MEASURING THE STRUCTURAL BUDGET DEFICIT IN THE EUROPEAN UNION

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Abstract:

Changes to the institutional framework of the Treaty on Stability, Coordination and Governance put great emphasis on fiscal discipline in the European Union, especially for countries belonging to the Eurozone, but also for the accession countries. Surveillance of budgetary policies and the excessive deficit procedure are directions, which have to be followed, to meet debt limit and public deficit of gross domestic product, so as to fulfill fiscal and financial stability and economic integration.

The objectives of this paper are to analyze, using the method of estimating the structural budget deficit, the EU Member State’s ability to fulfill the requirements of fiscal and financial stability. The findings of the scientific research and the methodology used shows the potential of the 28 member states of the European Union to fulfill the requirements for fiscal and financial stability.

Keywords: structural budget deficit, output gap

JEL Classification: H60, H62

1. Introduction:

The financial rules developed and included in the Maastricht Treaty set a level of 3% of GDP for limitation of the public deficit, with the exception of temporary moderate overtaking situations due to exceptional circumstances, such as major recessions considered. The goal is that states, members of the European Union, rectify their budgets within the limits of sustainability and adopt positions that allow automatic fiscal stabilizers to work on the economic cycle.

The Stability and Growth Pact seeks the excessive deficit procedure governing the requirements and surveillance of budgetary policies and the possible application of penalties. One criticism to the requirements is that they are based on the current rate and not a structural rate of the deficit, fact that would limit the influence of government with reference to a stable fiscal policy. For this reason, the Pact establishes a medium-term budgetary position "close to balance" or surplus, which would provide sufficient flexibility during the economic cycle.

Answers on determining the limit of budgetary prudence and calculation thereof, were given during time by several researchers. Thus Brandner, et. al. (1998) [2], considering aspects of sustainability of the fiscal position should be viewed beyond the short-term effects of business cycle fluctuations, even a medium-term balance being not sufficient to exclude the risk of rising debt, in his work he presenting methods used by the European Commission (EC), the Organisation for Economic Cooperation and Development (OECD) or the International Monetary Fund (IMF) and its own method. Using time series, Hagemann (1999) [6.] describes the methodology used by the IMF to calculate the structural budget balance, as an medium-term indicator for the fiscal position. Dalsgaard, et. al (1999) [4.] quantifies, using a vector autoregression model, the maximal negative effect of the output gap and needed distance to the deficit limit, so that any state can absorb future cyclical shocks. Bouthevillain, et. al. (2001) [1.] - presents some alternative methodologies for calculating the cyclically adjusted budget balance, based on methods used by the OECD, while Camba-Mendez, et. al. (2002) [3.] use methods based on unobservable components, eliminating the disadvantages arising from annual data availability. In his work, Enache (2009) [5.], presents the results of the influence of fiscal policy on economic growth in Romania's case, between economic cycles.
2. Defining structural budget deficit

The Economic Stability and Growth Pact, adopted by the European Council in 1997, aims to avoid excessive budget deficits in the Member States, contributing to ensuring budgetary discipline and monetary stability. Thus, the Pact creates an uniform institutional framework, regulating economic policies within the European Union.

The Pact is based on the following:
- Surveillance of budgetary policies;
- Excessive deficit procedure (as corrective component): factors determining the existence of an excessive deficit refers to the evolution of the economy on medium-term (growth potential), cyclical conditions, the implementation of policies to encourage research and innovation and medium-term budgetary developments, in particular fiscal consolidation efforts in good times, respectively implementation of pension reforms;
- Requirements for budgetary frameworks of the Member States.

The Maastricht Treaty (1992) imposes a limit on the public debt of 60% of GDP and a level of budget deficit of 3% of GDP for all countries that are in stage III of the Economic and Monetary Union (EMU III). Countries that are in the third stage of EMU must meet the independence criteria of Central Banks of the Member States, but particularly satisfying convergence criterion. Meeting these criteria is a prerequisite for a Member State to move to a single currency (euro). Also acceding countries have committed to the objectives of the medium-term budgetary position, a position which must be balanced or in surplus.

Also by this Treaty shall lay down the conditions under which the deficit is considered excessive, the deficit procedure and sanctions to be imposed in case of excessive deficit. Situations are highlighted when the net deficit may exceed the limit (exceptional circumstances, with temporary causes). In other words, it outlines the need to differentiate between structural and cyclical component of the budget balance.

The tracked target to achieve medium-term objectives can be calculated in relation to the structural component. Therefore, maintaining the structural component to a balance or surplus will provide countries constrain the budget deficit to 3% of gross domestic product, under normal conditions of economic decline. However, even a balanced position would be on medium term not sufficient to exclude the risk of increased public debt.

The obligation to respect the limitations of public debt and budget deficit does not require the use an anti-cyclical fiscal policy, because structural deficits can be registered below 3% of GDP. The question is, which the maximum level is for the budget deficit, so that the government can act as a stabilizer in a recession period. The size of the public deficit depends on the size of the economic shock and the shock sensitivity and the extent to which governments want to step in and replace the automatic fiscal stabilizers.

The Treaty on Stability, Coordination and Governance, in the Economic and Monetary Union (Brussels, in 2012) is a component of economic governance in the European Union and a new effort of the authorities responsible for implementing macroeconomic policies to counter the sovereign debt crisis. At the same time, this agreement is another step towards achieving political union in the European Union.

The Treaty defines a balanced budget as a general government deficit of lower than 3.0% of gross domestic product (GDP) and a structural deficit of less than 1.0% of GDP, if the government debt to GDP is significantly below 60% - if not, it must be less than 0.5% of GDP.

Budget balance reflects the influence of both temporary factors and those permanent. However, the effects come both as a result of decisions of governments and because of the influences that cannot be directly controlled by governments. The predominant factor is the fluctuations in economic activity. The analysis of budgetary policies seeks to correct the current budget balance from cyclical influences, using indicators of cyclical adjustment of the budget balances (developed by institutions such as the European Commission, International Monetary Fund and Organisation for Economic Cooperation and Development).

The structural component of the budget balance (or structural budget balance) is an indicator used in the analysis of fiscal policy in the medium term. Its purpose is to show how the budget balance will be presented, if the economy would follow a normal growth trend, characterized by slight increases in production over the medium term. This reflected the performance of budgetary aggregates, excluding the effects of fluctuations on revenue and expenditure (effects that summarized represent the cyclical component of the budget) in economic activity.

The cyclical or temporary budget deficit is connected with the business cycle, with the period of time when the economy varies from expansion to contraction, until it begins to expand again.

The cyclical budget deficit is at the lower point of the economic cycle, when there is a lower level of productivity and higher levels of unemployment. The consequences lead to lower government revenue, from the collection of taxes, and increasing government spending, for purposes such as security and social protection, and causes deficits for an economy.

Although the cyclical component is affected by government decisions, however, is mainly influenced by national and international economic conditions, beyond the control exercised by the government.

Permanent or structural budget deficit exists regardless to the point, where there economic cycle is and it is due to an imbalance of government revenues and expenditures. Therefore, even in an expansion of the economic cycle, when earnings are high, the economy could record a deficit. The structural component of the budget plays, therefore, a good image on the financial management of the government, indicating a balance between income and long-term government spending by eliminating factors that are attributed to the economic cycle.
The structural budget deficit remains, even in periods of economic expansion, a problem for the government, being necessary to continue borrowing and thus increasing indebtedness. This will further lead to deterioration of the debt to GDP, indicator that measures the health of the economy and indicates the country's ability to pay its debts.

Structural budget deficit problems can be solved through direct and explicit government policies, which primarily involves reducing government spending or tax increases. An alternative would be to create the currency used later to extinction. This will lead to high levels of inflation, however. In both cases diminishes investment. However, structural budget deficits can be planned by governments, which employed certain categories of public expenditure to improve future production potential.

Using different models of computation and estimation of the structural deficit, it presents solutions and answers regarding the safety limit one country is assured that it will not exceed a budget deficit of 3% of GDP, given a certain probability.

3. Methodology for measuring the structural budget deficit

Estimating the output gap

Estimating the potential output monitoring the level is a difficult problem because the variable cannot be observed in statistical data (having the form of an unobservable variable). The methods used for estimating potential output can be univariate (analyzes the evolution of real GDP) and multivariate (analyzes several macroeconomic variables).

As an univariate method is used Hodrick-Prescott filter, which decomposes real GDP in potential GDP and his cyclical component, analyzing the trend dynamics, respectively changes of the data series in the past and the output gap ("output gap ").

GDP decomposition thus in is long-term trend and potential GDP, and is given by the following formula:

\[
\text{Trend PIB} = \frac{\text{PIB real} - \text{PIB potential}}{\text{PIB potential}} \times 100
\]

The method of decomposition of GDP using univariate HP filter permits determining the trend of the time series, calculating the trend as a minimum of the variance, with help of the following equations:

\[
\min_{x_t} \sum \left( (x_t - x_t^p)^2 + \lambda \left[ (x_{t+1}^p - x_t^p) - (x_t^p - x_{t-1}^p) \right]^2 \right)
\]

Where:
- \( x_t, x_t^p \) current and potential values of the variable \( x \);
- \( (x_t - x_t^p)^2 \) sum of squares of deviations of actual values of the variable \( x \) related to its trend;
- \( \lambda \left[ (x_{t+1}^p - x_t^p) - (x_t^p - x_{t-1}^p) \right]^2 \) is the function that weighted square deviations in the growth rate trend component.

If \( \lambda = 0 \), the formulation solution is limited to \( x_t = x_t^p \), in which case the filter exclude all frequencies. In the opposite case, when \( \lambda \rightarrow \infty \), the solution is limited to the minimum square.

For the method proposed in this paper was used the Butterworth filter, considering that the results of this method render more accurately the trend of a series data and hence its separation in trend and cyclical component.

\[
x_t = x_t^p + c_t
\]

Where:
\( x_t^p \) și \( c_t \) represents the trend (nonstationary and may include a nondeterministic or stochastic trend) and the cyclical component.

The Butterworth filter is a filter with two parameters. The maximum period is specified by option, so that the stochastic cycles with larger time intervals are removed and the interruption of the growth function is marked and the filter order determines the amplitude of the growth function at a certain interrupted frequency.

The Butterworth filter is used mainly for investigating economic cycles corresponding to a period of time between 1.5 and 8 years.

The Butterworth filter amplitude is given by the formula:
\[ u(\omega) = \left[ 1 + \frac{\tan \left( \omega_c / 2 \right)}{\tan \left( \omega / 2 \right)} \right]^{-1} \]  
(4.)

where:
- \( m \) is the filter order;
- \( \omega_c = \frac{2\pi}{p} \) represents the interrupted frequency;

For calculations on the 28 countries, members of the EU, were extracted quarterly data from the Eurostat website statistics and were processed using the Butterworth filter with a moving average order setting 3. The data series uses quarterly data, for the period 1991-2015, the years 2014 and 2015 were years of a GDP projection. This estimation of GDP has the role to eliminate the disadvantage on the end point of the univariate filter (at this point the filter acts unilaterally).

The obtained results for the countries, members of the EU, show an increasing trend of GDP over the period analyzed, resulting from the extraction of the cyclical component.

It is noted for countries such as Italy, Czech Republic, Hungary and Slovenia a stagnation of the GDP trend between 2008 and 2011. Countries such as Spain, Great Britain and Ireland decreased GDP, followed by a slight increase in the next period, at the end of the financial crisis. Greece, Cyprus and Croatia show a decline in economic activity generated by a decrease in gross domestic product since the second quarter of 2009. Romania has continuously increased during the period analyzed, in 2007-2012 the increase was smaller.

The results are shown visually in the graphic no. 1 and graphic no. 2.

**Estimated structural budget deficit**

In order to estimate the structural budget deficit was used a grouping of the public revenues and expenditures in five or six categories. Income and expenditures are expressed in values, having as measurement unit billion euro.

*Public revenues* were grouped into the following categories:
- Revenues from contributions;
- Revenues from indirect taxes (on consumption);
- Revenues from direct taxes (on income, profit);
- Other current revenues;
- Other public revenues.

*Public expenditures* were grouped into the following categories:
- Expenditure on social transfers;
- Final consumption expenditure (other than social transfers);
- Capital expenditures;
- Salary expenditures;
- Expenditure on subsidies;
- Other public expenditures.

In order to decompose the mentioned budgetary aggregates in cyclical and structural components, it was used, following the same methodology as for the calculation of potential GDP, the Butterworth filter.

The Butterworth filter was set at a moving average of order 3, for a better filtration of the cycle periodicity. The ideal growth function, in case of the Butterworth filter, takes the value 0 for unwanted frequencies and 1 for the desired frequencies.

The data used to estimate the structural budget deficit, at the level of the 28 member states of the EU, has used annual data for the period 1990-2015 (the values for the years 2014 and 2015 are projected values, the aim being to reduce the effect of the end points, which tends to be linear at the beginning and at the end of the time series).

The method results show, in the table no. 1, that only very few EU member states, succeed to meet 0.5% structural budget deficit of the GDP. Those are Germany, Estonia and Ireland.

Other countries such as Austria, Finland, Sweden, Denmark, Luxembourg and Bulgaria fall within 3.0% of GDP structural budget deficit, which means that there is a risk to the limit imposed by the Maastricht Treaty, if there are taken into account also the cyclical influences on the budget deficit.

During the forecast even Italy, Belgium, Lithuania, Latvia, Malta, Poland and Romania tend to reduce the structural budget deficit below 3.0%.

Large imbalance recorded Spain, France, Britain, Cyprus, Portugal, Slovenia and Ireland, highlighting the financial crisis, structural budget deficits well above 3.0% of GDP. Also for these countries, the trend is to reduce the budget deficit, so that the conditions for financial stability are met. The hardest hit was Greece, recording budget deficits above 10% of GDP, while reducing GDP by more than 2%.

In the European Union (all 28 states), according to the graphic no. 1, there is a clear tendency to reduce the structural budget deficit below 3.0% of GDP, which shows fiscal discipline and compliance with the Treaty on Stability, Coordination and Governance.
4. Conclusions

A cyclical adjustment of budget balances, is an important tool for the analysis of fiscal policies used by EU Member States and in particular for the states belonging to the Eurozone. The proposed method in this paper has the advantage of using reliable statistical data, on budgetary aggregates, to be cyclically adjusted using categories of government expenditure and revenues in a more consistent manner.

The method is not new, but follows the methodology proposed by the Hodrick-Prescott filter. The filter is used by the European Commission, the European Union and International Monetary Fund frequently to decompose the trend of the analyzed macroeconomic variable. Resorting to other statistical methods, the cyclical component is determined, present throughout the analyzed time period, to balance in the medium and long term. In this paper was applied the Butterworth filter, considering that the results of this method render more accurately the trend of data series and the separation of the cyclical component.

The method proposed in this paper can be developed by extending the analysis on the following factors: the impact of relative price movements on public finances, other revenue and public expenditure, not cyclically adjusted (such as government investments, interest payments, government consumption, aso.).

Assessments for the sustainability of fiscal policies on medium and long-term, adopted by the Member States of the European Union, can be analyzed through structural gaps (of GDP and budget deficit).

The analysis results show that, for most of the countries, the global financial crisis from 2008 caused a decline in the GDP. This crisis has escalated into a crisis of the Eurozone, causing major instability in countries such as Italy, Portugal, Spain, Greece, Ireland (effects being felt even by middle of 2013).

In the medium and long term, EU Member States should register a structural budget deficit within 1,0-1,5% of GDP, so that the actual budget deficit should not exceed 3% of GDP limit. For countries such as Greece, Ireland, Spain, France, Cyprus, UK, Poland, Portugal, Romania, Slovenia and Slovakia (in descending order) and new entrant countries (Croatia), the need for a structural surplus to minimize the risk of failure the conditions imposed by the Treaty of Maastricht (1992) can be observed.

The targets for the budget deficit in the medium and long term, considered by each Member State individually, appear to be rather conservative. In the long term it seems that even for large developed economies (France, Italy and Spain) - the budget deficit target is uncertain. A safe situation presents Germany and Austria. Also for emerging countries, it can be said that the medium-term fluctuations of the budget deficit are justified by past fluctuations of the budget deficit.

Structural deficit position for Latvia, Lithuania, Luxembourg is a better one, given the negative output gaps made by these countries.

5. Bibliography

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Annex

Graphic no. 1. *The structural budget deficit in the EU countries (28)*

*Source: own processing in STATA*
Graphic no. 2. The GDP trend in the EU (28)
Source: Eurostat and European Commission, own processing in STATA