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.

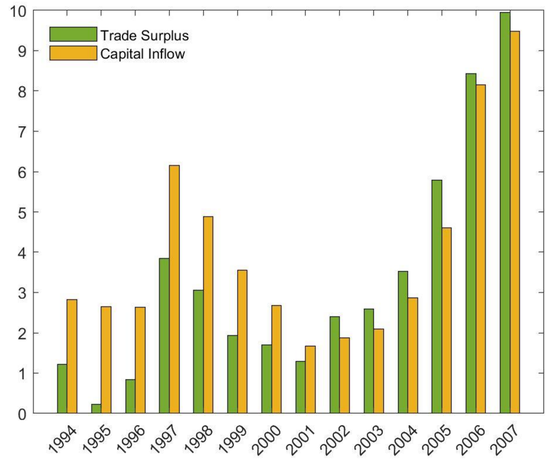

Figure 1. China's Trade Surpluses and Capital Inflows during CI (% of GDP)

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:

$$E_t[g_{t+1}] = -\rho y_t - \phi p_t + \theta E_t[\pi_{t+1}] + \psi s_t + \alpha$$

➢ Inflation:

$$E_t[\pi_{t+1}] = -\mu p_t + (\vartheta - \eta) y_t - \vartheta E_t[y_{t+1}] + \delta i_t + \gamma m_t + \beta$$

where

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

3.2 First-Order Difference Equation

➢ Matrix expression:

$$\mathbf{x_{t+1}} = (1 + \theta\vartheta)^{-1}(\mathbf{A x_t} + \mathbf{B z_t} + \mathbf{C w}) + \mathbf{u_{t+1}}$$

where

- $\mathbf{A} = \begin{bmatrix} 1 - \rho + \theta(\vartheta - \eta) & -(\phi + \theta\mu) \\ -(\eta - \rho\vartheta) & 1 - \mu + \psi\phi + \theta\vartheta \end{bmatrix}$
- $\mathbf{B} = \begin{bmatrix} \theta\delta & \psi & \theta\gamma \\ \delta & -\vartheta\psi & \gamma \end{bmatrix}$
- $\mathbf{C} = \begin{bmatrix} 1 & \theta \\ -\vartheta & 1 \end{bmatrix}$
- $\mathbf{u_{t+1}} = \begin{bmatrix} \epsilon^y_{t+1} \\ \epsilon^p_{t+1} \end{bmatrix}$ denotes the vector of the disturbance terms.

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.

Stability. The system is stable iff 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:

$$\mathbf{x_t^*} = \begin{bmatrix} y_t^* \\ p_t^* \end{bmatrix} = \frac{\mathbf{\Phi z_t} + \mathbf{\Gamma w}}{\rho\mu - \eta\phi},$$

where

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

4.2 Impulse Response Functions

Let $\boldsymbol{\xi_t} = \mathbf{x_t} - \mathbf{x_t^*}$ denote the vector of the output gap and the inflation gap against their potential values. It follows that

$$\boldsymbol{\xi_{t+1}} = (1 + \theta\vartheta)^{-1}\mathbf{A}\boldsymbol{\xi_t}.$$

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 improvement and/or financial regulations would create economic upturns in the long-run.

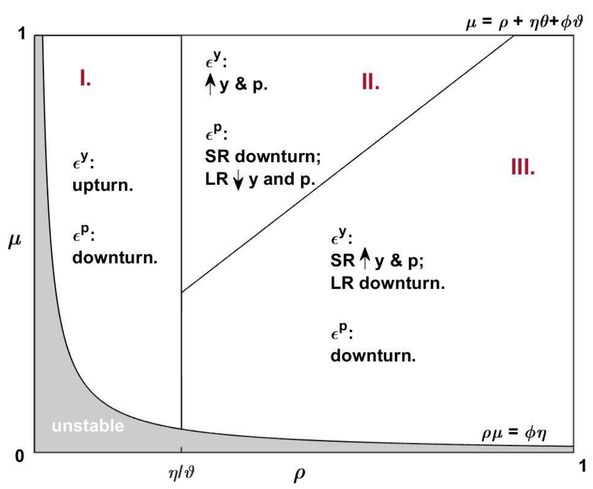

Figure 2. ϵ^y and ϵ^p on Economic Development

5. Case Study

✓ Based on the corresponding econometric analysis on China's economic development during 1996Q4-2007Q4, the parameters are calibrated as:

$\hat{\rho} = 0.238$	$\hat{\phi} = 0.065$	$\hat{\theta} = 0.234$	$\hat{\psi} = 0.017$	$\hat{\alpha} = 0.024$
$\hat{\mu} = 0.379$	$\hat{\eta} = 0.491$	$\hat{\vartheta} = 0.944$	$\hat{\delta} = 0.587$	$\hat{\gamma} = 0.137$	$\hat{\beta} = 0.015$

✓ 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).

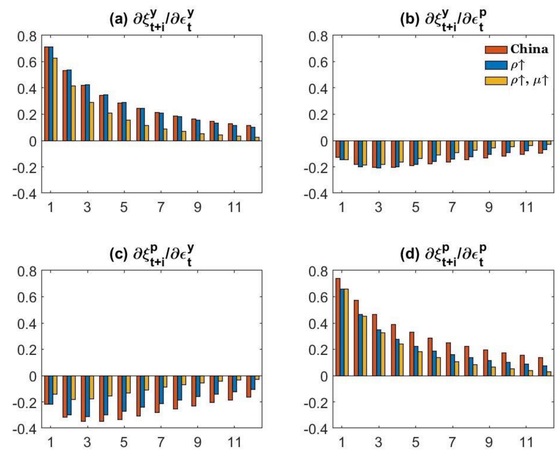

Figure 3. Shocks on China's Economic Development

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 cab 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.