

ESTIMATING A STYLIZED FISCAL POLICY DSGE MODEL FOR BRAZIL**Rodrigo M. Pereira**Researcher in the Department of Macroeconomic
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In the last five years there has been a progressive decline in fiscal stances for the federal as well as sub-national governments in Brazil. The economic downturn that hit the country in 2015/2016 reduced revenues, but expenditures kept growing, in part due to an extremely rigid structure, where a large share of government expenses is earmarked for areas such as public health and education. Administrations are therefore facing a lot less maneuverability room to balance the budgets. Additionally, a highly imbalanced public pension system, with a tendency to get worse as the population ages, is straining public finances. All these issues are raising doubts about long-run debt sustainability in Brazil. It then becomes important to understand how the fiscal policy has been implemented in Brazil in the last decades. This paper enhances this understanding by using the most recent data available in order to estimate a fiscal dynamic stochastic general equilibrium (DSGE) model to Brazil.

This paper builds a DSGE model for the Brazilian economy, with the focus on fiscal policy. I consider a closed economy with a government that taxes individuals, issues bonds and sells them to domestic residents. That is the way the government pays for its expenditures. It is assumed that government expenditures are neither productivity nor welfare enhancing. They are just a necessary burden to society, much alike military expenditures, for instance (but certainly not the case of, say, public investment). The budget is not balanced at all times, but the government follows a couple of fiscal rules that are consistent with its long-run solvency.

The interest rates are the mechanism that guarantees the clearance on the market for bonds. So, the bonds supplied by the government are equivalent to their demand by the households. Initially the model is calibrated, and its characteristics are compared to the real data. Because the model is a small one, it will

not replicate with precision all the characteristics of the Brazilian economy. The model predicts, for instance, an investment slightly more volatile, and a consumption slightly smoother than the data suggests for Brazil. Moreover, because of the lack of a monetary side in the model, the predictions for the interest rates are not very accurate. On the other hand, the model replicates relatively well the fiscal variables, such as government expenditures and the primary budget. It successfully replicates a relative volatility of public expenditure to GDP of 1.3, as well as the high volatility observed in the primary budget.

The government follows two fiscal rules. The first one states that public expenditures depend on lagged output and on an autoregressive term. This dependence on the lagged output captures a possible procyclicality of the fiscal policy. The other fiscal rule refers to the average tax rate in the economy. It also has an autoregressive component, and it depends crucially on the lagged debt/GDP ratio. A positive coefficient would indicate that the fiscal policy is consistent with the intertemporal solvency of the public budget, in spite of eventual short-run imbalances. Therefore, the government would raise taxes in the eventuality of an increase of its indebtedness level.

The model is initially calibrated to the Brazilian economy, being able to replicate reasonably well some of its characteristics. The consumption in Brazil is smoother than output (unlike most of the developing economies). Investment is a bit more than three times more volatile, labor hours is about as volatile, and government expenditures are about 1.3 times more volatile than output. And the primary budget is extremely volatile. All of these characteristics of the Brazilian economy are replicated by the model. However, due to its simplicity, the model fails to replicate other characteristics, most notably related to the interest rate.

I then use Bayesian methods to estimate the model to Brazil, with 20 years of quarterly data. The parameter that relates expenditures with lagged output, which serves as a proxy of the degree of procyclicality of the fiscal policy has a negative average of its posterior distribution. That is an evidence of a predominantly countercyclical fiscal policy across those twenty years of observations. In fact, a simple Pearson correlation between government expenditures and lagged output is close to zero (but still positive). However, the observed correlation between government expenditures and current output is positive. The other parameter of interest that I estimate relates taxation to the debt/GDP ratio. The positive value found for the mean of the posterior distribution suggests that tax rates have been used in Brazil as an instrument to correct eventual deviations from a sustainable path for the public debt. The economy has been more intensely taxed after hikes on government indebtedness. However, the magnitude of this mechanism has been relatively low if compared to other international evidence.

EXECUTIVE SUMMARY