AMEM: Tailoring the QPM to Azeri Economy

Tomas Motl, Course for Masaryk University, Spring 2023

Review of Findings

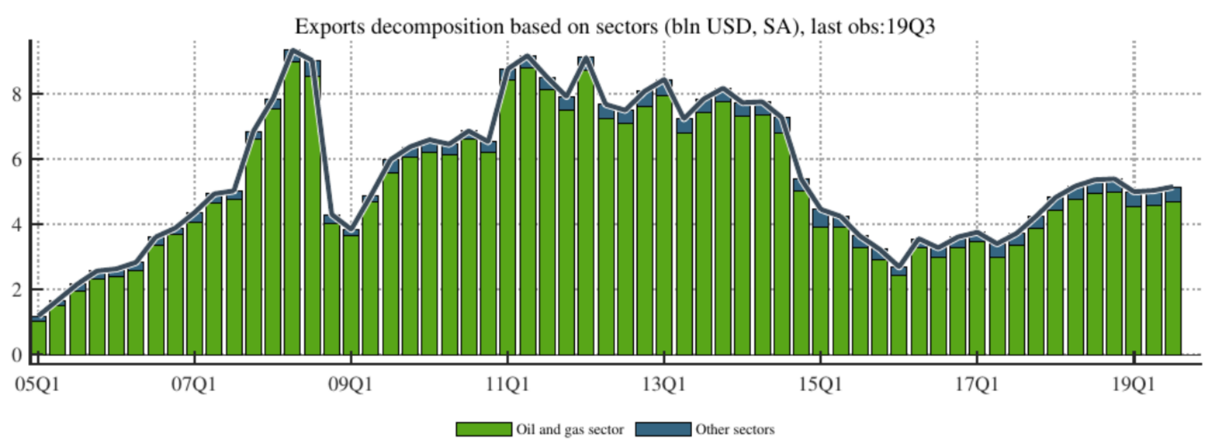
Key role of oil

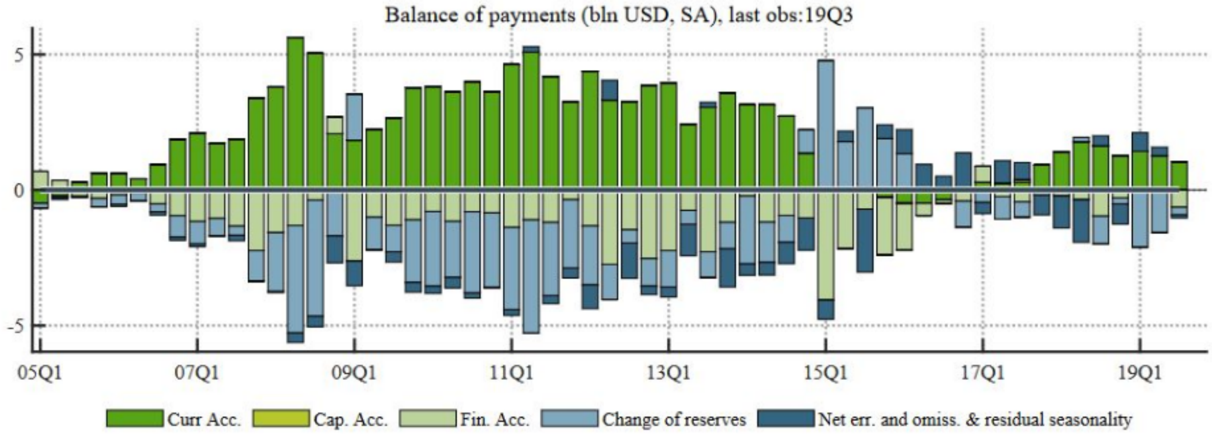
- Large determinant of GDP
  - Fiscal effects (output gap)
  - Investment (output trend)
- Large determinant of REER
  - money inflow, real appreciation
  - but monetary policy decides the FX vs CPI split

Different monetary policy regime

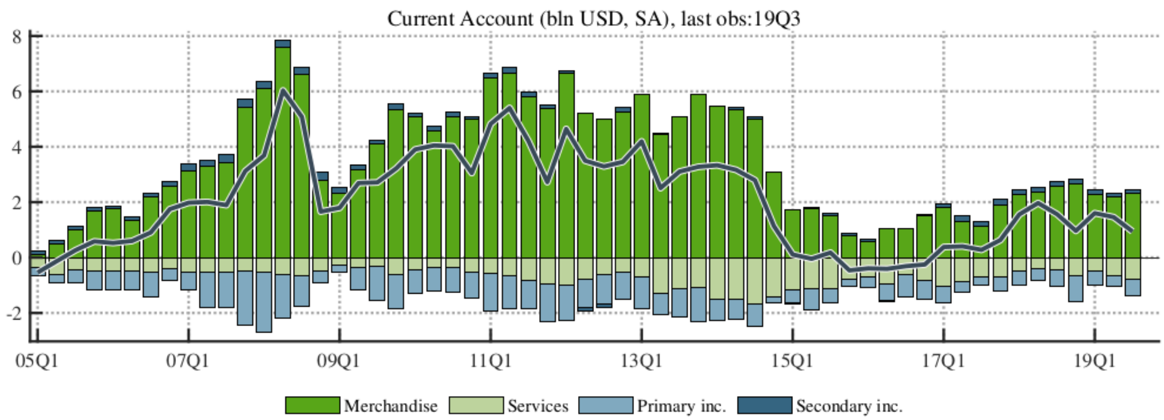
- No inflation targeting
- Explicit preference for stable FX rate
- Closed capital account
- How is this different from vanilla QPM?

Charts for discussion

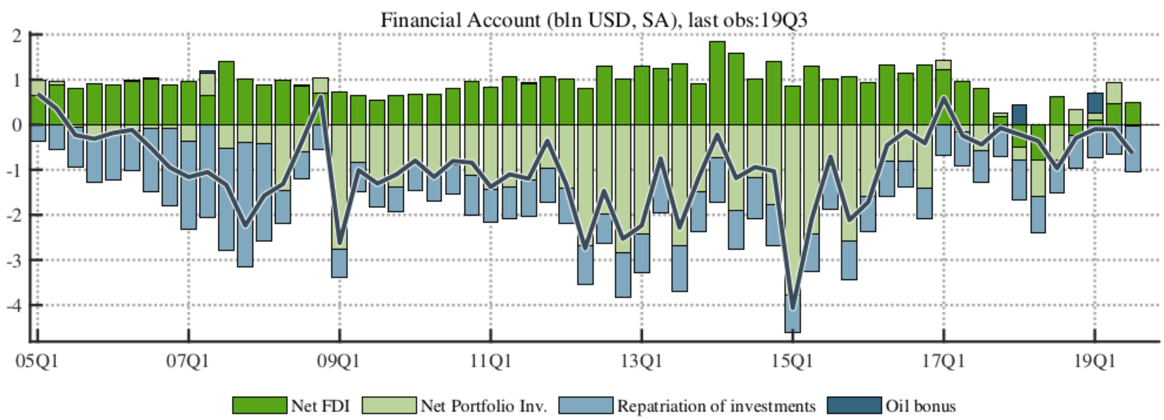




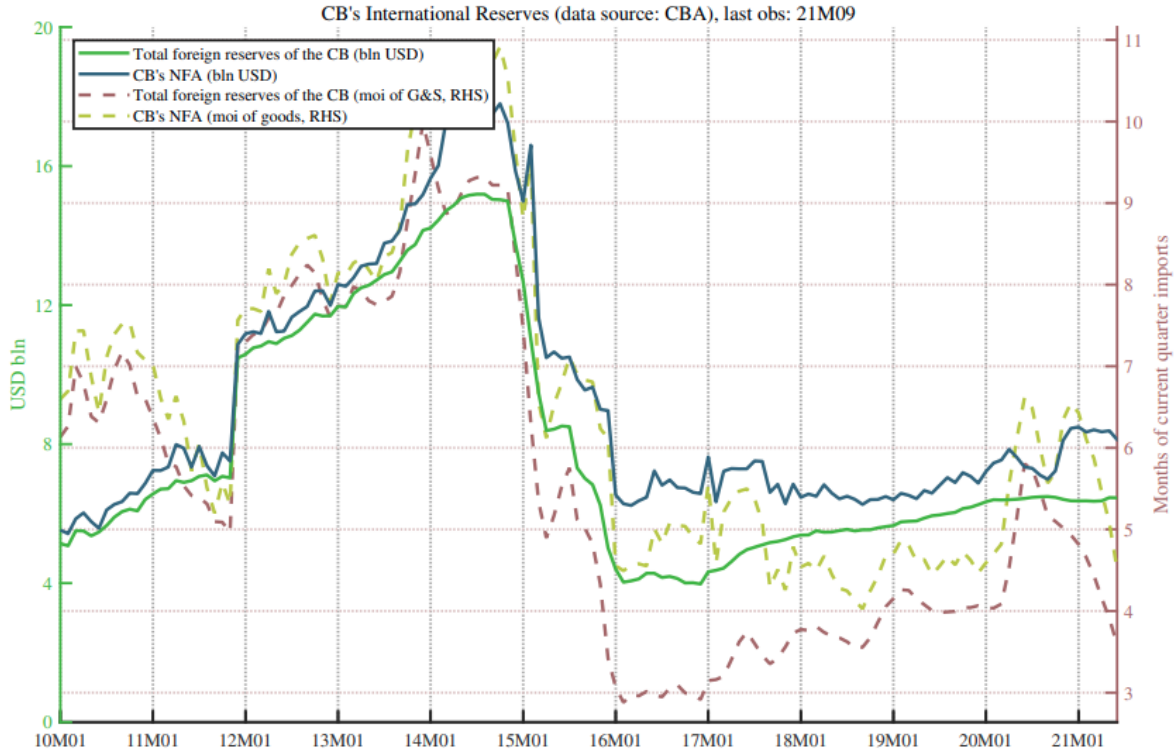
Balance of payments (bln USD, SA), last obs:19Q3
5
0
-5
05Q1
07Q1
09Q1
11Q1
13Q1
15Q1
17Q1
19Q1
Curr Acc.
Cap. Acc.
Fin. Acc.
Change of reserves
Net err. and omiss. & residual seasonality



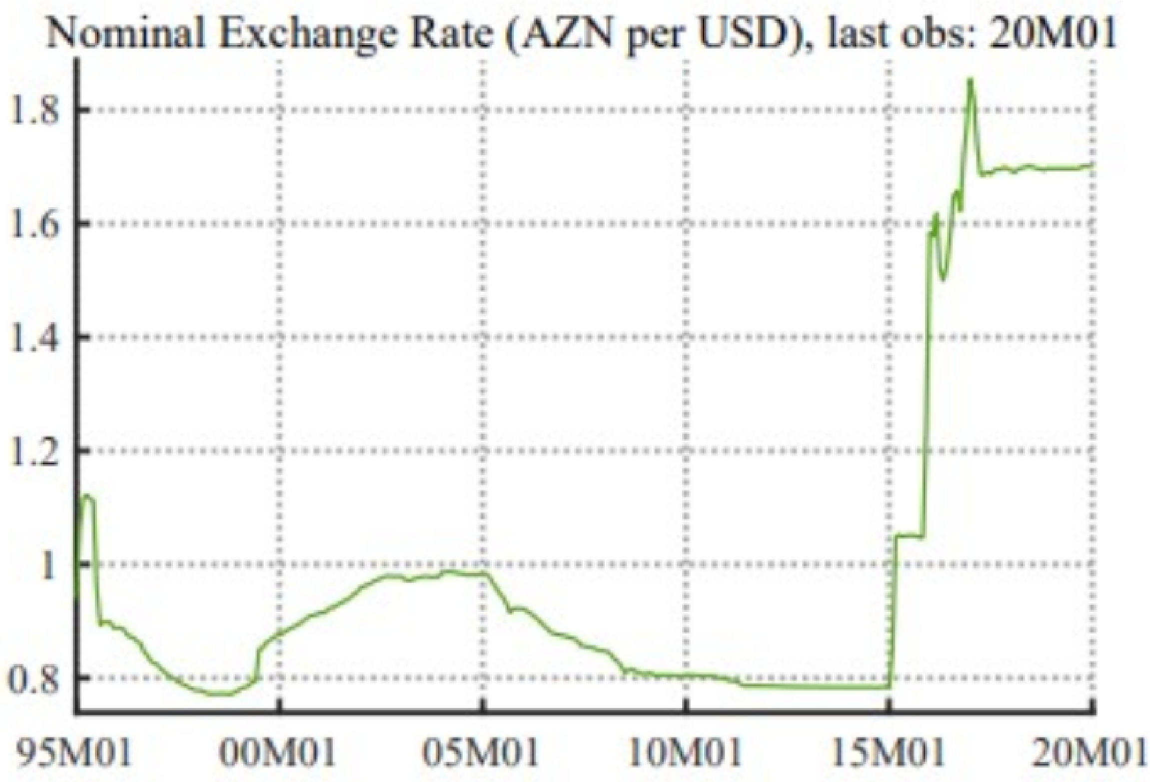
Current Account (bln USD, SA), last obs:19Q3
8
6
4
2
0
-2
05Q1
07Q1
09Q1
11Q1
13Q1
15Q1
17Q1
19Q1
Merchandise
Services
Primary inc.
Secondary inc.



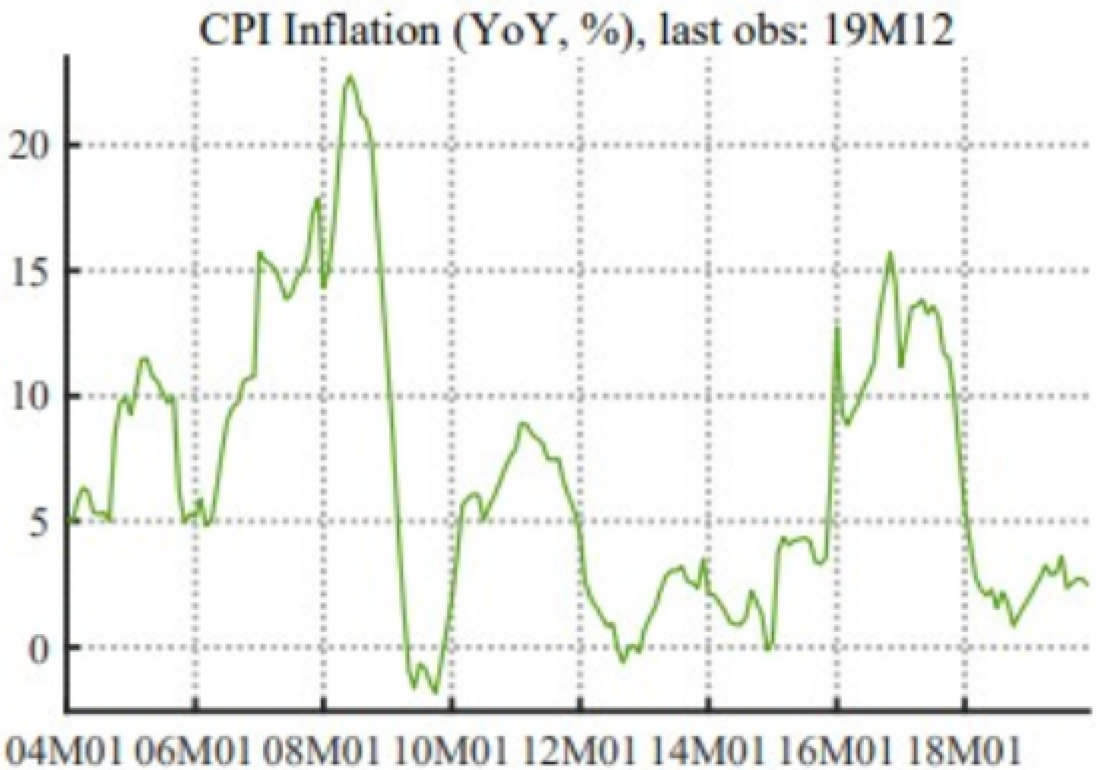
Financial Account (bln USD, SA), last obs:19Q3
2
1
0
-1
-2
-3
-4
05Q1
07Q1
09Q1
11Q1
13Q1
15Q1
17Q1
19Q1
Net FDI
Net Portfolio Inv.
Repatriation of investments
Oil bonus

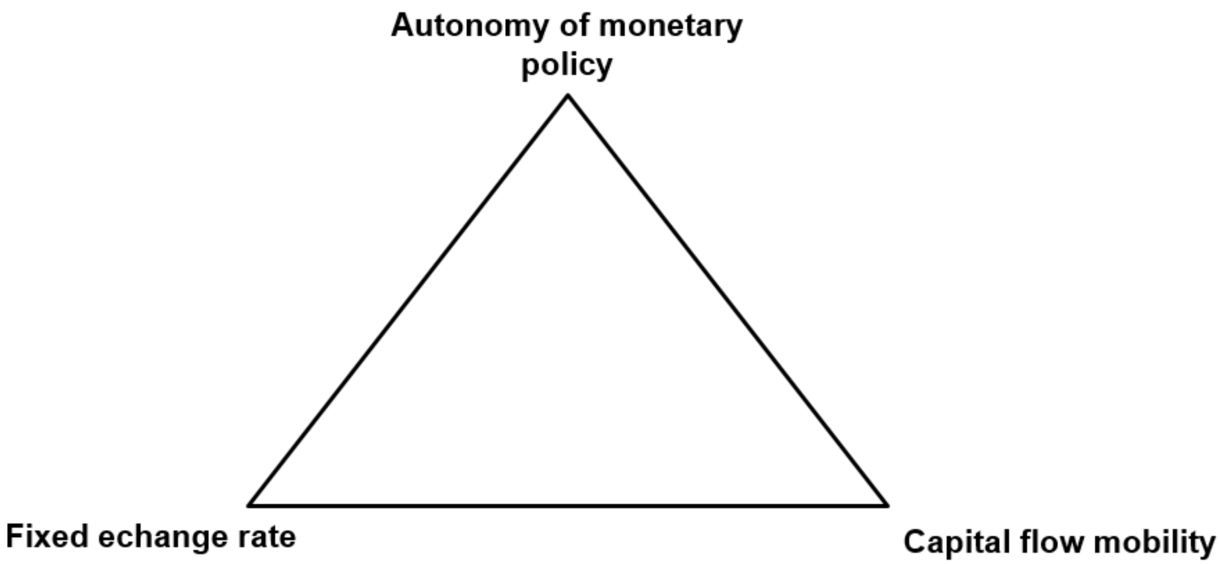


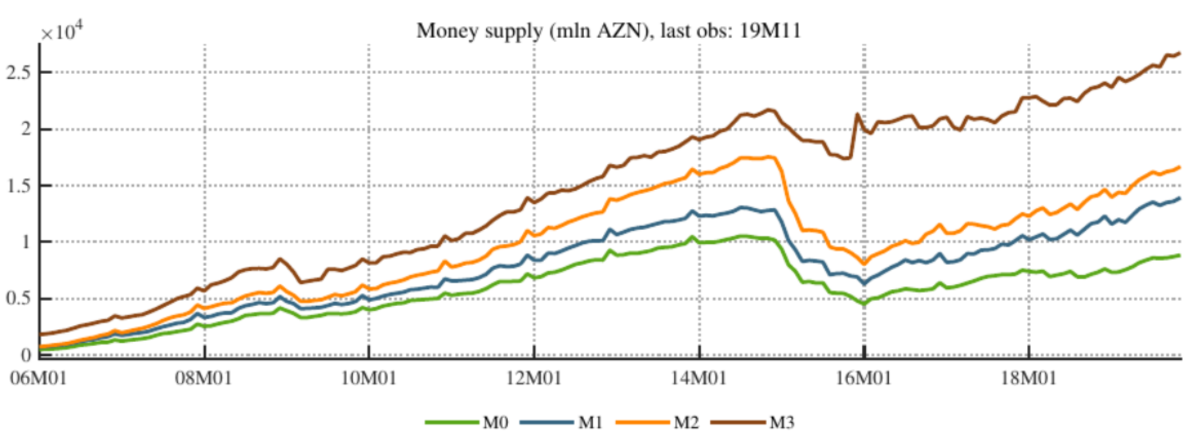
CB's International Reserves (data source: CBA), last obs: 21M09
Total foreign reserves of the CB (bln USD)
CB's NFA (bln USD)
Total foreign reserves of the CB (moi of G&S, RHS)
CB's NFA (moi of goods, RHS)
USD bln
Months of current quarter imports
10M01
11M01
12M01
13M01
14M01
15M01
16M01
17M01
18M01
19M01
20M01
21M01



Nominal Exchange Rate (AZN per USD), last obs: 20M01
95M01
00M01
05M01
10M01
15M01
20M01

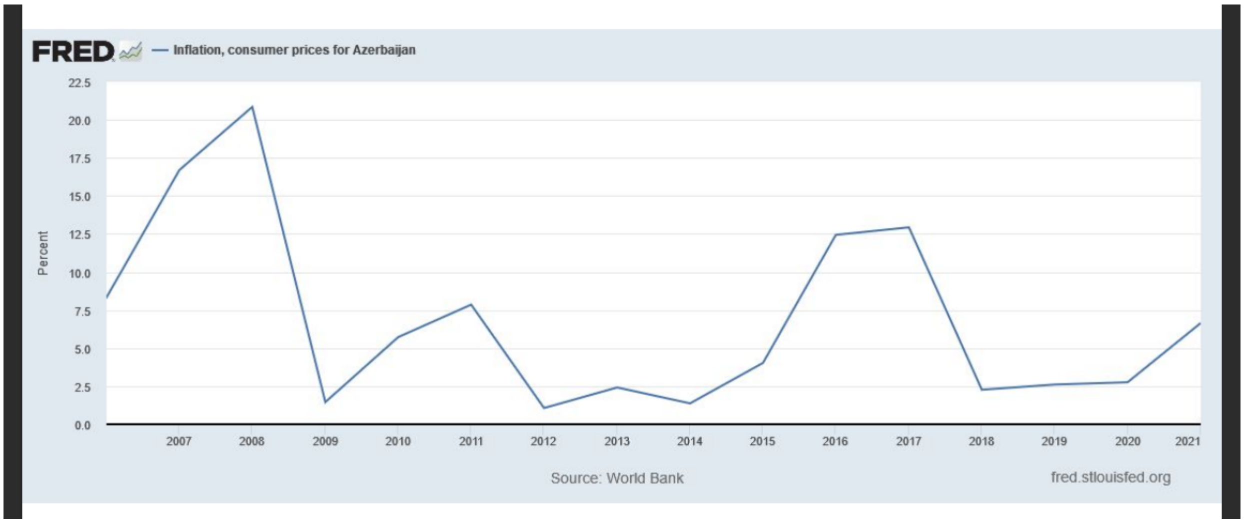

CPI Inflation (YoY, %), last obs: 19M12
20
15
10
5
0
04M01 06M01 08M01 10M01 12M01 14M01 16M01 18M01


Autonomy of monetary policy
Fixed echange rate
Capital flow mobility


×10^4
Money supply (mln AZN), last obs: 19M11
2.5
2
1.5
1
0.5
0
06M01
08M01
10M01
12M01
14M01
16M01
18M01
M0
M1
M2
M3

Your presentations

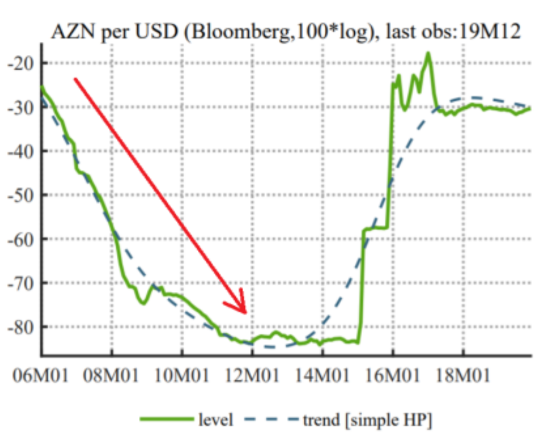
Don't do "DIY" slides



Do concise, but informative slides:

Reálný směnný kurz

- reálná apreciace směnného kurzu - růst ceny ropy
- příliv peněz - vládní kapitálové výdaje silně závislé na příjmech z ropy (přepočet dolarových příjmů z ropy na místní měnu)
- slabý transmisní kanál měnové politiky
- volatilita a apreciace REER poškozuje konkurenceschopnost a diverzifikaci vývozu



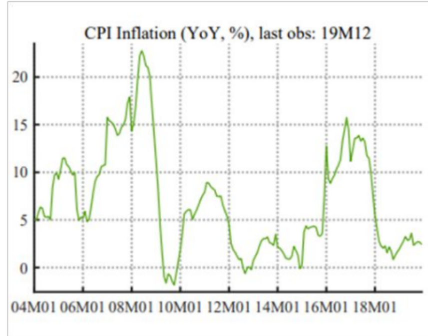
Pick the important stuff, don't do "laundry list"

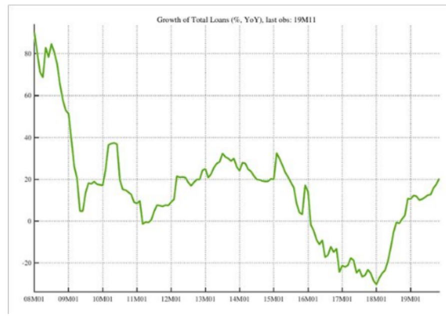
Inflation

Inflation peaked in 2008 followed by a rapid decline

Main drivers of inflation:

- Fiscal expansion (public investment programs, social transfers)
- Oil and gas prices
- Monetary policy expansion
- Households credit growth





Introducing Oil

No need to be sophisticated. Oil prices will be taken over from another model and imposed externally.

Simple gap-trend decomposition.

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

We can do the same for world price of food.

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

Oil and food are important determinants of consumer prices and we usually plug them in some way directly into Phillips Curves (same as REER).

Note:

- oil = Brent oil price
- food = FAO food price index

Modifying Equations

Note that small changes in equations can cause large changes in model properties.

Phillips Curve

Oil prices are regulated in AZ, but we can add food prices (again via two channels, refer back to REER channels):

$$\begin{aligned}\pi_t = &\beta_1 E_t \pi_{t+1} \\ &+ (1-\beta_1)\pi_{t-1} \\ &+ \beta_2 \hat{y}_t \\ &+ \beta_3(\hat{z}_t - \hat{z}_{t-1}) \\ &+ \beta_4 \hat{z}_t \\ &+ \alpha_5 \widehat{qfood}_t \\ &+ \alpha_6(\widehat{qfood}_t - \widehat{qfood}_{t-1}) \\ &+ \epsilon_t^{\pi}\end{aligned}$$

Monetary Policy

Clear preference for FX stability over inflation.

Simple equation - does it work?

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

- AZ did not have a strictly fixed FX rate
- we want some link to other variables

New exchange rate rule

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

Parameter κ_1 controls how much the FX is flexible ($\kappa_1 = 0$) vs controlled ($\kappa_1 = 1$). Parameters κ_2, κ_3 allow for impact of REER and oil.

Domestic Demand

Oil is an important determinant (fiscal effects):

$$\begin{aligned}\hat{y}_t = &\alpha_1 E_t \hat{y}_{t+1} \\ &+ \alpha_2 \hat{y}_{t-1} \\ &- \alpha_3 \cdot \hat{r}_t \\ &+ \alpha_4 \cdot \hat{z}_t \\ &+ \alpha_5 \cdot \hat{y}_t^{US} \\ &+ \alpha_6 \widehat{qoil}_t \\ &+ \epsilon_t^y\end{aligned}$$

Trends

Oil price impacts investment: both GDP and REER trend.

$$\Delta\overline{z}_t = \rho\cdot\Delta\overline{z}_{t-1} + (1-\rho)\cdot\Delta\overline{z}_{ss} + c_1(\Delta\overline{qoil}_t - \Delta\overline{qoil}_{ss}) + \epsilon_t^{\overline{z}}$$
$$\Delta\overline{y}_t = \rho\cdot\Delta\overline{y}_{t-1} + (1-\rho)\cdot\Delta\overline{y}_{ss} + c_1(\Delta\overline{qoil}_t - \Delta\overline{qoil}_{ss}) + \epsilon_t^{\overline{y}}$$