Foreign Exchange Intervention at the Zero Lower Bound (ZLB)

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The views expressed do not necessarily reflect those of the Bank of Israel
The NIS exchange rate – 1989-2015
BoI interest rate and FX purchases

BoI interest rate (Left axis)

FX purchases (Right axis)
Percentage change in FX reserves since the global financial crisis (2007-2014)

(Countries with reserves over 10 billions $ and 5 percent of GDP)
Does FX intervention benefit the economy?

• A controversial issue in the theoretical literature.
• The “trilemma”: With free capital flows, it is impossible to determine both the interest rate and the exchange rate.
• Results from a general equilibrium model: the optimal policy in an open economy is similar to a closed economy (Clarida, Gali and Gertler 2001).
• Currency Misalignments (Engel 2011): Optimal policy should take into account the exchange rate as well.
Does FX intervention affect the exchange rate?

- Mixed findings.
  - Higher ability to influence the exchange rate the “thinner” the FX market is.

- Econometric difficulty to identify the effect of intervention.
  - Endogeneity of intervention.
  - Using intra-day data: short-term effect only.

- Blanchard et al. (IMF 2015): In emerging market economies, FX interventions were effective in response to capital inflows.

- May be able to influence the exchange rate by other means.
FX intervention at the ZLB

- The interest rate in Israel is close to the ZLB.
- The ZLB poses special circumstances.
  - Possible extra considerations which are not present in the standard literature.
- We examined the effect of FX purchases under the ZLB, compared to normal conditions where the interest rate is positive.
Main findings

• FX purchases have larger effect under the ZLB.
• Larger effect on the exchange rate, inflation and output.
• Crowding out: Under the ZLB there is no crowding out of domestic uses.
• The strength of the effect depends on the “depth” of the ZLB.
• Our findings are similar to the findings with regards to the government spending multiplier in a closed economy of Christiano, Eichenbaum and Rebelo (2011).
A DSGE model for analyzing FX purchases

• A macro-economic (New-Keynesian) model for an open economy, of the type used by many central banks (including the Bank of Israel) for policy analysis and forecasting.

• Model equations are derived from optimal behavior of economic agents (households and firms).

• Monetary policy operates by using the interest rate to stabilize inflation and the output gap. (A Taylor rule for the interest rate.)
Methodological challenges

• Limitations of standard models concerning the analysis of FX purchases at the ZLB:
  • Monetary policy operates using a single policy instrument, namely the short-term nominal interest rate. FX purchases (or quantitative easing) have no effect.
  • Linear solution methods do not allow for a bound on the interest rate.

• We have extended the model so that FX purchases affect the exchange rate (introducing portfolio balance effects).

• We have used a non-linear solution method so that we may analyze the economy when the ZLB on the nominal interest rate is binding.
Model simulation

- The economy is hit by negative demand shocks.
- Output and inflation decline, hence the central bank lowers the interest rate.
- We examine the results under two versions of the model:
  1. A (standard) model with no ZLB.
  2. A model with ZLB.
Output loss due to the ZLB

Output

- Output graph showing the impact of ZLB with and without ZLB.

Interest Rate

- Interest rate graph showing the impact of ZLB with and without ZLB.
The effect of FX purchases under the ZLB

Output under ZLB

Exchange Rate under ZLB
The effect of FX purchases is larger under the ZLB

* The graphs show the net effect of purchases, relative to the corresponding paths without purchases.
Inflation and the interest rate

* The graphs show the net effect of purchases, relative to the corresponding paths without purchases.
No crowding out under the ZLB

* The graphs show the net effect of purchases, relative to the corresponding paths without purchases.
The size of the effect of FX purchases depends on the “depth” of the ZLB

Table: The effect of FX purchases in the following year

<table>
<thead>
<tr>
<th></th>
<th>No ZLB</th>
<th>ZLB</th>
<th>ZLB – Deeper recession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>0.2%</td>
<td>1.1%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Depreciation</td>
<td>6.7%</td>
<td>7.9%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Inflation</td>
<td>1.1%</td>
<td>1.6%</td>
<td>2.2%</td>
</tr>
</tbody>
</table>
Summary

• Under normal conditions the ability of the central bank to support economic activity via FX purchases is limited.
• FX intervention is more effective when the economy is at the ZLB.
• No crowding out at the ZLB.
• The effect of FX purchases depends on the depth of the ZLB.