeconomic variables.

There are a number of similarities in the findings of the two approaches. For example, both suggest that the main changes in the budget balance in Malta between 2000 and 2013 were a result of discretionary government policy rather than the economic cycle. During this period, the cyclically adjusted deficit ratio declined markedly, with the main developments taking place in the years immediately following Malta's entry in the European Union and the euro area, when the county was undergoing various structural and fiscal reforms.

Measuring the cyclically adjusted balance is just the first step in the evaluation of countries' underlying structural fiscal position according to the Fiscal Compact. Gauging the size and duration of temporary measures is the second step required to determine the structural balance.⁸ An assessment of both cyclical factors and temporary measures is therefore necessary to evaluate EU Member States' compliance with their fiscal obligations under EU rules.

⁸ For example, in 2003 the cyclically adjusted balance was negatively affected by one-off expenses related to the restructuring of Malta Drydocks and Malta Shipbuilding; these transactions did not affect the year's structural balance.