Foreign Exchange Intervention Effectiveness in Guatemala under Inflation Targeting

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I. Introduction
• Later decades have shown a growing number of countries establishing flexible exchange rate systems (IMF, 2017).

• Such growing numbers are “the jure”. But “de facto” there is are larger amounts of interventions at the FOREX markets among emerging and developing economies.

• FOREX interventions justified to moderate an exchange rate level or its volatility; to accumulate foreign reserves, or to correct currency misalignments.

• In Guatemala, FOREX interventions have been justified to moderate nominal exchange rate volatility, and to accumulate foreign currency reserves, although the later was done just during a brief period of time.
• FOREX interventions in Guatemala are based on a rule designed to moderate exchange rate volatility.

• Research objective: to determine whether such interventions have been effective in lowering the volatility of the Quetzal with respect to the US dollar.

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II. Literature Review
• Factors that induce FOREX intervention (Adler and Tovar, 2011; Basu y Varoudakis, 2013) :
  • Avoid nominal or real exchange rate misalignments;
  • Foreign currency reserves accumulation;
  • Reduce nominal exchange rate volatility.

• Transmission Channels of FOREX Intervention:
  • Portfolio Balanced Channel: Interaction between supply and demand of financial assets in domestic and foreign currency (Evans and Lyons, 2002 and 2005; Abbuy, 2018).
  • Signal Channel: Nominal exchange rate expectations. (Canales and Kriljenko, 2003; Guimaraes and Karacadag, 2006).
Content

III. Exchange Rate Policy in Guatemala
Tasas de variación interanual del tipo de cambio nominal
Países seleccionados
2005-2017

Porcentaje

Brasil  Chile  Costa Rica  Colombia  México  Guatemala
• Along with the establishment of Inflation Targeting in 2005 it was created an exchange rate intervention rule.

• The intervention rule has the following characteristics:
  • It is designed to moderate exchange rate volatility;
  • It is symmetric, that is, it does not favor an appreciation or a depreciation behavior in the local currency;
  • It is of public knowledge.

• This rule has been barely modified over the years, particularly to allow more flexibility to the nominal exchange rate.

• FOREX interventions are performed in US dollars through spot auctions, at a predetermined schedule.
GUATEMALA: FOREX INTERVENTION RULE

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<th>PURCHASING</th>
<th>SELLING</th>
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<td><strong>INTERVENTION CONDITION</strong></td>
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<tr>
<td>$S_t &lt; \bar{S}_t - 0.0075\bar{S}_t$ ; $\forall S_t$</td>
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<td>$S_t &gt; \bar{S}_t + 0.0075\bar{S}_t$ ; $\forall S_t$</td>
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Source: Own elaboration according to data from Bank of Guatemala.

$S_t$ : Bilateral exchange rate (Q/US$) in period $t$

$\bar{S}_t$ : Average exchange rate during the last five working days, including $t$
Content

IV. Empirical Analysis
Bank of Guatemala: FOREX Interventions respect to Total Transactions and to Net Market Demand
The Model

The Econometric analysis is based on the variable named “variation of exchange rate level”, $s_t$

$$s_t = e_t - \left( \lambda e_{pi} + (1 - \lambda) e_{pm} \right)$$

(1)

Where:
- $s_t$ : variation of exchange level in period $t$;
- $e_t$ : nominal exchange rate at the time of intervention;
- $e_{pi}$ : immediate average;
- $e_{pm}$ : average after one month;
- $\lambda \in [0, 1]$ : weight coefficient

The empirical analysis is based on an GARCH model with median effects, similar to one used by Guimaraes and Karacadag (2006).
The Model

The econometric specification of the model is described by the equation system (2) – (4):

Variation of Exchange Rate Level (as a measure of Exchange Rate Volatility):

\[ s_t = \beta_0 + \beta_1 I_t^c + \beta_2 I_t^v + \sum_{j=1}^{10} \beta_{j+2} r c_t^j + \beta_{13} d_i t + \epsilon_t \]  \hspace{1cm} (2)

Where, at period \( t \):

\( I_t^c \) = Purchase intervention;

\( I_t^v \) = Sale intervention;

\( r c_t^j \) = Exchange Rate Rule \( j \).

\( d_i t \) = Interest Rate Differential.
The Model

Short Term Volatility:

\[ h_t - q_t = \alpha (\varepsilon_{t-1}^2 - q_{t-1}) + \tau (\varepsilon_{t-1}^2 - q_{t-1}) z_{t-1} + \mu (h_{t-1} - q_{t-1}) \]
\[ + \gamma_1 I^c_t + \gamma_2 I^v_t + \sum_{j=1}^{10} \gamma_{j+2} r c^j_t + \gamma_{13} d_i t \]  

(3)

Where, at period \( t \):

\( h_t \) = Short run conditional variance;

\( q_t \) = Long run conditional variance;

\( \varepsilon_{t-1}^2 \) = Unforeseen lagged shocks.

\( z_{t-1} \) = Dummy variable that counts for unexpected nominal exchange rate variations.
The Model

Long Term Volatility:

\[ q_t = \omega + \rho(q_{t-1} - \omega) + \varphi(\varepsilon_{t-1}^2 - h_{t-1}) + \delta_1 I_t^c + \delta_2 I_t^v \\
+ \sum_{j=1}^{10} \delta_{j+2} r c_t^j + \delta_{13} d_i t \]  

(4)

Where, at period \( t \):
\[ q_t = \text{Long run conditional variance}; \]
\[ \omega = \text{Steady State Value}. \]
The empirical analysis was made based on daily data for the period 2005-2017, attending each of the following cases:

1. Three different values of $s_t$, each calculated for different values of parameter lambda ($\lambda$) in equation 1: 0.1, 0.5, and 0.9.

2. Three different time periods, $R$:
   - $R_1 = \text{January 2005 to December 2017}$
   - $R_2 = \text{January 2005 to December 2008}$
   - $R_3 = \text{January 2009 to December 2017}$

3. Parameters $\beta_1$ and $\beta_2$ are related to purchase and sale operations.

4. Parameters $\beta_3$ to $\beta_{12}$ are related to exchange rate rules.

5. Parameter $\beta_{13}$ is related to nominal interest rate differential.
Empirical Results

Regarding to the effect of FOREX interventions on the nominal exchange rate volatility (Q/US$):

• FOREX interventions have significantly moderated the quetzal exchange rate volatility with respect to the US dollar.
  o A purchase FOREX intervention of US$10 million leads to an average depreciation of 0.34% on the nominal exchange rate.
  o A sale FOREX intervention of US$10 million leads to an average appreciation of 0.55% on the nominal exchange rate.
Empirical Results

- A FOREX intervention has persistent effects on the nominal exchange rate, since it starts affecting its value just after intervention (as identified through the immediate average, $e_{pi}$), and it continues to be significant 30 days after the intervention is done (as identified through the average after a month, $e_{pm}$).

- Changes in the nominal exchange rate rules had additional effects on $s_t$. Such changes also helped to moderate nominal exchange rate volatility.
V. Conclusions
• FOREX interventions performed by Bank of Guatemala have significantly moderated nominal exchange rate volatility since the establishment of Inflation Targeting.

• Despite large amounts of unsterilized FOREX interventions, particularly purchasing US dollars (which add up to the total monetary base), Bank of Guatemala has also achieved price stability, since inflation has fluctuated around its target.

• Therefore, it seems that achieving nominal exchange rate stability has also contributed to achieving domestic price stability.
Thank you.
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