Tailoring the QPM model to Azerbaijan

OGResearch

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Implications for the model

- Oil effects:
  - REER: money inflow, real appreciation; monetary policy decided about the split between FX and inflation
  - GDP: fiscal effects (business cycle), but also investment (potential output)
  - FX Reserves
  - Which of these can we represent in the model without too much additional effort?
- Monetary policy:
  - Is it different from the standard QPM model?
  - Is it different before and after the crisis?
- Note: for other countries, we could consider remittances, foreign aid, money targeting, parallel exchange rate... Anything that is relevant.

Introducing oil

- We need to introduce oil prices to the model
- Equations don't have to sophisticated - external variables (oil prices, food prices, foreign inflation, ...) usually taken over from other models / forecasters and imposed over the whole forecast horizon
- We'll again employ trend-gap decomposition and AR processes

$$
\begin{aligned}
qoil_t &= oil_t - p_t^* \\
qoil_t &= \overline{qoil_t} + \widehat{qoil_t} \\
\Delta\overline{qoil_t} &= \rho_1 \Delta\overline{qoil_{t-1}} + (1-\rho_1)\Delta\overline{qoil_{ss}} + \varepsilon^1 \\
\widehat{qoil_t} &= \rho_2 \widehat{qoil_t} + \varepsilon^2
\end{aligned}
$$

- Note that since oil (and food) are important inputs into production, we can plug them into the Phillips Curve to help forecast inflation

Changes to Phillips Curve

- Oil prices are regulated in Azerbaijan, but food is an important inflation driver:

$$
\begin{aligned}
\pi_t = {} & \alpha_1 E\pi_{t+1} \\
& + (1 - \alpha_1 - \alpha_4 - \alpha_6)\pi_{t-1} \\
& + \alpha_2(\widehat{y}_t) \\
& + \alpha_3 \widehat{z}_t \\
& + \alpha_4(\Delta s_t + \pi_t^* - \pi_t) \\
& + \alpha_5 \cdot \widehat{qfood}_t \\
& + \alpha_6 \cdot (\Delta food_t + \pi_t^* - \pi_t) \\
& + \varepsilon_t^{\pi}
\end{aligned}
$$

Monetary policy

- Clear preference for FX rate stability over inflation stability
- But also sometimes adjustments – clearly not a strict fixed FX rate, so we cannot use the simple equation:

$$s_t = s_{t-1} + \varepsilon_t^s$$

- We need a rule that shows clear preference for FX smoothing
- The rule should also allow the FX to follow trends (REER movements)

Exchange rate modeling

- Exchange rate rule - we replace "natural" UIP with a policy rule:

$$
\begin{aligned}
s_t &= \kappa_1 * \left((s_{t-1} + \Delta s_t^{tar} - \kappa_2 \widehat{z}_t \right) \\
&\quad + (1 - \kappa_1) \left(E_t[s_{t+1}] + (i_t^* + prem_t - i_t)/4 - \kappa_3 \widehat{oil}_t \right) \\
\Delta s_t^{tar} &= \Delta \overline{z}_t + \pi_t^{tar} - \overline{\pi^*}_t
\end{aligned}
$$

- Parameter $\kappa_1 = 0.85$ controls how much the FX is flexible vs controlled
- We weaken the FX rate response to shocks
- Also, the external sector is not just "*", we have US, RU, Eurozone

Changes to trend equations

- IS curve:

$$\begin{aligned}\widehat{y}_t = &\beta_1 \widehat{y}_{t+1} + \beta_2 \widehat{y}_{t-1} \\ &- \beta_3 \widehat{r}_t + \beta_4 \widehat{z}_t \\ &+ \beta_5 \widehat{y}^*_t \\ &+ \beta_6 \widehat{oil}_t \\ &+ \varepsilon^{\widehat{y}}_t\end{aligned}$$

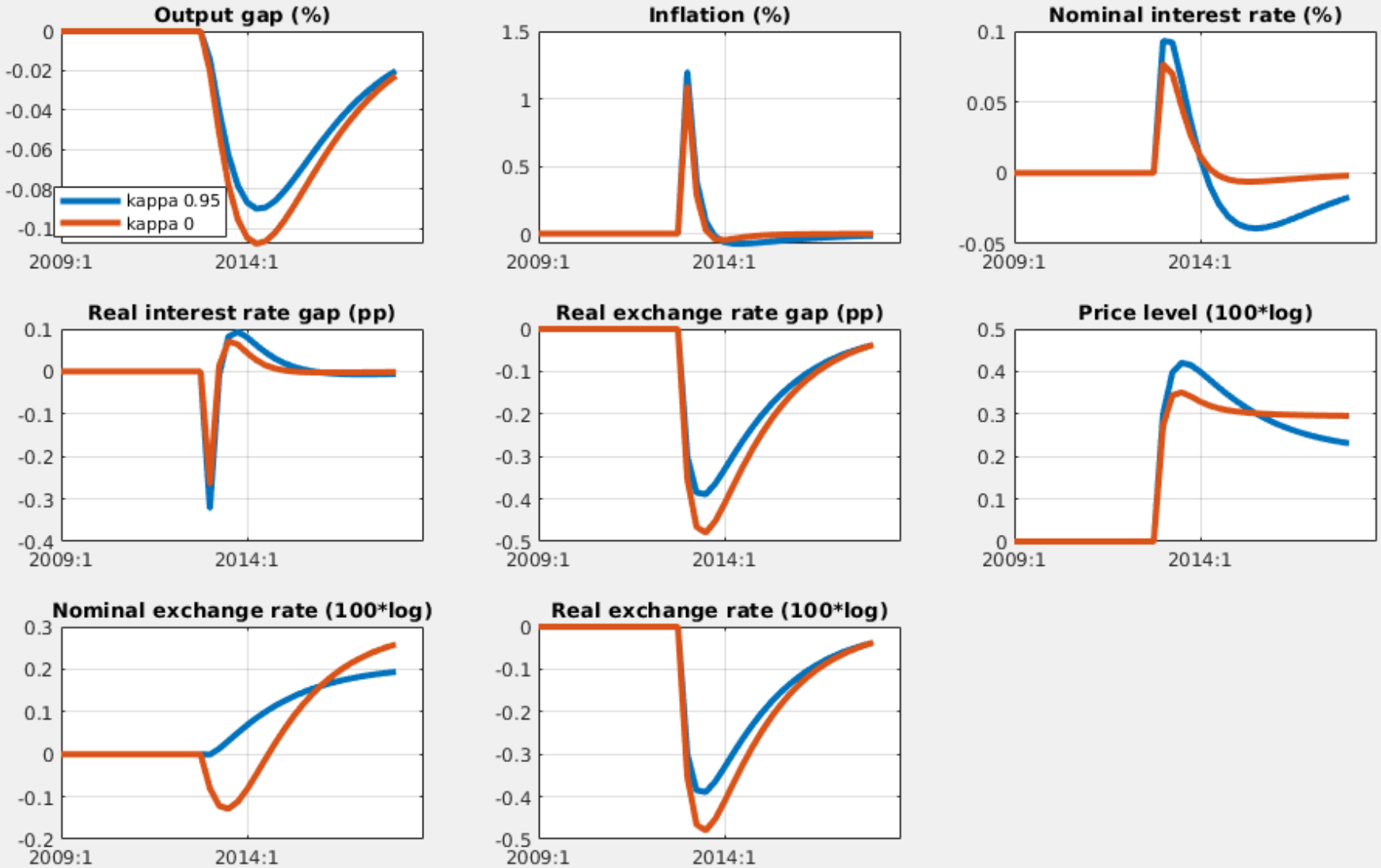
- REER tnd:

$$\Delta \overline{z}_t = \rho^z \Delta \overline{z}_{t-1} + (1-\rho^z) \cdot \overline{z}_{ss} + -(\Delta \overline{oil}_t - \Delta \overline{oil}_{ss}) + \varepsilon^{\overline{z}}_t$$

- Output potential:

$$\Delta \overline{y}_t = \rho^y \Delta \bar{\cdot} ney_{t-1} + (1-\rho^y) \cdot \overline{y}_{ss} + +(\Delta \overline{oil}_t - \Delta \overline{oil}_{ss}) + \varepsilon^{\overline{y}}_t$$

Effect of changing kappa



@CMOP Infrastructure

- Start IRIS
- initialize CMOP:
  c = cmop('./az_model','az202004','az_');
- c.readmodel();
- c.observeddata();
- c.analyzemodel();
- c.filterhistory('scenario')
- c.forecast('scenario') or c.forecast('base','alternative')
- Scenarios have to be defined in "az_round_options"

@CMOP Infrastructure cont.

- Scenarios have to be defined in ”az_round_options”
- Each scenario has a CSV file with tunes
- The tunes CSV is the primary place where you should work