The Portuguese Public Finances and the Spanish Horse

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Abstract

This study is based on the idea that inadequate use of fiscal policy through restrictive policies shifts the short-run demand curve that in turn induces shifts in the long-run supply curve leading to a dynamic reduction of growth. The analogy with the old metaphor of the Spanish horse seems obvious. We apply this idea to Portugal to 2002-2009, we will prove that in order not to be caught in the horse's trap we have to keep the concept of potential output in the evaluation of the structural budget balance instead of replacing it by a trend indicator, which, can lead to a sustainable reduction of the "food" and consequently to a disaster. The goal of full employment is no longer present in the idea of zero public balances. In the medium-term, the cycles will offset each other when calculated in relation to a trend and thus the same applies to budget balances as defined in the Stability and Growth Pact (SGP). If actual output moves away persistently from full employment output, trend output will also move away from full employment. As a consequence, expenditures will tend to increase and incomes to decrease. This situation creates deficits that should be corrected by the SGP. This correction will lead to a reduction in demand and thus in actual output and therefore, necessarily, in trend output itself. We present an empirical solution to this problem based on the concept of trend output in order to correct its inflection after 2002. This analysis has two drawbacks, the influence of deficits in the prices of non-tradable goods and the fact that we may not have food to give to our horse. This is the case if public debt is too high. Nevertheless, this study shows that the criteria and methods that are used by the SGP in the definition of fiscal policy are incorrect.

JEL Classification: C01, E62, H30, H63.
Key Words: Budget deficit, cyclically adjusted budget balance, fiscal policy, Hodrick-Prescott filter and output gap.

1. Introduction

This paper is based on a very simple idea. Fiscal policy by using an inadequate long-run supply curve will apply restrictive policies that by shifting the short-run demand curve will reduce actual output and will shift actual long-run supply curve to the left. The analogy with the old metaphor of the Spanish horse seems obvious: discourage the horse from eating by reducing the food supplied, the horse eats less and less and does less effort until when, without strength, the poor horse dies. We apply this idea to Portugal over the period 2002-2009, we will prove that in order not to be caught in the horse's trap we have to keep the concept of potential output in the evaluation of the structural budget balance instead of replacing it by a trend indicator, which, can lead to a sustainable reduction of the "food" and consequently to a disaster.

Two theses are presented and discussed throughout the paper. First, the limits on public deficits with the Stability and Growth Pact (SGP) do not correspond to the imposition of restrictive fiscal policies, but instead to the abandonment of an ultimate goal of economic policy: full employment. We claim that the Maastricht SGP design represents a truly rupture with fiscal policy approach in the post-war period and not just more discipline. Second, the simple choice for output trends, based on Hodrick-Prescott or production function, leads to an incorrect concept of potential output. We argue that fiscal policies tend to exacerbate the negative gaps if the potential output is assimilated to the output trend when used in fiscal policy. A few years of sluggish economic growth is just what is needed to generate that outcome.

We challenge the current design of fiscal policy that owes nothing to the policies and concepts of post-war economic policy and we show how the application of the cyclically adjusted budget balance with the currently used methods of trend output can be misleading and destabilizing.

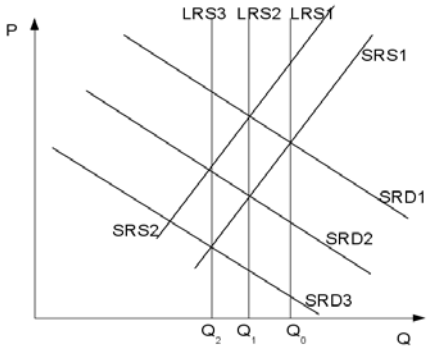
The paper is structured as follows. Section 2 discusses how the use of a poor fiscal policy indicator may lead to unintended output outcomes and also the problematic of fiscal indicators within the policy debate. Section 3 analyses the concept of cyclically adjusted budget balance; clarifies the notion of trend and output gap; explains budget expenditures and budget revenues elasticity's. Furthermore, actual balances are corrected from cyclical movements based on that information. Our empirical analysis is developed in Section 4, where we describe the data; estimate the elasticities mentioned above; compute trend output and the cyclical components of output; and propose a

computation of the cyclically adjusted budget balance based on a correction of trend output values that allow us to get closer to the concept of full employment. Finally, in Section 5, we conclude.

2. Equilibrium Output and Public Budget Deficits

Suppose that in an initial situation (Figure 1) output is Q_0, which corresponds to the quantity coordinate of the intersection point between the short-run supply curve, the short-run demand curve and the long-run supply curve, respectively SRS1, SRD1 and LRS1. For simplicity, we consider that the only policy instrument used is fiscal policy. Suppose that a shock[1] has occurred shifting the short-run supply curve to SRS2. This shift, in turn, might lead to a new long-run supply curve LRS2, associated with the new short-run equilibrium output Q_1. The LRS2 curve, not directly observable, is obtained from the short-run situation. The perceived reduction in the long-run output by decision-makers leads to restrictive demand policies. Thus, the short-run demand curve will shift from SRD1 to SRD2. This downward shift of the demand curve leads to a short-run equilibrium output lower than Q_1 and very close to Q_2. If the perceived long-run output is LRS3, then it is once again advisable a restrictive fiscal policy, as in the previous situation. And so, fiscal policy will lead to successive shifts to the left of the short-run demand curve that will continue to be interpreted as a reduction in the long-run output value.

Figure 1: Equilibrium in the Short and in the Long-Run



This is the metaphor of the "Spanish horse" applied to the global demand and

[1] For instance, the short-run supply curve moves to the left due to an unexpected rise in the price of oil or pessimist expectations among businessmen.

supply equilibrium. Why to mislead shifting equilibrium situations with long-run perceived behaviour? The horse food will be reduced gradually until it has no hunger … and dies. The methodology used by policy-makers to compute trend output leads precisely to this situation.

The picture described above hasn't always been like that. For a relative long time the concepts of trend and potential output, or full employment, were not confused. Let us begin precisely by recalling the notions of production (dimension of resources allocation), income (dimension of distribution), and expenditure (dimension of stabilisation) advocated by Musgrave (1959). The author proposed a classification of the economic functions of the State, which became a reference and which is usually confused with the classification of the public budget functions for the conduction of fiscal policy.

Richard Musgrave, one of the main advocates of the importance of fiscal policy, identified three economic functions to be performed by the public sector: i) to improve resources allocation efficiency to overcome market inefficiencies; ii) to improve equity and social justice, through income redistribution policies and promoting equal opportunities; and iii) to promote macroeconomic stability, through growth, employment and price stability policies to achieve business cycles smoothing.

Musgrave's classification can also help us to understand how fiscal policy has been conducted during recent years if it is not interpreted too restrictively. This is exactly what we propose to do by analysing the economic functions of public budget and of the main fiscal policy indicators[2].

Until the 1930's, the public budget was considered the natural financial support for the production of collective goods and services of administrative nature, such as national defence, police, education, health, etc., performing in this way the function of resources allocation. However, from the second half of the 1930's onwards, directly connected to the work of Keynes (1936) and the Keynesian tradition, the function of macroeconomic stabilisation becomes more important, gaining a predominant role. However, the emergence of the monetarist doctrine and the renewed interest in monetary policy as an instrument of economic policy led to a wave of opposition against the stabilising function by the public budget, and a rise in the importance of the budget's redistribution function.

[2] In the analysis of the main fiscal policy indicators we follow closely Boissieu (1980).

Although at any given point in time decision makers have a tendency to focus on one of the three functions proposed by Musgrave, these functions are always interlinked in public budgets. One of the most important principles of the classical budget law is the rule of the yearly budget. Public expenditures and public revenues must be applied to the same year. The corollary of this legal principle was the pursuit of a balanced budget in each year. In the early of 1930's, even before the publication of the General Theory by John Maynard Keynes, this rule was questioned in Sweden, influenced by Stockholm School authors. As an alternative to the above mentioned rule, it was proposed the so called *Swedish policy of cyclical budgets*. The underlain principle is that the budget surpluses accumulated during periods of economic expansion should be used to cover the budget deficits that occur during phases of recession. If the economic cycle is not too asymmetric, in the medium-run the intertemporal compensation between surpluses and deficits should be almost identical[3].

Another example of extension of the time horizon, more pragmatic than the Swedish one, is the one usually known as the "Tower of Julius"[4]. This was implemented in the second half of the 1950's in the Federal Republic of Germany. Under this policy, the budget surpluses were deposited by the Treasury at the central bank, forming the "Tower of Julius". They should serve, in principle, as precautionary savings, due to military spending growth that might occur. Since 1958, German rearmament was in part financed by these surpluses, thereby exercising a strong expansionary influence on the economy. This policy is an example of budget implementation that tries also to compensate the deficits with the surpluses over the economic cycle.

However, more important than the respect or not for the balanced budget, it is especially important to take into account the effects of fiscal policy on output, principles developed in the so called *functional finance*[5]. According to this policy, the government should determine the budget balance and, consequently, the amount of public debt, so that the equilibrium between both global supply and demand was exactly obtained at the point of full employment output. In turn, the Treasury should cover the budget deficit, choosing the combination between money creation and indebtedness, which allows to reach the desired interest rates and, in this way, the desired level of investment. Finally,

[3] We are thus speaking about implementing a counter-cyclical fiscal policy. This type of policy was undertaken in 1933 in Sweden, under the impulse of the Minister of Finance E. Wigforss and Stockholm economist G. Myrdal. See Hansen (1968) and Lindbeck (1975).
[4] See OCDE (1968: 37).
[5] See Lerner (1943).

the operations of money creation or money destruction should be carried out or encouraged by the Treasury, primarily to meet the two previous conditions[6]. According to this perspective, a policy based on a cyclical budget of the type implemented in Sweden does not respect at all the principles of *functional finance* since the need to fight inflation and unemployment might not lead to a budget balance compensated over the economic cycle.

The literature about fiscal indicators emerged then in the context of the fiscal policy debate. So, in order to analyse the influence of fiscal policy on the economy and on decision-makers it became necessary to build a set of indicators that provide information not only about the content of fiscal policy, but also about their effects on the main macroeconomic variables, particularly on the output.

One of these indicators is the so called *effective budget balance*[7]. The method used to compute this indicator gives equal weight to the increases (decreases) in public spending and taxes. However, according to the Haavelmo theorem this does not apply, since the public expenditure multiplier is higher than the income taxes multiplier[8]. Additionally, the effective public budget provides biased information regarding the nature of fiscal policy since it captures not only the automatic stabilisation effects of public revenues and expenditures, but also their discretionary changes. The latter are the result of deliberate actions taken by decision-makers, reflecting in this way the influence of the economy on public budget.

In order to eliminate this influence and to separate the automatic effects of fiscal policy from the discretionary ones, it became necessary to estimate, and compare over time, the values that the budget balance would take if the economy worked in a situation of full employment. This is done with the *full employment budget balance* indicator[9]. The computation of this indicator assumes that the existing relationships between the levels of income taxes and public expenditure are known. This implies also the use of a definition, necessarily conventional[10], of full employment, as well as the evaluation of full employment output or potential output. This indicator has the advantage to place emphasis on full employment output or the maximum feasible level of welfare as an ultimate goal of economic policy.

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[6] See Boissieu (1980).
[7] See Blinder and Solow (1974).
[8] See Haavelmo (1945).
[9] See Brown (1956), Heller (1966), Weydert (1968), Pascallon (1970) and Carlron (1976).
[10] Whether under the theoretical point of view, or empirical. See Boissieu (1980).

The full employment budget balance should be greater than or equal to the effective budget balance under the assumption that the effective public expenditures are virtually equal to public expenditures at the full employment output situation. Under which, in phases of expansion, the reduction of expenditures with unemployment benefits would be offset by equivalent increases in other public expenditures. Between two exercises the change in the full employment balance could then be the result of a change in potential output or in discretionary fiscal policy in order to achieve full employment.

With the rise of unemployment experienced by most countries and, in particular, by European countries, and furthermore with enlarging gaps between potential output and actual output, the use of a fiscal policy with the goal of full employment has been successively forgotten, loosing importance to the use of a cyclically adjusted budget balance as a fiscal policy indicator[11]. An indicator of this type, adjusted by cyclically fluctuations, allows a more appropriate understanding of the fiscal policy pursued by decision makers by distinguishing the discretionary component from the automatic one if the policy goal is limited to the stabilisation of output around its trend.

We witnessed in recent years to a change in the conception of fiscal policy and the type of indicators associated with it in the countries of the Euro area. They are better suited to the analysis of discretionarity, than to achieve the traditional goal of full employment[12].

The restrictions imposed by the Maastricht Treaty and by the Stability and Growth Pact (SGP) concerning fiscal policy are very illustrative of this new reality. Countries are committed to respect the budgetary goal of a position close to equilibrium or surplus in the medium-term. The application of this criterion (zero structural deficit in the medium-term) should allow the action of automatic multipliers and of discretionary fiscal policy, following the principle of balanced budget management over the economic cycle. What is relevant is that the own conception of fiscal policy as well as its goal has changed and not so much the question of having a more or less restrictive understanding of fiscal policy.

[11] See Hagemann (1999), Buchanan (1996), European Community (2003), Burnside and Meshcheryakova (2004) and Braz (2006).
[12] See, for example, Eichengreen (2003) and Werner (2006).

The implementation of a sustainable fiscal policy, conductive to achieve the goals of growth and stabilisation in European economies, should therefore imply not only the integration of common principles, but also to take into account different country evolutions of potential output over time. The Maastricht criteria are understandable in terms of the safeguard of financial stability by seeking to remove excessive pressure on capital markets in Europe. But these criteria have changed radically the conception of fiscal policy: the goal of full employment was abandoned in favour of a trend indicator that takes the output gap to be zero in the medium-term.

3. Cyclically Adjusted Budget Balance as a Policy Indicator

The abandonment of full employment as a goal for fiscal policy lead to the use, nowadays, of the fiscal policy indicator, the budget balance, which should be adjusted for cyclically changes in economic activity. This indicator has to considerer increases in expenditures resulting from a negative output gap. This increase in expenditures is in part automatic, resulting from a rise of unemployment benefits and other social transfers. The inverse is true for positive output gaps for which there will be a reduction in those expenditures. Besides, revenues will drop with negative gaps and increase with positive gaps, in an automatic and progressive way. The elimination of automatic effects on the budget balance is supposed to reckon what the government intended to do in a discretionary way. The deficits are lower because the government has implemented policies to obtain that or because we have a positive output gap? The deficit increases because the policy is expansionary or because of a negative output gap?

Recently, in 2009, Germany has changed its Constitution to prevent excessive public indebtedness (Federal Ministry of Finance (2009) and Feld and Baskaran (2010))[13]. The golden rule applied in the past, of a budget financed by public debt equivalent to public investment, did not revealed itself as an impediment to the growing State indebtedness. According to the new rule, in 2016, for the Federal State, and in 2020, for the Regional States (Länder), the budget evaluated by the structural balance[14] must be in equilibrium. By equilibrium we must understand a value up to the maximum of -0.35%. Exceptions to this rule include natural disasters and severe macroeconomic

[13] See Federal Ministry of Finance (2009) and Feld and Baskaran (2010).
[14] Corrected for cyclical fluctuations.

crisis situations[15]. The idea behind this model of constrained behaviour is that economic fluctuations must have a zero average over time, or cancel each other out. The principle of an indicator adjusted for economic fluctuations has thus gained the status of a Constitutional rule and, at the same time, the old idea of full employment budget is definitively put aside. The position expressed by the Deutsche Bundesbank is clearly against the possibility of empirical identification of asymmetric cycles due precisely to the difficulty that the existence of asymmetric cycles might create to the new fiscal rule[16]. We should also bear in mind that this rule was approved at a time when Germany was supportive of Keynesian demand policies to fight economic crisis and not at a time when Keynesian policies were challenged.

As mentioned before, the budget cyclically adjusted indicator allows an appropriate understanding of government policy by distinguishing the discretionary component from the automatic component[17]. This measure has replaced the previous concept of fiscal impulse of the International Monetary Fund (IMF)[18].

The construction of this indicator is done in two phases. In the first phase trend output values as well as cyclical values are calculated (section 3.1). In the second phase cyclical revenues and expenditures are calculated with the associated elasticities and so the actual budget balance can be corrected (section 3.1).

3.1. Trend Output and Cyclical Values

Trend output can be computed using different methods[19]. The less often used, nowadays, is based on the estimation of time series variables with ordinary linear models. However, this method is inappropriate when there are breaks in the times series that we thus need to filter. The method most widely used was suggested by Hodrick and Prescott[20] (H-P). Another method, less used, is the Baster-King filter[21], defined in terms of the domain of frequency, whose objective is to remove fluctuations of certain frequencies while maintaining other frequencies unchanged. Another method of

[15] This idea of equilibrium also aroused French economists who have proposed similar liabilities. See Fondapol (2010).
[16] "In this context, it is important to avoid making parameter and methodological changes that would induce asymmetries.", Bundesbank (2011: 57).
[17] As has been suggested by Brown (1956).
[18] See Heller, Haas and Mansur (1986) and Schinasi and Lutz (1991).
[19] See Burnside and Meshcheryakova (2004).
[20] See Hodrick and Prescott (1997).
[21] See Baxter and King (1999).

decomposition is the Beveridge-Nelson method[22]. With it the cycles turn out to have smoother evolutions and the trend is more irregular, which contradicts our idea of trend. We can also retain as a method to compute trend values, the creation of a curve that passes through the points that we assume as ceiling values of output. But in this latter case, we would be getting closer to a concept of potential output and not exactly of trend output.

The calculation of trend output by the H-P method consists in solving the following problem of minimisation, where *Y* stands for actual real GDP and *Y** for the trend

$$Min \sum_{t=1}^{T} (lnY_t - lnY^*_t)^2 \qquad (1)$$

subject to

$$\sum_{t=2}^{T-1} \left[(lnY^*_{t+1} - lnY^*_t) - (lnY^*_t - lnY^*_{t-1}) \right]^2 < \text{ò} \qquad (2)$$

ò is a number sufficiently small. The solution of that problem leads us to the minimisation of the Langrangean

$$\sum_{t=1}^{T} (lnY_t - lnY^*_t)^2 + \lambda \cdot \sum_{t=2}^{T-1} \left[(lnY^*_{t+1} - lnY^*_t) - (lnY^*_t - lnY^*_{t-1}) \right]^2 \qquad (3)$$

where, λ, stands for the Lagrange multiplier. The value assigned to this parameter is decided by the researcher but it is related to the length of the cycles associated with the series to filter.

The choice of H-P filter lies on its simplicity and the possibility of uniform application to different economies. But its use also raises problems. A first problem was pointed out by Cogley and Nason (1995): the possibility of generating spurious cycles. This problem is mitigated in our paper because we work with a series that has 50 observations, a quite reasonable number. The other problem results from the choice of the value of the parameter λ. This value is associated with the duration of the cycles, so

[22] See Beveridge and Nelson (1981).

the results obtained with its choice are already present in the option taken for its value. So, the choice of this value should be mainly pragmatic. For instance, the cycles that a growth economist is looking for are certainly not of the same duration as those a "macroeconomist of fiscal policy" is searching for[23].

In the seminal work of Hodrick and Prescott the value suggested for quarterly frequencies was 1600. For annual frequencies the preference has been for values of 400 or 100[24]. A high value of λ leads to the overestimation of the cyclical values, the so-called "leakage effect". On the other hand, a low value leads to the underestimation of those cyclical values, the so-called "compression effect". Recently it has become common to use the value of 100 for annual frequencies.

Other problems related to the H-P filter are the so-called end-points and the presence of breaks in the series to filter. As far as the first of these problems is concerned, since the determination of the trend results after all from the application of a moving average, the final values of a series no longer have values to the right and so the trend value (H-P) is close to actual values. It is thus necessary to extend the series. In general, the researchers do not care for the values to the left because they refer to a past relatively distant and the researchers are more interested in the current period. The most common practice consists in estimating ARIMA models to forecast values that will be added to the original series to which the H-P filter is going to be applied. In the case of breaks in the series, the situation is more complicated because, in addition to their identification, it is also necessary to propose a solution to eliminate them. In the present study this last problem does not occur.

An extreme case of the H-P filter use was that of Bouthevillain, et al. (2001) who considered a value for the parameter λ equal to 30. The the authors' purpose is clear when they say that they intended to have cyclical values with reduced volatility[25]. This amounts to say that they want to reduce the difference between actual budget balances and cyclically adjusted budget balances. But, doing this the idea of construction of the indicator is perfectly artificial and useless.

The European Commission proposed the use of the H-P filter as a method of calculation of trend output in order to adjust the budget balance[26]. Recently, the method

[23] An idea close to that proposed by Kaiser and Maravall (2001).
[24] See the values indicated by Baxter and King (1999).
[25] See Bouthevillain, et al. (2001:11)
[26] See European Community (1995).

used is also based on the production function[27]. The Organisation for Economic Cooperation and Development (OECD)[28] and the IMF[29] use similar methods based on the production function. Based on a Cobb-Douglas[30] function of the type $Y_t = A_t \cdot K_t^{\alpha} \cdot N_t^{1-\alpha}$ [31], they estimate trend values for the evolution of inputs and employment (through the use of the natural unemployment rate (OECD and EC) or from trend values of unemployment (IMF)). The methodology of the H-P filter is used in this organisation to estimate input trend values. In the case of the OECD, at least until recently, the estimated values could be corrected considering information specific to each country[32]. The use of the production function can eliminate the advantage of the existence of zero fluctuations in the medium-term and may create very long situations of expansion (positive gap)[33].

Once potential output is computed, the subtraction of these values from the actual values gives us the cyclical output. With these values, the revenues and expenditures associated with them are used to determine the cyclically adjusted budget balance.

3.2 Adjusting the Budget with Cycle Components

Inflation has distortionary effects on taxes and other fees that are budget revenues and has also effects on different budget expenditures not indexed to inflation and defined nominally[34]. Despite the well known effects of inflation on revenues and expenditures, these effects are generally not taken into account in the construction of the indicator that we analyse.

In general, studies are based on estimates made for periods prior to the correction to be performed and the series are normally very short and the stability of the empirical model is never studied. We will use all available data until the end of our estimates and the problem of empirical stability of the coefficients will be handled cautiously.

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[27] See D'Auria, et al. (2010).
[28] See Giorno, et al. (1995) and Girouard and André (2005).
[29] See IMF (1993) and Hagemann (1999).
[30] Japan used a CES production function. See Suyker (1999).
[31] Where *Y*, *A*, *K* and *N* represent output, the technological level, the capital stock and the workforce, respectively.
[32] See Suyker (1999).
[33] Such as 10 years for France and 13 years for the United Kingdom. See D'Auria, Denis, Havik, Morrow, Planas, Raciborski, Röger and Ross (2010) and Bundesbank (2011).
[34] See in this regard the classical contribution of Tanzi (1980) and Feldstein (1999) and the applied study to three European Countries by Immervoll (2003).

The possibility of studying the effects of the cyclical component of economic activity on revenues based on the budget law and other budget normatives may be theoretically correct, but presents great practical difficulties. This is the reason why the different methods used by international organisations for the calculation of the elasticities are based on econometric estimations.

Some of the expenditures, such as wages and other remunerations, present a pro-cyclical behaviour. However, it is understood that, in general, they result mainly from a discretionary behaviour and not from an automatic one. This is the reason why generally they are not corrected for cyclical fluctuations.

The European Commission[35] continues to calculate the elasticity of revenues which are divided into direct taxes on households, direct taxes on firms, indirect taxes and social contributions[36]. The different elasticities of these items are weighted according to their importance in total revenue. When it is justified, lags are applied to revenues. In the methodology described here, expenditures, represented by unemployment benefits, are calculated indirectly through the Okun's Law[37]. Expenditures are linked to the evolution of the unemployment rate and this, in turn, to the evolution of the economy. In this relationship, the dynamic aspects tend to be ignored. The presence of a trend in the determination of the unemployment rate gap is another element of uncertainty that is incorporated. Thus, the uncertainty associated with the formulation of this Law is included into the respective elasticity value.

Bouthevillain, et al. (2001), for the period 1970/75 to 1998, split revenues into direct taxes on households; direct taxes on firms; indirect taxes and social security contributions. They do not associate to these revenues GDP, but aggregates closer to estimated revenues: remunerations of the private sector workers; private employment; operating surplus; private consumption and unemployment. Using GDP in the estimation of budget revenues raises a problem of composition. Different revenues items depend on different macroeconomic aggregates and their aggregation can therefore generate estimation deviations[38]. The fact that in this study we propose a fully aggregated method makes the study of the stability of our estimates compulsory, as we said before.

[35] See European Community (1995) and D'Auria, Denis, Havik, Morrow, Planas, Raciborski, Röger and Ross (2010).
[36] This concept of revenues is also used by the OECD.
[37] The empirical relationship between changes in output and changes in the unemployment rate.
[38] See Langenus (1999).

In the case of expenditures, the variable generally used comprises the unemployment benefits and other social transfers.

The option for aggregate methods avoids the problems associated with multiple national specificities that more disaggregated methods eventually lead to. Our estimates involve actual values of both revenues and expenditures and of GDP. We consider that using estimates which exclude trend values eventually introduces a further element of uncertainty in the calculations, since we would have to estimate trend values prior to the analysis. Fiscal policy design takes into account the expected activity level, i.e., trend and cyclical activity level. This is the reason why we think it is preferable to use actual values in the elasticities estimations[39]. However, this practice does not solve the endogeneity problem posed by the fact that the budget revenues (and expenditures) are not only determined by the level of activity but also influence it.

The endogeneity problem can be solved by estimating VECM (vector error correction mechanism) models. But in this case, we will have some difficulty in interpreting the elasticities. Let us clarify this situation. In the first equation of the ECM equation, for example, the equation for revenues, which elasticity should we use? The values for medium-term and long-run adjustment or the short-run and long-run effects? None of these solutions is entirely appropriate.

With the estimated values of the elasticities (of the budget revenues $H=R$) and expenditures ($H=D$), the cyclical component in terms of GDP (c_H) of revenues and expenditures is determined as follows:

$$c_H = \left(\frac{H_t}{Y_t} \right) \cdot \xi_H \cdot \hat{y}_t \qquad (4)$$

where $\hat{Y} = ln(Y) - ln(Y^*)$ and ξ_H is the elasticity of H relative to output (Y), $\frac{\Delta H}{H} / \frac{\Delta Y}{Y}$.

[39] In the estimation of the values of the elasticities we will not use the method suggested by Burnside and Meshcheryakova (2004), which uses the estimated cyclical revenues based on the output gap.

4. Empirical Study Applied to the Portuguese Economy

Data was taken from the European Union database AMECO, with the exception of the series concerning public finances that were obtained from the Long-Run Series of the Portuguese central bank, Bank of Portugal, and updated with data published in various Statistical Bulletins. The unit for all the variables is billions of euros.

Elasticities are estimated (section 4.1), a new methodology for both output trend and gaps is applied (section 4.2) and finally (section 4.3) cyclically adjusted budget balance are calculated for the Portuguese economy.

4.1. Elasticities' Estimation

To compute the elasticity of expenditures we only use the item "Current Transfers" and for revenues the total of "Current Revenues". These variables were deflated by the GDP implicit price index with base year 2000. The estimates were made using the first differences of the logs of the variables of revenues and expenditures and of GDP. They are identified as DLRcuR_PRT, DLRCT_PRT, and DLYR_PRT, respectively. The values of the unemployment rate, U_PRT, are in percentage, with DU representing the increases in this variable. The high aggregation that we consider leads to problems of composition that we are aware of. However, we only intend to illustrate how we can be drifting away from full employment policies in the period in which we are living in. The estimations were made with the Newey-West correction of the standard deviations of the coefficients[40].

As fiscal policy evolved quite differently before and after the 1974 Revolution, we tried a dummy variable for the last period under analysis, the period after 1975 (Years75) and a binary dummy variable only for the year 1975 (D75). According to the estimated results, sometimes their inclusion cannot be justified. The estimations were made with all the available data.

[40] See Cottrell and Lucchetti (2011).

Table 1: Expenditures Model (1962 – 2009)

$$DLRCT\_PRT = \beta_0 DU\_PRT + \beta_1 Years75 + \grave{o}$$

DLRCT_PRT	*Coefficient*	*Standard Deviation*	*t-ratio*	*p-value*	
DU_PRT	0.0372427	0.0221001	1.685	0.0986	*
Years75	5.75874e-05	9.60424e-06	5.996	2.73e-07	***

R-squared	0.530136	Adjusted R-squared	0.520139
F(2, 47)	18.14551	P-value(F)	1.45e-06
Schwarz Criterion	-76.70345	S.E. of regression	0.104328

Table 2: Expenditures Elasticities Values at 90%

Variable	**Coefficient**	**Confidence Interval of 90%**	
DU_PRT	0.0372427	0.000160429	0.0743250
Years75	5.75874E-05	4.14722e-005	7.37026e-005

Table 1 reports the results for the model with the best Schwarz criterion and we consider it the most appropriate. In this model, expenditures depend on the unemployment rate, through its variation (first differences). In a second model, the changes of the unemployment rate are related with the evolution of the economy, which corresponds to using a version of Okun's Law. We do not follow a common practice that consists in using deviation values from natural rate of unemployment because the uncertainty associated with the elasticity would be obviously higher. Also for this reason, we must be careful with the stability of the coefficients of the estimated model. Based on the given standard deviation of the coefficient of variation of the unemployment rate, we can conclude that the 90% confidence intervals are relatively large (Table 2) confirming a problem on uncertainty even when we are aware of it.

The stability analysis of the coefficients was conducted based first on a estimation with 20 observations (see Figure 2). We can see that the coefficient associated with the temporal dummy variable looses significance, while the effect of the changes of the unemployment rate remained relatively constant. This means that the changes introduced in this type of transfers are eventually absorbed by the temporal effects. The stability tests for the coefficients, presented in the last three charts in Figure

2, correspond to tests where the null hypothesis is that of equality of coefficients between the samples analyzed. These tests are based on Chow (1960), "1-Step Chow tests", "Break-point Chow tests", and "Forecast Chow tests" and were proposed by Hendry and Doornik (2001). The respective graphs are normalised to the critical value of 5%. As can be seen by the inspection of those charts, the estimated model rejects the hypothesis of instability of the coefficients.

Figure 2: Stability of the Coefficients of the Model with Current Transfers

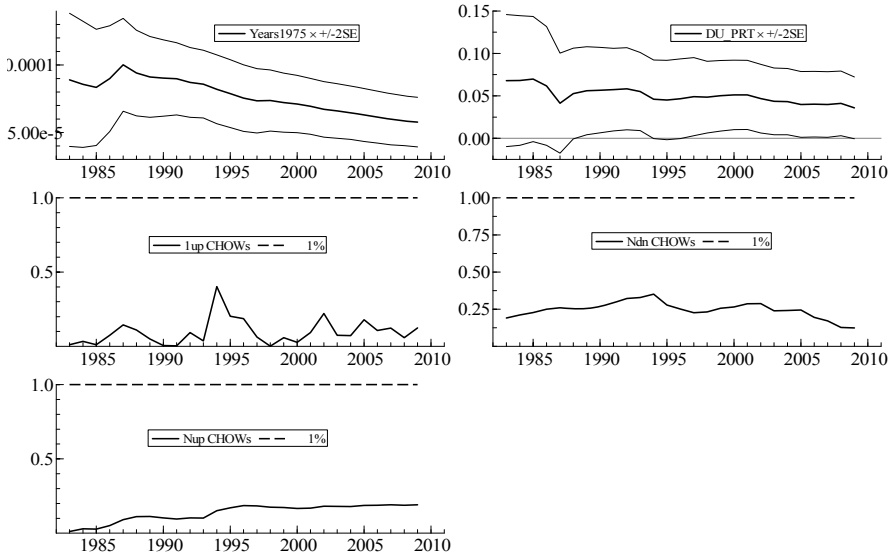


Table 3: Model with the Okun Law (1962 – 2009)

$$DU\_PRT = \beta_0 + \beta_1 DLYR\_PRT + \beta_2 DU\_PRT_1$$

DU_PRT	*Coefficient*	*Standard Deviation*	*t-ratio*	*p-value*	
Constant	0.599771	0.183890	3.262	0.0021	***
DLYR_PRT	-13.8338	4.38779	-3.153	0.0029	***
DU_PRT_1	0.407546	0.0961359	4.239	0.0001	***

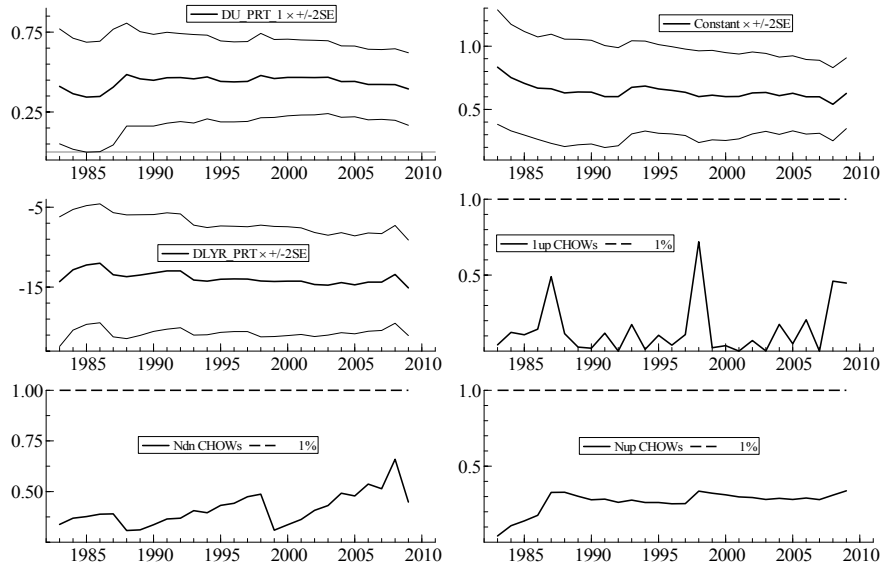
R-squared	0.469286	Adjusted R-squared	0.445699
F(2, 45)	20.34216	P-value(F)	5.09e-07
Schwarz criterion	101.0925	S.E. of regression	0.634704

Table 4: Okun Coefficients Model Values at 90%

Variable	Coefficient	Confidence Interval of 90%	
Constant	0.599771	0.290941	0.908600
DLYR_PRT	-13.8338	-21.2028	-6.46481
DU_PRT_1	0.407546	0.246093	0.569000

Tables 3 and 4 refer to the model with Okun's Law. The estimated value of the long-term coefficient of output variation is -23.3 [-13.83/(1-.407)], which corresponds to an acceptable value since the values for the unemployment rate are in percentage. If the unemployment rate values were in a decimal scale the coefficient would correspond to -0.233, a value close to those normally found in the literature.

Figure 3: Stability of the Coefficients of the Model with Okun's Law



As far as the stability of the model is concerned, we can verify that it is stable, based not only on the evolution of the coefficients presented in the first three charts in Figure 3, but also from the statistical Chow tests (the last three charts in Figure 3).

This expenditures model in two stages is necessary in order to avoid the positive association between these and output, through their rates of change. This is an empirical

device to control for what we know to be the pro-cyclical nature of fiscal policy[41] and for the natural evolution of a society that becomes "older"[42].

Now that we have the equations that allow us to adjust expenditures, we can move on to the revenues equation. The results and the graphs concerning the stability analysis are presented in Tables 5 and 6 and in Figure 4, respectively.

Table 5: Model with Current Revenues (1961 – 2009)

$$DLRcuR\_PRT = \beta_1 DLYR\_PRT + \beta_2 Years75$$

DLRcuR_PRT	*Coefficient*	*Standard Deviation*	*t-ratio*	*p-value*	
DLYR_PRT	1.2943	0.223828	5.7826	<0.00001	***
Years75	3.32856e-05	1.09789e-05	3.0318	0.00395	***

R-squared	0.641546	Adjusted R-squared	0.633919
F(2, 47)	23.88011	P-value(F)	6.98e-08
Schwarz criterion	-106.5925	S.E. of regression	0.076903

Table 6: Current Revenues Elasticities Values at 90%

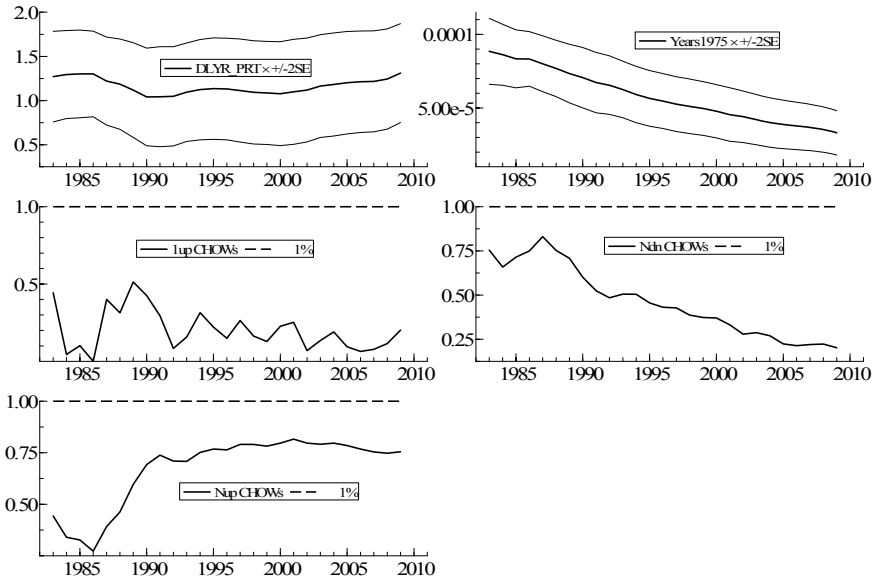
Variable	**Coefficient**	**Confidence Interval of 90%**	
DLYR_PRT	1.29430	0.918735	1.66987
Years75	3.32856e-05	1.48639e-005	5.17074e-005

Based on the results presented in Tables 5-6 and Figure 4, we can conclude that the estimated model for revenues is sufficiently robust and so we can use its estimated coefficients. The difference between the values of the elasticity of revenues relative to the values of the elasticity of expenditures reflects the normal result that the first are greater than the second (Noord (2002)).

[41] See Marinheiro (2003).

[42] See in this regard the application to the health industries of the idea of "cost disease" proposed by Baumol and Bowen (1966). The increase in life expectancy and birth rates and the weak productivity growth in health industries are partly responsible for this behaviour. However, the electoral "game" (political cycle) is also responsible for this evolution.

Figure 4: Stability of the Coefficients of the Revenues Equation



With these coefficients of both expenditures and revenues determined by the evolution of output we can correct these same items associated with cyclical fluctuations. But first we must compute output gaps.

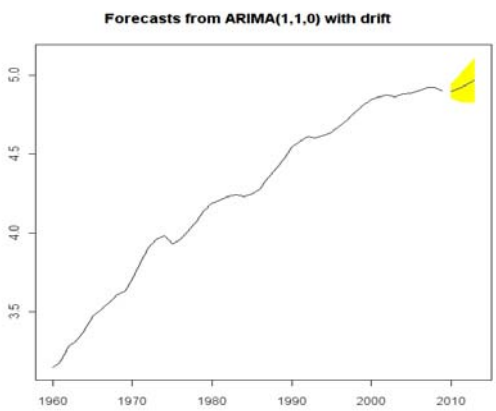
4.2. Computing Trend GDP and Output Gaps

To solve the problem of the final values of the series for real GDP in the application of the H-P filter, we used the methodology of Hyndman (2011)[43] for the selection of the best ARIMA model and for the projection of the next 4 values. The model, selected according to the Schwarz criterion is given by: $LYR\_PRT = 0.0343\,(0.0082) + 0.5397\,(.1237)\cdot LYR\_PRT_1$, with the standard deviations of the coefficients in parentheses. The value of the standard deviation of the estimation is $\sigma = \sqrt{0.0007206}$. Based on this series, that now has four more observations, we obtained the trend values (H-P). Subsequently we eliminate the 4 observations added through the method described above. Figure 5 shows the series with the additional values and the respective 90% confidence intervals and the series for the trend values.

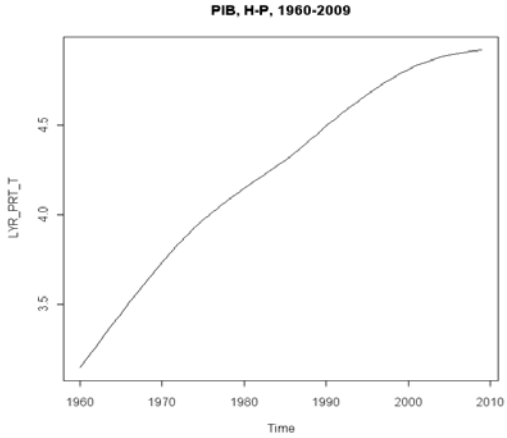
[43] See also Hyndman and Khandakar (2008).

Figure 5: Actual and Trend GDP

Actual GDP (1960-2009) and forecasts (2010-2013)



Trend GDP H-P with Lambda=100

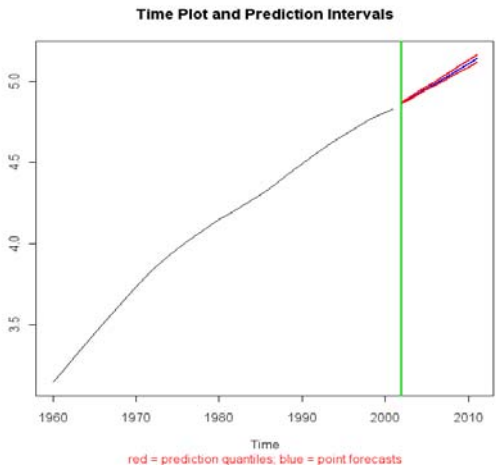


As we can see, trend GDP suffered recently (in 2002) a change in its evolution, starting to present growth rates that decrease steadily, which corresponds to a slope close to zero. Although in 2003 the growth rate of trend GDP was still 1.5%, by 2009 it was already 0.7%. One would expect, for an economy with the level of development of the Portuguese economy, a growth rate of trend GDP in general higher than 3%. The adjusted GDP trend that we computed has a growth rate of 3.1% after 2002 and it is convenient to recall that only after 1997 the growth rate of output trend was lower than the 3.1%.

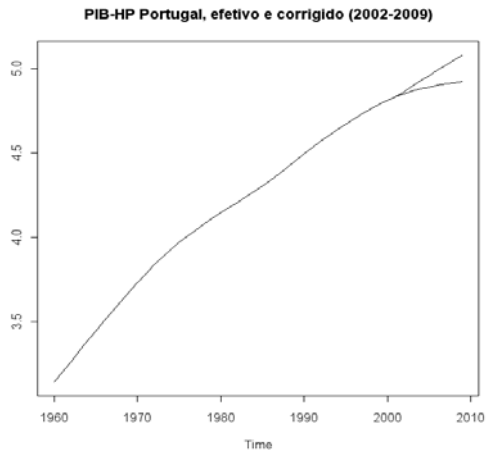
Given the evolution described above for trend GDP, we have "adjusted" its evolution by creating a series of "desirable" values for the Portuguese trend GDP. Taking into account the atypical behaviour of GDP in the period immediately after the 1974 Revolution, we forecast the trend GDP for 2002 to 2009 based on the series from 1978 to 2001. The model used for this forecast, with the GDP trend values (in logs), includes a constant, a time trend and the lagged value of the dependent variable. The aim of this lagged value is to take into account the inertia concerning the evolution of trend output. We used the procedure developed by Ki (2009) for the statistical software *R*. This procedure uses the correction of Shaman and Stine (1998) for the bias caused by the auto-regressive model and the correction of Kilian (1998) for the confidence intervals of the projection, based on 1000 bootstrap iterations, at the 90% confidence interval.

Figure 6: Trend GDP and Adjusted Trend

Trend GDP H-P (1960-2001) and forecasts (2002-2009)



Trend GDP Curves/lines (1960-2009)



As can be seen from the inspection of the two charts presented in Figure 6, the adjusted trend GDP evolution is now smoother and more in line with what we would expect for the evolution of GDP trend in Portugal to look like. Let us consider this series and relate it to the evolution of the budget balance during recent years. The values, in logs, of GDP and respective deviations are presented in Table 7.

Table 7: Values of Actual GDP, Trend GDP and Deviations

Year	LYR_PRT	LYR_PRT*	LYR_PRT*c	LYR_PRT-LYR_PRT*	LYR_PRT-LYR_PRT*c
2002	4.871	4.851	4.864	0.020	0.007
2003	4.861	4.866	4.895	−0.005	−0.034
2004	4.877	4.879	4.926	−0.002	−0.049
2005	4.884	4.890	4.957	−0.006	−0.073
2006	4.899	4.899	4.988	−0.001	−0.090
2007	4.922	4.907	5.019	0.015	−0.097
2008	4.923	4.914	5.050	0.008	−0.127
2009	4.896	4.921	5.080	−0.024	−0.184

As expected, the difference between actual GDP and the adjusted trend GDP (LYR_PRT-LYR_PRT*c) has not stopped rising, standing at 18.4% in 2009. This value is a

lot more different than the value traditionally calculated which represents a deviation of only 2.4%. The adjusted GDP trend shows output gaps much more important than those calculated with the reference to the simple H-P filter. We are going to calculate the cyclically adjusted budget balance based on these output gaps.

4.3. Calculation of the Cyclically Adjusted Budget Balance

We are now in conditions for calculating a more accurate cyclically adjusted budget balance. We have the values of the adjusted output trend and the relevant revenues and expenditures elasticities so we can compute the values that revenues and expenditures would take if the implementation of the fiscal policy intended to arrive at the adjusted trend value. Taking into account the values of actual output, we can compute the output's desired rate of change, $DLYR\_PRT^{*}_{c,t} - DLYR\_PRT_{t-1}$, and based on this value we can estimate the values of revenues and expenditures by replacing in the values of $DLYR\_PRT$. We thus obtain the budget balance corresponding to our adjusted trend output[44], as documented in Table 8.

Table 8: Budget Balance as % of GDP

Years	2002	2003	2004	2005	2006	2007	2008	2009
Budget/GDP	-2.74	-2.79	-3.25	-5.91	-3.80	-2.50	-2.73	-9.18
Budget/GDP EC-Trend	-3.8	-2.8	-3.3	-5.8	-4.2	-3.7	-3.6	-8.6
Budget/PIB EC-Pot. Output	-3.4	-2.5	-2.9	-5.4	-3.7	-3.1	-3.0	-8.2
Adjusted Budget/GDP	-3.17	0.74	1.17	-1.28	1.06	3.51	5.77	4.30

EC-Trend: Trend GDP (H-P) calculated by the European Commission (EC).

EC-Pot. Output: GDP calculated by the EC based on the production function.

According to the correction of the budget balance carried out in this paper, we get a value for the deficit in 2002 higher than in the case when the budget balance is not adjusted. After 2006, the values of the budget balance are positive and increasing (with the exception of the year 2009). In 2008, the adjusted balance represented almost a positive value of 6% of GDP and in 2009 also a positive value of 4.3%. The values after 2006 reflect an extremely restrictive policy: the budget balances are not only positive

[44] Recall that all calculations were made in real terms (at 2000 prices).

but also very high. And, as one would expect, these values are clearly distant from the values published by the EU based on the application of either of the two methods that it uses to compute trend GDP.

We thus come to the end of our Spanish Horse metaphor. As we depart from a trend closer to the idea of full employment output, expenditures are increasing and revenues decreasing making the actual budget balance increasingly negative. The same happens to the budget balances adjusted to a simple GDP trend or even to potential output based on the production function. The action of reducing the budget balance by shifting the aggregate demand curve to the left will have an impact on equilibrium output. If the value of trend output, or potential output based on the production function, depends on this reduction, the calculation of the adjusted balance will also be increasingly negative. The illusion that the equilibrium will be achieved by increasingly restrictive policies will lead to the "death of the horse": unaccustomed to eat, the economy will wither.

5. Conclusion

The aim of this study was to draw attention to the fact that the criteria of the SGP correspond not to a conservative view of fiscal policy, but rather to a deep change in the perception of this policy. The goal of full employment is no longer present in the idea of zero public balances in the medium-term when the reference for long-run output is a concept of trend GDP. In the medium-term, the cycles will offset each other when calculated in relation to a trend and thus the same applies to the budget balances as defined in the SGP. We used the metaphor of the "Spanish Horse" to emphasize the fact that if actual output moves away persistently from full employment output, trend output will also move away from full employment output. As a consequence, expenditures will tend to increase and revenues to decrease. This situation creates deficits that should be corrected by the SGP. This correction will lead to a reduction in demand and thus of actual output and therefore, necessarily, in trend output itself. This will in turn bring the economy back to the problem of an excessive deficit. The horse will become accustomed to eat nothing, little by little. We have presented a solution to this problem based on the concept of trend output in order to empirically correct its inflection after 2002. The correction proposed reconciles, in a certain sense, the concept of trend output

with the "old concept" of potential output. Based on this newly constructed output series, we calculated the values of the budget deficit adjusted for the output gap. We show evidence that the policy pursued during recent years is far from being expansionist. On the contrary, it is very restrictive contributing to moving actual output away from its full employment value.

This analysis deserves, however, two comments. The first refers to the influence of the deficit on equilibrium output. Suppose that government expenditures lead to an increase in the prices of non-tradable goods, a reasonable assumption given the type of expenditures that were made in Portugal in recent years. In this situation, the impact of public expenditures on output in an open economy like the Portuguese one (and that belongs to a monetary union) is negative. Recalling our metaphor, this means that either we kill the horse from starvation or we will give him too much strong food and he will die from indigestion. The second comment refers to the fact that we may not have food to give our horse. If public debt is too high, we will not have any money to buy him food and so he will die from starvation. Also in this situation, and unfortunately so, reality confirms this possibility.

These comments mean that it is not possible to draw economic policy implications from the exercise carried out in this study. Nevertheless, this paper shows that the criteria and methods that are used by the SGP in the definition of fiscal policy are not conceptually correct.

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