Discussion of Acharya and Bengui, "Liquidity Traps, Capital Flows and Currency Wars"

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This Paper

- Canonical sticky price model
- One group of countries (North) at ZLB, others (South) are not
- Optimal cooperative policy has capital controls
  - Subsidize outflows from North when at ZLB; reverse the measure out of ZLB
  - Farhi-Werning: Suboptimality of individual saving decisions with sticky prices + constraint on monetary policy
    - But the mechanism is novel
- If policy set non-cooperatively: South imposes restrictions on inflows

My discussion

Focus on:

- Optimality of capital controls when ZLB binds in cooperative Ramsey outcome
  - Review mechanism
  - Expenditure switching vs. exchange rate pass-through
- When monetary policy set non cooperatively: How exchange rates are determined?
  - Need to clearly spell out details of policy game

Economy

- Two types of countries: North, $i \in [0, \chi]$, and South, $i \in (\chi, 1]$
- Preferences

$$U_i(\{C_{it}, L_{it}\}) = \sum_{t=0,1,...,T} \beta_{i,t} \left[\log C_{it} - \psi \frac{L_{it}^{1+\phi}}{1+\phi} \right]$$

  North more patient for $t = 0, ..., T^*$: $\beta_{nt} = \beta^t (1+\iota)^t > \beta_{st} = \beta^t$
  For $t > T^*$: $\beta_{nt+1}/\beta_{nt} = \beta_{s,t+1}/\beta_{st} = \beta$

- Technology

$$C_{it} = C_{Hit}^{\alpha} C_{Fit}^{1-\alpha}$$

$$\int C_{Fit} di = \exp\left(\int \log Y_{Fit} di \right)$$

$$L_{it} = Y_{it} \equiv C_{Hit} + Y_{Fit}$$

Prices are fully rigid

- Price of each good fixed in term of local currency
  - Wlog let $P_{Hi} = 1$ for all i

- Law of one price holds:

$$P_{Hi} = P_{Hij} E_{ij}$$

  where
  - P_{Hij} is the price of good produced in i in country j currency
  - E_{ij} is the nominal exchange rate b/w i and j

Output is demand determined

- Domestic demand is

$$Y_{Hi} = (1-\alpha)\frac{P_i}{P_{Hi}}C_i$$

- Foreign demand is

$$Y_{Fi} = \frac{P_{Fi}}{P_{Hi}}\int C_{Fk}dk = \frac{P_{Fi}}{P_{Hi}}\int \alpha\frac{P_k}{P_{Hk}}C_k dk$$

- Using law of one price, $P_{Hi} = 1$, $P_i = P_{Hi}^{1-\alpha}P_{Fi}^{\alpha}$

$$\begin{aligned} Y_i &= Y_{Hi} + Y_{Fi} \\ &= (1-\alpha)P_{Fi}^{\alpha}C_i + \alpha P_{Fi}^{\alpha}\int E_{ij}^{1-\alpha}C_k dk \end{aligned}$$

Capital controls

- Each country can impose taxes on inflows and subsidies on outflows

- Consumer's problem

$$\max U_i$$

subject to the budget constraint

$$P_{it} C_{it} + \frac{B_{it+1}}{1 + r_{it}} + \int \frac{B_{ijt+1}}{1 + r_{jt}} \frac{E_{ijt}}{(1 - \tau_{it})(1 + \tau_{kt})} dj \leqslant$$
$$\leqslant W_{it} L_{it} + \Pi_{it} + B_{it} + B_{ij} E_{ijt} + \omega_{it}$$

- Wedge in the interest parity condition

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- Wedge in the interest parity condition

- Can tax capital flows but not domestic savings (Correia, Farhi, Nicolini, Teles)

Implementability conditions

Aggregate allocations $\{C_{nt}, Y_{nt}, C_{st}, Y_{st}\}$, exchange rates E_{nst}, and (positive) nominal interest rates, $\{r_{nt}, r_{st}\}$ and capital control wedge τ_{ns} part of symmetric competitive equilibrium if and only if

$$Y_{it} = (1-\alpha)\, S_{1i}(E_{ns})^{\alpha} C_{it} + \alpha S_{2i}(E_{ns}) \chi C_{nt} + \alpha S_{3i}(E_{ns})(1-\chi) C_{st}$$

$$\sum_{t=0}^{T} \prod_{j=0}^{t} \frac{1}{1+r_j} \left[P_{ti}(E_{ns}) C_{ti} - Y_{ti} \right] = \omega_i P_{0i}$$

$$\frac{C_{1i}}{C_{0i}} = \frac{\beta_{it+1}}{\beta_{it}} (1+r_i) \frac{P_{1i}(E_{ns})}{P_{0i}(E_{ns})}, \quad i = n, s$$

$$(1+r_n) = (1+r_s) \frac{E_{1ns}}{E_{0ns}} (1+\tau_{ns})$$

where S_{1n}, S_{2n}, S_{3n} are decreasing function in E_{ns} and S_{1s}, S_{2s}, S_{3s} are increasing function in E_{ns}

Cooperative Ramsey outcome

Choose allocation to

$$\max \sum_{i=n,s} \lambda_i U_i(\{C_{it}, L_{it}\})$$

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If ZLB binds

- Too little consumption and production in North in $t = 0, ..., T^*$
- Stimulate North production by with a depreciation
- Subsidy to capital outflows from North when ZLB binds
- Reverse policy once it ceases to bind

Mechanism: Exchange rates level vs devaluation

- Let τ_{ns} be a subsidy to North-to-South flows, so UIP

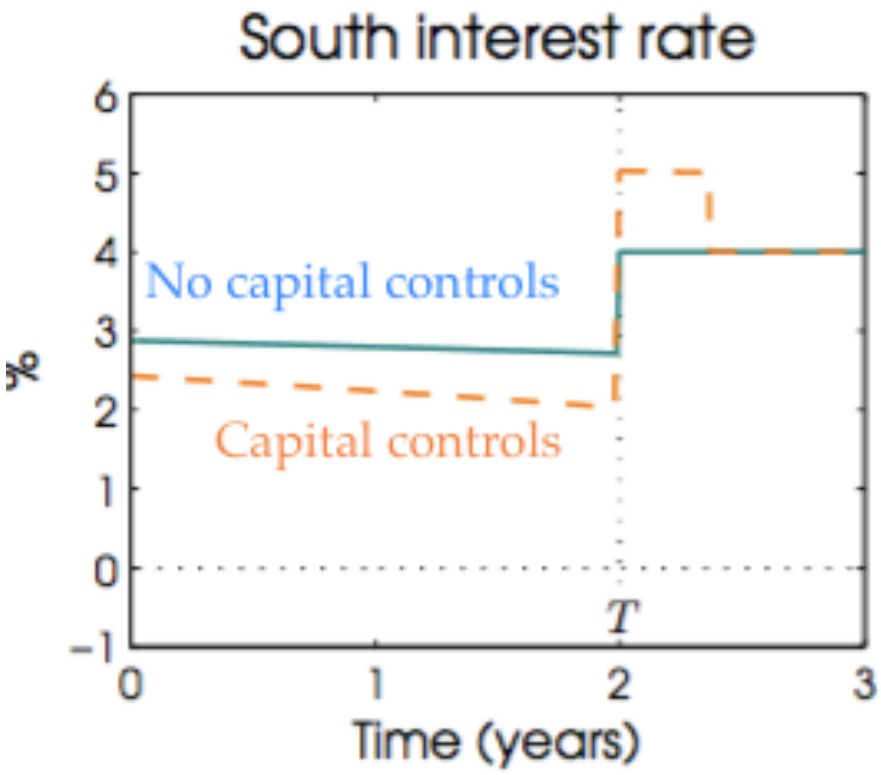
$$0 = r_{nt} \approx r_{st} + \tau_{nst} + \log(E_{nst+1}/E_{nst})$$

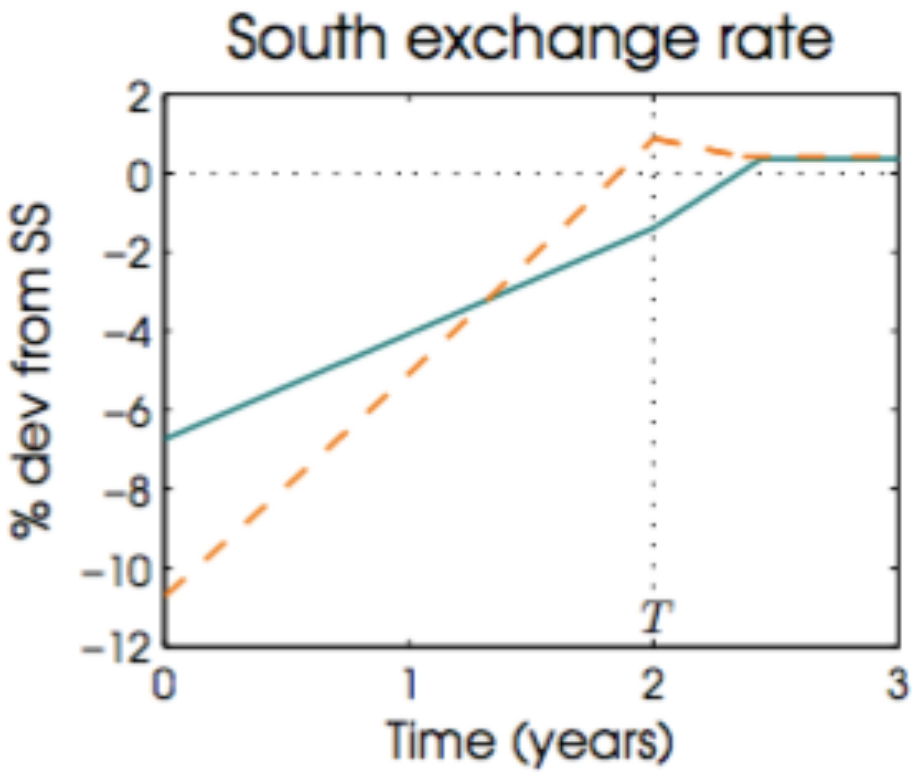
- To stimulate production at $t = 0$, level of E_0 is crucial and it is unrelated to capital controls

- If ZLB binds for more periods: $\tau_{nst} > 0$ keeps E_{nst+1} low $\Rightarrow$ North appreciates more $\Rightarrow$ Y_{nt+1} goes down; why optimal?

- Decouple exchange rates from South monetary policy
  - Want low interest rates in the South are good for the North since it increases demand early
  - That requires South to appreciate
  - Capital controls allow to control separately r_s and E_{t+1}/E_t

Capital controls and South monetary policy





Expenditure switching and exchange rate pass-through

- "Expenditure switching": depreciation makes domestic goods cheaper at home and abroad via law of one price $P_{Fi} = P_{Fj} E_{ij}$ $\Rightarrow$ more demand for domestic goods

- 100% pass-through of nominal exchange rates into prices

- Data? Pass-through is low (about 20%)

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- What if prices are sticky in local currency (0% pass-through)? If North depreciates:
  - No effect on P_F/P_H: it does not affect relative demand
  - North firm's markup goes up (in local currency)
  - Transfer to North consumers $\Rightarrow$ consumes more at all t $\Rightarrow$ output goes up (via home-bias)
  - So it may still be beneficial if output too depressed
  - But: need to distort inter-temporal margin or just adjust E_0?

Non-cooperative equilibrium

- So far, policy chosen cooperatively:
  - E_0 chosen by central monetary authority, no problem

- What if policy is chosen non-cooperatively?

- I am confused on how outcomes are determined in the paper

Exchange rate is indeterminate

Let $T = 1$, timing and actions:

- At $t = 0$ monetary authority in country i chooses (r_i, τ_i)
- Given policies, outcome is a competitive equilibrium
  i.e. it satisfies implementability conditions

Problem:

- Real indeterminacy
- Equilibrium outcome is not pinned down, multiple equilibria indexed by E_0

Existence?

Alternatively:

- At $t = 0$ monetary authority in country i chooses $(r_i, \tau_i, \{E_{0ij}\}_{j \neq i})$
- Given policies, outcome is a competitive equilibrium i.e. it satisfies implementability conditions

Problem:

- What if monetary authority in i and j disagree on E_{0ij}?
- Is the existence of an equilibrium knife-edge?