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Fiscal Policy Stimulus:
Consequences and Caveats for Monetary Policy in Guatemala

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Seminario de Investigadores Económicos de Guatemala

Guatemala, octubre 2015

Disclaimer

The views expressed in this presentation are those of the author and do not necessarily represent those of the Bank of Guatemala or its authorities.

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Motivation: Particular and pragmatic

- Actions of fiscal policy jointly determine aggregate demand, and thus, it has a strong influence over the economic cycle.

- It is important for monetary authorities to have a clear idea of what is the fiscal policy stance during the economic cycle, and determine if it is being pro-cyclical or counter-cyclical, and therefore, discern whether fiscal policy is assisting or deterring efforts of the central bank.

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Motivation: Of broader interest

- The study of transmission mechanisms of fiscal policy has received less attention than the transmission mechanism of monetary policy.

- In general, there are few studies in the literature that rigorously analyze the dynamic effects of fiscal policy shocks.

- Both, theoretical and empirical literature, leave open the possibility that variables that contribute to determine aggregate demand, exhibit opposite responses to fiscal impulses.

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- Theoretical models,

  - Neoclassical models predict, for example, that both private consumption and real wages should decrease as a result of a positive shock to government spending.

  - Other theoretical models, such as those of the new-Keynesian approach, predict the opposite, *i.e.* that the responses of both variables should be positive in face of the same shock to government spending.

- Empirical literature,

  - The scant evidence can be interpreted in favor of either the two theoretical positions aforementioned, depending on the methodology used to identify fiscal policy shocks.

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Motivation

- The absence of a robust theoretical suggestion, and the lack of a clear empirical guidance, motivates further to the study the effects of fiscal policy shocks in the particular case of Guatemala.

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Objective

- Therefore, in this paper I present a short empirical characterization of the effects of fiscal policy in Guatemala and propose a DSGE model for a small open economy, estimated using Guatemalan data.

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Relative Size of Government

Size of Government: Relative to GDP

	2001-14	2001-07	2008-14
Shares of GDP (%)			
Deficit	-2.09	-1.72	-2.47
Total revenue	12.02	12.51	11.53
Debt	22.66	21.66	23.67
− Domestic	9.19	7.19	11.18
− Foreign	13.47	14.47	12.48
Public Spending	14.11	14.23	13.99
− Expenditure	9.97	9.64	10.30
− Investment	4.14	4.59	3.70

Simple averages.

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Government spending shock

- In order to identify the spending shocks, I use a recursive approach based on the Choleski decomposition, using the following order for a five-variable VAR: tax revenue (τ), government expenditure (g), output (y), inflation (π) and the policy interest rate (i).

- With this ordering, we are assumimg that fiscal variables (τ and g) do not react contemporaneously to the other variables (y, π and i).

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Government spending shock

- When using quarterly data, this identification scheme can be very useful, since public expenditures and taxes are set annually, at the beginning of the period when government budget is approved, therefore, variables like quarterly output, inflation or the policy rate cannot influence contemporaneously public spending or tax rates, since changes to government budget requires approval from congress and that process usually takes longer than a quarter.

- This timing helps to attenuate the dual (or reverse) causality problem, and helps to isolate the effects of a fiscal shock.
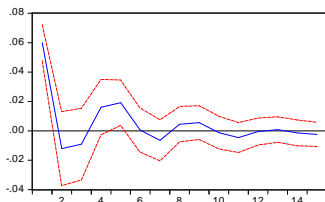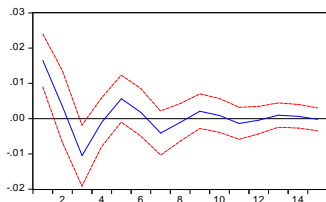
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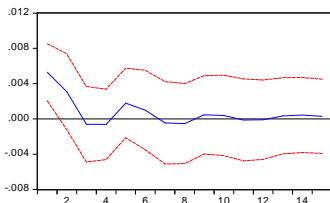Model
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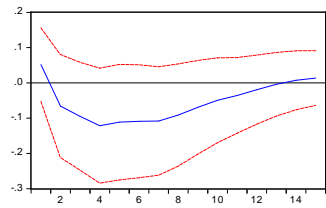
Model characteristics

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Model characteristics

Model main characteristics

- Firms producing the intermediate good and importers, operate in a monopolistic competitive market.

- When these firms decide to change their prices, they face adjustment costs *à la* Rotemberg [1982].

- The model also includes a central government, carrying out unproductive spending and public investment, both financed by:

  - Issuing debt (domestic and foreign) and,
  - Charging taxes on:
    - capital rent,
    - labor income and,
    - consumption.

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Model characteristics

Model characteristics

- Households supply labor services and rent capital to firms producing an intermediate good.

- They consume and invest domestic and foreign goods, buy domestic assets and take foreign debt.

- A final good is produced by firms operating in a perfectly competitive market.

- There is a monetary authority that sets the short term interest rate —the policy rate- according to a Taylor-type rule.

- Finally, the model considers imports and exports of goods and the artificial economy is subject to several exogenous shocks.

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Households

$$\max_{\{c_t, n_t, b_t, b_t^*, k_t, x_t\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{1-\sigma} \left(c_t - \chi \frac{n_t^{1+\gamma}}{1+\gamma} \right)^{1-\sigma} \cdot \zeta_t^c \right]$$

s.t.

$$(1-\tau_t^k) r_t^k k_{t-1} + (1-\tau_t^l) w_t n_t + \frac{(1+i_{t-1})}{(1+\pi_t^c)} bd_{t-1} + \xi_t^h + \xi_t^f + Trg_t \ldots$$

$$\ldots + s_t \cdot rem_t + \frac{s_t p_t^*}{p_t^c} b_t^* = (1+\tau_t^c) c_t + \frac{p_t^x}{p_t^c} x_t + bd_t + \frac{s_t p_t^*}{p_t^c} b_{t-1}^* \frac{(1+i_{t-1}^*)}{(1+\pi_t^*)}$$

and

$$k_t = x_t (1 - ss_t(\cdot)) + (1-\delta) k_{t-1}$$

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Intermediate good production

- Firms maximize profits subject to three constraints:
  - Production function, summarizing the available technology:

$$y_{jt}^{hs} = z_t k_{jt-1}^{\alpha} n_{jt}^{\alpha_n} rm_t^{(1-\alpha-\alpha_n)} \left(k_{t-1}^g\right)^{\alpha_g}$$

  - Demand curve, each firm faces:

$$y_{jt} = \left(\frac{p_{jt}}{p_t^h}\right)^{-\varepsilon_d} y_t^d$$

  - The cost of adjusting their prices:

$$p_t^h \frac{\kappa}{2} \left(\frac{p_{jt}^h}{p_{jt-1}^h \Pi_{t-1}^{\chi_p} \bar{\Pi}^{(1-\chi_p)}} - 1\right)^2$$

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Monetary policy

- Monetary policy will follow a standard Taylor-rule described as,

$$1 + i_t = (1 + i_{t-1})^{\rho_i} \left(\left(1 + \bar{\imath}\right) \left(\frac{1 + \pi_t^c}{1 + \bar{\pi}} \right)^{\rho_\pi} \right)^{1 - \rho_i} \exp\left(\varepsilon_t^{z^i} \right)$$

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Government and fiscal policy

- Government will carry on both, unproductive spending $-g_t^c$- and investment$-g_t^x$-. These activities will be financed by issuing bonds: bd_t in domestic markets and bg_t^* in foreign markets. Government will also collect taxes $-Tax_t$-.

- The government budget identity is given by,

$$Tax_t + b_t = g_t + \frac{(1+i_{t-1})}{1+\pi_t^c}bd_{t-1} + \frac{s_t p_t^*}{p_t^c}bg_{t-1}^* \frac{(1+i_{t-1}^*)}{1+\pi_t^*} + Trg_t$$

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Fiscal rules

- Government expenditure rule:

$$g_t = \bar{g} \left(\frac{y_t}{\bar{y}} \right)^{-\psi_g} \left(\frac{b_{t-1}}{\bar{b}} \right)^{-\gamma_g} \cdot \exp\left(z_t^g \right)$$

- Tax rate over capital rent,

$$\tau_t^k = \bar{\tau}^k \left(\frac{y_t}{\bar{y}} \right)^{\psi_{\tau^k}} \left(\frac{b_{t-1}}{\bar{b}} \right)^{\gamma_{\tau^k}} \cdot \exp\left(z_t^{\tau^k} \right)$$

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Fiscal rules (cont.)

- Tax rate over labor income,

$$\tau_t^l = \bar{\tau}^l \left(\frac{y_t}{\bar{y}} \right)^{\psi_{\tau^l}} \left(\frac{b_{t-1}}{\bar{b}} \right)^{\gamma_{\tau^l}} \cdot \exp\left(z_t^{\tau^l} \right)$$

- Tax rate over consumption,

$$\tau_t^c = \bar{\tau}^c \left(\frac{y_t}{\bar{y}} \right)^{\psi_{\tau^c}} \left(\frac{b_{t-1}}{\bar{b}} \right)^{\gamma_{\tau^c}} \cdot \exp\left(z_t^{\tau^c} \right)$$

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Exogenous processes

- Foreign Economy,

$$c_t^{h^*} = \left(\frac{p_t^h}{p_t^c} \left(\frac{s_t p_t^*}{p_t^c} \right)^{-1} \right)^{-\mu} c_t^*$$

$$i_t^* = \bar{i}^* \cdot \exp\left(z_t^{i^*} \right) + \phi_b \cdot \left[e^{\left(nfl_t - \bar{nfl} \right)} - 1 \right]$$

- Exogenous Shocks
  - Fourteen in total, including
    - Foreign economy shocks
    - Productivity shocks
    - Policy shocks

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Long-run ratios

Ratios	Model	Data
Consumption / GDP	82.84%	84.35%
Investment / GDP	19.18%	16.64%
Total imports / GDP	38.17%	38.31%
Exports / GDP	28.84%	26.61%
Remittances / GDP	9.88%	9.88%
Dom. consumption / Consumption	78.75%	79.25%
Impor. Consumption / Consumption	21.25%	20.75%
Dom. Invest. / Investment	59.15%	60.18%
Import. Invest. / Investment	40.85%	39.82%
Public debt / GDP	24.5%	22.66%

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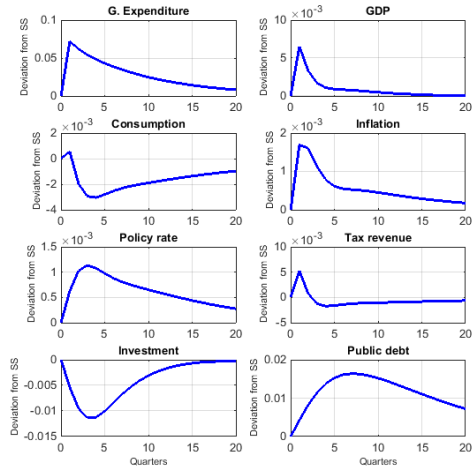
Long-run ratios
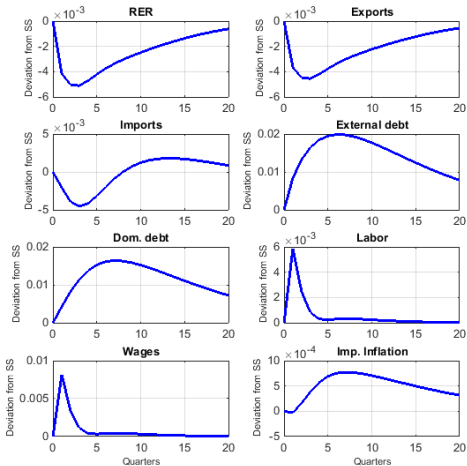Model dynamics

Simulation

- In order to study the dynamics of the model, this section shows the impulse-response functions for different types of transitory shocks:

  - A government spending shock,

  - Temporary shock to tax rates

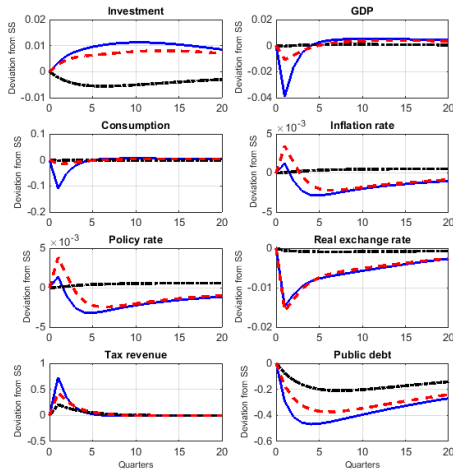 - A comparison between a government with and without fiscal rules.

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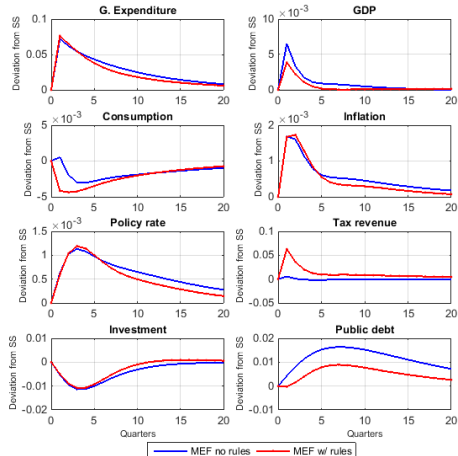Model
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A model without fiscal rules

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- The proposed model is intended to serve as an analytical tool of the known interactions between fiscal and monetary policies in Guatemala.

- This paper is part of an effort to improve and increase the set of tools for analyzing monetary policy in Guatemala.

- As part of this effort, the model presented in this paper, needs be taken closer to the Guatemalan data, and applied to real and relevant policy tradeoffs in order to aid discussion and the decision making process within the central bank.

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Julio J Rotemberg. Sticky prices in the united states. *The Journal of Political Economy*, pages 1187–1211, 1982.