UIP with FX interventions under exchange rate peg and inflation targeting: The case of Ukraine

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Summary

- The study modifies an uncovered interest parity (UIP) condition in a semi-structural New Keynesian model with a view to account for exchange rate management by the National bank of Ukraine (NBU)

- Foreign exchange (FX) interventions cushion small open economies against excessive exchange rate fluctuations. Modeled deviations from the pure UIP help assess their effectiveness and the role in stabilizing prices

- Moderate amounts of FX interventions help stabilize both exchange rate and prices. But the exchange rate must remain floating to serve as a monetary policy transmission channel. Aggregate demand is inelastic to the degrees of exchange rate management

- Sterilized FX interventions under IT are more effective than non-sterilized ones under the fixed exchange rate regime
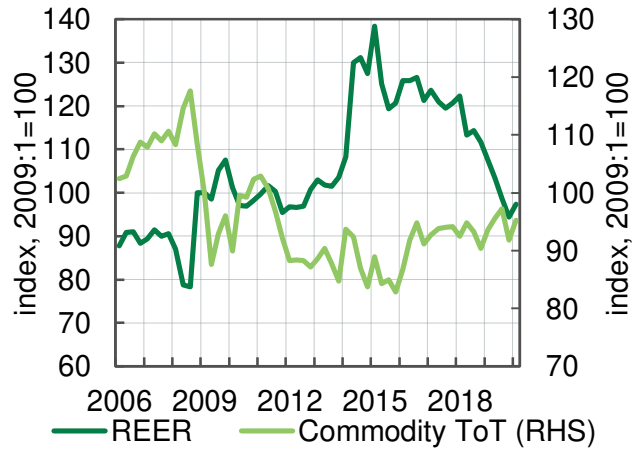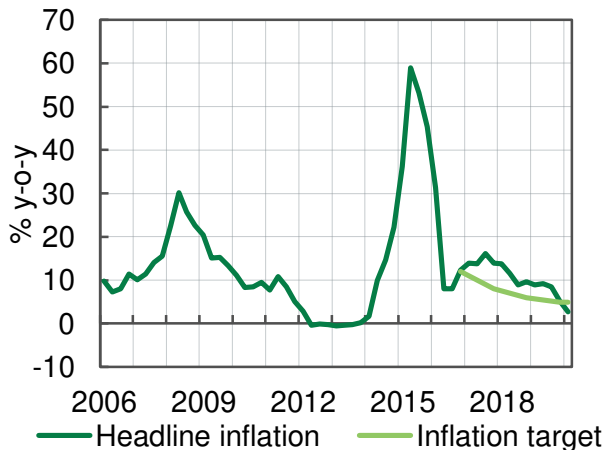
The NBU abandoned fixed exchange rate and adopted IT in 2015 during a "perfect storm". Ukraine is vulnerable to external shocks

FX interventions — Exchange rate (RHS)
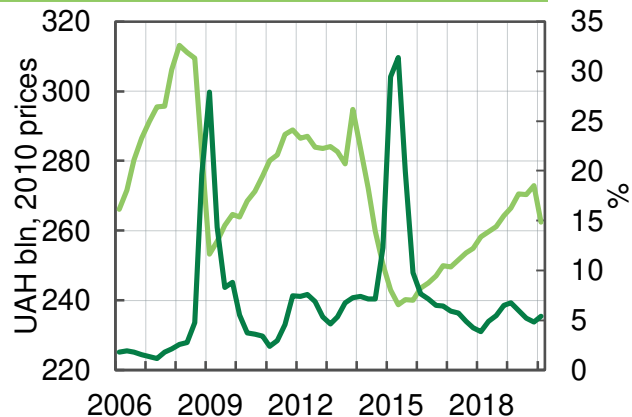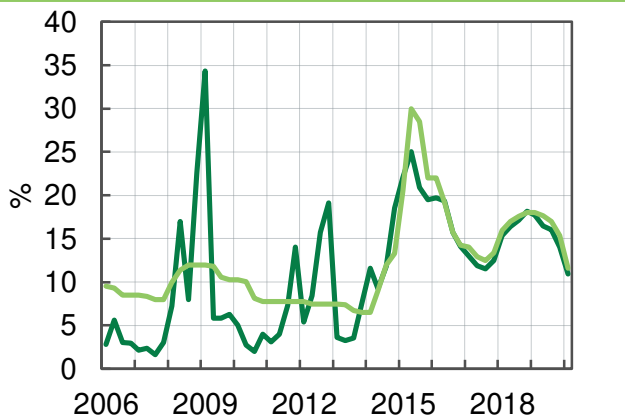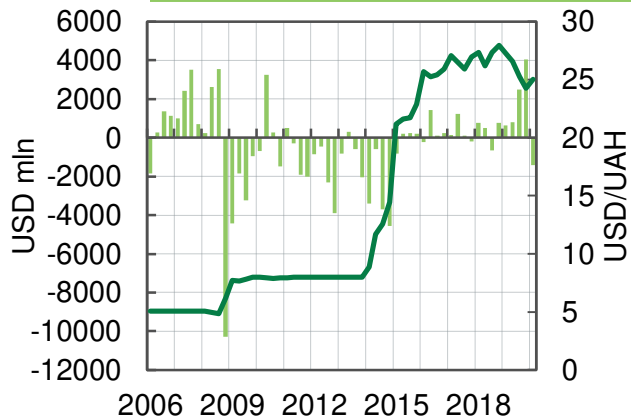
Note: negative FX interventions mean that foreign currency was sold by the NBU on the market

Source: National Bank of Ukraine, cbonds.com, own estimates

"Perfect storm" in 2014–2015

- Russian military aggression, macroeconomic crisis

- Current account and budget deficits, currency crisis

- Exposed oligarchic banking, banking crisis

Interbank interest rate — Key policy rate

Headline inflation — Inflation target

GDP — Sovereign risk premium (RHS)

REER — Commodity ToT (RHS)

The model

- Semi-structural New-Keynesian "in gaps" model of a small open economy

- Similar models are used by many central banks

  - Beneš, J., Clinton, K., George, A., Gupta, P., John, J., Kamenik, O., Laxton, D., Mitra, P., Nadhanael, G.V., Portillo, R., Wang, H., Zhang, F. (2017). Quarterly projection model for India: key elements and properties. IMF Working Papers, 17/33. International Monetary Fund.

- Standard structure with Ukraine specific extensions

  - Open economy IS curve, Phillips curve with expectations, Taylor-type reaction function, hybrid UIP

- Coefficients are estimated with Bayesian techniques separately on the 2006–2014 and 2015–2020:Q1 horizons

  - Strong exchange rate channel to inflation, limited policy transmission to aggregate demand

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Hybrid uncovered interest parity

- spot nominal exchange rate in log (up is depreciation)

- risk adjusted interest rate differential (premium is spread between yields on UA Eurobonds and 10y US T-bonds)

$$s_t = s_{t+1} + interv_t + \frac{1}{4}(i_t^* - i_t + prem_t) - \gamma_4 \widehat{tot}_t + \varepsilon_{4,t}$$

- interventions (in terms of impact) are endogenously defined with a view to smooth exchange rate volatility

- commodity terms of trade (gap) influence the exchange rate in an economy with a large share of commodities in trade

- willingness to intervene rises with the degree of exchange rate management

- interventions are applied when current and/or expected exchange rate devaluation deviate from a parity-implied value

$$interv_t = \frac{\beta_5}{4}\left((\Delta s_t^P - \Delta s_{t+1}) + (\Delta s_t^P - \Delta s_t)\right)$$

- parity-implied value represents relative purchasing power parity, when adjusted for a real exchange rate trend

$$\Delta s_t^P = \Delta \bar{z}_t + \pi_t^T - \pi_t^{*,T}$$

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Moderate exchange rate management reduces inflation volatility, but stronger management exacerbates it

**Model implied unconditional standard deviations (2015–2020:Q1 parametrization)**

	Nominal exchange rate deviations from parity	Model implied interventions	Output gap	Inflation	Policy interest rate
	$\Delta s_t - \Delta s_t^P$	$interv_t$	$\hat{y}_t$	π_t	i_t^P
$\beta_5 = 0$	**1.32**	**0.00**	1.00	1.07	1.16
$\beta_5 = 0.57$	1.00	1.00	**1.00**	**1.00**	**1.00**
$\beta_5 = 1$	0.64	1.16	1.00	1.08	1.32
$\beta_5 = 100$	**0.01**	**1.24**	**0.99**	**1.22**	**2.01**

- FX interventions in 2015–2020:Q1 prevented the exchange rate from being 32% more volatile. They also stabilized inflation

- Further 36% reduction in exchange rate volatility would have been associated with 8% less stable inflation and 32% more active policy interest rate

- Output gap volatility respond little to changes in the exchange rate management

Systematic deviations from the UIP to a large extend can be explained with strong and lasting effect of FX interventions

Model simulated interventions compared to observed series
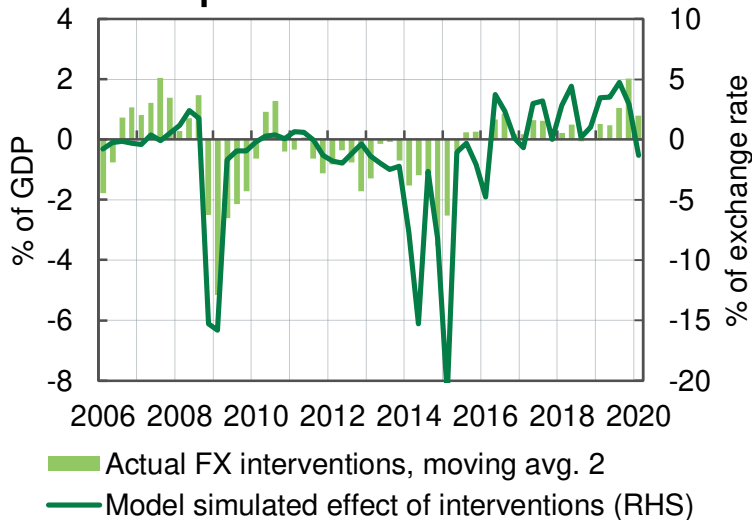
Source: National Bank of Ukraine, own estimates
Note: negative model estimated effect of interventions means that the nominal exchange rate was strengthened

- Actual FX interventions, moving avg. 2
- Model simulated effect of interventions (RHS)

Model simulated interventions regressed on observed series

Dependent variable: model simulated effect of interventions

Variable	Coefficient
actual FX interventions	2.96***
actual FX interventions (-1)	2.80***
dummy0614*actual FX interventions	-1.51
dummy0614*actual FX interventions (-1)	-2.24***
dummy0614	0.50
constant	-1.51*
R-squared	0.62
Observations (2006–2019)	56

1
0.17

Source: own estimates
Note: model simulated interventions are in % of nominal exchange rate, actual FX interventions are in % of annual GDP; dummy0614 equals one in 2006–2014; * means significance with 10%, ** 5%, *** 1%

- 0.17% of GDP (USD 273 million in 2019) worth of interventions are required to nudge the exchange rate in a necessary direction over the course of two quarters

- Interventions under IT in 2015–2020:Q1 are three times stronger than they used to be in 2006–2014 under the fixed exchange rate regime

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7

Appendix: Impulse response functions to the demand shock for various betas under the 2015–2020:Q1 parametrization

Source: own estimates

Output gap · beta=0 · beta=0.57 · Policy interest rate · Interbank interest rate · Inflation · Nominal exchange rate · Interventions · beta=1 · beta=100

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