Fiscal policy in Brazil in Real Plan: pro or countercyclical?

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Abstract*: The methodology of Structural Balance Budget proposed by the IMF and OECD is applied to Brazil from 1997 to 2013 with the objective to identify the behavior of fiscal policy. This methodology, according to the international literature, is an very important instrument, once it takes into account the effect of the business cycle on public finances. The results showed that fiscal policy, as a countercyclical instrument, began to be used from 2004 or 2005, depending on the methodology. In the period in which the country suffered the greatest consequences of the subprime crisis, fiscal policy proved to be a very well used tool to mitigate the effects of the crisis. One reason for the improvement of the use of fiscal policy, at this period, was the decrease in the stock of public debt, provided by primary surpluses occurred in previous years. This results are in line with those found by public finances researchers. Thus, the pre-crisis fiscal situation has become an important element in the performance of countercyclical fiscal policies. Furthermore, both methodologies did not show large differences among themselves.*

Key-words*: Fiscal Rules, Cyclicality, Structural Budget Balance.*

JEL Codes: H62, H11, E62, F41

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Introduction

Theories of fiscal and monetary policies were developed to consider several aspects of microeconomics and macroeconomics, such as business cycle, employment, taxes, interest rates etc. One of the most important is the influence of the cycles to better understand the results of these policies. In the case of the Fiscal Balance this influence is direct, affecting both revenues and expenses. In this process a fiscal policy can both be pro as countercyclical, generating significant impacts on various economic agents.

Some authors, such as Budnevich (2002) and Auerbach (2005), suggest that in the economic cycle, fiscal policy is a very important tool, especially in recession periods. At this, the stabilizer function can be expansionary to mitigate the recessionary cycle. The opposite is also true, so that when the cycle is at the stage of prosperity, the fiscal policy should be used sparingly, since excessive government spending could cause the economy to grow above the considered normal. Thus, the government can simply reduce it's spending or else raise taxes so that the disposable income of the private sector decreases. When there are large fluctuations of the fiscal policy it is natural to see imbalances in the economy, either in prices, production activity, the labor market or foreign accounts.

Thus, the reasons for having such a persistent inflationary process, as in Brazil between the 1970s and 1980s, may be linked, at least in part, to the high public deficit. On the other hand, in the first years of the Real Plan, the Government reformulated the state, where one of the goals was the improvement of public accounts, tax control and construction of basis to price stability. It is noteworthy that this period included a fiscal effort by federal, state and municipalities, and also there was an addendum to extraordinary revenues from privatizations and concessions in several areas such as financial services, roads and electric sector.

Discretionary fiscal policy has an important role in controlling the variability of the business cycle, that is, without the use of this tool the business cycle becomes more volatile, especially in countries like Brazil, where there are additional complicating factors such as big budget rigidities where only 11% of the recipes are free, Maciel (2005). In this sense, the fiscal rule[1] becomes a key element, since it may become a barrier to ease the business cycle.

However, there is a dichotomy between the use of the fiscal policy which the main objective is to decrease the deficit bias from that used to reduce its pro cyclicality, according to Perry (2002). If the goal is just to improve public accounts the result can be a greater distance from the stage when the economy

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1 Fiscal rule is a term used to define the legal restrictions that impose limits on indicators used in the assessment of tax administration.

is in the economic cycle of its long-term level, since it ignores the effects of transitory shocks. On the other hand, if the goal is to create a strictly countercyclical fiscal tool, it can become unsustainable and unreliable, since there is the possibility that the balance of long-term debt will not be obtained. This is where comes the idea of automatic fiscal stabilizers, preventing the deficit bias of accounts and also great movement in public spending.

Another problem encountered in too rigid regimes are the changes in tax procedures, in what is called creative accounting[2] as pointed out by Milesi--Ferretti (2000). In this sense, the Structural Balance Budget (SBB) becomes an interesting option in a target regime, since there is more flexible fiscal rule, because there is the possibility of using fiscal policy to alleviate the cycle in addition to considering the effect of the cycle on public accounts. Considering the importance of fiscal policy in the macroeconomic equilibrium process, the purpose of this study is to identify whether it is possible to say that Brazil had in fact, during the Real Plan, a tax adjustment, and investigate whether fiscal policy was countercyclical in the period 1997-2013, using as a backdrop the methodology of SBB. The application of this model become more relevant after the global financial crisis, which demanded greater attention to the fiscal side of various countries and put into perspective the social problems, price stability and debt.

The application of SBB has three important aspects in the analysis of fiscal policy, as seen in Dobrescu et al. (2011). The first is to measure discretionary changes in fiscal policy. The second is to measure fiscal sustainability. And finally, there is the possibility of obtaining the stance of fiscal policy, ie, whether is expansionary or contractionary. Our findings indicate, first, that, by applying the SBB for the Brazilian economy from 2007 to 2010, a period of economic turmoil due to the subprime crisis, for example, fiscal policy was countercyclical. On the other hand, most likely due to the bias of the public deficit reduction, in the years 1998 to 2003 fiscal policy was pro-cyclical.

Besides this introduction, this paper has four sections. The first shortly explain business cycle, fiscal policy and structural budget balance through a conceptual and theoretical review. In the second section the methodology of the SBB from IMF and OECD is presented. Third section analyse Brazilian economy in the period between 1997 and 2013, and in the fourth one we comment the Brazilian SBB and principal results. Finally, the last section concludes.

1. Cycle, Fiscal policy and sbb

The theories of business cycles began to be developed from the nineteenth century and were common to relate the economic cycle with weather events,

2 Creative accounting is a process where the reality of the accounting of a particular entity is disguised. For this, the data are manipulated in order to display the desired image, Kraemer (2008).

the production of grains and their prices, according to Pustil'nik (2004). Already at that time, the visions about the causes and behavior of economic cycles were not unified, that is, there was disagreement between the studies. This was related to reasons why cycles behaved as wave movements, even among authors who shared the same basic view of how the economy worked.

As the theory incorporated cycle measurement techniques it was created a better understand of economic movements and use this in other areas. Currently, the wave behavior, cycle phases and their characteristics can be evaluated from parametric and non-parametric techniques, like Bry and Boschan (1971) and Hamilton (1989). In this case, the relationship between the theory of business cycles and fiscal policy is direct, and may be pro or countercyclical depending on how behaves the Government Budget Balance.

It is common to observe in the literature that fiscal policy is procyclical in developing economies, see Alesina et al. (2008), Mendoza and Oviedo (2006), Talvi and Végh (2005) and Ilzetski and Végh (2008). This is not only due to imperfections in the international market, but also due to political pressures. One of the reasons of procyclicality is that government revenues, independently if they come from taxes or royalties, rise in periods of boom. However, the government can not resist the seduction or political pressure to increase their spending at the same rate or greater magnitude. Thus, the increase of theses spends generally focuses on two areas of Government. The first is the public investment expenditure, while the second is the public employment.

Subprime crisis created a challenge scenario to Governments and has grown the interest in verify the relevance of fiscal policy in the economic recovery in the light of the various stimulus packages that have been implemented in developed economies. As pointed out by Dolls et al (2012) fiscal policy was a central tool in combating economic stagnation in Europe and USA. And in countries where automatic fiscal stabilizers are larger, there is a tendency for smaller fiscal stimulus packages, besides the fact that the size of this stimulus is related to the tax status of each country in the pre-crisis period. Studies on automatic fiscal stabilizers and their relationship to the cycle in Brazil indicate a small role, interfering little fluctuations in the product Rocha (2009), but that fiscal policy has a direct relationship with the political cycle, as shown in Neto et al. (2013) for data from the State of Minas Gerais in Brazil.

Confronted with evidence of a relationship between the economic cycle and fiscal policy is natural to imagine that the structural budget balance is presented as an alternative to the usual Budget Balance. Thus, the observed changes in this are not necessarily associated with changes in fiscal policy, since a worsening or improvement of the fiscal balance may simply be associated with the phase in the economic cycle. Thus, the SBB has greater scale when it comes to observing the direction of fiscal policy and the improvements or deteriorations observed in the public accounts.

In periods where the economy grows above its natural long-term trend we look for an increase in revenues simultaneously with a reduction in spending. Thus, this interpretation of Budget Balance without cyclicality adjustment could lead to misinterpretation, so that this "bonus" observed in the primary surplus can be understood as perpetual. Conversely, when the economy is below its long term trend, there will be a decline in revenues along with increased spending, which will lead to a lower primary surplus economy than if it were on its trend. Thus, Budget Balance without adjustment can't distinguish between what is cyclic and what is structural component.

It is in this sense that the methodology of the structural budget balance is presented as an interesting alternative, as in this case there will be discrimination between the structural component and the temporary. Thus, one can more easily use fiscal policy to bring the economy to its trend and organize more efficiently the expenses, especially those related to investments.

The structural budget outcome has two conventional methodologies and widely used in the international literature, the OECD, presented by Giorno et al. (1995), and the IMF, presented in Hagemann (1999). Both have been implemented in several countries, mainly from the 2000s. Worth noting that in some regions, such as Latin America, for example, the authors apply this methodology to look for what alternative was used with some innovations, such as commodity prices that have a significant impact on government revenues. Such measures are adopted in order to make better estimates, like Klemm(2014) that find evidence of procyclical fiscal policy on average of Latin America countries despite some differences. Examples of work with such modifications are Rincón et al, (2004) for Colombia and Gouvea et al (2011) for Brazil. In both the price of oil were used as element in the fiscal budget, Marcel and Tokman (2002) use copper price to estimate the structural balance in Chile, Frankel (2011) suggests that countries that have pro--cyclical fiscal policy use the tax rules to control cycles, especially if they are commodity exporters. Some examples at region of successful countercyclical fiscal policy are Chile, Mexico and Colombia. Chile determined the income tax according to the estimates of the structural balance, see Frankel (2011) and Schmidt-Hebbel(2012), obtaining satisfactory results in the stabilization of the economic cycle. Others results are Rodriguez et al (2007) and Larrain and Parro (2006) which allowed even to overcome the economic difficulties of the period of crisis during 2008-2009 and Céspedes and Velasco(2013) that showed different performance in fiscal policy between countries after international crisis.

The purpose of this work is to use the aggregate IMF methodology exposed by Dobrescu et al, (2011), and applied by Maciel (2005) for Brazil and the OECD methodology, which uses the method of disaggregated elasticities in groups, to measure the structural balance of Brazil, and is presented in Mello and Moccero (2006). Despite the some advantages of OECD methodology

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compared with the IMF, such as it is possible to observe the impact of the business cycle in diffent groups of revenues, there are greater chances of errors in the data adjustment process from the disaggregated elasticities, see Gouvea et al (2011). Therefore, in order to avoid such errors in the application of SBB we use OECD methodology proposed by Mello and Moccero (2006).

In any of the methods proposed to obtain the structural budget balance we follow three steps. In the first we estimate the potential GDP and the output gap. The second involves the quantification of the cyclical component of expenditure and government revenue. In this part we use the estimated income-elasticity product. And finally, in the third one, subtract this cyclical component of revenue and expenditure levels observed, calculating the SBB. Although split into only three steps, it is noteworthy that there are several techniques that can be used in step one to calculate potential GDP, as well as the estimated income-elasticity of the product, see Maciel (2005).

The estimation of the potential output, for example, can be obtained through a function of production[3] or the use of statistical filters. The first case usually adopts a Cobb-Douglas specification with factors capital and labor, and also may be used more generally specified as the function with constant elasticity of substitution (CES). Alternatively, the most commonly used filters for the estimation of potential GDP are the Hodrick-Prescott (HP), see Hodrick and Prescott (1997) and Ravn and Uhlig (2002), and the Kalman filter, see Harvey (1990) and Houtekamer (1998). Subtracting the cyclical part of the balance observed is done via elasticities of revenues and expenditures of the government. As stated earlier, the most widespread methods for obtaining these elasticities are the IMF and OECD proposals by Hagemann (1999) and Giorno et al. (1995), respectively. The main difference in the calculation of the SBB between these occurs exactly in the estimation of such elasticities.

It is noteworthy that, on the expenditure side, only the unemployment account are adjusted, both in OECD methodology as the IMF. In this sense, the OECD uses as a reference the level of structural unemployment, while the IMF use the unemployment rate that doesn't accelerate inflation, the NAIRU. However, as done in Marcel and Tokman (2002), Rincón et al. (2004) and Maciel (2005), this work doesn't use expenditure adjustment via IMF methodology, since spending on unemployment insurance are not representative of the total expenditures of the Federal Government[4] in Brazil.

Already at the revenue side, according to Gouveia et al (2011), the process is slightly more complex when comparing the two methods. The OECD decompose the elasticities of revenues into two components, where the first one are the elasticities of revenue with respect to their respective bases to and the

3 For a greater understanding of the estimation of potential GDP via the production function see Giorno et al. (1995).
4 In 2013, for example, the amount spent on unemployment insurance was 4.94% to the total expenditure of the Central Government. Thus, the amount spent on unemployment insurance does not quite represent 1% of GDP.

second is a coefficient that represents the elasticity of the tax base due to the economic cycle. Moreover, the IMF methodology proposes simply to estimate parameters of elasticity for each category of tax collection, see Oreng (2012).

Alternatively to the classical methodology of the IMF, also can get the elasticity revenue-product aggregate, as shown in Dobrescu et al, (2011), which is fully compatible with the work done by Hagemann (1999). The authors

emphasize that the aggregate method, in terms of results, is very similar to the model in which revenues are disaggregated. The advantage of disaggregated view is the possibility of the existence of large differences in sensitivity between groups of expenses and income with the cycle. However, because there is much information, at this point is more difficulty and there is great possibility of larger errors.

2. Structural Budget Balance (Sbb)

This section is intended to show the structural budget balance. For this, we present the aggregate IMF and the disaggregated OECD methodology. As previously mentioned, the big difference between the two methodologies is in the elasticities, so that the IMF this is obtained by the total revenue. Already from the perspective of OECD revenue is broken down into groups, so it is estimated elasticities for each income group in relation to its incidence base and then of its incidence base in relation to the output gap. Already on the expenditure side the only expense that has cyclical behavior are those related to unemployment.

2.1 IMF Methodology

The SBB, according to Dobrescu et al, (2011), can be written as in equation 3.1, where B, R and E are, respectively, the budget balance, revenues and expenses and the subscript c refers to the cyclical and s is the structural component. Thus, the sum of the cyclical components $(B_{c,t})$ and structural $(B_{s,t})$ one results in the budget balance observed in period t B_t,

$$B_t = B_{c,t} + B_{s,t} \qquad (3.1)$$

or:

$$B_t = \left(R_{c,t} - E_{c,t} \right) + \left(R_{s,t} - E_{s,t} \right) \qquad (3.2)$$

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where,

$$R_{s,t} = R_t + R_{c,t}$$

(3.3)

Note that, as argued, the result to the cyclic recipe is not available. This can be achieved through an adjustment on the observed revenue using an elasticity of revenue-product. After this we do the adjustment of expenditure via spending on unemployment insurance that diverge from the current level of unemployment and the NAIRU[5]. Thus, structural revenue is calculated in year t, given the elasticity-revenue product[6] (γ), adjusting the observed revenue and the value that reflects the gap in potential output Y_t^* with the observed product (Y_t), called (C_t), Like this:

$$R_{s,t} = R_t . (C_t)^\gamma$$

(3.4)

Where the output gap is given by:

$$C_t = \frac{Y_t^*}{Y_t}$$

(3.5)

Thus, the SBB can be described as follows:

$$SBB_t = R_{s,t} - E_{s,t}$$

(3.6)

2.2 OECD Methodology

In this proposal the elasticities are calculated on a disaggregated basis with the possibility to see the different cycles in each group of revenues. Therefore, the equation to find the SBB, as shown in Dobrescu et al (2011), is given by:

5 Authors such as Marcel and Tokman (2002), Rincón et al. (2003), Maciel (2005) and Oreng (2012), applying the structural balance for Latin American economies also do not perform adjustments on the expenditure side. For a deeper about why not make the adjustment see Gobetti et al. (2010).
6 This shows how much revenue will vary in percentage terms if the product range by 1%.

$$CAB = \left[\left(\sum_{i=1}^{N} R_i^{CA} \right) - G_{cur}^{CA} + R^{NCA} - G^{NCA} \right] \qquad (3.7)$$

Where R_i^{CA} represents the cyclical component of adjusted revenue category i, G_{cur}^{CA} represents the current primary spending adjusted by the cycle, and R^{NCA} and G^{NCA} are the revenues and expenditures that do not require cyclical adjustments.

On the revenue side, each category can be decomposed into two factors. Thus, the total elasticity $(\gamma_{Ri,Y})$ is the elasticity of revenue (R_i) in relation to its base (B_i), $\gamma_{R_i B_i}$, with the elasticity of the base relative to the output gap, $\gamma_{Bi,Y}$,

$$\gamma_{Ri,\,Y} = \gamma_{RiBi} \cdot \gamma_{Bi,Y} \qquad (3,8)$$

Applying 3.8 to find the adjusted revenue for the cyclic component of category i:

$$R_i^{CA} = R_i \left((C_t)^{\gamma_{Bi,Y}} \right)^{\gamma_{RiBi}} \qquad (3.9)$$

Note that the difference between equation 3.9, OECD proposal, and 3.4, IMF proposal, it is precisely the existence of an income elasticity of decomposed into elements i, relative to its base. The practical implication of this change is that we may have different responses of the collection in relation to the business cycle, for example, income tax, tax on production or consumption. Also decompose the elasticity of current expenditure into two factors, where the elasticity of expenditure $(\gamma_{G_{cur},\,Y})$ is the product of the elasticity of current spending (G_{cur}) with respect to their base, in this case unemployment, with respect to the output gap, as shown in 3.10:

$$\gamma_{G_{cur,\,Y}} = \gamma_{G_{cur,\,U}} \cdot \gamma_{U,Y} \qquad (3.10)$$

The decomposition can be adjusted to find the cyclic component for expenditure in category i:

$$G_{cur}^{CA} = G_{cur} \left((C_t)^{\gamma_{U,Y}} \right)^{\gamma_{G_{cur,U}}} \qquad (3.11)$$

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It is noteworthy that only costs related to unemployment insurance have been cyclical, thus other expenditure do not require adjustments. Another important difference between the methodology of the IMF and the OECD is that this applies cyclically adjusted spending from 3.11, while in the IMF proposal this is not done. Depending on this elasticity and the share of spending related to unemployment in total spending, this setting can produce very different results between the two methodologies. Notably, in a period of elevated negative shock to the economy which results in increased expenditure, especially with unemployment insurance, it is natural to imagine that the result pointed out by the OECD methodology differs from that proposed by the IMF. On the revenue side, literature usually separate the revenues into four groups: i) Personal income tax (PIT); ii) social contribution (SS); iii) corporate profits (CIT) and iv) Indirect Tax (IT),

3. Structural Budget Results

This section is divided in five parts. In the first one, it is estimate the GDP gap, where three different methods will be applied, as well as the trend GDP. It is noteworthy that the results obtained in this first section will be used for budget outcome through the methodology of the IMF and the OECD. In the second part, we estimate the elasticity of revenue-aggregated product from the perspective of the IMF, while the third shows the same under the OECD methodology. In the fourth section we estimate the structural budget balance for Brazil, besides a comparison of the two methodologies. Finally, the fifth section analysis the fiscal policy through the results from the structural budget balance in both methodologies.

3.1 Potential Output

To compare the result with the observed and structural it is essential to perform the estimation of potential output. The original series is quarterly GDP IBGE's index number. By comparing three different methods, HP, Christiano-Fitzgerald and the trend of GDP by the X-12 Arima[7] is possible to note similarities in the results for the cyclical factor. Therefore, it is chosen to use the HP filter, so this is also the most used in the literature.

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7 We call this method of TC.

3.2 Elasticity Revenue Product-Imf

The revenue data are from the Treasury Department, discounted transfers to states and municipalities. Then these values are deflated by the IPCA price to 2013 at quarterly basis and with seasonal adjustment by X-12. The regressions follows the proposed by Maciel (2005) that uses log for the elasticities. Various estimations were made with the exogenous variable log (GDP) lagged by one to two quarters, using dummy variables to control possible outliers or structural breaks and also a trend. The final equation was regressed with 68 observations and the software used was the Eviews 7.1. The main equations permormed, along with their coefficients and the main tests, can be found in the table A.1 in the Annex.

The dummies 1, 3 and 4, as seen in equation 5.1, were used to correct a problem of outlier, ie a point outside the curve that appeared in 4Q08, 3Q10 and 4Q13, respectively[8]. Thus, we used values of 0 for all quarters except precisely that quarter in outlier, which received the value of 1. Already dummy 2 was used in order to monitor the change in the exchange rate regime in the year 1999, fiscal rules and the adoption of the inflation targeting regime. Thus, this dummy was not treated as a transitory shock and received value 0 until the last quarter of 1998 and 1 from the first quarter of 1999 until the end of the period of the series.

Thus, among the estimated equations, which presents the best comparison criteria (Akaike and Schwarz), smaller statistical error of prediction (MAE, RMSE and MAPE) and significant coefficients[9], was:

$$Log(r) = \underset{(0.93)}{-0.89} + \underset{(0.22)}{1.084\log(gdp)} + \underset{(0.00)}{0.006t} + \underset{(0.03)}{0.31D1} + \underset{(0.02)}{0.08D2} + \underset{(0.03)}{0.09D3} - \underset{(0.01)}{0.03D4} \quad (5.1)$$

Where (r) is the revenue, (gdp) is GDP, t is trend and D1, D2, D3 and D4 are dummies, The LM test[10] signals for the nonexistence of autocorrelation, $LM_{(1)} = 0.16[0.68]$ and $LM_{(2)} = 0.33[0.84]$, In addition, the test $ARCH_{(1)} = 0.42[0.51]$ and can not reject the null hypothesis of homoscedasticity. As can be seen, the value found for the income-elasticity product is ɣ=1.084, between 0.62 and 1.54 at 95% significance. This value is close to that found by Maciel (2005) for Brazil, ɣ=1.025 for the period 1999-2005, Additionally, Marcel and Tokman (2002) study for Chile ɣ=1.05, also being within the range of [0.95 1.25] found by Hagemann (1999) for OECD countries.

Thus, this elasticity shows that for every 1% change in GDP has been a change

8 The tax evolution observed in this period is due to overheating of the Brazilian economy in the first half of 2010, with growth of 9.2% in the first quarter and 9.3% in the second, compared with the same period in 2009. Remember that there is a lag between actual tax payment and the triggering event.
9 Number in parentheses below each variable represents the standard deviation.
10 Numbers in brackets in this section represent the p-value.

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of 1,08% in revenues, maintaining all other variables constant. It is in this sense that Maciel (2005) points out that the value of the elasticity should be close to one, since, if the government were to raise taxes in an extreme form, the amount of revenue could exceed GDP in the long run. The dummy 2 shows a change in tax revenue from the first quarter of 1999 resulted not only in a change of the exchange rate regime, but also major changes in tax rules.

3.3 Elasticity Revenue Product-Oecd

It is noteworthy that this section, unlike section applied to the IMF, the elasticities are not estimated, but assumed. This happens due to the greater difficulty of estimation of these compared to the previous method. Thus, we use elasticities estimated by Mello and Moccero (2006) and presented in the table 5.1. It is noticed that the elasticity of the first group of revenue, ie the group regarding the personal income tax (PIT), is well above the OECD average. This indicates, according to Mello and Moccero (2006), that the personal income tax in Brazil is more progressive than in OECD countries.

Already elasticity in relation to contributions to social security (SS) is very close to the average of OECD countries. If the side of the personal income tax elasticity was well above average, when analyzing corporate income tax (CIT) is perceived that they are below the OECD average. And the last group with respect to revenue, the indirect taxes (IT), it is assumed that the elasticity refers to the group is unitary. Already in the elasticity of expenditure, it is considered just transfers related to unemployment sensitive to the cycle. Thus, Mello and Moccero (2006) found an elasticity of -0.06, indicating that the sensitivity of the expenditure in relation to the cycle in Brazil is low compared with OECD countries. The authors claim that this low sensitivity to the cycle occurs at least in part, due to a substantial informal sector.

TABLE 5.1 - ELASTICITY OF BRAZIL AND OECD AVERAGE

|	Revenue				Expenditure	Total[1]
	PIT	SS	CIT	Indirect Taxes		
Brazil	2.70	0.67	1.17	1.00	-0.06	0.32
OCDE average	1.26	0.71	1.50	1.00	-0.10	0.44

Source: Mello and Moccero (2006) for Brazil, and Girouard and Andre (2006) for the OECD average.
1. Refers to the elasticity of the structural balance to changes in the economic cycle, It is calculated as the difference between the sensitivity of the four items of income and expenditure, weighted by their respective shares of GDP in 2003.

3.4 Structural Fiscal Balance in Brazil

After the estimation of elasticity-revenue product we can use this in the rule appointed at section 3 for the Brazilian economy. The sample period comprises five presidential cycles. Graph 5.1 shows the evolution of observed revenue and structural revenues, the latter obtained by the method of the IMF and the OECD, using equation 3.4 and 3.9, respectively. The difference between them is due to removal of the cyclic factor of the revenue and the difference between the elasticities. Indeed, when the product grows above its trend, there is a portion of the revenue that comes precisely from the higher level of activity. The reverse is also true, so that when grow below trend the income level is below too. This is considered normal.

GRAPH 5. 1- OBSERVED AND STRUCTURAL REVENUE- NO. INDEX
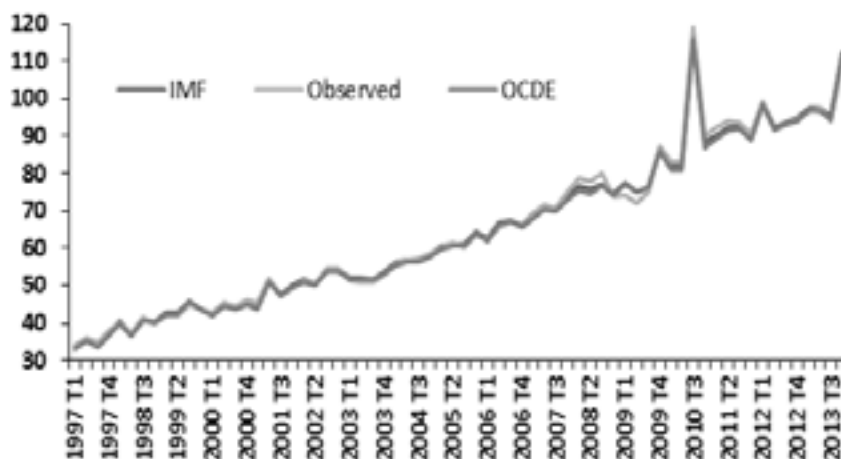
Source: Authors elaboration

Graph 5.2 shows the evolution of observed expenditure and structural, the latter referring to the OECD method, since the side of the IMF was not treated for this. The two are very similar and this occurs due to expenditure related to unemployment being very low in the composition of total expenditure[11]. Thus, as can be seen, for Brazil, the differences in results for the structural budget balance between the two methodologies are, in general, at the revenue side.

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11 On 2013, the expenses with unemployment represented less than 5% of total federal expenses.

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GRAPH 5. 2 - EXPENDITURE TRENDS OBSERVED AND STRUCTURAL
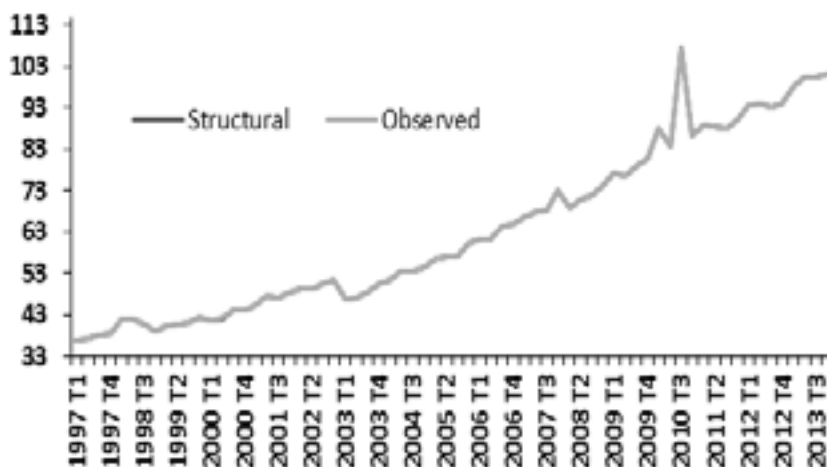
Source: Authors elaboration

With these results, is possible to estimate the structural budget balance method with the IMF using equation 3.6, since the treatment on the expenditure side is not necessary. The structural budget balance, obtained by both methods, and observed for the Brazilian economy is presented in graph 5.3. It is noticed that the structural budget balance obtained by IMF methodology is less volatile[12] than the observed and this, in turn, lower than the OECD structural balance.

[12] The standard deviation confirms that volatility of the IMF model is less volatile, while the OECD is more volatile than the balance observed. Thus, σ = 3.58 for the balance without cyclical adjustment, σ = 3.29 for the model of the IMF and σ = 4.02 for the OECD Model.

GRAPH 5. 3 - OBSERVED AND STRUCTURAL BALANCE BUDGET -% OF GDP
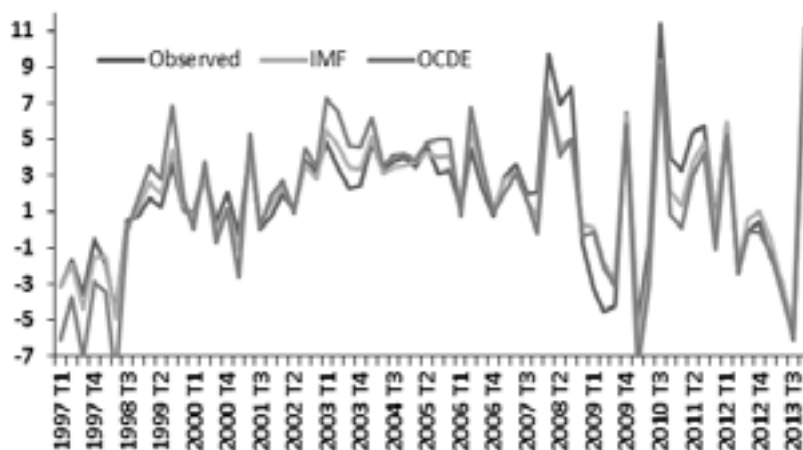
Source: Authors elaboration

Although useful for the analysis of fiscal policy, the estimated structural balance quarterly shows very little volatile and represent very little on reality, once the conduct of fiscal policy and the cyclical behavior of the economy occur over longer periods. Thus, besides the quarterly structural balance, we get the same results in annual periodicity, using both the OECD and IMF methodology, in order to compare this with the primary surplus in Federal Government. It is noteworthy that in this part we used the same elasticities presented[13] above, that is, $\varepsilon = 1.084$ for the IMF and submitted by Mello and Moccero (2006) for the OECD.

Graph 5.4 shows the ratio between potential and actual GDP and contributes to understanding structural balance. Whenever this value is less than one, this means that the country has grown above trend, that is, the potential output will be lower than the actual GDP, resulting in an additional amount of revenue, precisely because of the elasticity being greater than unity, and that will be corrected in the structural balance, which withdraws the cyclical part of the revenue. But when the opposite occurs, ie, potential GDP is greater than real GDP, and this value is greater than one, this will lead to a lower than considered normal, if there were no output gap. Thus, the points below the red line are those where there were gains arising inflow of the economic cycle, since the points above this line are the periods in which the revenue was lower due to the cycle.

Following the methodology, the years in which growth was below trend, showed lower revenues than normal periods. Thus, the structural balance is greater than that observed since the recipes do not change. And the opposite is

13 We opted to use the same elasticity since the annual period because of lack of data.

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also true, ie, in years where growth was higher than the trend we get revenues bonus resulting from this increased growth. This will cause structural balance difference that is lower than the observed primary surplus.

GRAPH 5. 4 - POTENTIAL AND EFFECTIVE GDP RATIO
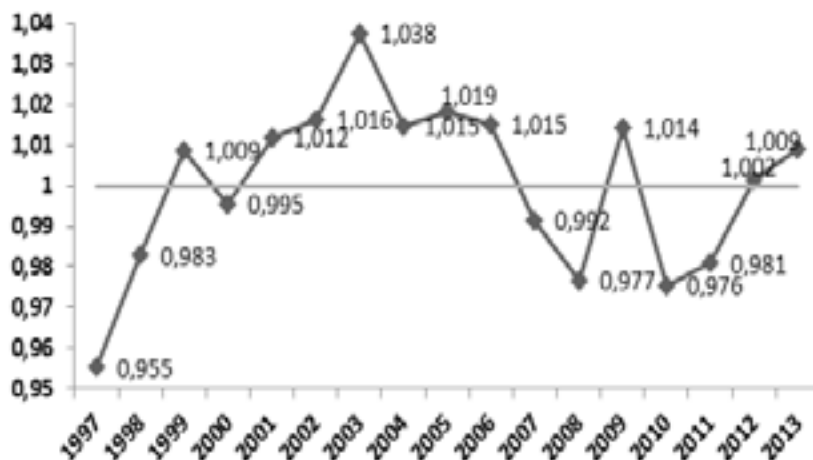
Source: Authors elaboration

Graph 5.5 shows the difference between the observed balance from the structural, ie the observed subtracted the structural, for both IMF and OECD methodology. This difference shows the amount, as a percentage of GDP, which has been added or removed from revenue. Positive values mean how the primary surplus occurred at above trend growth, not coming from the fiscal effort. Negative values represent the amount of income that was not collected because real GDP was lower than trend GDP. In this case, before the occurrence of such event the fiscal policy need toward tax effort to bring the deficit to near unity. It is noticed that this difference is, in general, between -0.50% and 0.50% of GDP. The year 1997 was a turbulent year and can be considered, therefore, an exception. Thus, the structural budget balances shows up, and very importantly, a tool that would not generate large distortions in the results obtained, as the mean difference, ie was 0% and 0.12% GDP for the model of the IMF and the OECD, respectively.

GRAPH 5. 5 - DIFFERENCE BETWEEN OBSERVED AND STRUCTURAL RESULTS (OBS-EST) % OF GDP
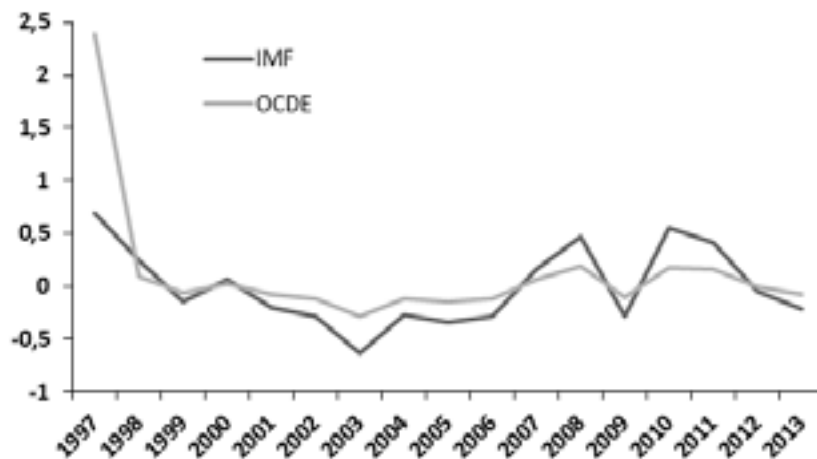
Source: Authors elaboration

4. Fiscal Expansion or Contraction?

With the SBB estimated we can get precision about fiscal policy direction with greater reliability than that obtained through the primary surplus, since, at first, the effects of the economic cycle were removed. For this, to distinguish whether fiscal policy was expansionary or contractionary, you must subtract the value of the structural budget balance of the year under the previous year. Whenever this amount is positive, fiscal policy is contractionary. Conversely, when this amount is negative, fiscal policy was expansionary. Still, one might wonder how contractionary or expansionary fiscal policy was in any year from the magnitude of this difference.

The years in which there is the greatest disparity observed between the primary surplus and the structural budget balance, both as a proportion of GDP, are those where greater distances between trend GDP and observed GDP were seen. Thus, on one hand, the year 1997 showed the largest tax receipt provided by the business cycle. On the other hand, in 2003, the opposite happened, where it failed to raise the largest amount depending on the economic cycle. This is true both for model results via IMF or OECD methodology. However, it is worth noting the magnitude of the difference between the two methodologies applied to observed outcome and structural analyzes in 1997. At this year the difference was much greater in the OECD model, compared to the IMF.

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From 1999 to 2006, except for 2000 where the economic cycle had little impact on revenues, every year had a GDP growth below the trend line, which caused the observed primary surplus smaller than the structural, since revenues were adversely affected by phase of the cycle of the economy. However, when we look from 2007 to 2011, except for 2009, where it had the greatest impact of the subprime crisis, it is noticed that the opposite occurs, and the economy grew above trend, and that observed surplus was higher than the structural, due to additional revenues from higher growth. This is true for both models, indicating no major differences in results.

The above trend in times of crisis, indicate that fiscal policy was used in a discretionary manner, contrary to cycle. Already in the last two years, 2012 and 2013, it was observed a period again where it grew less than the trend and the structural budget balance was greater than the primary surplus, signaling fiscal difficulties. It is worth noting that the cyclical effect on results in OECD model was lower than the IMF. Table 5.2 shows the average primary surplus and the structural budget balance in presidential cycles. It is noticed that the first and the last two presidential cycles had an observed primary surplus greater than the structural budget balance, since, on average, these presidential cycles had actual GDP greater than potential GDP, for both methodologies.

In the second and third presidential cycle the average primary surplus is smaller than the structural budget balance, indicating that this period the Government experienced lower tax collection where actual GDP is less than potential GDP, both for the model of the IMF and OECD. The largest observed difference occurs in the first presidential cycle, being well above the OECD model. This is due mainly to the difference observed in 1997. Accordingly, the average of five presidential cycles for the primary surplus was 1.87%, while for the structural budget balance was 1.82% and 1.64% to the model of the IMF and the OECD, respectively.

TABLE 5.2 - AVERAGE PRIMARY SURPLUS AND STRUCTURAL BUDGET BALANCE BY PRESIDENTIAL PERIOD - %

Cycle	Year	Primary S.	IMF		OECD	
			SBB[1]	Difference	SBB	Difference
1º	1997-1998	1.56	1.09	0.47	0.32	1.24
2º	1999-2002	1.68	1.82	-0.14	1.74	-0.06
3º	2003-2006	2.15	2.53	-0.39	2.31	-0.16
4º	2007-2010	2.04	1.81	0.23	1.96	0.08
5º	2011-2013	1.92	1.86	0.06	1.89	0.03
Average		1.87	1.82	0.05	1.64	0.23

Source: Authors elaboration

Regarding to the fiscal policy, it is noticed an alternation between periods of expansion and fiscal contraction, with eight years of contractionary fiscal policy and eight of expansionary, according to the IMF model. While the OECD model, we got nine years that fiscal policy was contractionary and seven with expansionary. The biggest fiscal squeeze occurred in the years 1999, 2002 and 2003, respectively, with the IMF model. But when it comes to the OECD methodology, it is observed that larger squeeze occurred in 1999, 2008 and 2010, respectively. In 1999 this fiscal tightening may be explained, probably, by the adoption of new tax rules that were imposed under the regime of inflation targeting. In 2003 this fiscal tightening may be related with a political change[14], where this bigger surplus aimed an improvement of the expectations. Already in 2010 this fiscal tightening is related to the good performance of the economy after the crisis, when GDP grew 7.5% compared with the previous year.

The larger fiscal expansions occurred in 1998 and 2009 by the IMF methodology, and 2009 and 2012 by the OECD methodology. In 1998 there was a large imbalance in the economy due to the volatility of the exchange rate. Thus, this may have been the reason for the large fiscal expansion in the year. But the OECD methodology pointed contractionary fiscal policy. In 2009 the fiscal relaxation may have occurred because of the impact of the subprime crisis, ie, a discretionary fiscal stimulus.

Table 5.3 shows the expansion or contraction, on average, of the fiscal policy in each presidential cycle. It is clear, analyzing the model of the IMF, two presidential cycles with contractionary fiscal policy, the first from 1999 to 2002 and another from 2011 to 2013. Already from 2003 to 2010, a period that includes two presidential cycles, fiscal policy was expansionary. While in the OECD model the presidential cycle, from 1999 to 2002, show that fiscal policy was contractionary. So, from 2003 to 2013 we can see that the fiscal policy was expansionary.

14 In 2003, a political party, which was opposition for a long time, won the elections of 2002. This caused some turbulences on the markets, affecting the expectations.

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TABLE 5.3 - AVERAGE TAX DIRECTION BY PRESIDENTIAL CYCLE[15]

| Presidential Cycle	IMF		OECD	
	Average $\Delta SP_t - SP_{t-1}$	Direction of Fiscal Policy	Average $\Delta SP_t - SP_{t-1}$	Direction of Fiscal Policy
1999-2002	0.46%	Contraction	0.38%	Contraction
2003-2006	-0.02%	Expansion	-0.02%	Expansion
2007-2010	-0.16%	Expansion	-0.02%	Expansion
2011-2013	0.09%	Contraction	-0.08%	Expansion

Source: Authors elaboration

Graph 5.6 shows the evolution of the economic cycle, which is obtained by dividing the potential GDP by the observed, and the direction of the IMF model of fiscal policy. The horizontal line represents the point where the potential GDP equals real GDP and fiscal policy is neutral. Therefore, values below that line represent points where real GDP is above potential GDP and also fiscal policy, compared to the previous year, was expansionary. Contrary are those where the trend GDP was higher than the actual GDP and also that fiscal policy was contractionary. When fiscal policy and the cycle are in opposite quadrants, that is, when fiscal policy is at a point below the horizontal line and cycle above we have countercyclical fiscal policy. The opposite is also true, ie when fiscal policy is above the horizontal line and the business cycle below.

Thus, from 1998 to 2003, fiscal policy was not countercyclical, ie, it did not act to stabilize the business cycle, However, from 2004 to 2012, except for 2007, fiscal policy was countercyclical, when using the IMF model. Finally, in 2013 fiscal policy was procyclical. Thus, there were eight periods where fiscal policy was countercyclical, and eight that was procyclical. However, it is noteworthy that there were years in which fiscal policy was countercyclical, but the fiscal contraction could have been higher, as in the years 2010 and 2011. Conversely, there were periods where fiscal expansion could have been greater, as the years 2004 and 2005.

15 It is emphasized that it was not called the first presidential cycle from 1997 to 1998, since it was not possible to calculate the direction of fiscal policy for the year 1997, since we had not the value of the structural budget balance of the year 1996.

GRAPH 5. 6 - BUSINESS CYCLE AND FISCAL POLICY - IMF
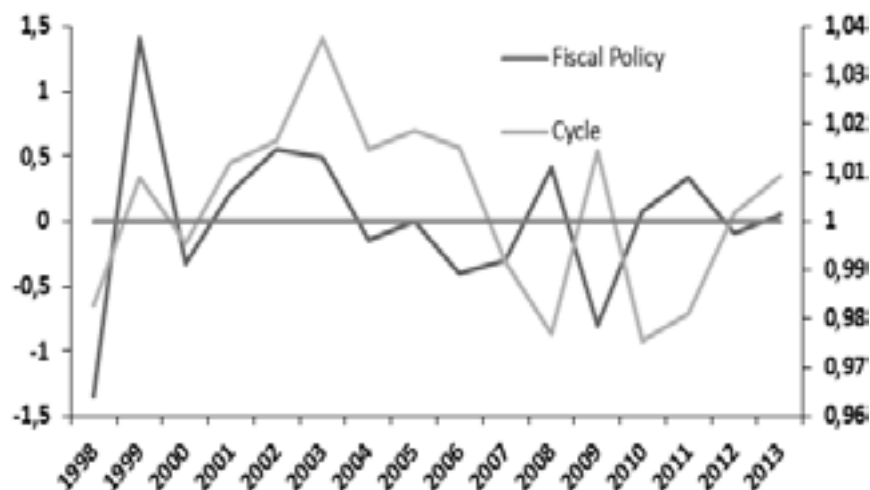
Source: Authors elaboration

Graph 5.7 shows the evolution of the economic cycle and the direction of fiscal policy using the OECD approach. It is apparent that this is very similar to that observed by the IMF method, ie, the two methodologies do not differ significantly. Thus, from 1999 to 2004 and in 2007 fiscal policy was pro--cyclical. In contrast, fiscal policy was countercyclical in 1998 and in the period 2005-2013, with the exception of 2007. There are years in which fiscal policy estimated by the OECD model might have had greater magnitude to contain the economic cycle, both for expansion, and for contraction, as we see in the IMF model. Thus, in 2005, for example, fiscal policy was almost neutral and the growth was well below trend. Conversely, in 2011, for example, the fiscal contraction could have been higher, given that GDP grew well above trend.

GRAPH 5. 7 - BUSINESS CYCLE AND FISCAL POLICY - OECD
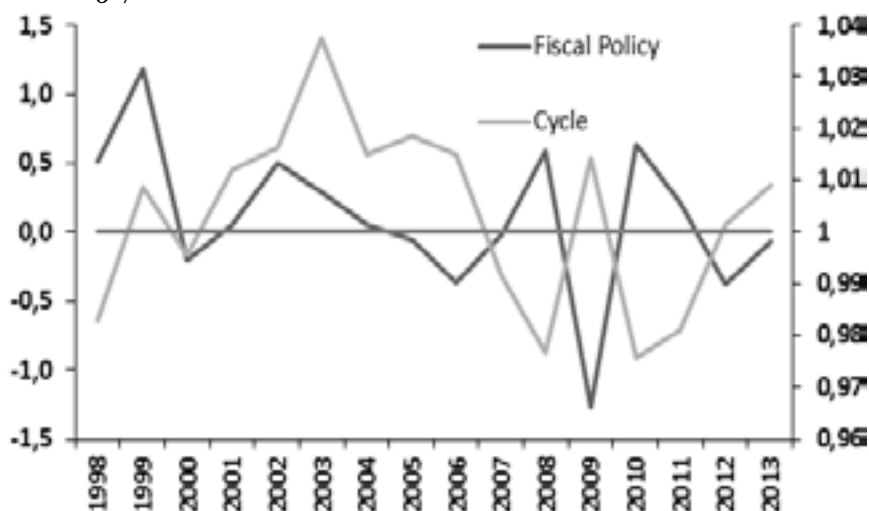
Source: Authors elaboration

Thus, when the two lines are mirrored we can say that fiscal policy fulfills its stabilizing function. In this case, the two lines should show a negative correlation. If the correlation is positive fiscal policy is procyclical. Table 5.4 shows the correlation between fiscal policy and the business cycle in each presidential cycle and in the total period for both the IMF and OECD model. We notice that, in general, in the first two presidential cycles the fiscal policy was pro-cyclical, and in the last two, oppositely, it was countercyclical.

Fiscal policy had a strong negative correlation with the business cycle, from 2007 to 2010, signaling that the government may have made changes in the behavior of revenues and expenses in order to counteract the negative effects of the subprime crisis. This applies to both models. Another important aspect is that in the IMF model the positive correlation is much stronger than the OECD in the first presidential cycle. Still, the big difference between the two models is in the correlation between fiscal policy and the cycle in the period 1998-2013. Thereby, the major difference observed between the two metodolgies is that in the model of the IMF the correlation was positive while it was negative in the OECD.

Therefore, this result is consistent with the assertion of Rocha (2009), that there was not a discretionary attempt by Brazilian authorities, between 1995 and 2005, in order to use fiscal policy to stabilize the business cycle, whereas fiscal policy, recorded through the structural result, in 2004 and 2005 was almost neutral. Evidences founded by Neto et al. (2003), that pointed that fiscal policy, in the state of Minas Gerais, was used for political gain, does not seem to fit nationwide. It's only possible to say that only in the first presidential

cycle, since 1998, an election year, it was observed a strong fiscal expansion and in 1999 there was a fiscal contraction. Moreover, this statement is only valid for the model of the IMF. In the OECD model there is no such evidence for 1998. A factor that may have been decisive in order to suppress such practices was the adoption of the Fiscal Responsibility Law in 2000.

TABLE 5.4 - CORRELATION BETWEEN FISCAL POLICY AND THE BUSINESS CYCLE

		IMF	OECD
Cycles	Years	Correlation	Correlation
1[1]	1998-2002	0.8352	0.1793
2	2003-2006	0.9371	0.7667
3	2007-2010	-0.95	-0.9973
4	2011-2013	-0.8376	-0.6900
Average	1998-2013	0.1935	-0.2822

Source: Authors elaboration

1. In this cycle, added the year 1998 to the cycle which covers the period 1999-2002.

One possible explanation for the procyclicality of fiscal policy until 2003, by IMF model, and 2004, to OECD model, is that the country was still in a period of fiscal adjustment and fiscal policy was strongly biased with the goal of stabilizing the debt[16]. Thus, with the improvement of public accounts, it was also possible to use fiscal policy to stabilize the economy, as can be seen from 2004 onwards, but more intensively since 2008. This is consistent with the Dolls et al. (2012) that performed the same for 19 EU countries and the U.S., where the previous fiscal situation before the subprime crisis had a major influence on fiscal stimulus undertaken with the intention of using fiscal policy countercyclical manner. Thus, as in Brazil's public accounts were balanced, it was possible to carry out tax incentives and exemptions to face recession.

Conclusions

Applying IMF and OECD methodologies of SBB to Brazilian economy, it was possible to see that the observed output was below than the potential from 1999 to 2006 except for the year of 2000. This meant that the structural budget balance was greater than the surplus obtained, which discards the

16 Public debt remains very high in 2013 in Latin America countries and, like pointed by Klemm(2014), this can constraint the countercyclical policy

influences of cycles. Since 2007-2011, with the exception of 2009, the opposite occurs, ie, the observed GDP was greater than potential GDP, which led to a structural budget balance smaller than the primary surplus. The last two years of the series are characterized by a lower GDP than the trend, leading to a structural budget balance greater than the primary surplus. Another use of the structural budget balance is the possibility of evaluating fiscal policy. It was found that, using the approach of the IMF, the biggest fiscal squeeze in Brazil was observed in 1999 and 2003, while the largest fiscal expansions occurred in 1998 and 2009. Already by the OECD approach, the larger squeeze occurred in 1999 and 2010, while the largest fiscal expansions were observed in the years 2009 and 2012.

On the one hand it was observed that, from 1998 to 2003 and over the years 2007 and 2013, fiscal policy was pro-cyclical using IMF model. With the OECD model, fiscal policy was pro-cyclical from 1999 to 2004 and in 2007. Moreover, it was noted that fiscal policy was countercyclical between the years 2004-2012, with the exception of 2007, using IMF model. Apllying OECD method, fiscal policy was countercyclical in 1998 and from 2005 to 2013, with the exception of 2007. Therefore, using IMF methodology we got eight years of countercyclical fiscal policy and eight pro-cyclical. While with at the OECD approach, there is seven years where fiscal policy is procyclical and nine years where it was countercyclical. One explanation for the better use of fiscal policy in the period after 2004 may be the fiscal space. This occurred due to continuous fall in the stock of public debt after 2003.

Thus, although there are some peculiarities between the two methods, in general, they showed very similar results, which reinforce the robustness of the results. Finally, the structural budget balance is presented as an important tool for assessing public finance and fiscal policy, and also appears as an alternative to the adoption of a new fiscal rule, which considers the effects of the economic cycle on public accounts. The adoption of this new fiscal rule could reconcile the strong bias of the public debt of the actual fiscal rule with the use of fiscal policy to minimize the short-term shocks. Still, the adoption of this tool could reduce cases of creative accounting that often occur in Brazil.

It is suggested for future work, re-estimate the elasticities of Mello and Moccero (2006) to compute the structural budget balance using the OECD methodology. Still, one can compute the structural budget balance excluding extraordinary income, as done by Gouvea et al (2011).

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Annex

TABLE A.1 – EQUATIONS AND ITS TEST

	EQ1	EQ2	EQ3	EQ4	EQ5	EQ6
$C(1)$	-	-1,25[0,19]	-	-	-0,7197[0,45]	-
$C(2)$	1,0833[0,00]	1,1732[0,00]	0,9294[0,00]	0,95[0,00]	1,0425[0,00]	1,0845[0,00]
$C(3)$	0,0073[0,00]	0,0064[0,00]	0,0075[0,00]	0,0074[0,00]	0,0064[0,00]	0,0069[0,00]
$C(4)$	0,3205[0,00]	0,3329[0,00]	0,3105[0,00]	0,3077[0,00]	0,3094[0,00]	0,3191[0,00]
$C(5)$	0,0725[0,00]	0,0817[0,00]	0,0824[0,00]	0,087[0,00]	0,0967[0,00]	0,0835[0,00]
$C(6)$	-	-0,050,9[0,00]	x	x	0,0966[0,01]	0,0974[0,01]
$C(7)$	x	0,0966[0,01]	x	x	x	-
R^2	0,9876	0,9889	0,986	0,986	0,9879	0,9887
AIC	-3,67	-3,75	-3,59	-3,59	-3,66	-3,70
SBC	-3,47	-3,52	-3,42	-3,43	-3,46	-3,47
HQ	-3,59	-3,66	-3,52	-3,53	-3,58	-3,61
LM(1)	0,05[0,81]	0,20[0,64]	0,13[0,71]	0,07[0,78]	0,633[0,42]	0,169[0,68]
LM(2)	0,05[0,97]	0,20[0,90]	0,16[0,92]	0,24[0,88]	0,9862[0,61]	0,3357[0,84]
ARCH(1)	0,15[0,69]	1,15[0,28]	1,58[0,2]	0,54[0,46]	0,16[0,68]	0,422[0,51]
ARCH(2)	0,46[0,79]	1,17[0,55]	2,52[0,28]	4,53[0,10]	6,94[0,03]	5,87[0,053]
RMSE	2,55	2,24	2,69	2,54	2,20	2,12
MAE	1,83	1,65	2,06	1,95	1,76	1,58
MAPE	2,74	2,58	3,07	3,01	2,85	2,58

Eq1: log(receita_sa)=c(1)+ c(2)*log(pib_sa(-1))+c(3)*@trend+c(4)*dummy1+c(5)*dummy2+c(6)*dummy5
Eq2 : log(receita_sa)=c(1)+c(2)*log(pib_sa(-1))+c(3)*@trend+c(4)*dummy1+c(5)*dummy2+c(6)*dummy5+c(7)*dummy9
Eq3: log(receita_sa)=c(1)+c(2)*log(pib_sa(-1))+c(3)*@trend+c(4) *dummy1+c(5)*dummy2
Eq4: log(receita_sa)=c(1)+c(2)*log(pib_sa)+c(3)*@trend+c(4) *dummy1+c(5)*dummy2
Eq5: log(receita_sa)=c(1)+c(2)*log(pib_sa)+c(3)*@trend+c(4)*dummy1+c(5)*dummy2+c(6)*dummy3
Eq6: log(receita_sa)=c(1)+c(2)*log(pib_sa)+c(3)*@trend+c(4)*dummy1+c(5)*dummy2+c(6)*dummy3+c(7)*dummy4

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