China’s Economic Development under Currency Intervention

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1. Introduction

- During the recent two decades, the spectacular economic growth of China has been under increasing scrutiny in the literature.
- However, prevailing discourses have either evaluated the causes/effects of the renminbi (RMB) exchange rate misalignment or theorized the investment and speculation channels.
- The implication of the Chinese-style currency intervention (CI) regime on economic development, in comparison, remains one of the most contentious subjects in international economics.

2. Objectives

- The purpose of this research is to develop a new macroeconomic model to address the two core attributes of the Chinese economy during CI:
  - the stagnant adjustment of the capital markets
  - the fast liberalization of the commodity markets.
- It investigates the impacts of macroeconomic controls on output growths and price levels from multiple aspects.
- It also conducts a case study to examine China’s economic development during CI.

3. The Benchmark Model

3.1 Model Specification

- Output Growth:
  \[ E_t[\pi_{t+1}] = -\rho_1 y_t - \phi_1 p_t + \theta E_t[\pi_{t+1}] + \psi s + \alpha \]
- Inflation:
  \[ E_t[\pi_{t+1}] = -\mu p_t + (\theta - \eta) y_t - \theta E_t[y_{t+1}] + \delta t + \gamma m_t + \beta \]

where
- \( y, p, s \) and \( m \) denote the output, the relative price index, government spending, and money supply, respectively;
- \( E_t[\pi_{t+1}] = E_t[y_{t+1}] - y_t \) is the expected output growth, while \( E_t[\pi_{t+1}] = E_t[p_{t+1}] - p_t \) is the expected inflation;
- \( \rho, \phi, \theta, \psi, \mu, \eta, \delta, \gamma \) are positive parameters;
- \( \alpha \) and \( \beta \) symbolize the general technological and financial conditions, respectively.

Proposition 1. In the short-run, fiscal expansions and technology improvements would create economic upturns, while monetary controls and financial innovations would incur tradeoffs between higher output and lower inflation.

3.2 First-Order Difference Equation

- Matrix expression:
  \[ x_{t+1} = (1 + \theta \delta)^{-1}(Ax_t + Bz_t + Cw_t) + u_{t+1} \]

where
- \( A = \begin{bmatrix} 1 - \rho + \theta(\theta - \eta) & -(\phi + \theta \mu) \\ -\theta - \rho \theta & 1 - \mu + \psi \phi + \theta \theta \end{bmatrix} \]
- \( B = \begin{bmatrix} \delta \\ -\delta \end{bmatrix} \psi \theta \gamma \)
- \( C = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \theta 
- \delta \end{bmatrix} \psi \theta \gamma \)
- \( u_{t+1} = \begin{bmatrix} \xi_{t+1} \\ \epsilon_{t+1} \end{bmatrix} \) denotes the vector of the disturbance terms.

Stability. The system is stable if the price in the long-run output-adjustment equilibrium is more sensitive to the output change than that in the long-run price-adjustment equilibrium, and vice versa.

4. Economic Development

4.1 Long-Run Output and Relative Price

If the economy is stable, the long-run (potential) output and relative price can be derived as:

\[ x_t^* = \begin{bmatrix} x_t^* \\ p_t^* \end{bmatrix} = \Phi x_0 + \Gamma w \]

where

\[ \Phi = \begin{bmatrix} -\delta \phi & \psi \mu & -\gamma \phi \\ \delta \rho & -\eta \psi & \gamma \rho \end{bmatrix}; \quad \Gamma = \begin{bmatrix} \mu \\ -\eta \end{bmatrix} \]

4.2 Impulse Response Functions

Let \( \xi_t = x_t - x_t^* \) denote the vector of the output gap and the inflation gap against their potential values. It follows that

\[ \xi_{t+1} = (1 + \theta \delta)^{-1} A \xi_t \]

Accordingly, the CI economies can be classified into three types as exhibited in Figure 2.

Proposition 2. Fiscal expansion, interest rate cut, monetary contraction, technology improvements and/or financial regulations would create economic upturns in the long-run.

5. Case Study

- Based on the corresponding econometric analysis on China’s economic development during 1996Q4-2007Q4, the parameters are calibrated as:
  - \( \hat{\rho} = 0.238 \quad \hat{\psi} = 0.005 \quad \hat{\theta} = 0.234 \quad \hat{\alpha} = 0.017 \quad \hat{\delta} = 0.024 \)
  - \( \hat{\mu} = 0.379 \quad \hat{\eta} = 0.401 \quad \hat{\gamma} = 0.941 \quad \hat{\delta} = 0.567 \quad \hat{\gamma} = 0.137 \quad \hat{\beta} = 0.015 \)

- Accordingly, the Chinese economy belongs to the Type I economy outlined in Figure 2. Therefore, a positive output shock would elicit persistent economic upturns, while a positive output shock would elicit persistent economic downturns (Figure 3).

6. Conclusion

- The presented model differs from stereotype financial distortion models which circle around short-run economic troughs, or standard macroeconomic frameworks with well-functioning financial systems.
- The model can be applied to examine economic issues of similar developing countries.
- From the theoretical perspective, the model may also be extended to more delicate systems with detailed information on transitional dynamics and microeconomic components.