

# Understanding Fiscal Policy Shocks in Costa Rica\*

Emmanuel Aguero<sup>†</sup>

Javier Beverinotti<sup>‡</sup>

July 8, 2016

## Abstract

In this paper we employ a Structural Vector Autoregression (SVAR) technique to estimate and analyze the effects of government spending shocks on Gross Domestic Product (GDP) and the real exchange rate in Costa Rica. Our structural identification embraces that macroeconomic variables such as output and real exchange rate react immediately to fiscal policy shocks, whereas fiscal policy makers are not able to respond immediately to output shocks. Our main contribution is to find that changes in government consumption does not produce a significant effect on output and the real exchange rate. In addition, we find, through different simulations, that if the government reduces the spending rigidity, it *could* increase the contemporaneous relation between GDP and government expenditure substantially and, thus, expand the capacity of the government spending to foster economic activity.

## Introduction

The purpose of fiscal policy is to use government spending and/or taxation in order to influence the economy. Many times, it is also used as a way to smooth the economic cycle. For example, according to [Izquierdo and Manzano \(2012\)](#) and [Lagarda et al. \(2015\)](#), the majority of Central American countries increased their fiscal expenditures as a counter cyclical response to the 2008-2009 Financial Crisis. Specifically, most of these countries increased their current expenditures as a response to the crisis ([Prat and Beverinotti, 2016](#)). These new outlays were mostly channeled to rigid expenditures (i.e. salaries and non-flexible transfers). Some countries in the region are nowadays suffering from that in the form of rigid budgets. Some of these budgets, as is the case in Cost Rica, are more than 90% rigid, which means that there is very little room of maneuver for the Government. Also, it means that it would be much more difficult for these economies to navigate a crisis like the one suffered during 2008-2009 since the rigidities also reduced the fiscal space that many

---

\*Draft version. Please do not quote

<sup>†</sup>Economist at Aldesa Grupo Bursátil ([emmaguero@gmail.com](mailto:emmaguero@gmail.com))

<sup>‡</sup>Country Economist for the Central American Department at the Inter-American Development Bank ([javierbe@iadb.org](mailto:javierbe@iadb.org))

countries had before the crisis. Furthermore, the positive medium term results related to this expansionary fiscal policy are not that clear for the economies of the region, particularly in Costa Rica. In this scenario, it is important to study the reaction of the economy to fiscal shocks, both in terms of GDP reaction and in terms of other macroeconomic variables. This will help to evaluate the results that the expansionary policy had in a country like Costa Rica.

To study the reaction to fiscal shocks, we employ Structural Vector Autoregression (SVAR) techniques to estimate and analyze the effects of government spending shocks over GDP and the real exchange rate in Costa Rica. There is no consensus in the literature regarding the impact of fiscal policy on private consumption and the level of GDP. This is probably related to the characteristics of each economy and in this paper we'll study how does this work in Costa Rica, which is one of the countries that is actually suffering from the legacy of the crisis in terms of budget rigidities<sup>1</sup>.

From a theoretical point of view, there are two important approaches. The first one is the Neoclassical approach studied by [Baxter and King \(1993\)](#), in which the government purchase effect disturbs directly the consumer's wealth. Thus, from the inter temporal budget constraint, the increase in government spending today must correspond to a rise in taxation tomorrow (Ricardian Equivalence). Consequently, the negative wealth effect causes the consumer to decrease consumption and leisure, which leads to an increase in output and a depreciation of the real exchange rate. The second case is the Neokeynesian approach, which has been studied by [Galí et al. \(2007\)](#), [Monacelli and Perotti \(2008\)](#), [Lee \(2010\)](#) and [Bilbiie \(2011\)](#). In this case, a rise in government spending induces an increase in private consumption, which is positively associated with the real exchange rate. The remaining macro variables move in the same direction as in the Neoclassical approach.

Regarding the empirical evidence, [Bénétrix and Lane \(2013\)](#) and [Monacelli and Perotti \(2008\)](#) studied the impact of government spending on the real exchange rate and output, using a SVAR approach under the assumption of a small open economy. In those articles, they describe the fiscal policy shocks using only the government and public investment. They found that government spending shocks appreciates the real exchange rate and produces a transitory increase of GDP. Additionally, [Blanchard and Perotti \(2002\)](#), [Perotti \(2004\)](#) and [Gonzalez-García et al. \(2013\)](#) argues that, in order to characterize the fiscal policy shock, it is required to introduce not only the dynamic effects of government shocks but also taxation shocks. However, their model is estimated under a closed economy assumption.

This paper follows [Bénétrix and Lane \(2013\)](#) for two reasons. First, Costa Rica is a small open economy, which is very sensitive to foreign shocks. In addition, the average of the degree of openness has been around 94%<sup>2</sup> over the last 10 years, which is likely to reduce the effectiveness of government spending shocks on

---

<sup>1</sup>It is important to mention that Costa Rica already had a rigid budget before the crisis, related to constitutional mandates and different laws.

<sup>2</sup>This information comes from the World Penn Table. The degree of openness is defined as exports plus imports divided by GDP.

output as argued by Lee (2010). Thus, to evaluate the fiscal policy shocks in Costa Rica, it is necessary to estimate a model under a small open economy assumption. Second, as argued by Manzano and Gutierrez (2014), tax shocks have an insignificant effect on output (tax multiplier is close to 0) in Costa Rica, whereas general government spending contains some components (for instance CONAVI<sup>3</sup> and local governments<sup>4</sup>) that could foster economic growth more effectively. For that reason, to describe fiscal policy shocks in this country, we prefer to use only the government spending shocks as in Bénétrix and Lane (2013).

Our empirical strategy consists of computing the impact of fiscal shocks on output and real exchange rate. The basic idea behind this is to estimate the fiscal multipliers. In addition, we need to include the real exchange rate because it is a key variable for a small open economy. Furthermore, we implement a Choleski ordering to identify the fiscal policy shocks. The main result is that macroeconomic variables such as output and the real exchange rate react immediately to fiscal policy shocks, whereas fiscal policy makers are not able to respond immediately to output shocks.

The main contributions of the article is twofold. First, we find that an increase in government consumption does not produce a significant effect on output and real exchange rate. Additionally, we suggest that government spending rigidity is the cause of the ineffectiveness of the instrument. For that, we compute a simulation that shows that if government reduces its spending rigidity, it *could* increase the contemporaneous relation between GDP and government expenditure substantially and, thus, increase the effect of government spending on economic growth.

This paper is organized as follows: section II presents the empirical model. Section III shows the results and the intuition of the econometric model. Section IV explains the structure of government spendings and section V concludes.

## II. Empirical model

### VAR model

As aforementioned, the purpose of this paper is to compute a SVAR model in order to evaluate the response of output and real exchange change rate to government spending shocks. The specification of the model follows closely Bénétrix and Lane (2013), which identifies fiscal policy shocks in a small open economy.

Let's define  $x_t = [\Delta g_t, \Delta y_t, \Delta e_t]'$  as a three-dimensional vector, where  $g_t$  is the log of the government spending,  $y_t$  is the log of GDP and  $e_t$  represents the log of the real exchange rate. Thus, the vector autoregressive model is represented by the following equation:

$$x_t = \theta_0 + \theta_1 x_{t-1} + \dots + \theta_k x_{t-k} + w_t + \varepsilon_t \quad (1)$$

---

<sup>3</sup>National Roads Council in Costa Rica.

<sup>4</sup>i.e. Municipalities.

Additionally,  $\varepsilon_t = [\varepsilon_t^g, \varepsilon_t^y, \varepsilon_t^e]'$  is the vector of innovations, and  $w_t$  contains any exogenous variable in the model. In this particular case, we implement two dummy variables as exogenous. The first one captures the real depreciation of the exchange rate in 2008 due to the financial crises ( $d_{2008}$ ). The second one explains the structural change in the exchange rate regime in 2006, when the Central Bank of Costa Rica decided to introduce a soft peg regime with band fluctuations after abandoning a 20 years lasting crawling peg regime ( $d_{2006}$ ). Thus, this dummy takes the value of 1 after the third quarter of 2006, or:

$$d_{2006} = \begin{cases} 1; & \text{if } t \geq 2006Q3 \\ 0; & \text{otherwise} \end{cases}$$

### Shock Identification

According to [Perotti \(2007\)](#) and [Beetsma \(2008\)](#), the literature suggests two major methods to identify fiscal policy shocks. The first one is the ‘‘Dummy variable’’ approach developed by [Ramey and Shapiro \(1999\)](#), whereas the second imposes structural restrictions by using the procedure developed by [Blanchard and Perotti \(2002\)](#). Following the work of [Ramey and Shapiro \(1998\)](#) parts of the literature have tried to avoid the identification problem inherent in structural VAR analysis and have instead looked for scal episodes which can be seen as exogenous with respect to the state of the economy. [Ramey and Shapiro \(1998\)](#) have argued that the large increases in military spending associated with the onset of the Korean war, the Vietnam war and the Reagan military buildup can be seen as such exogenous events.

The identification approach due to [Blanchard and Perotti \(2002\)](#) relies on institutional information about tax and transfer systems and about the timing of tax collections in order to identify the automatic response of taxes and government spending to economic activity. This identification scheme relies on a two-step procedure: In the first step, the institutional information is used to estimate cyclically adjusted taxes and government expenditures. In a second step, estimates of fiscal policy shocks are obtained. [Blanchard and Perotti \(2002\)](#) applied this approach to estimate the effects of government spending and tax shocks for the United States. From the perspective of the empirical evidence, the literature prefers to follow the second method either by applying exactly the same approach as [Gonzalez-García et al. \(2013\)](#), or by creating some extensions to it, like in [Perotti \(2004\)](#) and [Monacelli and Perotti \(2008\)](#).

In our particular case the identification strategy needs to satisfy two characteristics. First, we need an equation that describes fiscal policy in Costa Rica, by taking into account that tax shocks do not have a significant effect on macroeconomic variables, whereas government spending shocks are more effective ([Manzano and Gutierrez 2014](#)). Second, a multiple equations small open economy model to capture how fiscal policy shocks affect the economic growth and the real exchange rate. Consequently we use a Choleski ordering to identify the fiscal policy shocks. Under this approach, macroeconomic variables such as output

and real exchange rate do react immediately to fiscal policy shocks, whereas fiscal policy makers cannot respond immediately to output shocks. This method is used by [Bénétrix and Lane \(2013\)](#) and [Beetsma \(2008\)](#), and it does not include tax shocks as [Monacelli and Perotti \(2008\)](#) and [Blanchard and Perotti \(2002\)](#).

Let's define the vector  $u_t = [u_t^g, u_t^y, u_t^e]'$ , which contains the structural innovations of the VAR model. Forecast errors could be expressed, using the Choleski ordering, in this way:

$$\begin{pmatrix} \varepsilon_t^g \\ \varepsilon_t^y \\ \varepsilon_t^e \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ \alpha_{gy} & 1 & 0 \\ \alpha_{ge} + \alpha_{ye} & \alpha_{ye} & 1 \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^y \\ u_t^e \end{pmatrix} \quad (2)$$

$$\varepsilon_t = Au_t \quad (3)$$

This approach restricts  $A$  to a lower triangular matrix, which implies the decomposition of the variance-covariance matrix  $\Sigma_\varepsilon = A \Sigma_u A'$ . This result is obtained from the Choleski decomposition  $\Sigma_\varepsilon = PP'$ . Additionally  $\alpha_{ij}$  captures the contemporaneous relations between the different endogenous variables, for instance, the impact of the  $i$ -th variable on the  $j$ -th variable. From an economic point of view these parameters allow to describe the non-systematic effect of the fiscal policy. Besides, according to [Blanchard and Perotti \(2002\)](#), the “*direct evidence on conduct of fiscal policy suggests that it takes policymakers and legislatures more than a quarter to learn about a GDP shock*”. Hence, the contemporaneous effect of any macroeconomic variable on the government spending is zero ( $\alpha_{yg} = \alpha_{eg} = 0$ ). Thus, the reduced-form of our model becomes:

$$x_t = \theta_0 + \theta_1 x_{t-1} + \dots + \theta_k x_{t-k} + w_t + Au_t \quad (4)$$

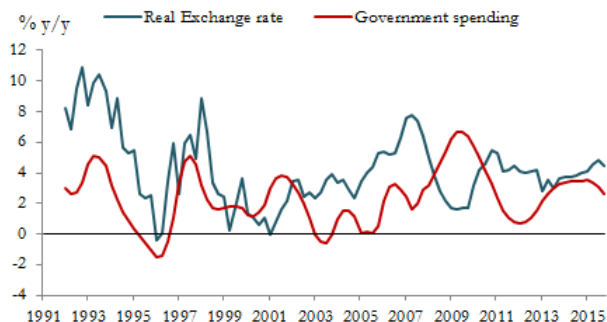
## Data

The following section presents the main variables of the empirical model and provides a preliminary insight on how the variables are correlated with each other. The underlying data for this study is provided by the Central Bank of Costa Rica. The baseline sample uses quarterly time series data for output, government spending and the real exchange rate from 1991Q1 to 2015Q4. It is important to mention that government spending is defined as current spending on goods and services by the general government<sup>5</sup>, so-called government consumption. The real exchange rate is based on the ITCER<sup>6</sup> bilateral vis-à-vis the US dollar and output is measured in levels of GDP.

<sup>5</sup>General government includes central government (ministries, parliament and other institutions), local governments and public entities.

<sup>6</sup>ITCER refers to “índice de tipo de cambio efectivo real bilateral”, which represents the index of the real effective exchange rate.

Figure 1: Variation in government spending and the real exchange rate (annual percentage changes)

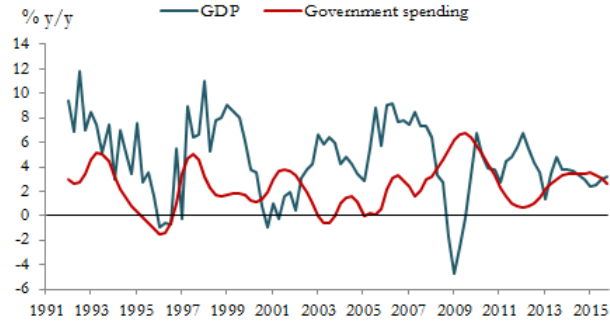


Source: Central Bank of Costa Rica.

Figure 1 shows the annual variation in government spending and the real exchange rate in Costa Rica. In the decade of the Nineties until 2006, the relationship between the two variables was positive (positive correlation coefficient), whereas it turned negative once the Central Bank introduced the inflation targeting and the more flexible exchange rate regime (negative correlation coefficient). The largest divergence between these variables can be seen with the beginning of the Financial Crisis in 2007-2008, where the growth rate in government spending increased up to 6.7% (year over year) during the third quarter of 2009, which correspond to the Arias government fiscal policies. To the contrary, the real exchange rate significantly reduced the growth rate during the crisis and its annual variation dropped from 5.0% in 2008Q1 to 1.7% in the first quarter of 2009. This downturn was mainly driven by high inflation during the crisis years. Afterwards, the trend reversed and within one year the variation in the real exchange rate reached its peak with 5.5% in 2010Q4. In the following years, the real exchange rate growth stabilizes around 4.0%, ending 2015 growing by 4.4%.

Similar business cycle behavior can be observed for the variation in government spending and the GDP level (Figure 2). Before the turn of the millennium annual changes in government spending commoved with GDP level variations, although the latter illustrates significant fluctuations. Again the relationship turns countercyclical with the burst of the Dot-Com bubble in the U.S., where GDP growth in Costa Rica was about zero percent and the variation in government spending increased up to a 6.4% in 2001Q3. After this short negative shock, the economy in Costa Rica recovered and movements turned procyclical. Yet, fluctuations in both macroeconomic variables remained. The Financial Crisis in 2007-2008 hit the economy significantly, where growth rates in GDP for the first time in decades reached a minimum low of about -4.7% in 2009Q1 and variations in government spending increased up to a 6.7% in 2009Q3. After the crisis, the GDP growth started recovering and fluctuated around 4%, whereas changes in government spending continue augmenting due to large increases in remunerations and transfers. Recently, the government has made efforts in order to control the total spending, at the end of 2015; government spending grew by 2.6%

Figure 2: Variation in government spending and in GDP level (annual percentage changes)



Source: Central Bank of Costa Rica.

against the 3.5% in 2014.

### III. Results

#### Impulse-response analysis

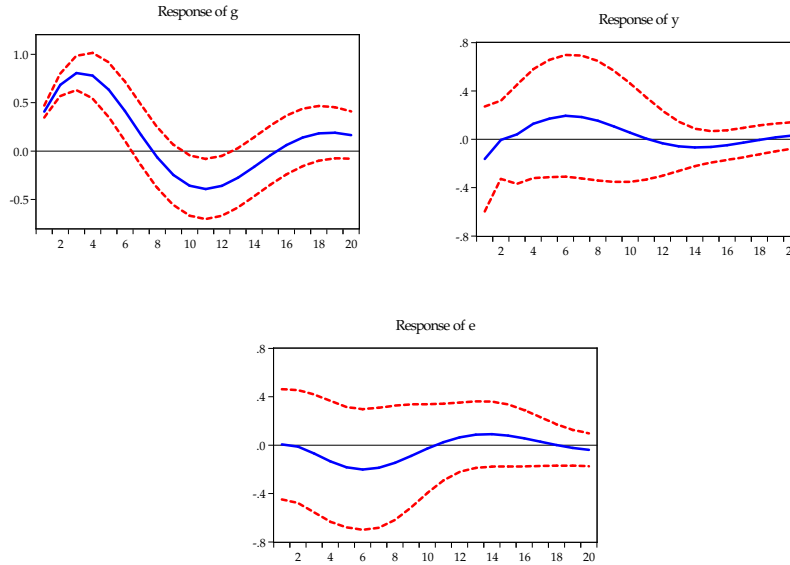
In this section we report the impulse response of a number of variables to a government spending shock. As mentioned at the beginning of this paper, the key idea is to evaluate the effectiveness of fiscal policy.

Figure 3 displays the estimated responses to a government spending shock. This shock produces a 0.36 standard deviation (s.d.) increase on GDP after 6 quarters. The effect is transitory and after the 7th quarter the response on GDP starts to decrease and becomes statistically insignificant at a 5% level. Regarding the real exchange rate, this spending shock triggers a transitory decrease in the real exchange rate (appreciation) followed by expectations of future increases on this variable (depreciation). The bottom is reached in the 5th quarter with a value of -0.28 s.d., while the peak is in the 19th quarter with a 0.19 s.d.

Figure A in the appendix presents the accumulated response of GDP in order to transform the variables in differences to the level of GDP. We find a 2 s.d increase in this variable after a government spending shock, but the results are statistically only significant at a 5% level until the third period. These results are partially in line with the empirical evidence. [Blanchard and Perotti \(2002\)](#) and [Monacelli and Perotti \(2008\)](#) found a significant and positive effect of a fiscal shock on GDP for the United States. In their estimation the peak is reached after the fourth year with values of 1.29 s.d. and 1.6 s.d., respectively. In addition, [Bénétrix and Lane \(2013\)](#) obtain for the Economic and Monetary Union member countries<sup>7</sup> a significant 1.36 s.d. increase during the first year, and then this effect starts vanishing in year seven.

<sup>7</sup>Of the 28 Member States today, 18 (Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Luxembourg, Malta, the Netherlands, Austria, Portugal, Slovenia, Slovakia and Finland) have adopted the euro, meaning that they participate fully in Stage Three of the EMU.

Figure 3: Response to government spending shock

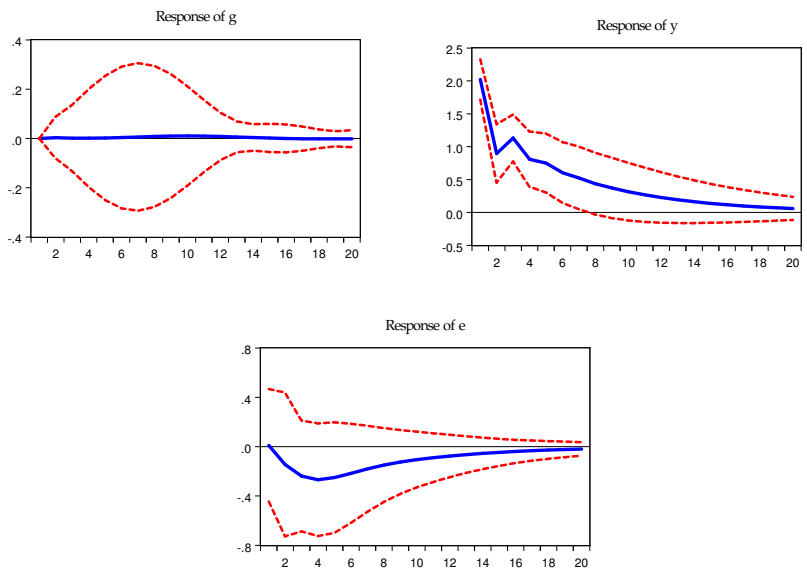


Our results shows that, in comparison with these other results, government consumption produce a small effect on GDP and the real exchange rate and theses effects are significant until seven quarter or less. Nevertheless, the empirical evidence (Bénétrix and Lane (2013), Blanchard and Perotti (2002), Gonzalez-García et al. (2013), Manzano and Gutierrez (2014)) suggests that shocks in government investment creates larger and more persistent exchange rate and GDP responses than shocks in government consumption. In our particular case it is important to mention that we do not have any measure of government investment, which could produce an underestimation of the effectiveness of the fiscal policy in Costa Rica.

In order to complement the government spending shock analysis, we compute the response to a GDP shock to study how sensitive this spending is to the economic activity shock. Figure 4 display the results. After the shock, the real exchange rate decreases during the first year, and then the effect starts to vanish. Regarding the reaction in the government spending, the effect is zero and statistically insignificant. In other words, the government spending in Costa Rica does not react to the economic activity. According to Blanchard and Perotti (2002), fiscal authorities take more than a quarter to react to GDP shocks due to the fact that most fiscal policy measures have to be approved by the Ministry of Finance and the Parliament. However, as we can see in Figure 4, in Costa Rica there is no contemporaneous effect, as in Blanchard and Perotti (2002), but also there is no effect after one or two quarters. This means that the shock to the economic activity does not affect the government spending. We'll later show that this has a close relationship with the budet rigidity.



Figure 4: Response to GDP shock



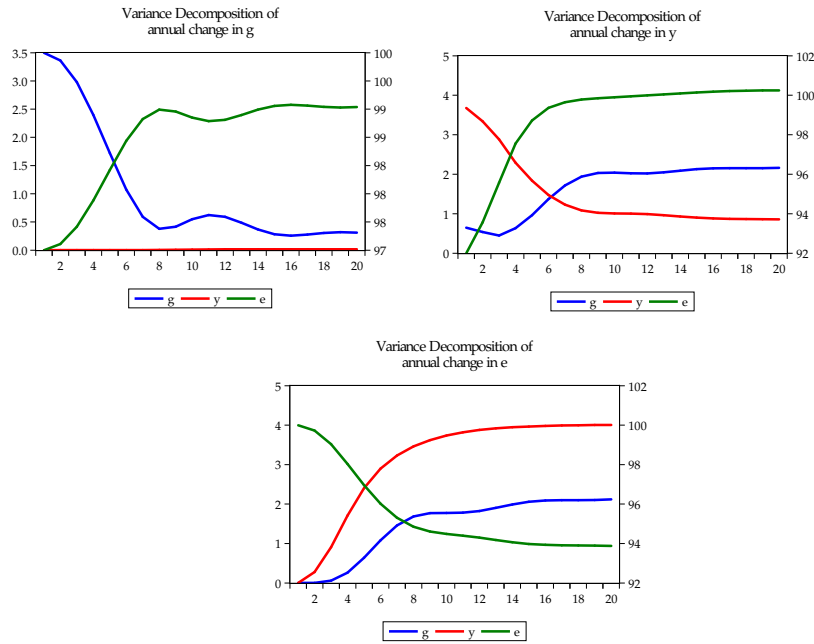
## Variance decomposition

Now, we'll study the contribution of structural innovations to the  $h$ -step ahead forecast error variance. The idea is to evaluate how sensitive is the forecast error variance of the equations in the VAR system to the different shocks. Figure 5 displays the results of the variance decomposition. In addition, in the right axis of each graph we present the value of the  $j$ th shock in the  $j$ th equation (for instance, in the right axis for the forecast error variance of the GDP equation, we present the value of the GDP shock), while the left axis the value of the other shocks (for instance, in the left axis for the forecast error variance of the GDP equation, we present the value of the government spending shock and the real exchange rate shock).

First, we analyze the contribution of the government spending shocks in the forecast error variance of the GDP equation. According to the variance decomposition, the forecast error variance caused by the government spending varies between 0.3 and 1.5 percent. Between  $h = 1$  and  $h = 14$  this value increases and then after  $h = 14$  it stabilizes at 1.5 percent. Regarding the forecast error variance of the real exchange rate equation, the forecast error variance attributable to this shock (government spending shock) ranges between 1.1 and 4.7 percent. Moreover, the dynamic behavior is similar to the one in the GDP equation. That is, after  $h = 14$  this proportion stabilizes at 4.7 percent.

Similar to the impulse response analysis, the GDP shock only explains 0.1 percent of the volatility in the forecast error of the government spending equation. Between  $h = 1$  and  $h = 8$  this proportion is almost zero, then it increases and stabilizes until 0.1 percent. Nevertheless, in this case the government spending shock almost explains all the forecast error variance. The value ranges between 97 and 99 percent.

Figure 5: Variance decomposition



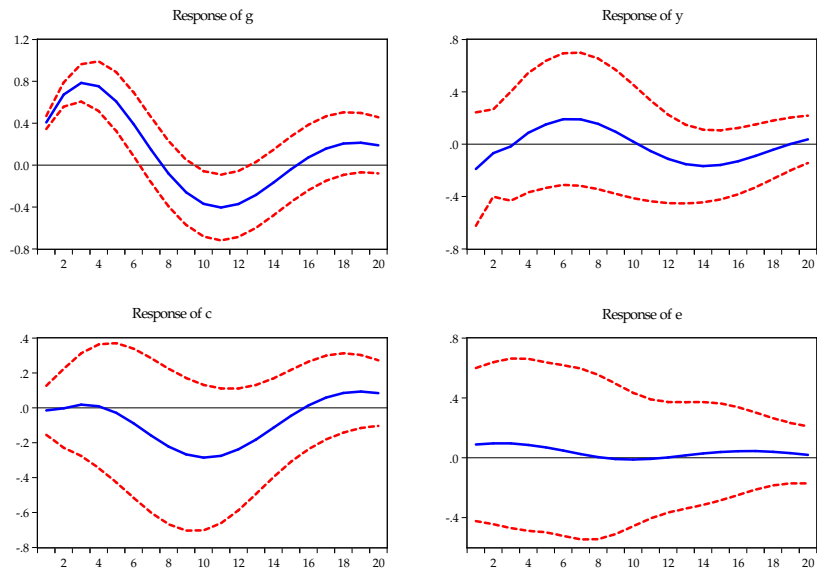
These results are complementary to the impulse response analysis. This implies that the response of the GDP and the real exchange rate to a government spending shock does have a very small effect in Costa Rica. Additionally, we find that in Costa Rica the government spending does not react to economic shocks on GDP. The effect is not statistically significant. Further explanation of this result will be given in section IV.

## Robustness checks

In order to verify the robustness of our results, we follow two different strategies. First, we estimate the model by introducing private consumption, like in most of the theoretical macroeconomic models of fiscal policy (Bilbiie (2011), Galí et al. (2007) and Lee (2010)).

Figure 6 present the results. First, the reaction on GPD is lower than in the baseline. This shock produces a 0.19 standard deviation increase (s.d.) on GDP after 6 quarters; after this period the shock starts to disappear. Regarding the impact on private consumption, we find empirical evidence that support the Neoclassical approach studied by Baxter and King (1993). This approach argues that an exogenous increase in goverment spending financed by lum-sum taxes reduced the representative agent’s wealth causing the agent to consume less and to work more which in turn depresses the real wage. That said, after the fiscal shock, this macroeconomic variable decreases until the second year, and then the effect starts to disappear.

Figure 6: Response to a government spending shock with private consumption



In the case of the real exchange rate the result is almost the same.

Second, we separate the baseline estimation into two sub-samples in order to separate the exchange rate regime. Therefore, the first sample runs from 1991Q1 to 2005Q4, and the second one from 2006Q1 to 2015Q4. Figures 7 and 8 in the appendix display the results. Regarding the period 1991Q1 to 2005Q4 (Figure 7), we obtained the same result as in the baseline case. For instance, we find that the government spending shock produces a 0.36 standard deviation increase (s.d.) on GDP after 6 quarters. Regarding the real exchange rate, this spending shock triggers a transitory decrease in the real exchange rate (appreciation) followed by expectations of future increases on this variable (depreciation). In the case of a major drawback is the low number of observations in the second sub-sample, which leads to ambiguous results.

## IV. Structure of the government spending

In this section we are going to provide an intuitive explanation of the empirical results found in the previous chapter. First, we explain how the government budget rigidity can affect the effectiveness and sensitivity of the fiscal policy on GDP. Second, we simulate a counterfactual scenario using our model in order to analyze how the government budget rigidity *could* affect the impulse response of the GDP to government spending shock. We'll show that a more flexible budget could lead to a higher response of the economic activity to a fiscal shock.

According to [Echeverry et al. \(2011\)](#) “*inflexibility limits the ability of elected representatives to carry over their policy programs, threatens macroeconomic stability, (...) facilitates the duplication of expenses*

Figure 7: Response to a government spending shock, 1991Q1-2005Q4

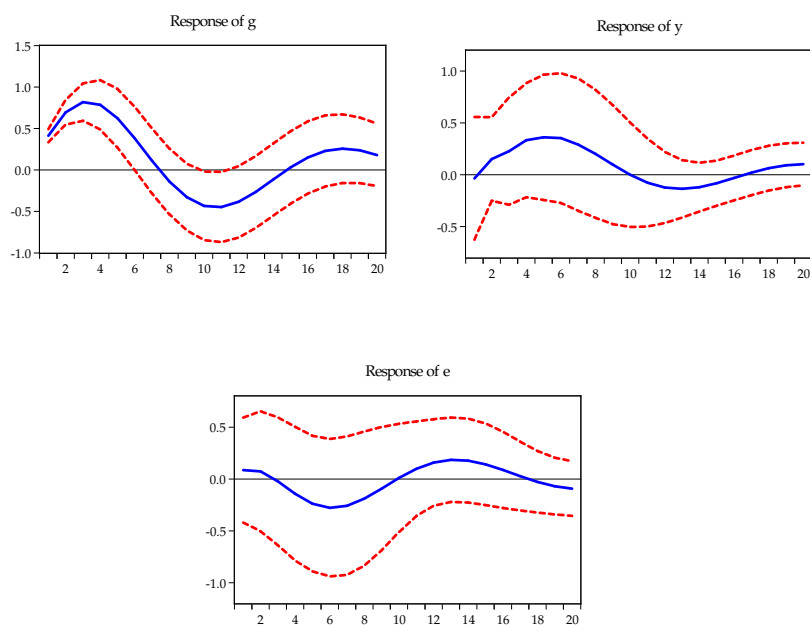


Figure 8: Response to a government spending shock, 2006Q1-2015Q4

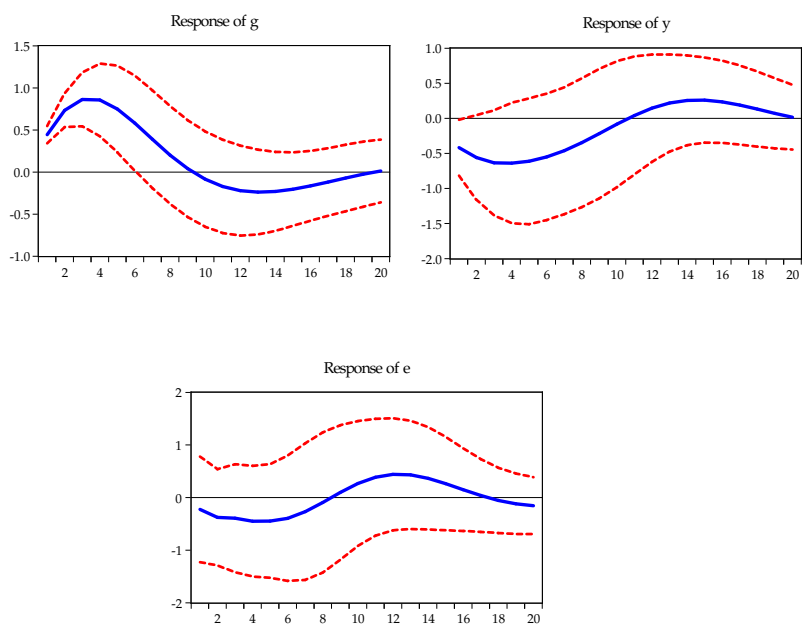
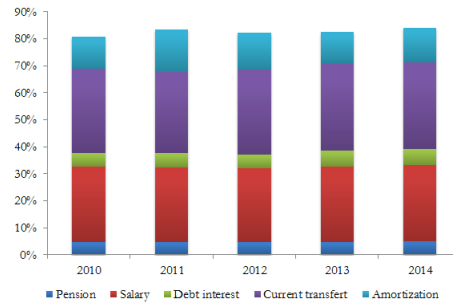


Figure 9: Non discretionary government spending. (% total government spending)



Source: Contraloria General de la República.

for a single objective, and makes the budget process less transparent". Consequently, government spending is restricted to operate as an instrument to achieve public policy objectives and; thus, to stimulate the economic activity.

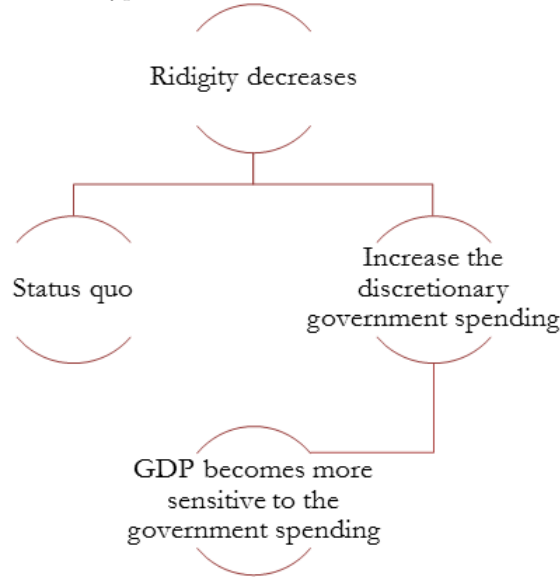
In Costa Rica, the budget has many specific obligations determined by law: programs to reduce poverty or unavoidable obligations such as a certain percentage of GDP to education, salaries, pensions, debt interests, municipalities, etc. All these expenses are part of an important, inflexible component of Costa Rica's national budget.

Following [Echeverry et al. \(2011\)](#), a component of government spending is inflexible if it is incorporated into the budget by a non-discretionary criteria in the short term, defining short-term as one fiscal period. According to [Izquierdo and Manzano \(2012\)](#) and [Manzano and Gutierrez \(2014\)](#), in Central America and the Dominican Republic, the 2008-2009 crisis left a legacy of great inflexibility in public spending. These authors mention that 80% of the increases in primary expenditure between 2007 and 2010 (24% regional average) was inflexible, highlighting the case of Costa Rica as the country where this kind of expenditure increased by 50% during this period (2007-2010).

However, such expenditures were not only a result of the international crisis. First, there are items that the government has to commit each year by constitutional law such as: i) 8% of GDP for education, ii) 10% of revenues for the financial year for local governments, iii) about 6% of the revenue of the central government to the judicial authority and electoral spending. Even some of these mandates are not fulfilled completely, the flexibility that the Government has after covering those obligations is minimal.

Second, following [Echeverry et al. \(2011\)](#), payroll expenses and debt services are also considered inflexible, and in Costa Rica such expenditures have an important weight among the total. Components like Amortization, Interest and Fees, Remunerations (salary and pensions) and Current Transfers represent more than 80% of general government expenditure (average of 2010 and 2014). The remaining items represent a 20% of expenditures, where Capital Transfers represent the most important item constituting 4.6% of the total expenditure between 2007 and the first half of 2014.

Figure 10: Hypothetical scenario of the simulation

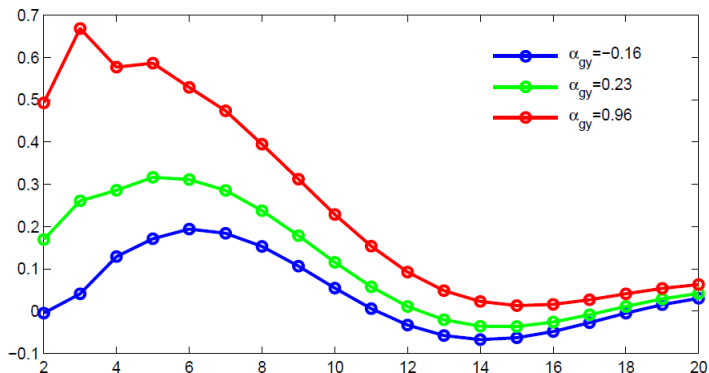


According to [Blanchard and Perotti \(2002\)](#), the effectiveness of the fiscal policy is affected by the different institutional restrictions. For instance, any fiscal policy measure has to pass through the Ministry of Finance and the Parliament. However, as we see in the case of Costa Rica, the government expenditure has a dominant inflexible component, which is another restriction that has to be taken into account. This rigidity of the government spending is a key factor to understand our empirical results, because these obligations (pensions, salaries, debt interests, current transfers and amortizations) leave little room for capital investment.

As a consequence, in order to complement this analysis, we simulate a counter-factual scenario to study how the government budget rigidity *could* affect the impulse response of the GDP to a government spending shock. The computation of this analysis is based on a hypothetical scenario. First, let's suppose that the rigidity decreases due to an exogenous reason. This means that we do not know how and how much the government reduces the level of this rigidity. The reduction implies that the government has two possibilities: status quo or increasing the discretionary government spending. By "status quo" we refer to the possibility of the government to keep the distribution of the public budget as in the budget rigidity regime (figure 9), for instance, to dedicate 8% of GDP for education and to spend 28% of total expenditure on salaries. If the policy makers choose the second option as argued by [Echeverry et al. \(2011\)](#), they have a greater policy space to use the government spending as an instrument of fiscal policy. Consequently, this implies that the contemporaneous relation between GDP and government expenditure increases. Putting in technical words,  $\alpha_{gy}$  should increase.

It is important to mention that our simulation has many simplicities. We do not know by how many percentage points the government spending rigidity decreases, which is a key element to determine by how

Figure 11: Simulation of the impulses of GDP to government spending shock



many points  $\alpha_{gy}$  should increase. Despite this problem, this counter-factual analysis is a starting point to compute how the budget rigidity can affect the effectiveness and sensitivity of the government to affect the GDP.

The simulation exercise consists of changing the value of the parameter  $\alpha_{gy}$  and then, computing the new impulse response of the GDP to a government spending shock as in the previous section. To minimize the aforementioned problem, we select two values for this parameter: 0.23 and 0.96. These parameters correspond to the contemporaneous relation between GDP and government expenditure in Uruguay and U.S, respectively. We have chosen these parameters for two reason: first, we take Uruguay because the country has similar economic and social conditions to Costa Rica, and according to Bucakos y Tiscordio (2008) the fiscal policy shocks do not have a significant effect on the GDP (like in Costa Rica). Nevertheless, they found a higher contemporaneous relation between GDP and government spending than in Costa Rica (0.23 and in Costa Rica this value is equal to -0.16) . Second, we select the U.S. since the country has an effective fiscal policy, and therefore this would be the “*perfect scenario*”.

Figure 8 displays the results. The baseline shock corresponds to the blue line, which is the same shock presented in figure 1. By construction, if we increase the parameter  $\alpha_{gy}$  the response of the GDP will be higher; however, this is not an interesting result. Instead, we want to see how many times the ratio “new respond of the GDP (with the new  $\alpha_{gy}$ ) to the baseline respond of the GDP” increases by changing  $\alpha_{gy}$ .

First, when  $\alpha_{gy} = 0.23$ , the response of GDP is increased by 3.6 times during 20 periods, on average. Nevertheless, if we take only the average of the first 2 years (8 periods), this response increases up to 6.4 times. Second, in the “*perfect scenario*”, the response of GDP is increased 9.6 times and 17.5 times during 20 and 8 periods, respectively.

Consequently, we can deduce two important conclusion. If the fiscal policy makers reduce budget rigidity of the government spending, they could improve the contemporaneous relation between GDP and government expenditure, and thus they could expand the capacity of the government spending to foster the economic

activity. In addition, our results contribute to reinforce the idea of [Echeverry et al. \(2011\)](#), which points out that there is a close connection between budget rigidity, non-discretionary government spending and the effectiveness of fiscal policy. In the case of Costa Rica by making a simple simulation, we show how sensitive the effectiveness of fiscal policy is by changing the key parameter ( $\alpha_{gy}$ ) in our SVAR model.

## V. Conclusions

In this paper, we use Structural Vector Auto regression (SVAR) techniques to estimate and to analyze the effects of government spending shocks on GDP and the real exchange rate in Costa Rica. From a methodological perspective, our structural identification satisfies two important assumptions: first, this is the first paper that estimates fiscal policy shocks in Costa Rica using a small open economy scenario. Second, we do not take into account tax shocks due to its insignificant effect on output in the case of Costa Rica ([Manzano and Gutierrez, 2014](#)).

Regarding the empirical results, our results show that the government consumption does not produce a significant effect on output and real exchange rate. The literature points out that shocks in government investment create larger and more persistent exchange rate and GDP responses than shocks in government consumption. Nevertheless in this paper we do not have a measure of investment, which could produce an underestimation of the effectiveness of fiscal policy in Costa Rica. Our main conclusion is that government spending rigidity is the cause of the ineffectiveness of the fiscal policy instrument. We found that if the government reduces the spending rigidity could increase the contemporaneous relation between GDP and government expenditure substantially.

Despite our results, this is a preliminary exercise to evaluate the fiscal policy shocks in Costa Rica and further research is needed. First, our counterfactual analysis do not take into account how much the government should reduce the rigidity in the government spending to increase the contemporaneous relation between GDP and government expenditure. Second, [Ramey and Shapiro \(1999\)](#) advocates estimating an SVAR with annual data, because government spending on goods and service does not respond to macroeconomic news within a quarter. In our structural identification we set some restrictions to mitigate this problem; however, it would be interesting to estimate the model using annual data. Third, our model has only three variables describing the real sector, which calls for extension to introduce monetary policy to compare the interaction with fiscal policy (policy mix).



## References

- BAXTER, M. AND R. KING (1993): “Fiscal Policy in General Equilibrium,” *American Economic Review*, 83, 315–334.
- BEETSMA, R. (2008): “Social Expenditure in Central America, Panama and the Dominican Republic at a Glance: 2007-2013,” Working paper, Swedish Fiscal Policy Council.
- BÉNÉTRIX, A. S. AND P. R. LANE (2013): “Fiscal Shocks and The Real Exchange Rate,” *International Journal of Central Banking*, September, 1–32.
- BILBIIE, F. O. (2011): “Nonseparable Preferences, Frisch Labor Supply, and the Consumption Multiplier of Government Spending: One Solution to a Fiscal Policy Puzzle,” *Journal of Money, Credit and Banking*, 43, 221–251.
- BLANCHARD, O. AND R. PEROTTI (2002): “An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output,” *The Quarterly Journal of Economics*, 117, 1329–1368.
- EACHEVERRY, J. C., L. FERGUSSON, AND P. QUERUBÍN (2011): “La batalla política por el presupuesto de la Nación: Inflexibilidades o supervivencia fiscal,” Universidad de los Andes.
- GALÍ, J., J. D. LOPEZ-SALIDO, AND J. VALLÉS (2007): “Understanding the Effects of Government Spending on Consumption,” *Journal of the European Economic Association*, 5, 227–270.
- GONZALEZ-GARCÍA, J., A. LEMUS, AND M. MRKAIC (2013): “Fiscal Multipliers in the ECCU,” Working paper, IMF.
- IZQUIERDO, A. AND O. MANZANO (2012): “El mundo cambió: Cambiará el crecimiento en Centroamérica: Desafíos y oportunidades,” Macroeconomic report, IADB.
- LAGARDA, G., O. MANZANO, AND J. PRAT (2015): “The Legacy of the Crisis: Policy Options in a Favorable Environment,” Macroeconomic report, IADB.
- LEE, J. Y. (2010): “Government Spending Effects in a Small Open Economy,” Indiana University.
- MANZANO, O. AND P. GUTIERREZ (2014): “Tiempo de ajustar el rumbo?: Opciones de políticas ante el cambio en el entorno externo en Centroamérica y República Dominicana,” Macroeconomic report, IADB.

MONACELLI, T. AND R. PEROTTI (2008): “Fiscal Policy, Wealth Effects, and Markups,” NBER Working Papers 14584, National Bureau of Economic Research, Inc.

PEROTTI, R. (2004): “Estimating the effects of fiscal policy in OECD countries,” Working papers.

——— (2007): “In Search of the Transmission Mechanism of Fiscal Policy,” Working Paper 13143, National Bureau of Economic Research.

PRAT, J. AND J. BEVERINOTTI (2016): “Social Expenditure in Central America, Panama and the Dominican Republic at a Glance: 2007-2013,” Book, IADB.

RAMEY, V. A. AND M. D. SHAPIRO (1999): “Costly Capital Reallocation and the Effects of Government Spending,” Nber working papers, National Bureau of Economic Research, Inc.

## IV) Appendix

Figure A: Response to the GDP

