Forecasting the Term Structure and Inflation

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The building blocks of a forecasting model with trends and cycles

- If the Central bank is credible, then Inflation is a mean reverting process, towards the central bank inflation target. The long-term inflation expectations are a good measure of the central bank inflation target and its credibility.
- Bond prices are (co-)drifting
- they reflect two factors: expected monetary policy over the residual life of the bond and risk premia
- if there is a common stochastic trend driving the entire term structure, then risk premia are stationary and (counter-)cyclical.

A Strategy for Modelling a Drifting Term Structure:Intuition

- Decompose inflation in two components:
  - long-term inflation expectations (drifting while the central bank is building credibility)
  - a stationary component reflecting deviations from long-term inflation expectations
- Decompose the short term (monetary policy) rates in two components:
  - a drift reflecting the natural rate, driven by slow moving "long-term" drivers
  - a stationary component reflecting the CB responses to transitory fluctuations in inflation and output and deviations from MP rule.
  - assess the validity of the model by checking the stationarity of deviations from the MP rule
- Decompose the yields at any maturity in two components:
  - a drift reflecting the average future expected monetary policy for the residual life of the bond
  - stationary deviations from the drift, reflecting term premium and deviations of short-term rates from their drift or misspecification in the model adopted for expectations formation
  - assess the validity of the model by checking the stationarity of deviations of yields from their drift

Trend and Cycles in Inflation

$$\pi_t = \pi_t^* + u_t^\pi$$

- π_t^* are long-run inflation expectations, whose variability depends on the central bank credibility,
- u_t^π is the cycle in inflation.

Trends and Cycles in Short-term Rates

In a standard Ramsey model, in which households intertemporal optimization delivers a relationship between the natural rate of interest, $r = y^* - \pi^*$, the growth rate of output in the economy g and shifts in household preferences θ:

$$y^* - \pi^* = \frac{1}{\sigma} g + \theta. \quad (1)$$

Jorda et al.(2019) and Mian et al.(2021) illustrate that fluctuations in per capita output growth of the economy cannot fully explain the drift in natural rate.
We propose the following specification:

$$\begin{aligned} y_t^{(1)} &= y_t^* + u_t^{(1)} \\ y_t^* &= \gamma_1 \Delta x_t^{pot} + \gamma_2 MY_t + \gamma_3 \pi_t^* \end{aligned}$$

Trends and Cycles in Long-term Rates

$$
\begin{aligned}
y_t^{(n)} &= y_t^{(n),*} + u_t^{(n)} \\
y_t^{(n),*} &= \left(\frac{1}{n}\right) \sum_{i=0}^{n-1} E_t[y_{t+i}^{(1)}]
\end{aligned}
$$

Note that, under no-arbitrage, the cycle in rates does not have a zero mean as it reflects risk premia and deviations of short-term rates from their long-run trend

A Strategy for forecasting with trend and cycles

$$
\begin{aligned}
y_t^{(1)} &= y_t^* + u_t^{(1)} \\
y_t^* &= \gamma_1 MY_t + \gamma_2 \Delta x_t^{pot} + \gamma_3 \pi_t^* \\
\pi_t &= \pi_t^* + u_t^{\pi} \\
y_t^{(n)} &= y_t^{(n),*} + u_t^{(n)} \\
y_t^{(n),*} &= \left(\frac{1}{n}\right) \sum_{i=0}^{n-1} E_t[y_{t+i}^*] \\
\mathbf{X_t} &= \mathbf{A_0} + \mathbf{A_1}(L)\mathbf{X_{t-1}} + \mathbf{v_t} \\
\mathbf{X_t} &= \begin{bmatrix} u_t^{(1)} \\ u_t^{(n)} \\ u_t^{(\pi)} \\ x_t - x_t^{pot} \end{bmatrix}
\end{aligned}
$$