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The Size of Fiscal Multipliers and the Stance of Monetary Policy in Developing Economies[♦]

Jair N. Ojeda-Joya[♠]

Oscar E. Guzman[♣]

Abstract

In this paper we estimate the effect of government consumption shocks on GDP using a panel of 21 developing economies. Our goal is to better understand the reasons for the low fiscal multipliers found in the literature by performing estimations for alternative exchange rate regimes, business-cycle phases, and monetary policy stances. In addition, we perform counterfactual simulations to analyze the possible gains from fiscal-monetary policy coordination. The results imply that government consumption shocks are usually followed by monetary policy tightening in developing economies with flexible regimes. Our simulations show that this reaction partially explains the presence of low fiscal multipliers in these economies. Government consumption shocks imply lower multipliers in developing economies during flexible regimes, economic slowdowns or monetary contractions. In addition, implementing fiscal programs during monetary expansions seems to improve significantly their economic stimulus.

[♠] Corresponding author: Senior Research economist, Banco de la Republica. Cr. 7 No. 14-78, Bogotá D.C., Colombia. E-mail: jojedajo@banrep.gov.co

[♣] Economic Advisor, Office of the National Comptroller, Bogotá D.C., Colombia. E-mail: oscar.guzman@contraloria.gov.co

1. Introduction

Having reliable estimations of fiscal multipliers is exceptionally important for central governments when evaluating new fiscal programs. Recent estimations show that such multipliers are very small in developing economies (Ilzetzki et al, 2013). In this paper, we further explore the size of fiscal multipliers by empirically evaluating the role of the implied monetary policy reactions in their determination. This exercise is interesting because fiscal multipliers which are derived from Structural Vector Auto Regressions (SVAR) include the predicted future reaction of monetary and tax policies as they are typically estimated with historical data which capture such reaction to government shocks. (Kuckuck and Westermann, 2014). In this sense, the computation of counterfactual multipliers is useful to better understand the direct effects of government consumption shocks on economic performance.

We study a panel of quarterly data and 21 developing economies using SVAR within panel data estimation. We also briefly study a panel of 20 developed economies to initially compare the size of fiscal multipliers and their monetary policy reaction. For comparison purposes, the whole set of 41 countries is similar to the one studied by Ilzetzki et al (2013). In the case of fiscal policy, a key identification assumption is that changes in government consumption require at least a quarter to respond to innovations in the remaining macro variables, including GDP. For monetary policy, we use the money stock as a control variable for money demand which reacts quickly to the macro environment. In contrast, policy interest rates take longer to react to macroeconomic news.

Opposite to the case of developed economies, our impulse-response functions imply that government consumption shocks are followed by monetary policy tightening in developing economies with flexible exchange rates. In addition, we perform counterfactual simulations to obtain fiscal multipliers which are free of the monetary policy reaction implied by the data. That is, we shut down the estimated policy rate reaction while allowing all the remaining feedbacks of the system to operate. These simulations show that such tightening partially explains the presence of low multipliers in these developing economies. The results also imply that further fiscal-monetary policy coordination might be useful during the implementation of policy programs. In particular, we show that when the government consumption shock coincides with a monetary expansion, the multiplier increases significantly.

The related literature has found that the size of fiscal multipliers is a function of specific macroeconomic features of the economies under study. Favero et al (2011) find heterogeneous results for the size of fiscal multipliers within a sample of developed economies even after controlling for macroeconomic features and using the narrative method to identify fiscal shocks. Auerbach and Gorodnichenko (2012) show that positive multipliers are mostly associated to recessions according to their estimations using OECD data and local projection methods. Kraay (2012, 2014) finds positive multipliers (around 0.5) in developing economies using credits from multilateral organizations as identification device. These multipliers are found to be significantly lower in open economies but still positive. Corsetti et al (2012) find

that multipliers are low in flexible exchange rate regimes and high during financial crises in developed economies. In addition, Riera-Crichton et al (2015) confirm that fiscal multipliers are larger during recessions in OECD economies, especially when these phases coincide with countercyclical fiscal policies.

There is also a recent literature which focuses on developing economies. Ilzetzki et al (2013) find that fiscal multipliers are low in developing economies, especially, during flexible exchange rate regimes and when public debt is relatively high. Hory (2016) studies a panel of emerging and advanced economies and finds that emerging economies can increase the size their multipliers by improving their government indebtedness indicators. Similarly, Huidrom et al (2016) use panel data for 34 economies (emerging and developed) to estimate fiscal multipliers for alternative fiscal positions. Their results show that multipliers are very small during episodes of high public debt and large fiscal deficits. In addition, these authors find that the fiscal position is much more relevant than the business cycle to determine the size of these multipliers.

The literature on the interaction between monetary and fiscal policies is mostly based on general equilibrium models. Davig and Leeper (2011) use a DSGE model to study monetary-fiscal policy interaction and find that the results crucially depend on whether these polices have an active or passive role after macroeconomic shocks. On the other hand, Woodford (2011) shows, within a stylized macro model, that the size of fiscal multipliers crucially depends on the monetary policy reaction. These multipliers are even higher at the zero lower bound. Born et al (2013) also show, within an open new-Keynesian model, that the monetary regime is very important on the determination of the size of fiscal multipliers. Chinn (2013) reviews most of the theoretical approaches and concludes that empirical estimations of fiscal multipliers are crucial since models with alternative assumptions and calibrations lead to widely different GDP responses to fiscal shocks.

There are two recent contributions that empirically examine the effect of the monetary policy reaction on the size of fiscal multipliers. Belinga and Lonkeng (2015) find that the fiscal multiplier in the US is higher if it coincides with accommodative monetary policy. Similarly, Pyun and Rhee (2015) study a panel of 21 OECD economies during the aftermath of the Great Financial Crisis and find that the combination of fiscal and monetary expansions contributed to fiscal multipliers greater than 1. To the best of our knowledge, this work is the first to study the effect of monetary-fiscal policy interactions on the size of fiscal multipliers within a set of only developing economies.

The rest of this paper is organized as follows. Section 2 describes the data. Section 3 reports the econometric methodology. Section 4 shows the empirical results for alternative macroeconomic features of the countries under study. Finally, Section 5 makes some concluding statements.

2. Data Description

We use data for 21 developing economies: Argentina, Botswana, Brazil, Bulgaria, Chile, Colombia, Croatia, Ecuador, El Salvador, Hungary, Latvia, Lithuania, Malaysia, Mexico, Peru, Poland, Romania, Slovak Republic, South Africa, Thailand and Turkey. We choose this set of countries due to their availability of fiscal and monetary macro data. We follow the World Bank's classification to define the "developing" category. We also make some preliminary exercises with data for the following 20 developed economies: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, United Kingdom, and United States of America.

For each country, we retrieve data to compute the following quarterly indicators: i) real gross domestic product, ii) real government consumption, iii) real effective exchange rate, iv) real monetary policy rate, and v) real Money Balances (M2). Series for all countries span the first quarter of 2000 until the first quarter of 2015. These data have good quality and fairly easy access since they are retrieved from International Financial Statistics (IFS), OECD, Eurostat, national statistical agencies and central banks.

We compute annual growth rates for each variable in each country to correct for non-stationarity and seasonality in the data. That is, we compute the difference between the log level of each variable at t and $t-4$. In the case of the real interest rate we do not use logs but only differences between percentage points. In the Appendix, we present results of panel unit root tests for all five panels of variables, after differencing (Tables 2 and 3).

3. Econometric Methodology

The main challenge when computing fiscal multipliers is the proper identification of fiscal shocks. We use the Structural Vector Auto Regression (SVAR) approach first employed by Blanchard and Perotti (2002). In this approach, a key identification assumption is that policy decisions about government consumption require at least a quarter to respond to innovations in other macroeconomic variables, including GDP.

Since our focus is the interaction between monetary and fiscal policies, we need to simultaneously identify both shocks. To identify monetary policy shocks, we partially follow Kim (2003) and Anzuini et al (2013). Their strategy consists of controlling for money demand by allowing this variable to contemporaneously react to interest rate and output shocks. Monetary policy rates instead, take longer to react to output innovations.

We use the Cholesky decomposition to perform this identification. The variables are included in the following ordering: Government consumption, monetary policy rate, GDP, real money balances (M2) and real exchange rate. Such ordering implies that the real exchange rate and M2

react contemporaneously to shocks on the remaining variables of the system. In addition, policy variables are those with the most sluggish reaction to macroeconomic shocks[1].

Alternative identification methods for fiscal shocks use natural experiments such as military build-ups (Ramey and Shapiro, 1998) or large international loan disbursements (Kraay, 2012 and 2014). These data are not available for all the countries in our sample. In addition, this approach assumes that the private sector is not able to predict these government operations which might not hold in small-size economies.

We estimate the following Panel VAR system:

$$Y_{it} = A_1 Y_{it-1} + A_2 Y_{it-2} + \cdots + A_p Y_{it-p} + u_i + e_{it} \quad i = 1, \cdots, N \quad t = 1, \cdots, T \tag{1}$$

This is a homogeneous panel VAR of order p, with k dependent variables and with panel-specific fixed effects. The vector Y_{it} contains the dependent variables for country i at quarter t. Country-specific fixed effects are shown in the k-vector u_i. Idiosyncratic errors for each country and quarter, are contained in the k-vector e_{it}. We want to estimate the $(k \times k)$ matrices of coefficients $A_1, A_2, \cdots A_p$. The errors are assumed to be zero-mean and serially uncorrelated.

We follow the estimation and lag selection procedures for panel VAR as suggested by Abrigo and Love (2016). The optimal lag order (p) is selected using the consistent model selection criteria (MMSC) proposed by Andrews and Lu (2001) which are based on the test for over-identifying restrictions (J statistic) devised by Hansen (1982). The estimation is performed using a GMM approach to Equation (1). This method employs instruments to guarantee the consistency of estimators, especially for settings with fixed T and large N. Instead of a first difference transformation, this method uses forward orthogonal transformation which minimizes data loss when instrumenting. In addition, the whole system is estimated as a system of equations which allows efficiency gains and makes cross-equation testing possible.

We perform counterfactual simulations of the effects of government consumption shocks by shutting down the estimated monetary policy reaction and allowing all the remaining feedbacks of the system to operate. These exercises allow obtaining impulse-response functions which are free of the monetary policy reaction implied by the data. Therefore, the difference between unrestricted and counterfactual fiscal multipliers can tell us about the degree of coordination between monetary and fiscal policy, in terms of GDP, during fiscal shocks.

We compute fiscal multipliers from 0 to 20 quarters using the following standard formula:

$$fm(T) = \frac{\sum_{t=0}^{T}(1+r)^{-t}\Delta y_t}{\sum_{t=0}^{T}(1+r)^{-t}\Delta g_t} \tag{2}$$

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[1] Mountford and Uhlig (2009) propose an alternative identification approach for fiscal policy, monetary policy and business-cycle shocks within a similar VAR system. This approach uses sign and orthogonality restrictions for the identification of shocks. Their results for the US are in line with alternative identifications.

In this equation, the cumulative fiscal multiplier in period T is defined as the present value of the implied changes in GDP divided by the present value of changes in government consumption. Both Δy_t and Δg_t are extracted from their respective impulse-response functions. The discount interest rate (r) corresponds to the average real policy rate across all countries and periods of analysis. Impact, medium-run and long-run multipliers correspond to T= 0, T= 10 and T = 20, respectively, in Equation 2. This definition of fiscal multipliers is standard in the literature, except for the use of a real interest rate to discount future flows of GDP and government consumption (Chinn, 2013). However, for low values of this interest rate, the effect of discounting on the multiplier size is very small.

4. Empirical Results

In this section, we initially present results on the implications of a government consumption shock in developed and developing economies. Then, we describe the results during alternative exchange rate regimes, business-cycle phases and monetary policy-stances in developing economies. In every case, we show impulse-response functions for all variables of the system and then the implied cumulative fiscal multiplier. Each figure shows both unrestricted and counterfactual results. Using the procedure by Andrews and Lu (2001), the optimal lag orders for developed and developing economies are $p = 1$ and $p = 2$, respectively. See tables 4 and 5 in the Appendix.
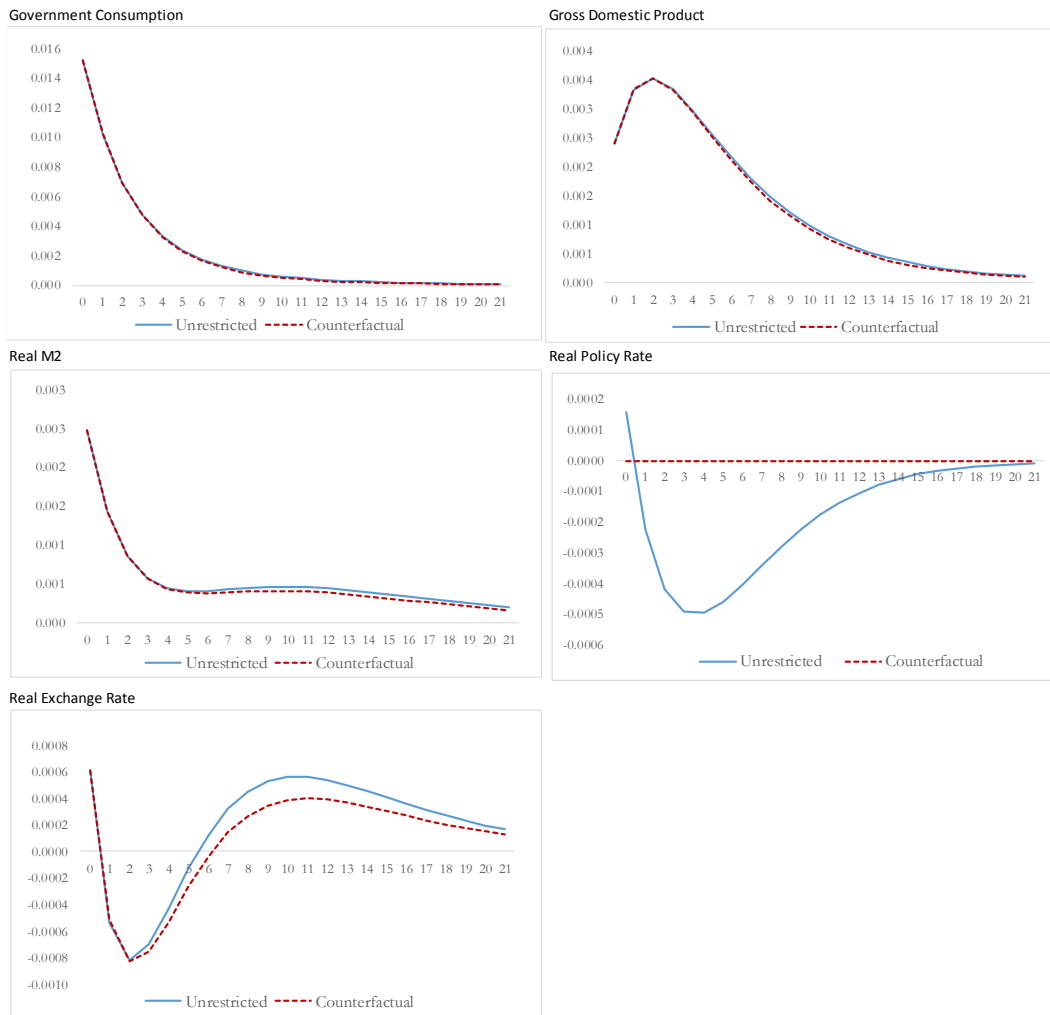
4.1 Developed versus Developing Economies

Figure 1 shows impulse responses of all variables in the system to a one standard-deviation government consumption shock in high-income economies. These graphs describe both the unrestricted and counterfactual responses during 20 quarters after the initial shock. The counterfactual responses exclude the monetary policy reaction implied by the data.

It is clear from Figure 1 that the government consumption shock has a consistent positive effect on GDP lasting more than 20 quarters. Notice that most of the monetary policy reaction is expansionary since interest rates are reduced during all 20 quarters after the impulse. However, the monetary policy effect on the transmission of the fiscal shock on GDP is very small as the counterfactual response is very similar to the unrestricted one.

Figure 2 presents the cumulative fiscal multiplier implied by the GDP response depicted in Figure 1. The impact multiplier (immediately after the shock) is 0.83. It starts gradually increasing until reaching 2.8 in the medium-run (10th quarter) and 3.05 in the long run (20th quarter). The counterfactual multiplier is slightly lower (3.04 in the long-run). Therefore, the monetary policy channel for the transmission of fiscal shocks om GDP is really small in developed economies. Thus, there is no role for further fiscal-monetary policy coordination in these economies.

Figure 1. Impulse-response functions in developed economies. one standard-deviation government consumption shock

Government Consumption

Gross Domestic Product

Real M2

Real Policy Rate

Real Exchange Rate

Source: Authors' computations

## Figure 2. Cumulative fiscal multiplier in developed economies.
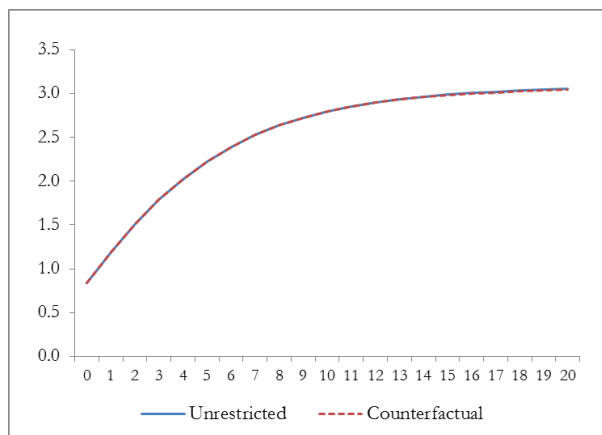
Source: Authors' computations

Figure 3. Impulse-response functions in developing economies.
one standard-deviation government consumption shock

Government Consumption

Gross Domestic Product

Real M2

Real Policy Rate

Real Exchange Rate

Source: Authors' computations

Figure 4. Cumulative fiscal multiplier in developing economies.
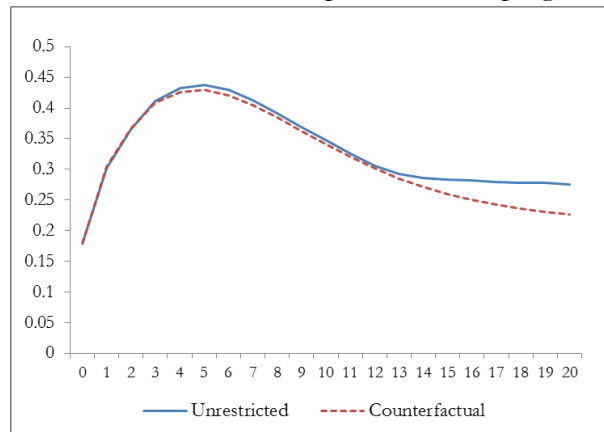
Source: Authors' computations

Figure 3 shows impulse responses for developing economies. The response of GDP is initially positive during the first 6 quarters after the shock. Then it becomes negative but close to zero during the remaining quarters. Notice that the monetary policy reaction is cyclical, initially expansionary and then, 4 to 9 quarters after the shock, it becomes contractive; then, between the 11th and 19th quarters it turns expansionary again. The counterfactual GDP response is slightly below the unrestricted response.

The impact multiplier is 0.18 and then the multiplier increases until 0.44 which occurs 5 quarters after the shock, see Figure 4. Afterwards, it starts decreasing gradually until reaching 0.35 in the medium run and 0.28 in the long-run. Similar to the case of developed economies, there is a very weak fiscal shock transmission through the monetary policy channel. Therefore, no further fiscal-monetary policy coordination is needed for the average developing economy. In the following sub-sections, we further analyze these results in developing economies by exploring alternative episodes of exchange-rate regimes, business-cycle phases and monetary policy stances. Within these exercises, it will be possible to find some examples with a clear role for further fiscal-monetary policy coordination.

Notice that the fiscal multiplier size in developing economies is much smaller than in developed economies. Figures 3 and 4, show that the monetary policy reaction has a very little role in this difference. This role will be more important in economies with flexible exchange rate regimes. It is also interesting to note the strikingly different money demand response in developing versus developed economies. While real M2 rises with the government consumption shock in developed economies (Figure 1), a persistent M2 reduction is the estimated response in developing economies. This result suggests that a major portion of the spending expansion in developing economies is allocated to payments abroad through purchases of foreign goods or services.
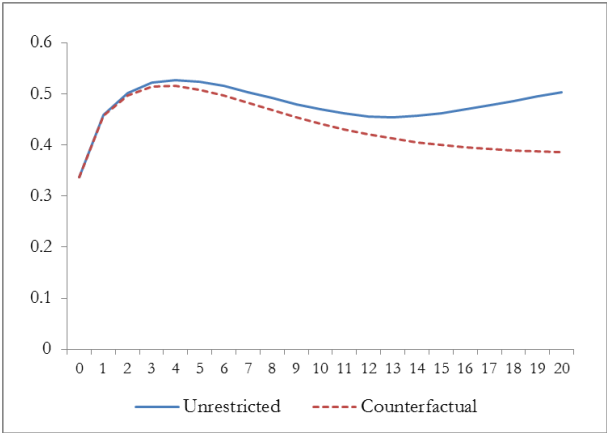
4.2 Exchange-Rate Regimes in Developing Economies:

We study whether low fiscal multipliers in developing economies can be explained by the exchange rate regime. We also try to disentangle the role of the monetary policy channel in the transmission of the shock. Following Ilzetzki et al (2013), the dataset is divided into episodes of flexible and fixed regimes using the classification by Reinhart and Rogoff (2004) updated with information from the International Monetary Fund (IMF) until 2015. Fixed-rate episodes are defined by legal tenders, hard pegs, crawling pegs, and bands. All other cases are classified as flexible regimes. Most countries alternate between fixed and flexible exchange rate regimes.

In the case of fixed regimes, the GDP response is positive during 6 quarters after the shock and then becomes essentially zero. In addition, monetary policy becomes consistently expansionary during all 20 quarters after the shock; see Figure 11 in the Appendix. The fiscal multiplier (Figure 5) is initially 0.34 on impact, and reaches a maximum of 0.53, 5 quarters

later. Medium and long-run multipliers are 0.47 and 0.5, respectively. The counterfactual multiplier stands near 0.4 which implies that the monetary policy channel is small there is no further role for fiscal-monetary policy coordination. These results are driven by the central bank's commitment to prevent exchange rate appreciations after the shock, by reducing short-term interest rates.

Figure 5. Cumulative fiscal multiplier in developing economies with fixed exchange rate.

Source: Authors' computations

Figure 6. Cumulative fiscal multiplier in developing economies with flexible exchange rates.
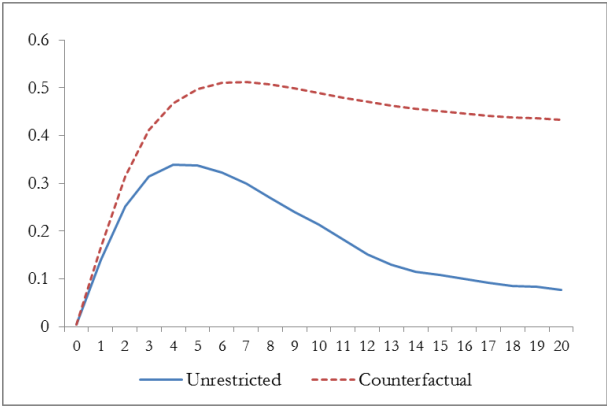
Source: Authors' computations

In the case of flexible regimes, the unrestricted GDP response is positive during 6 quarters and then it becomes negative but close to zero, see Figure 12 in the Appendix. This reaction is partly related to the increase in the monetary policy rate observed in the same figure. Figure 6 shows that the implied fiscal multiplier is essentially zero on impact and then it gradually grows to reach a maximum of 0.34, 4 quarters after the shock. Medium and long-run unrestricted multipliers are 0.21 and 0.08, respectively. The counterfactual simulation shows that in this case there is a key role for fiscal-monetary policy coordination since counterfactual multipliers are much higher: 0.49 and 0.43, in the medium and long-run, respectively. This result is in line with the predictions of standard open-economy models in which the monetary policy reaction

is the reason for lower fiscal multipliers in flexible regimes than in fixed regimes; see for example, McCallum (1996). However, the multiplier size gap between developed and developing economies is not fully explained by this lack of coordination.

4.3 Business-Cycle Phases in Developing Economies

In this section we divide the dataset into two alternative stances of economic activity: booms and recessions. We explore whether the business cycle phase prevailing during the fiscal shock has any influence on the size of the multiplier developing economies. Auerbach and Gorodnichenko (2012), Riera-Crichton et al (2015), among other works, have performed similar exercises and found that fiscal multipliers are greater during recessions in the US and OECD economies, respectively.

We apply a quarterly Hodrick-Prescott filter to real GDP data to estimate their trend country by country. Then, we define as recessions (booms) those periods when observed GDP is below (above) such trend[2]. Notice that all countries have several alternative episodes of booms and recessions and our econometric methodology allows computing fiscal multipliers on these subsets of data. Since the average duration of these phases is around 8 quarters in developing economies, we present impulse-response functions only up to 10 quarters after the shock.

When there is a fiscal shock during an economic boom, the GDP response is positive during most periods after the shock. In addition, except for the first quarter, we observe monetary policy tightening during all subsequent periods (Figure 13 in the appendix). The implied cumulative fiscal multiplier (Figure 7) is positive on impact (0.22) and reaches a maximum of 0.51 six quarters later. Then it starts decreasing gradually until reaching a medium-run level of 0.47. The role for monetary-fiscal policy coordination is small in this case since the counterfactual multiplier is only slightly higher than the unrestricted one.

When the shock hits during an economic recession, the unrestricted GDP response is initially zero and then remains positive from quarters 1 to 5. The monetary policy response is cyclical, with interest rate increases only between quarters 2 and 6 (Figure 14 in the Appendix). Therefore, the implied fiscal multiplier (Figure 8) is initially close to zero but then it starts increasing until reaching 0.26 in the fifth quarter and a very similar level in the medium-run (tenth quarter). There is only a tiny role for fiscal-monetary policy coordination since the multiplier is slightly higher in the counterfactual simulation.
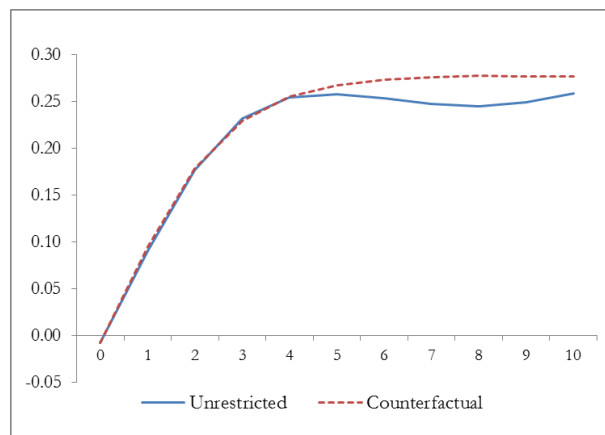
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[2] In practice, since the optimal lag order is 2, we only consider boom or recession episodes of at least 3 quarters.

Figure 7. Cumulative fiscal multiplier in developing economies during economic booms.
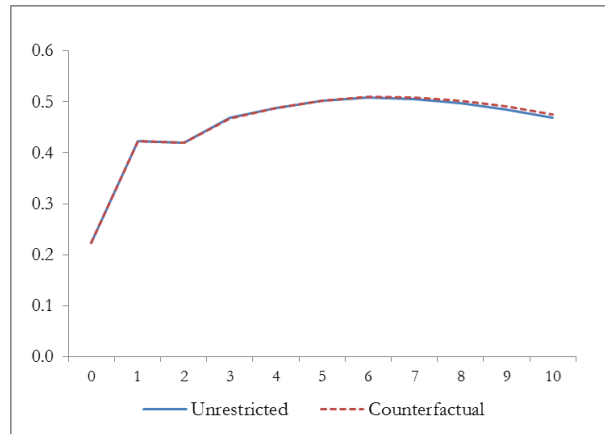
Source: Authors' computations

Figure 8. Cumulative fiscal multiplier in developing economies during economic recessions.

Source: Authors' computations

We find that cumulative multipliers are higher during booms than during recessions. This result contrasts with the findings in Auerbach and Gorodnichenko (2012) for the US, and related exercises for mostly developed economies (OECD data). It seems that during recessions, developing economies have a much more restricted fiscal space than developed ones. Further studies on the reasons for this reversal in the relation between business cycles and fiscal multipliers are needed.

4.4 Monetary Policy Stances in Developing Economies

We also study whether the transmission of fiscal policy to GDP is affected by the monetary policy stance at the time of the shock. For this exercise, first we compute Hodrick-Prescott trends on the real policy rate, country by country. This trend is a proxy of the natural interest

rate. We define episodes of monetary contraction (expansion) when the real policy rate is above (below) its natural rate[3]. Since these monetary policy stances have similar durations to business cycles, we show impulse responses and cumulative multipliers only up to 10 quarters after the shock.

When the government consumption shock happens during a monetary expansion, the GDP response is positive during all 10 quarters after the shock. In addition, the policy rate response is negative and the real exchange rate tends to depreciate. Both reactions are expected to improve the transmission of the fiscal policy shock to GDP, (Figure 15 in the Appendix). The implied cumulative multiplier (Figure 9) is small on impact (0.22) and then, it starts increasing gradually until reaching a medium-run level of 1.37 which is much higher than the average multiplier estimated for developing economies (Figure 4). Similarly to Woodford (2011), our results shows that the relatively low real interest rates bring about good financial conditions that increase the effect of the fiscal stimulus on economic activity.

Figure 9. Cumulative fiscal multiplier in developing economies during monetary expansions.
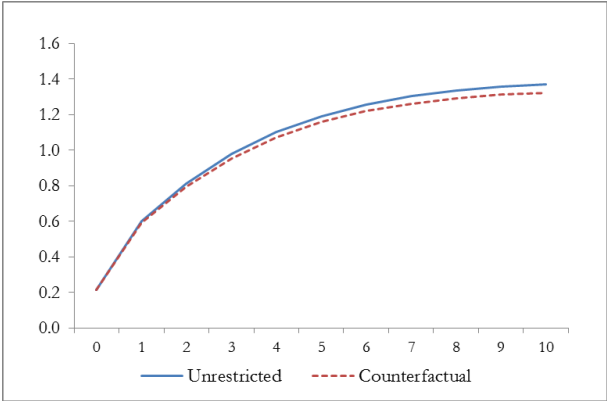
Source: Authors' computations

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[3] Similarly to business-cycle phases, in practice we only consider monetary-policy stances of at least 3 quarters long since the Panel VAR includes 2 lags for all variables.

Figure 10. Cumulative fiscal multiplier in developing economies during monetary contractions.
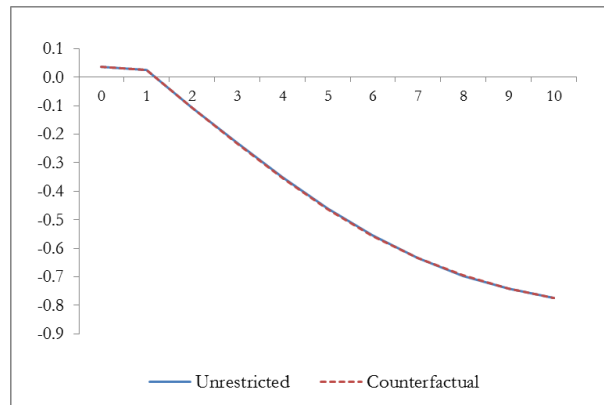
Source: Authors' computations

If the shock hits during a monetary contraction, the GDP reaction is negative starting in the second quarter after the shock. Meanwhile, the implied monetary policy reaction is cyclical and the effect on the real exchange rate is very small (Figure 16 in the Appendix). This GDP reaction leads to an insignificant impact multiplier (Figure 10) of 0.04 that starts going downward until reaching -0.78 in the medium run. This negative multiplier is likely the result of increased sovereign risk that worsen the tighter financial conditions implied by the contractive monetary policy. However, these negative multipliers are not statistically different to zero as we show in Section 4.5. Notice that counter-factual multipliers in these figures are not relevant because in this exercise, coordination with monetary policy is driven by the initial monetary policy stance before the shock.

In summary, fiscal stimulus programs are especially effective if implemented during monetary expansions. The mechanism is related to those explained by Woodford (2011) or Davig and Leeper (2011) on the higher effectiveness of fiscal expansions during loose monetary and financial conditions. There is indeed possibility of further fiscal-monetary policy coordination in developing economies by synchronizing the initial steps of a fiscal program with the appropriate monetary policy stance.

4.5 Statistical Significance of Fiscal Multipliers

We perform statistical significance tests on fiscal multipliers by computing confidence bands on the cumulative GDP response. These tests are based on Abrigo and Love (2016) and use 10000 Montecarlo draws from the estimated panel VAR using a Gaussian approximation. In Table 1, we present selected multipliers for alternative panel subsets and report whether they are significant with a confidence degree of at least 90%.

The results discussed previously in Section 4, remain similar once the statistical significance results are taken into account. First, fiscal multipliers for developed economies are high and

significant for all horizons. In contrast, multipliers for developing economies are low and only significant on impact for fixed exchange rate regimes, economic boom and monetary expansions. On the medium-term, multipliers are only significant in developing economies if the shock takes place during a monetary expansion. The latter result is new for developing and has important policy implications. A similar finding is described in Belinga and Lonkeng (2015) and Pyun and Rhee (2015) for the US and OECD economies, respectively.

Table 1 – Summary of Unrestricted Fiscal Multipliers for Alternative Horizons

Panel Subset	Impact	5th quarter	Medium Term (10th quarter)	Long Term (20th quarter)	# of observations
Developed	0.83**	2.22**	2.80**	3.05**	1180
Developing	0.18**	0.44	0.35	0.28	1218
Developing & Fixed Reg.	0.34**	0.52	0.47	0.50	643
Developing & Flex. Reg.	0.00	0.34	0.21	0.08	605
Developing & Boom	0.22**	0.50	0.47	NA	328
Developing & Recession	-0.01	0.26	0.26	NA	445
Developing & Mon. Exp.	0.22**	1.19**	1.37**	NA	369
Developing & Mon. Con.	0.04	-0.46	-0.78	NA	371

** Significant with a confidence degree of at least 90%; NA: Not available
Source: Authors' computations

5. Concluding Statements

In this work, we study the size of fiscal multipliers and the transmission channels of government consumption shocks, using panel data for 21 developing and 20 developed economies. The goal is to better understand the reasons for the existence of low fiscal multipliers in developing economies. We also explore the role of fiscal-monetary policy coordination by computing counterfactual simulations in which the implied monetary policy reaction is elapsed. Furthermore, we estimate fiscal multipliers in subsets of the data for alternative degrees of development, exchange-rate regimes, business-cycle phases and monetary policy stances.

We find that relative to developed economies, fiscal multipliers in developing economies are positive but much lower. Among developing ones, we find higher multipliers in fixed exchange rate regimes, during economic booms and during monetary expansions. Fiscal multipliers are especially big during episodes of monetary expansion since they reach levels above one in the medium-run.

Using counterfactual simulations, we find that by enhancing fiscal-monetary policy coordination in developing economies with flexible regime, it is possible to increase the effects of fiscal policy. Namely, fiscal policy programs would me more effective if the monetary policy reaction was more gradual.

Our empirical results have important policy implications for developing economies. First, policy makers in these economies should be very careful before engaging in countercyclical fiscal expansions. These fiscal programs seem to have higher effects during economic booms and more importantly, during monetary expansions. This effectiveness can be further improved if monetary authorities delay interest rate increases during their implementation.

The transmission channels of fiscal policy should be further explored using empirical estimations as well as general equilibrium macro models. Our estimations suggest that the financial stability channel might be important since government consumption shocks are mostly followed by real money demand reductions in developing economies, in contrast to developed economies. Other channels not considered in this work are: sovereign default risk and political risk.

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Appendix

Table 2: Panel Unit Root Tests – Developed

Test by Im, Pesaran and Shin (2003)

Null: Unit root (assumes common unit root process)

Panel	t-bar	P-value
Gov. Consumption	-2.8217	0.0000
GDP	-2.7561	0.0000
Policy rate	-3.0407	0.0000
Real exchange rate	-2.5220	0.0000
M2	-2.2732	0.0001

Source: Authors' calculations

Table 3: Panel Unit Root Tests – Developing

Test by Im, Pesaran and Shin (2003)

Null: Unit root (assumes common unit root process)

Panel	t-bar	P-value
Gov. Consumption	-4.0455	0.0000
GDP	-2.4721	0.0000
Policy rate	-3.6118	0.0000
Real exchange rate	-2.3654	0.0000
M2	-2.9201	0.0000

Source: Authors' calculations

Table 4: Lag Selection Criteria – Developed[4]

Lags	MBIC	MAIC	MQIC
1	**-476.36**	77.70	**-132.48**
2	-419.96	54.95	-125.21
3	-367.38	**28.38**	-121.75
4	-283.14	33.47	-86.63

Source: Authors' calculations

Table 5: Lag Selection Criteria – Developing

Lags	MBIC	MAIC	MQIC
1	**-549.04**	-10.49	-201.26
2	-510.70	**-31.11**	**-212.60**
3	-420.22	-20.56	-171.81
4	-342.15	-22.42	-143.42

Source: Authors' calculations

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[4] MBIC, MAIC and MQIC are modified information criteria for panel data as defined by Andrews and Lu (2001)

Figure 11. Impulse-response functions in developing economies during fixed exchange rates
One standard-deviation government consumption shock
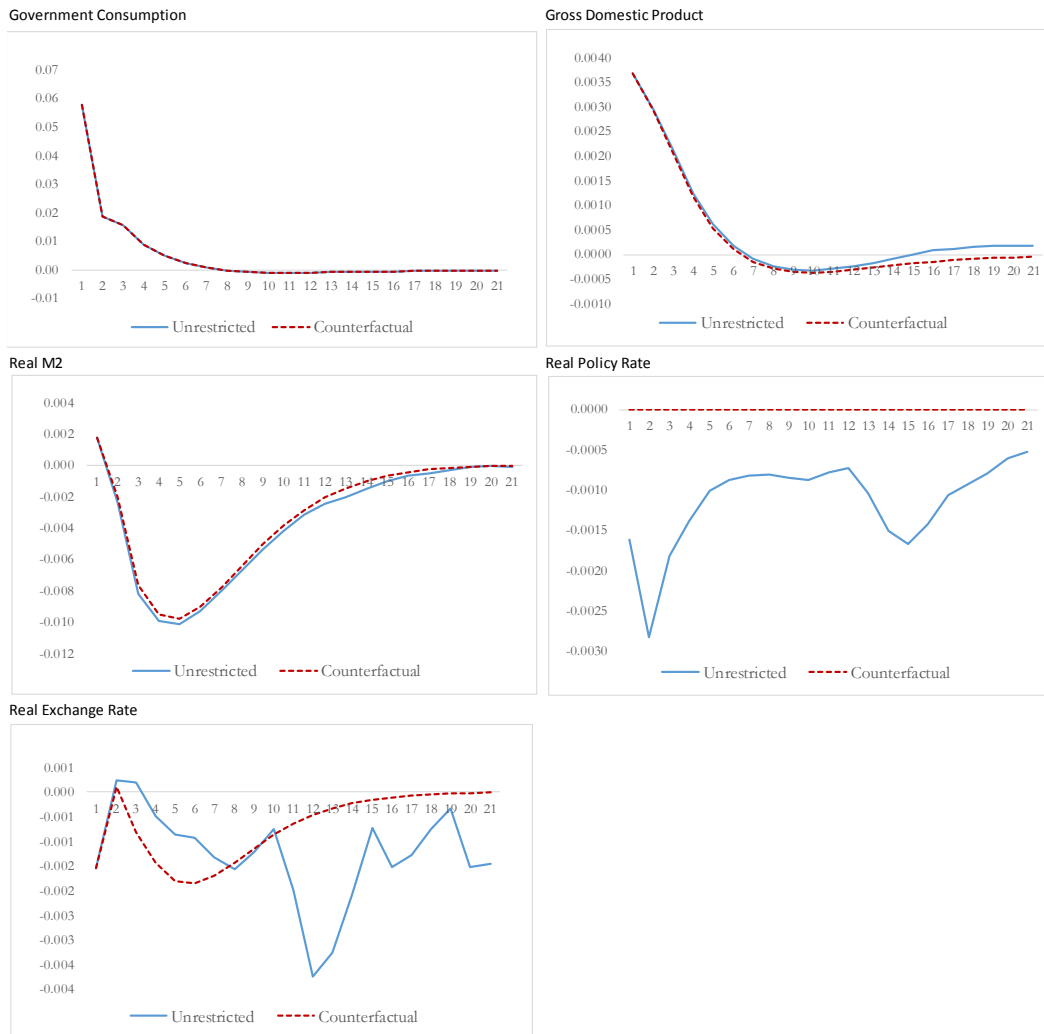
Source: Authors' computations

Figure 12. Impulse-response functions in developing economies during flexible exchange rates
One standard-deviation government consumption shock

Government Consumption

Gross Domestic Product

Real M2

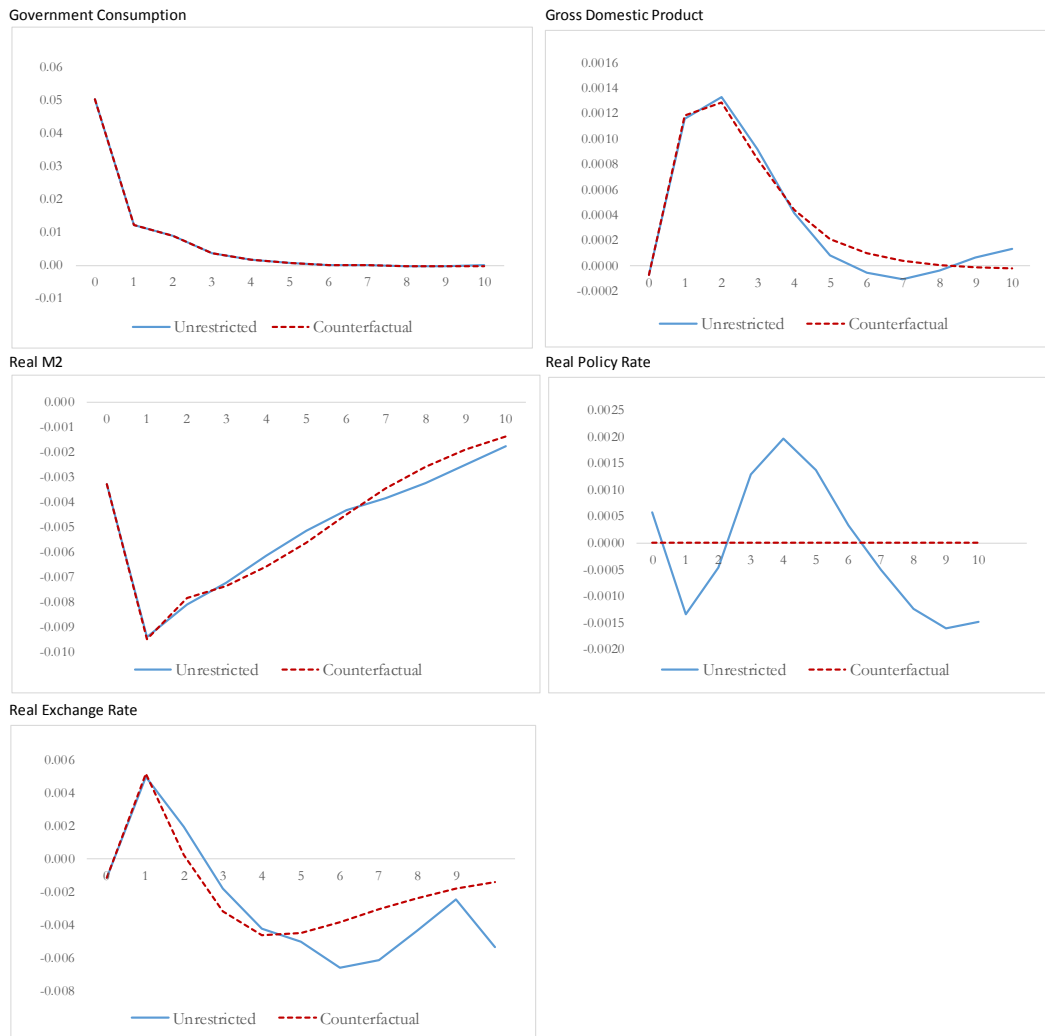Real Policy Rate

Real Exchange Rate

Source: Authors' computations

Figure 13. Impulse-response functions in developing economies during economic booms
One standard-deviation government consumption shock

Government Consumption

Gross Domestic Product

Real M2

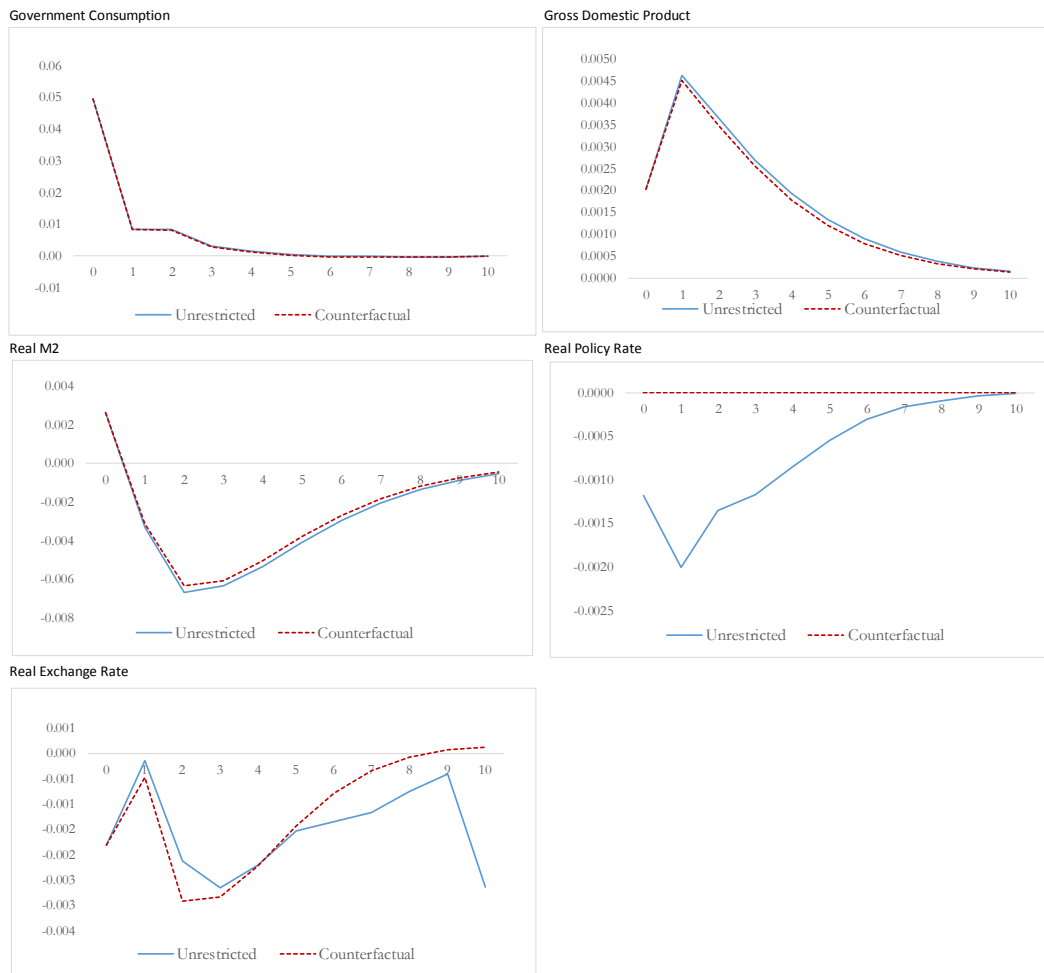Real Policy Rate

Real Exchange Rate

Source: Authors' computations

Figure 14. Impulse-response functions in developing economies during economic recessions
One standard-deviation government consumption shock

Government Consumption

Gross Domestic Product

Real M2

Real Policy Rate

Real Exchange Rate
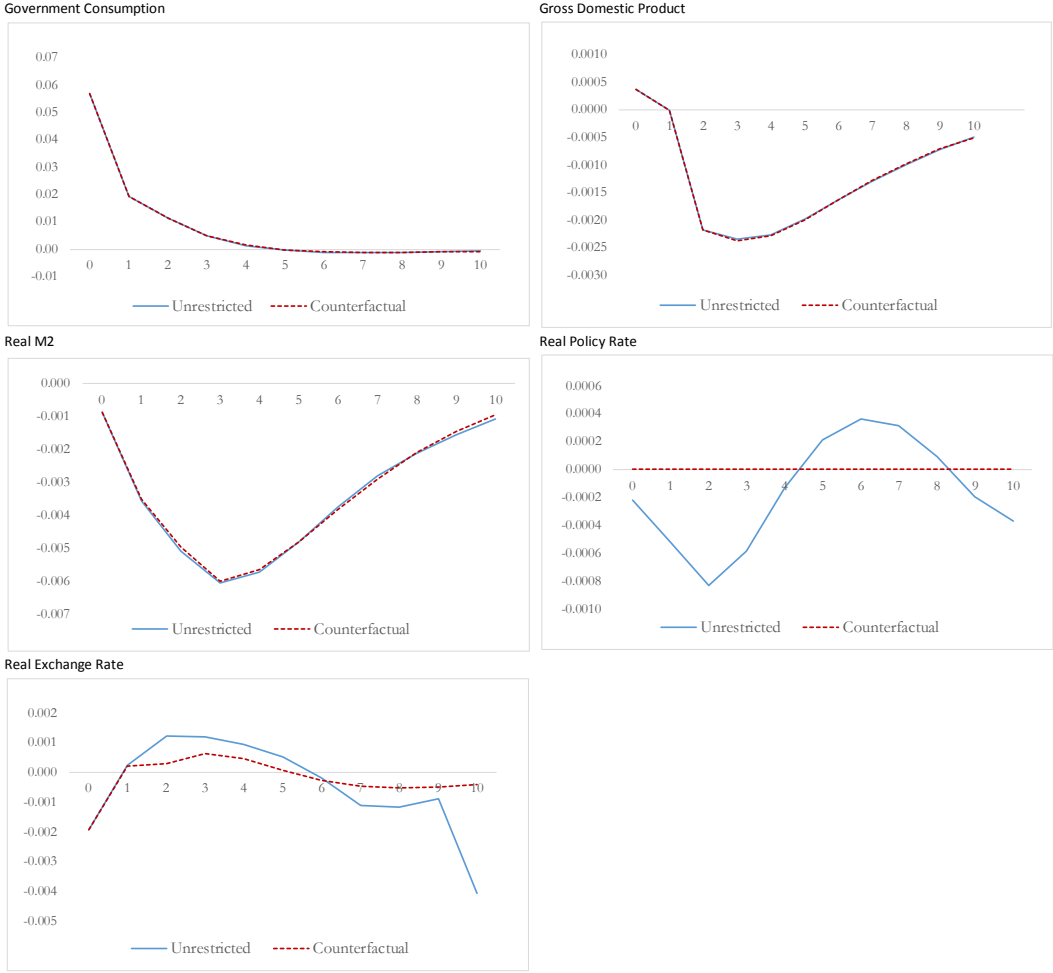
Source: Authors' computations

Figure 15. Impulse-response functions in developing economies during monetary expansions
One standard-deviation government consumption shock

Source: Authors' computations

Figure 16. Impulse-response functions in developing economies during monetary contractions
One standard-deviation government consumption shock

Source: Authors' computations