IMF's QPM

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1 Baseline model

1.1 Aggregate Demand

AD represents real economy activities. First, we have the output gap defined as

$$\hat{y}_t = y_t - \overline{y}_t$$

Aggregate demand

$$\hat{y}_t = b_1 \hat{y}_{t-1} - b_2 mci_t + b_3 \hat{y}_t^* + \varepsilon_t^y$$

with the Monetary Condition Index (mci) governed by

$$mci_t = b_4 \hat{r}_t + (1 - b_4)(-\hat{z}_t)$$

where mci is the weighted average between real interest rate and real exchange rate gap.

1.2 Phillips Curve

The Phillips curve governs headline inflation. It describes how inflation is determined by the expected inflation and by the domestic and imported costs of production.

$$\pi_t = a_1 \pi_{t-1} + (1 - a_1)E_t \pi_{t+1} + a_2 rmc_t + \varepsilon_t^\pi.$$

Similar to Calvo pricing, there is a_1 portion of backward-looking firms and $(1 - a_1)$ portion of forward-looking firms. Inflation is also affected by *real marginal costs* (rmc). The rmc is governed by

$$rmc_t = a_3 \hat{y}_t + (1 - a_3)\hat{z}_t$$

which is a weighted average of output gap and real exchange rate gap.

1.3 Uncovered Interest rate Parity (UIP) condition

This establishes the link between the nominal change rate and the interest rate differential and the country risk premium.

$$s_t = (1 - e_1)E_t s_{t+1} + e_1[s_{t-1} + 2(\pi_t^T - \overline{\pi}^* + \Delta\overline{z}_t)/4] + (i_t^* - i_t + prem_t)/4 + \varepsilon_t^s$$

where s_t is the nominal exchange rate. In a perfect world, an optimizing household must be indifferent between investing in domestic or foreign assets so that

$$i_t = i_t^* + E_t s_{t+1} - s_t + prem_t$$

where a wedge or premium risk $(prem)$ is added to make the two side balanced. Similar to the Phillips curve, there are forward looking household of portion $(1 - e_1)$ and backward-looking households e_1. Annual inflation and interest rates are divided by 4 to convert from annual to quarterly frequency.

1.4 Monetary Policy Rule

The central bank reacts by changing the nominal interest rate in response to deviations of expected inflation from the inflation target and to the business cycle captured by the output gap.

$$i_t = g_1 i_{t-1} + (1 - g_1)[i_t^n + g_2(E_t\pi_{t+N}^4 - \pi_{t+N}^T) + g_3\hat{y}_t] + \varepsilon_t^i$$

wht the neutral nominal interest rate

$$i_t^n = \overline{r}_t + E_t\pi_{t+N}^4$$

with $+N$ means N quarters ahead, while the superscript T stands for target, which is set exogenously.