Exchange rate forecasting

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Taylor Rule in Exchange rates

⊡ The macro-variable based monetary model and the Taylor rule model are the successful models for out-of-sample exchange rate prediction (Ince et al., 2009).

⊡ The linear macro foundation models are successful model in predicting the exchange rates (Rossi, 2013).

⊡ Can the RMB exchange rates be forecasted (Galimberti and Moura, 2013)?

Elasticity monetary model

The real exchange rate Q_t is defined as,

$$Q_t = \frac{S_t P_t^*}{P_t} \tag{1}$$

take log,

$$s_t = p_t - p_t^* + q_t \tag{2}$$

then,the h step ahead exchange rate prediction function can be written as(PPP),

$$s_{t+h} = p_t - p_t^* + q_t + v_{t+h} \tag{3}$$

where,$v_{t+h} \sim N(0, \sigma_{t+h}^2)$.

Elasticity of monetary model

To write the money demand function as (Molodtsova and Papell,2009),

$$m_t = p_t + ky_t - li_t \tag{4}$$

$$m_t^* = p_t^* + k^* y_t^* - l^* i_t^* \tag{5}$$

Unified with (3),

$$s_{t+h} = m_t - m_t^* + k^* y_t^* - ky_t + l^* i_t^* - li_t + q_t + v_{t+h} \tag{6}$$

where, $v_{t+h} \sim N(0, \sigma_{t+h}^2)$ is i.i.d.

Taylor rule model

If we set the interest rate as(Engel and West, 2005),

$$i_t = \alpha_1 y_{dt} + \alpha_2 \pi_t + \alpha_3 i_{t-1} \qquad (7)$$

$$i_t^* = \alpha_1 y_{dt}^* + \alpha_2 \pi_t^* + \alpha_3 i_{t-1}^* \qquad (8)$$

Suppose(IRP): $E_t s_{t+h} - s_t = i_t - i_t^*$, then

$$\Delta s_{t+h} = \beta_0 + \beta_1(\pi_t - \pi_t^*) + \beta_2(i_{t-1} - i_{t-1}^*) + \beta_3(y_{dt} - y_{dt}^*) + u_{t+k} \qquad (9)$$

where $u_{t+k} \sim N(0, \sigma_{t+h}^2)$ is i.i.d.

Forecasting accuracy comparison

	RMSE	MAE
Taylor rule	**0.0086**	**0.0079**
Elasticity monetary model	0.0098	0.0087
Random walk	0.0121	0.0099
PPP	0.0153	0.0105
IRP	0.0155	0.0104

Table 1: 3-months ahead forecasting accuracy comparison

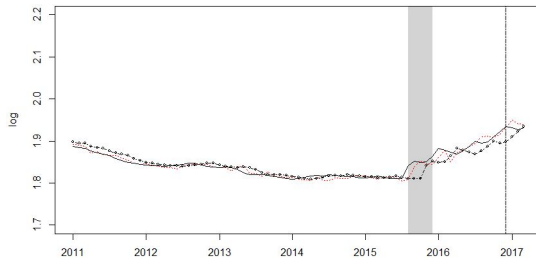# The USD exchange rate against RMB

Figure 1: 3-months ahead out-of-sample forecast comparing

Conclusion

- ⊡ The RMB exchange rates can be forecasted.
- ⊡ The Taylor rule model dominates the other Macro-factors based models in RMB exchange rate forecasting.