

# Foreign Exchange Intervention at the Zero Lower Bound (ZLB)

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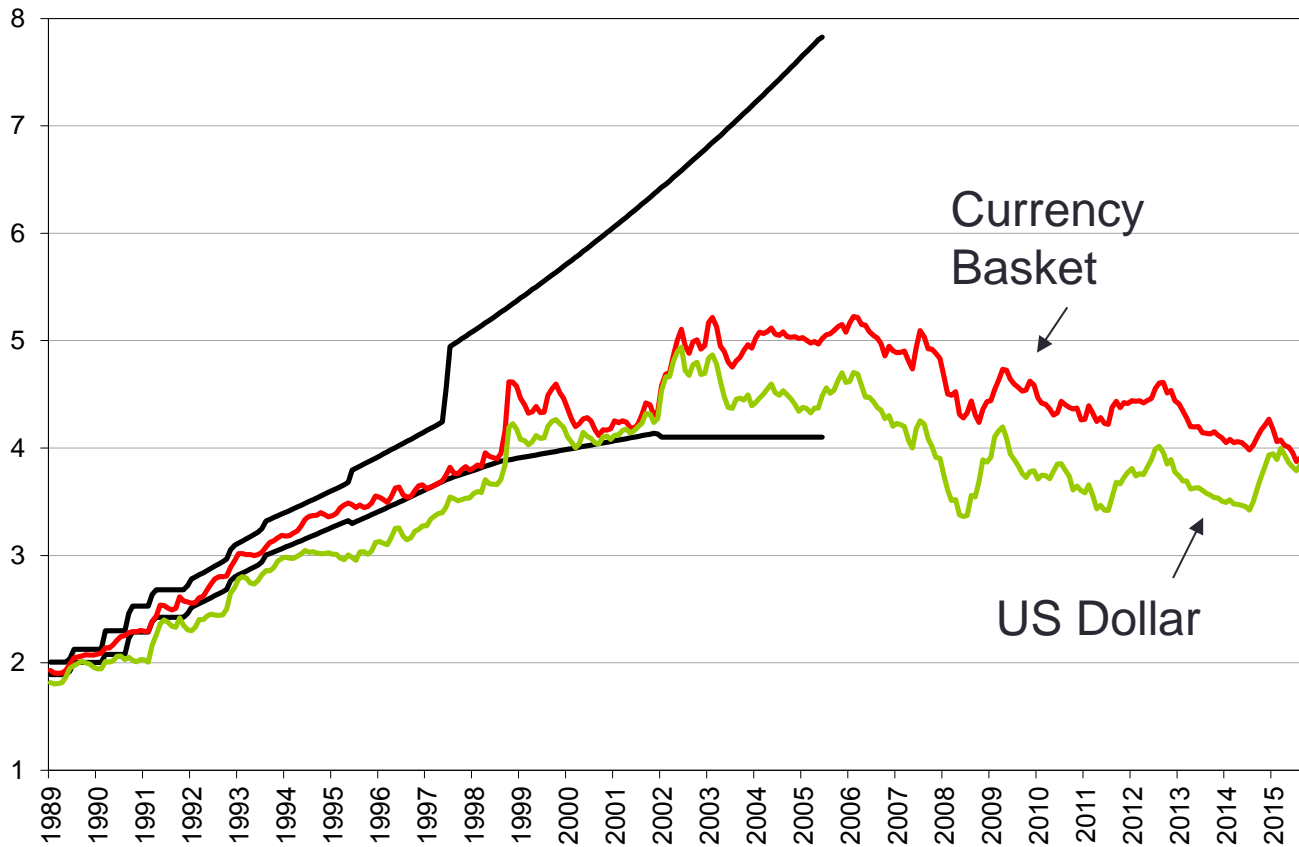
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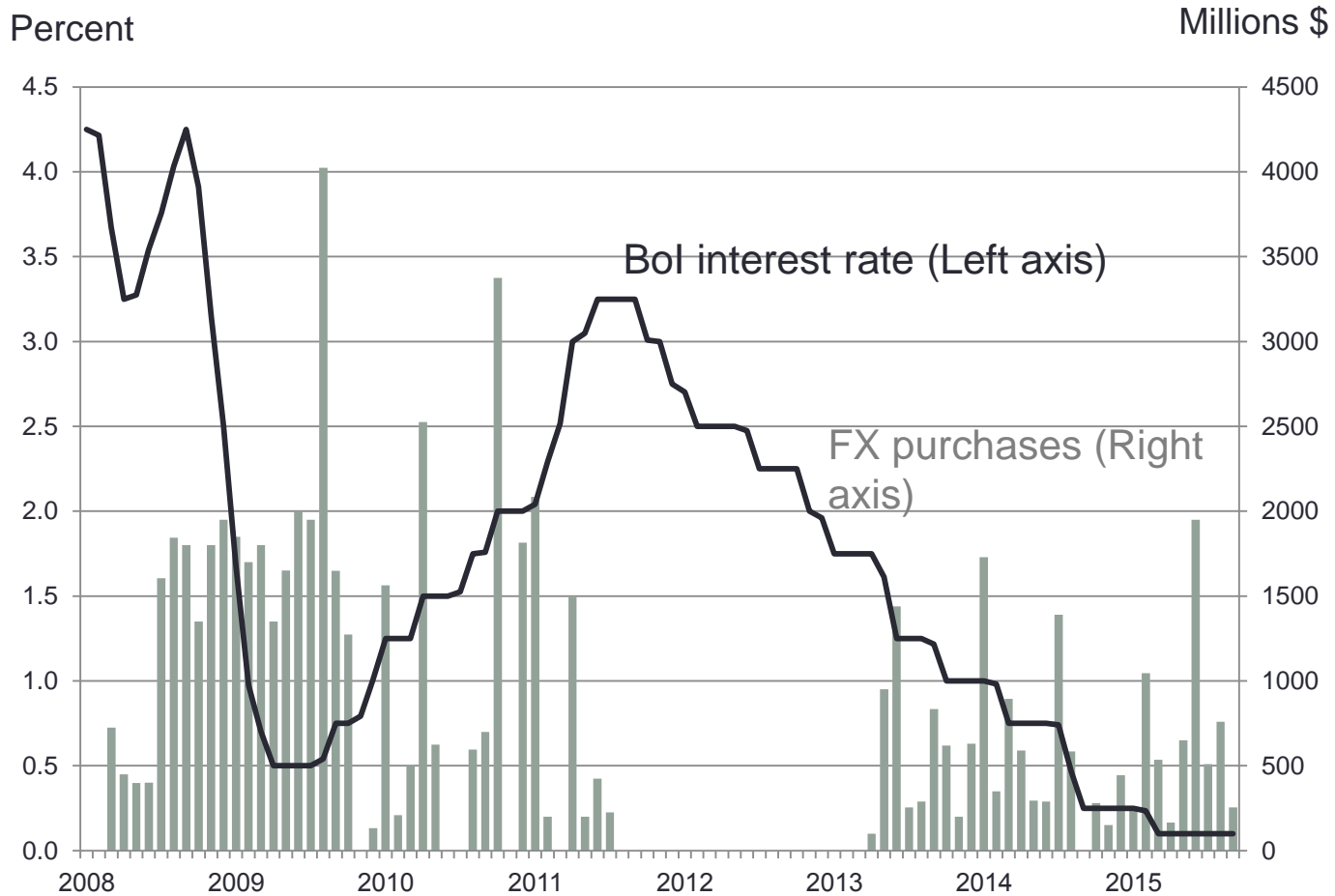
Aaron Institute for Economic Policy, Round Table, December 28<sup>th</sup> 2015

The views expressed do not necessarily reflect those of the Bank of Israel

# The NIS exchange rate – 1989-2015

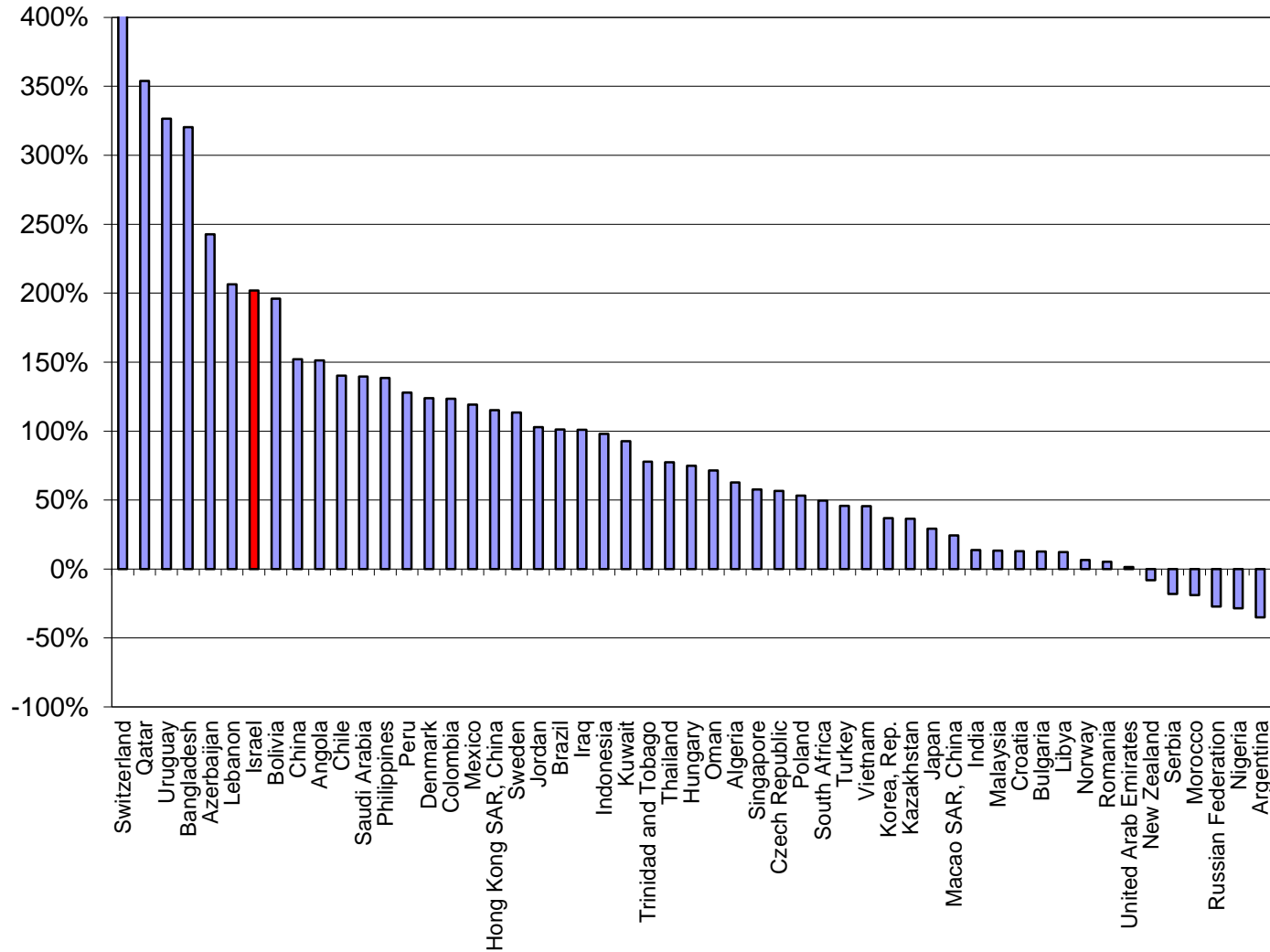


# Bol interest rate and FX purchases



# 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.)

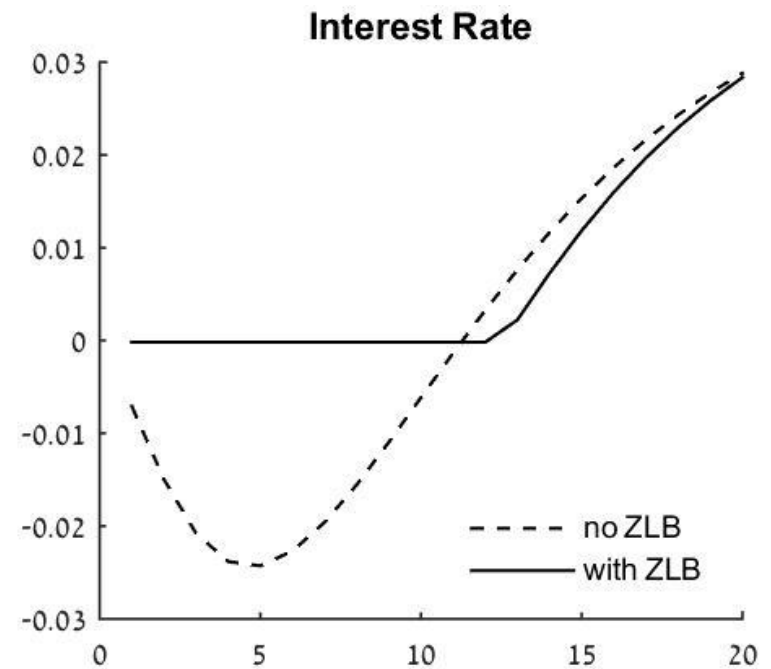
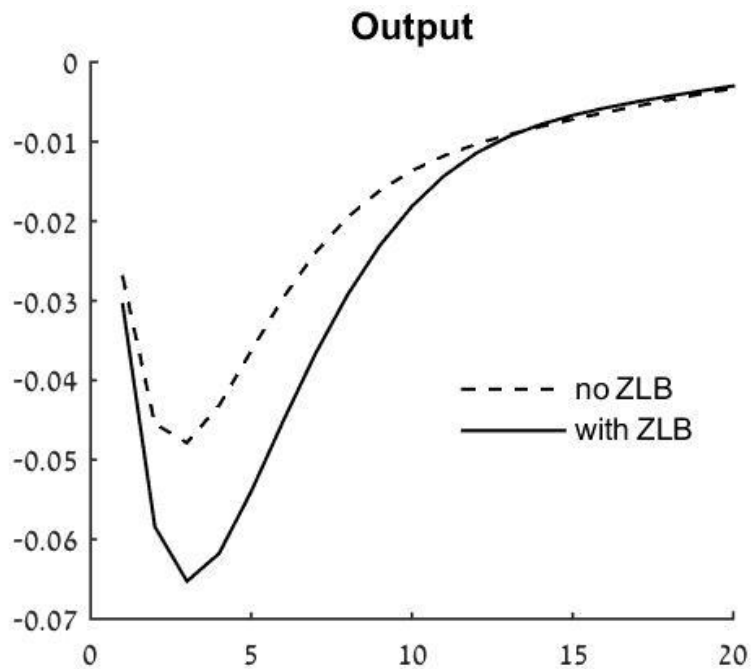
# Methodological challenges

- 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.

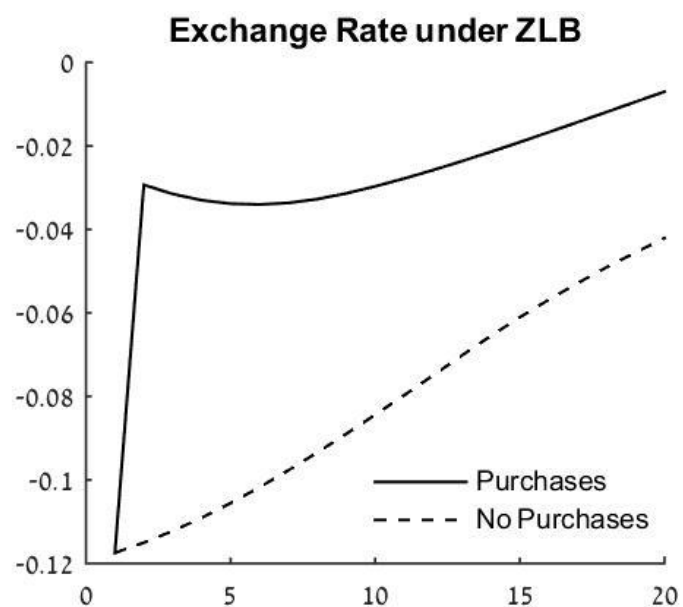
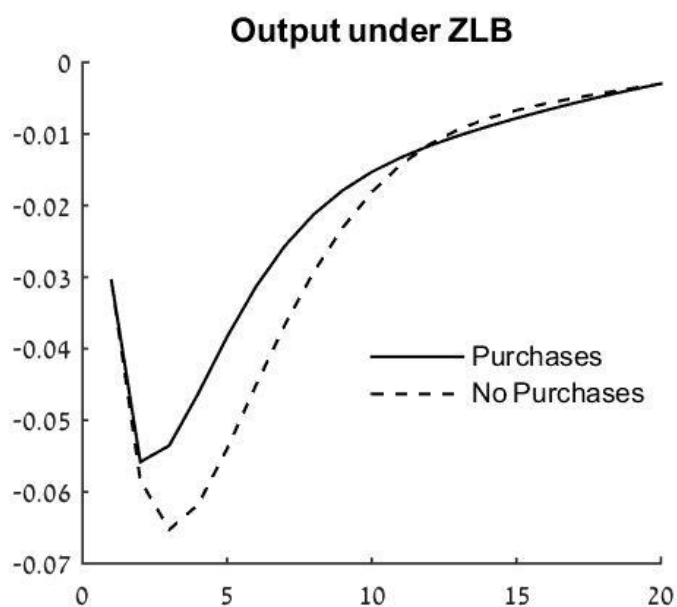
# Model simulation

- 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.

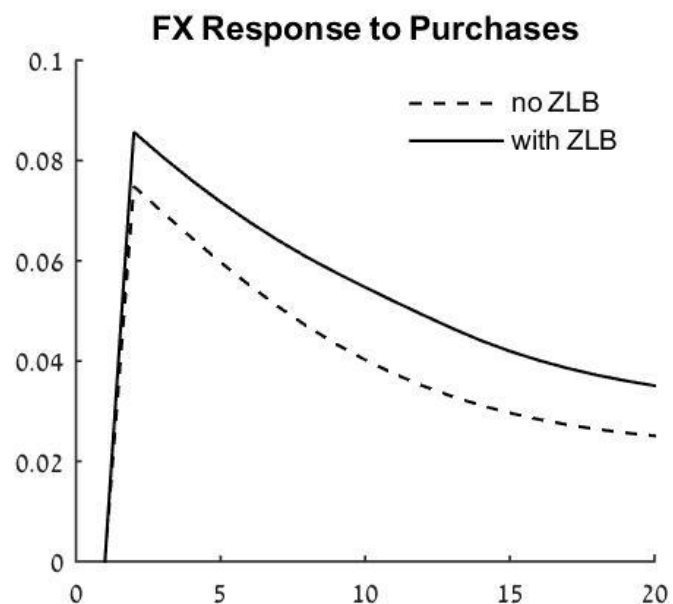
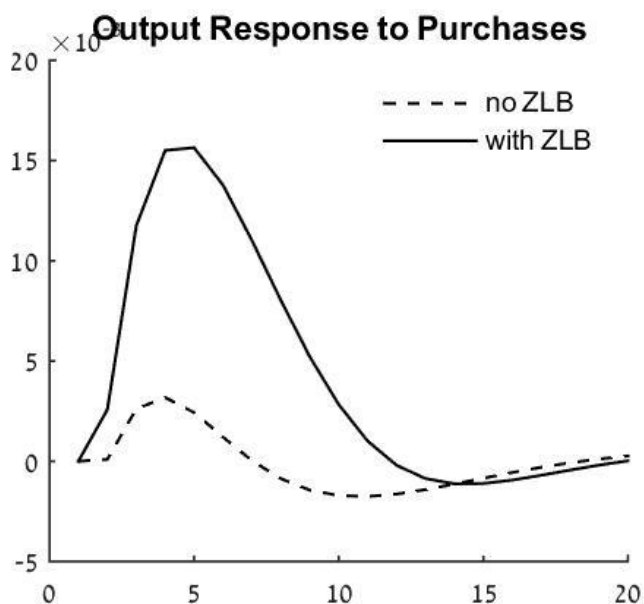
# Output loss due to the ZLB



# The effect of FX purchases under the ZLB

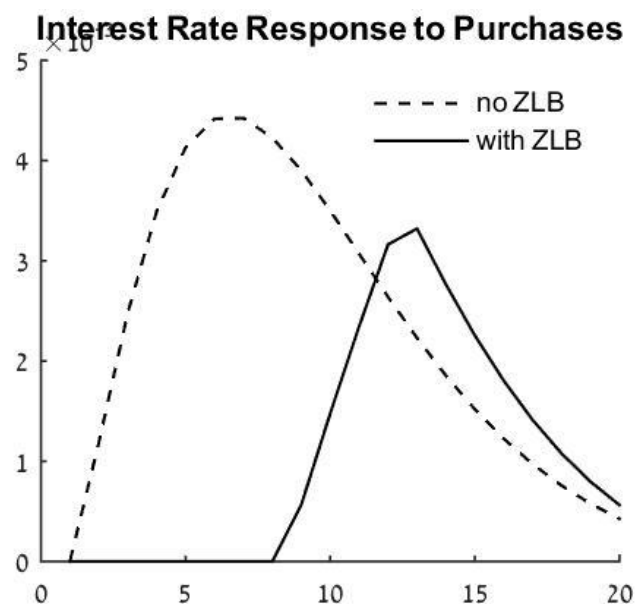
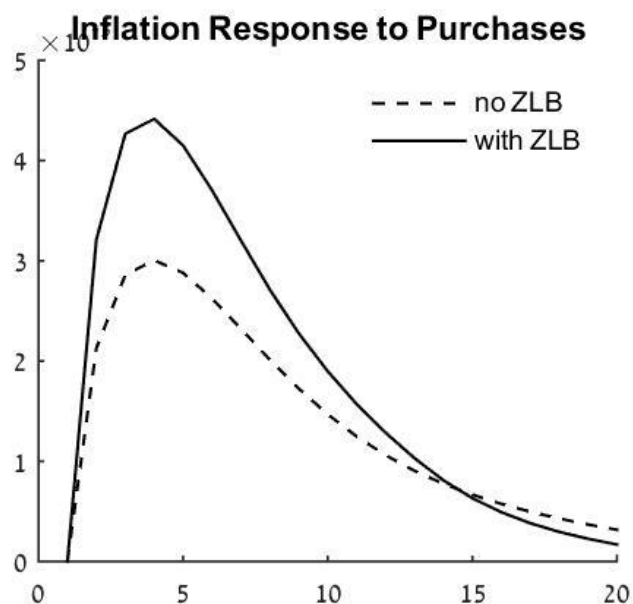


# The effect of FX purchases is larger under the ZLB



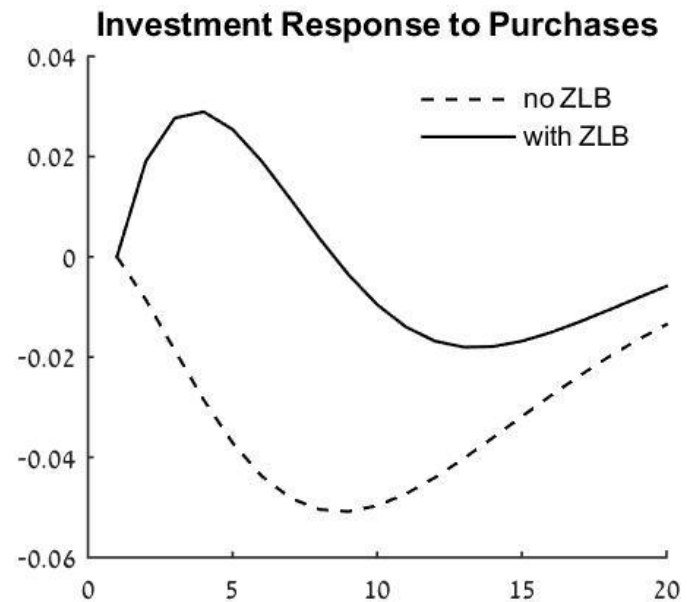
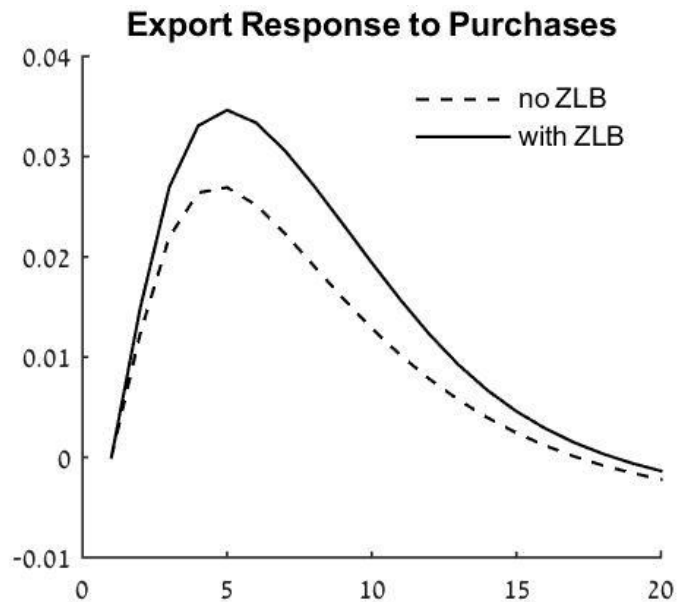
\* The graphs show the net effect of purchases, relative to the corresponding paths without purchases.

# 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

	<b>No ZLB</b>	<b>ZLB</b>	<b>ZLB – Deeper recession</b>
Output	0.2%	1.1%	1.8%
Depreciation	6.7%	7.9%	9.4%
Inflation	1.1%	1.6%	2.2%

# 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.