Optimal Exchange Rate Policy in a Growing Semi-Open Economy

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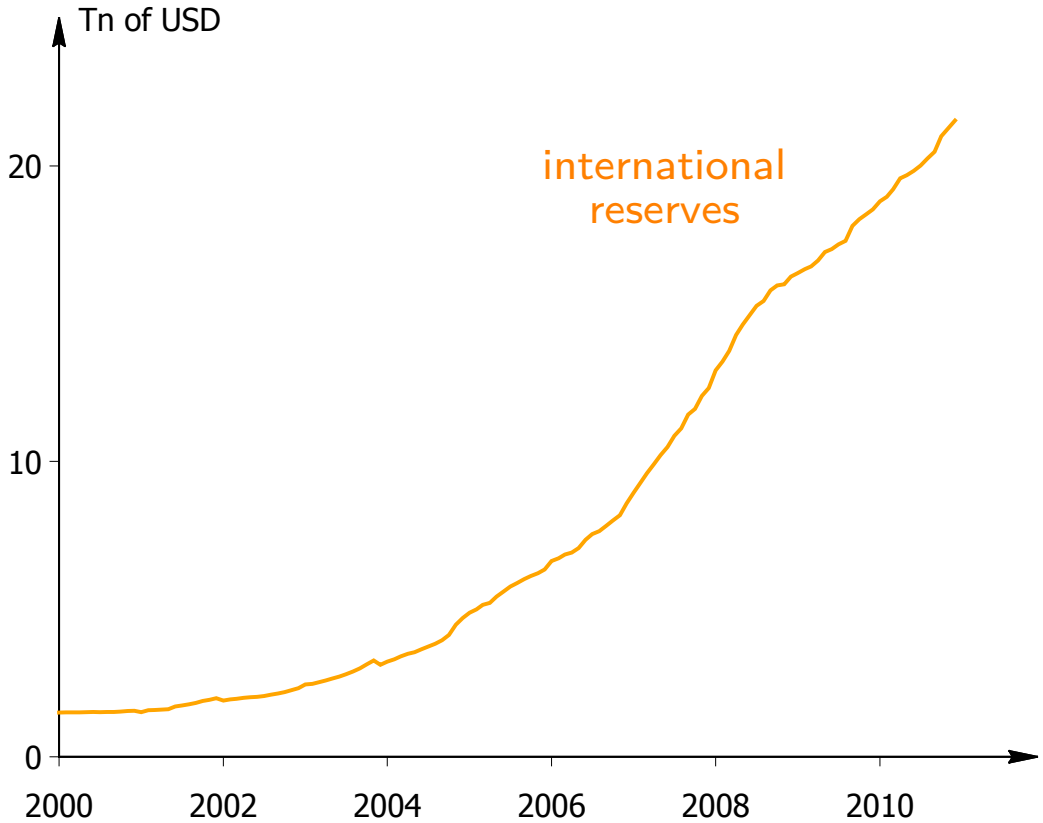
The debate on China's exchange rate policy



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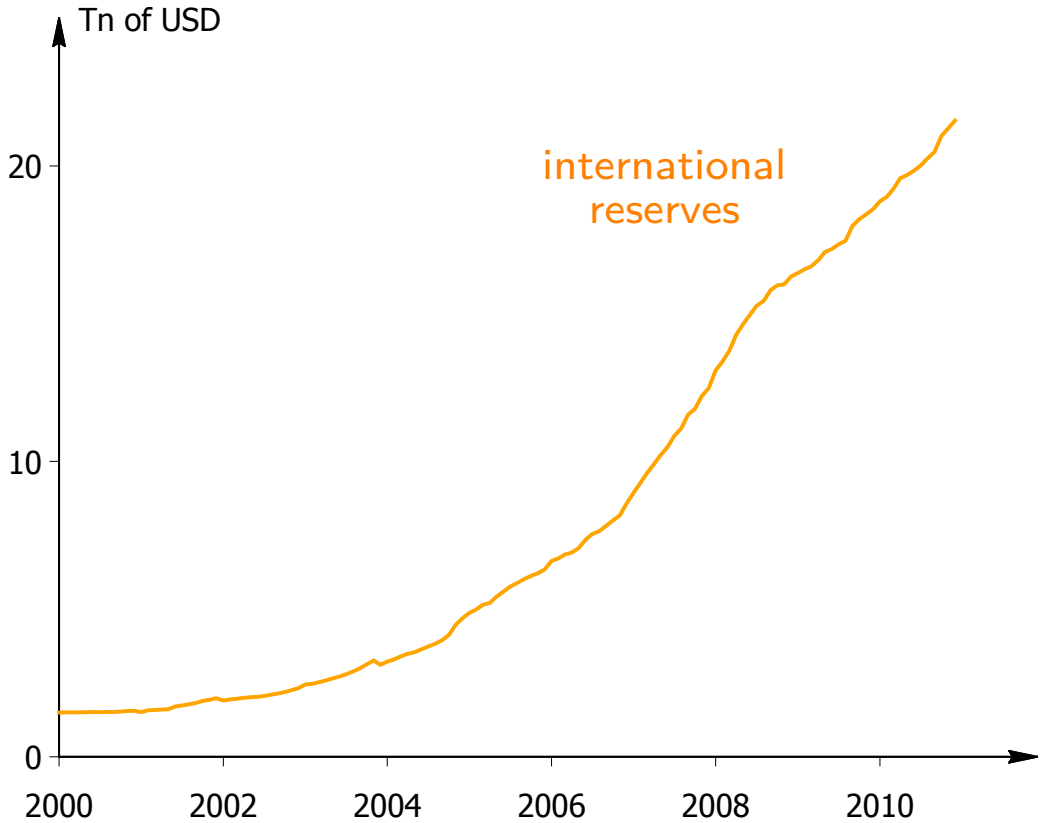
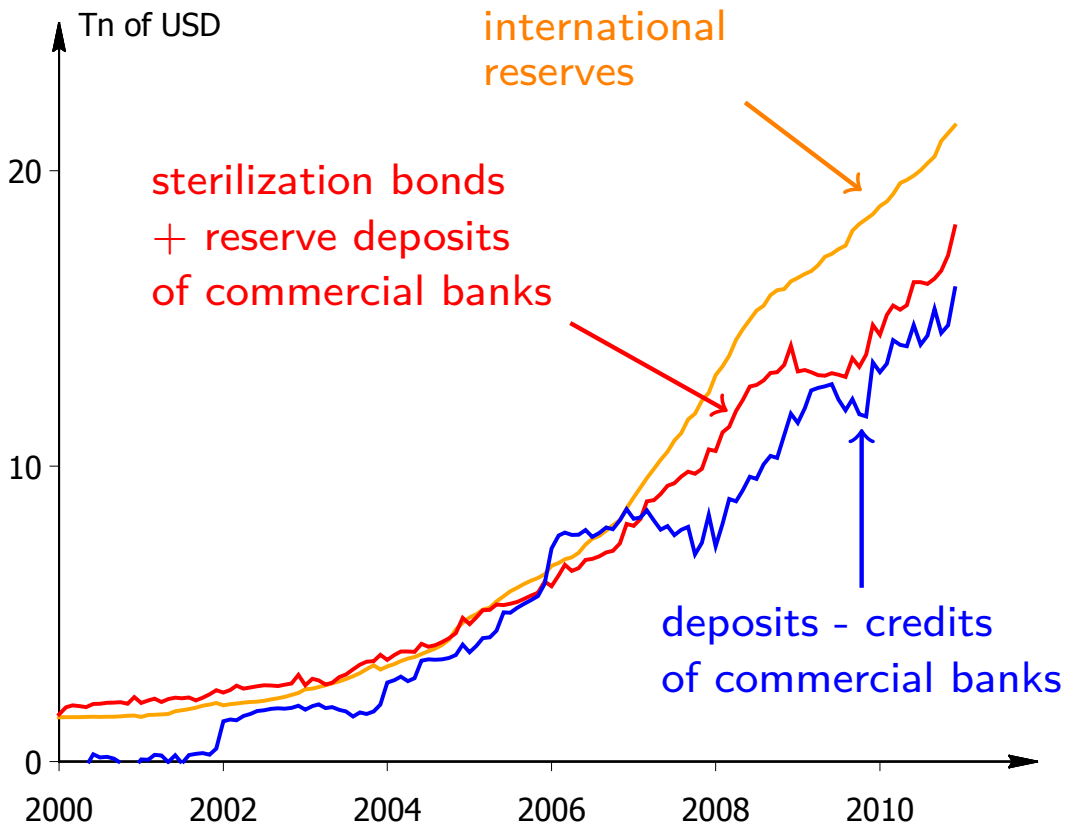


"It's time to stand up to the cheaters"

Mitt Romney (2012)

Liabilities of the Central Bank



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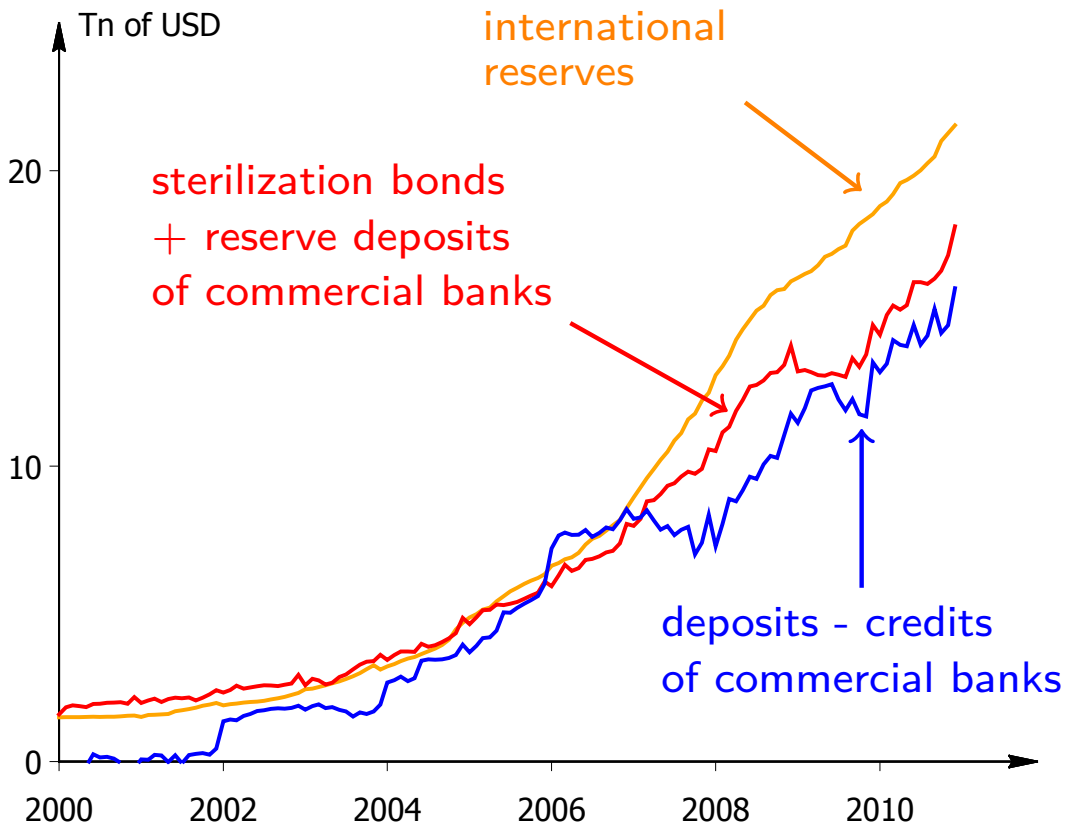
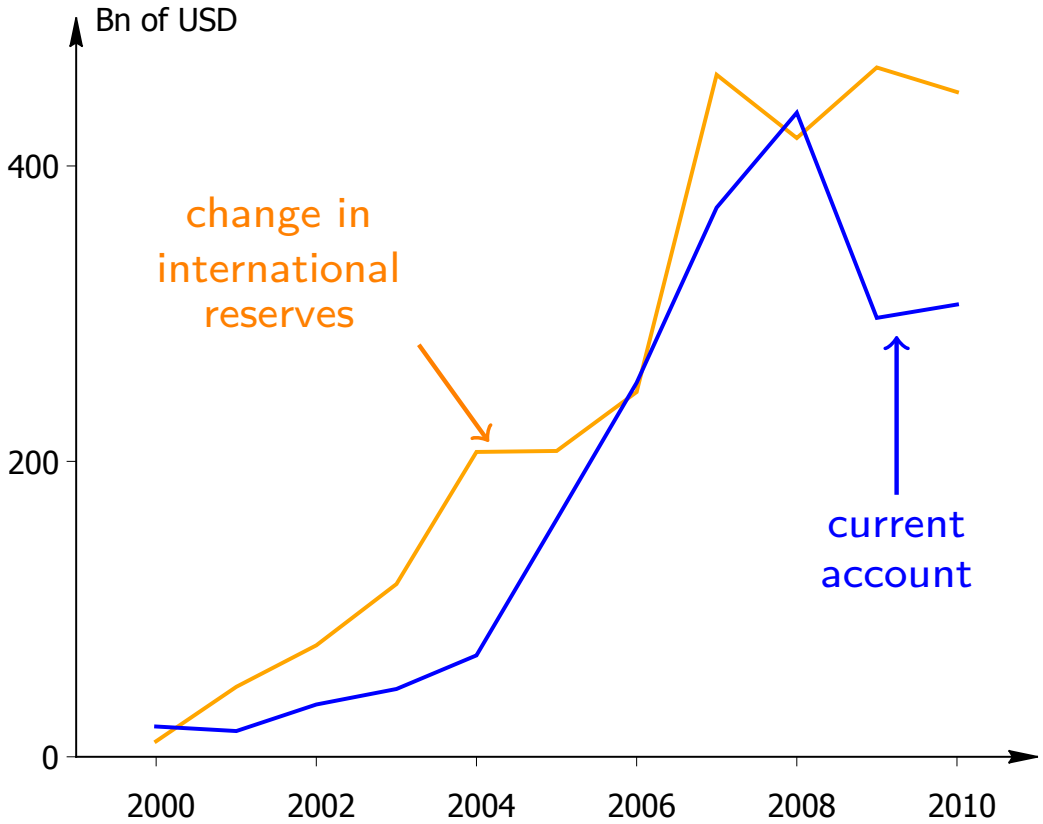


the Central Bank has supplied large amounts of saving instruments to the private sector

The semi-open economy



- strict capital controls on private flows
- large public outflows

What we do

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Real and intertemporal approach

- current account $\leftarrow$ private saving
- RER $\leftarrow$ relative price of N goods

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[standard Obstfeld-Rogoff type model]

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Underdeveloped financial system

- borrowing constraint
- low supply of saving instruments
- excess private saving

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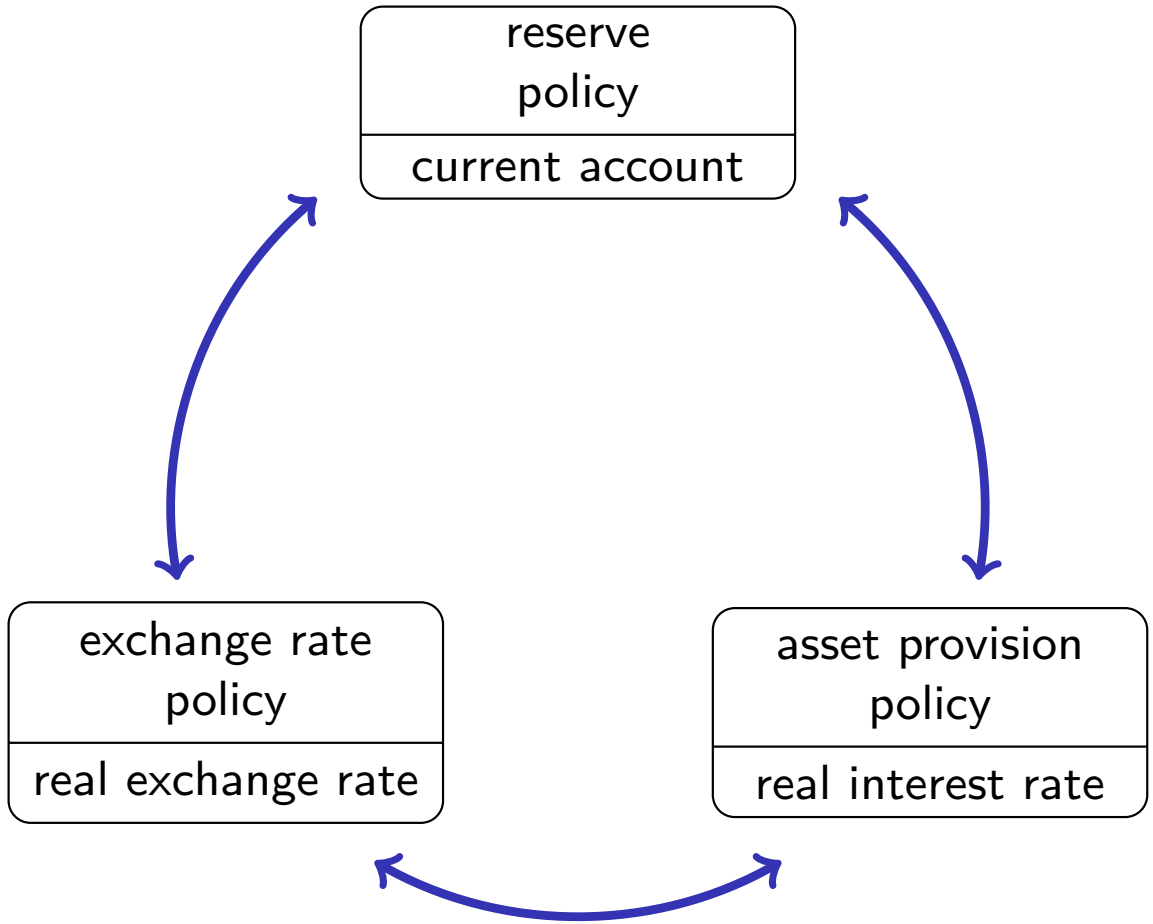
Central Bank policy



What we find

Optimal policy in a fast-growing economy

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Central Bank
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- depreciation in short run, appreciation in long run
- stronger financial friction $\longrightarrow$ larger initial depreciation

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Central Bank balance-sheet	• accumulate reserves • provide saving instruments to private sector • reserves are superior to private flows
Real exchange rate	• depreciation in short run, appreciation in long run • stronger financial friction $\longrightarrow$ larger initial depreciation • dynamics close to open economy with private flows

Related literature on the role for Government intervention

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overcome borrowing constraint
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Pecuniary externality	Macroprudential policy: Bianchi 2011, Korinek 2011, Benigno et al. 2012, Cespedes et al. 2012

Related literature on the role for Government intervention

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Pecuniary externality	Macroprudential policy: Bianchi 2011, Korinek 2011, Benigno et al. 2012, Cespedes et al. 2012
Growth externality in sector T	Reserve accumulation and currency depreciation: Korinek and Serven 2011, Benigno and Fornaro 2012

Outline

1. Model

Main assumptions

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Ramsey planner: the Central Bank

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Catching-up: $Y_{t+1}^i = (1 + g_{t+1}) Y_t^i \quad$ for $i = N, T$

with $g_{t+1} = \mu g_t, \quad 0 \leq \mu < 1, \quad a(1 + g_{t+1}) < 1$

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$$Y_t - r_t L_t + \pi_t/2 = c_t^{AT} + p_t c_t^{AN} + A_{t+1}$$

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Credit constraint

$$r_{t+2} L_{t+2} \leq \phi Y_{t+2}$$

Insufficient supply of saving instruments

Bond market

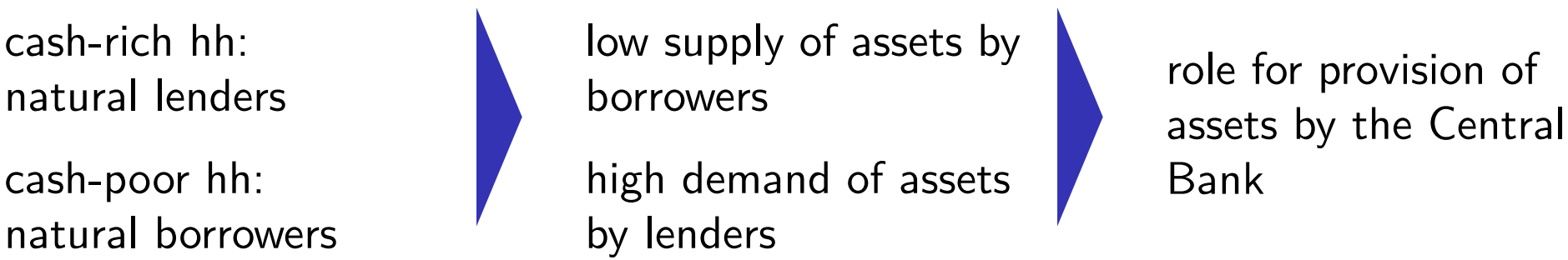
cash-rich hh:
natural lenders

cash-poor hh:
natural borrowers

Insufficient supply of saving instruments

Bond market		Credit constraint
cash-rich hh: natural lenders		low supply of assets by borrowers
cash-poor hh: natural borrowers		high demand of assets by lenders

Insufficient supply of saving instruments



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Ramsey planner with social objective $\sum_{t=0}^{\infty} \beta^t \left[u(c_t^{AT}, c_t^{AN}) + u(c_t^{LT}, c_t^{LN}) \right]$

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Assuming $B^*_0 = B_0$, we have $B^*_t = B_t$

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Distribute profits period by period: $\pi_t = (r^* - 1)B_t^* - (r_t - 1)B_t$

Assuming $B_0^* = B_0$, we have $B_t^* = B_t$

Two special cases: $\begin{cases} \text{closed economy } (B^* = 0, p = \text{constant}) \\ \text{open economy } (r = r^* = \text{constant}) \end{cases}$

2. Theoretical insights

Real exchange rate

Households maximize $\sum_{s=0}^{\infty} \beta^s u(c_s^T, c_s^N)$

Separable iso-elastic utility $u(c_s^T, c_s^N) = v(c_s^T) + \kappa v(c_s^N)$

with
$$v(c) = \frac{c^{1-\sigma}}{1-\sigma} \quad \text{for } \sigma \neq 1$$
$$v(c) = \ln c \quad \text{for } \sigma = 1$$

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Real exchange rate $p_t = \kappa \left[\dfrac{c_t^{AT} + c_t^{LT}}{(1+a) Y_t^N} \right]^{\sigma}$

Link between reserves and exchange rate

$$p_t = \kappa \left[\frac{(1+a)Y_t^T + (r^* - 1)B_t^* - (B_{t+1}^* - B_t^*)}{(1+a)Y_t^N} \right]^{\sigma}$$

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p_t decreases with reserves accumulation

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Steady state

p_t increases with B^*/Y^N

Link between reserves and interest rate

Equilibrium in bond market

$$A_{t+1}(\underset{+}{r_{t+1}}, \underset{-}{\phi}) = L_{t+1}(\underset{-}{r_{t+1}}, \underset{+}{\phi}) + B_{t+1}$$

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- An increase in B^* leads to a higher r_{t+1} to clear the market
- True even in the steady state
  as long as B^*/Y^T lower than some threshold
  (binding borrowing constraint)

Ramsey problem

First-order condition w.r.t. B^*_{t+1}:

$$-\left(\gamma^G_t - \gamma^G_{t+1}\right) + \beta r_{t+1} \frac{\Lambda_{t+1}}{2} = 0$$

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shadow cost of resource constraint for T goods

Lagrange multiplier of borrowing constraint

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- optimal to accumulate reserves when ϕ small
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with binding constraints, the Central Bank can do better than the open economy

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- correct for pecuniary externality

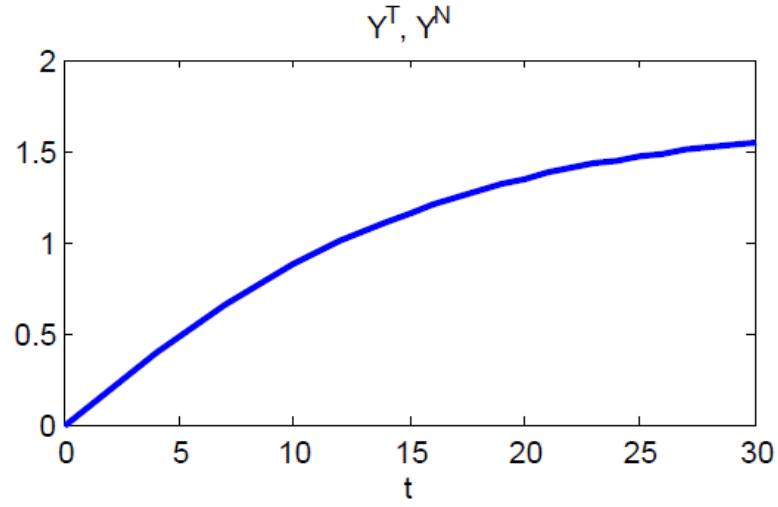
3. Simulations

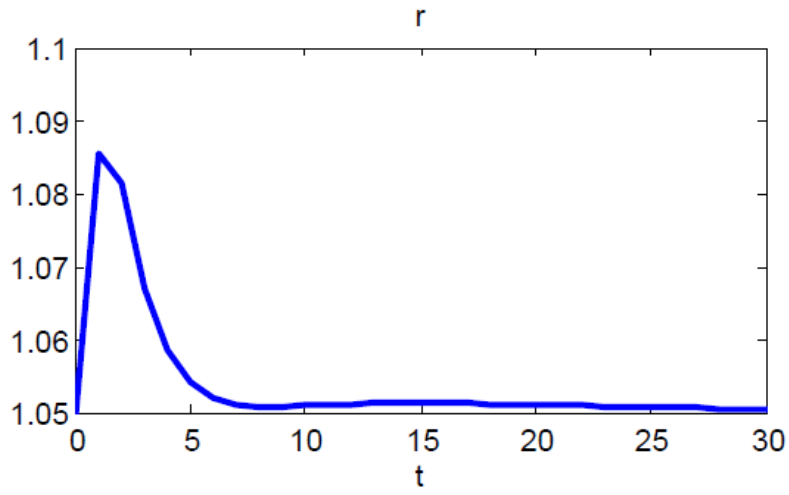
Growth acceleration

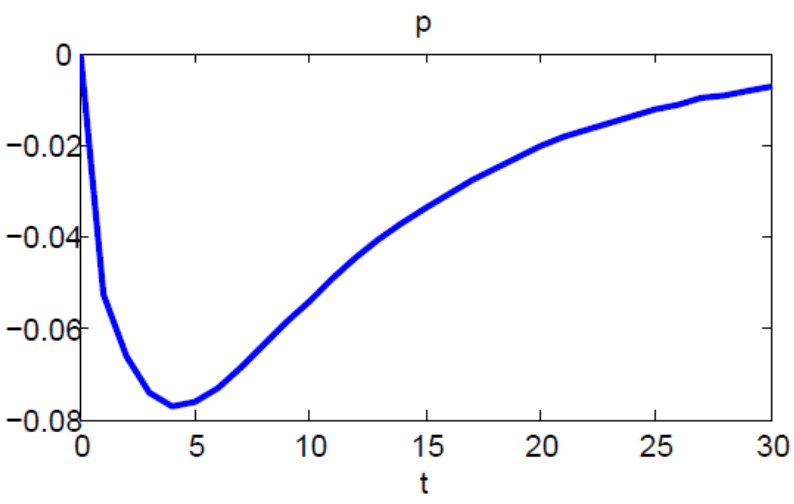
- Start from steady state
- At $t = 0$, positive growth shock: $g_0 = 10\%$
- Other parameters

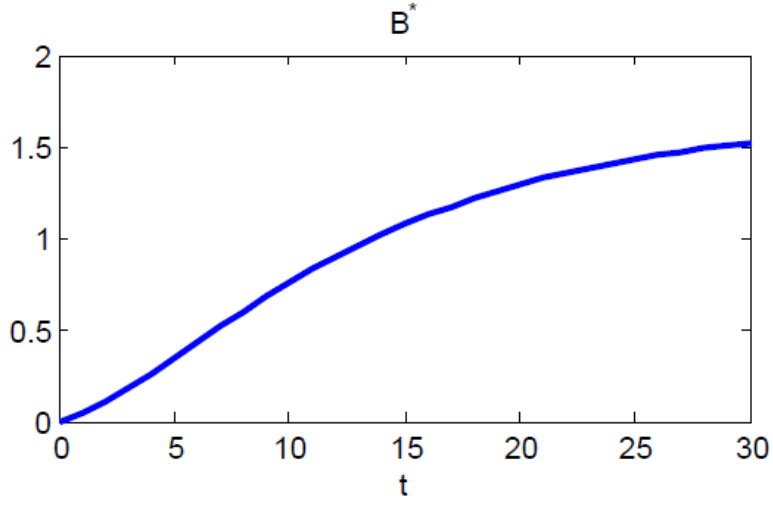
κ	3	N=3/4 of C
ϕ	0.1	strong borrowing constraint
a	0	high income volatility
β	1/1.05	$r^* - 1 = 5\%$
μ	0.9	sustained growth
σ	1	log-utility

Growth acceleration









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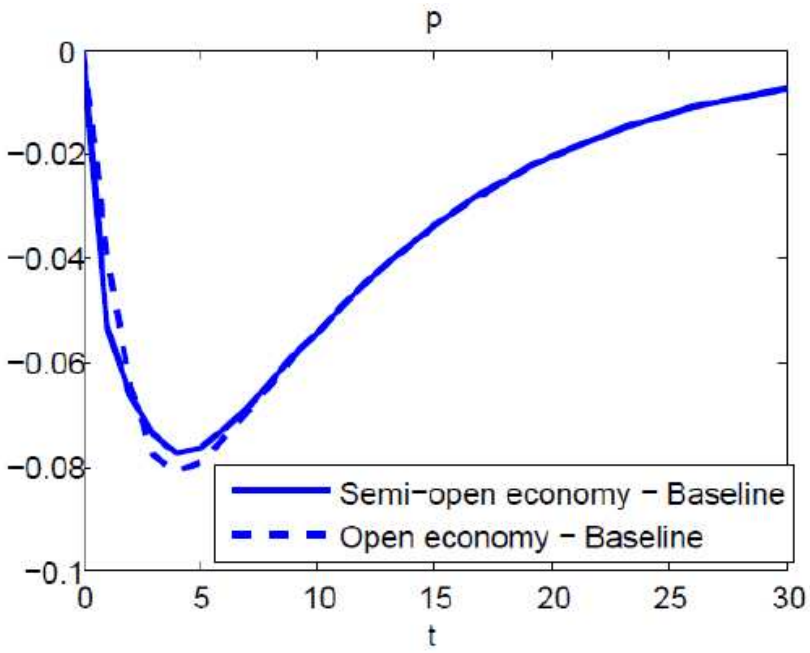

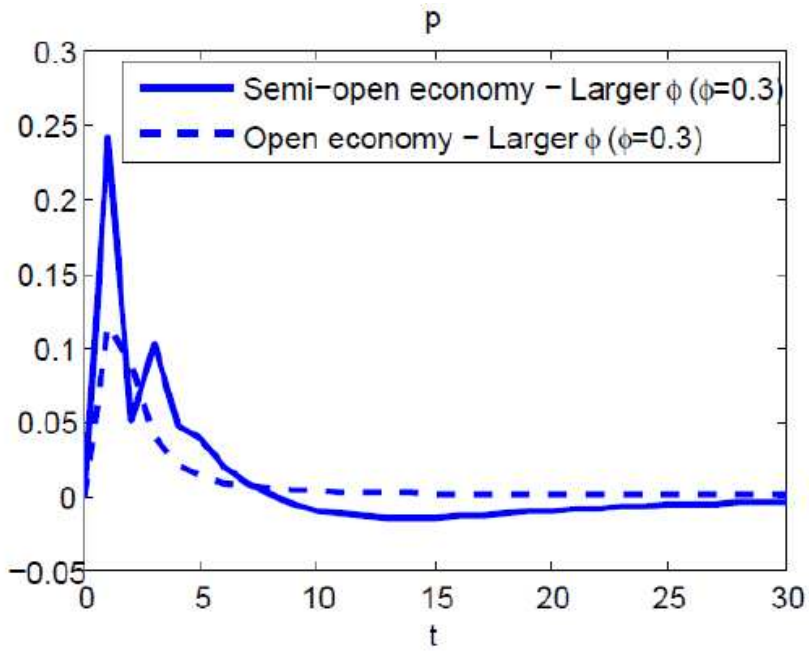

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- Larger κ and σ: larger depreciation (real exchange rate more sensitive to relative changes in consumption)
- Assume only N goods are collateral: $r_{t+2} L_{t+2} \leq \phi^N p^N_{t+2} Y^N_{t+2}$
  Little change in results $\Rightarrow$ pecuniary externality has little effect

Conclusion

- analyze optimal exchange rate policy in a dynamic model with features observed in the Chinese economy
- in growth-acceleration episode,
  optimal to accumulate international reserves
  and initially depreciate the real exchange rate
- if our analysis is correct,
  it is optimal to see the RMB on an appreciating path
- this appreciation is not due to a Balassa-Samuelson effect,
  but to the presence of financial frictions

Krugman: "The issue whose time has passed"

Chinese real effective exchange rate

Source: IMF, CPI-based real effective exchange rate

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