

Discussion of  
**“A Theory of Optimal Capital Controls”**

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# Capital Controls

- Huge policy importance
  - widespread use
  - effectiveness (?)
- No theoretical framework
  - Magud, Reinhart and Rogoff (2011)
- Great complexity of the question
  - portfolio choice (incomplete markets)
  - frictions
- This paper: lays out a basic **frictionless** framework
  - endowment economy
  - no uncertainty: one international real bond
  - trade across periods (and across goods)

## Results

- Optimal tariff argument for intertemporal trade
  - tax net exports to affect intertemporal terms of trade
  - tax net exports to affect intratemporal terms of trade (if there is home bias)
  - reduce intertemporal (and intratemporal) trade in periods of
- very intuitive (almost)
- Obstfeld and Rogoff Chapter 2, generalized and solved analytically. very nicely done.

# 1. is this the right framework?

- This model: capital controls = trade protection
  - Capital controls equivalent to a tariff (Jeanne, 2011)
  - Pareto inferior (prisoner's dilemma)
  - Why no WTO for capital controls?
- Reasons for capital controls:  
what makes intertemporal trade different?
  - ① Enforcement frictions: require borrowing limits
    - Alvarez and Jermann (2000); Aoki, Kiyotaki, Benigno (2009)
  - ② 'Hot Money'; Information frictions
    - Calvo and Mendoza (2000), Chari and Kehoe (2003)
  - ③ 'Trilemma' and monetary policy
    - Obstfeld, Shambaugh and Taylor (2010)
  - ④ Real exchange rate management
    - Jeanne (2011)
    - Currency unions and pegs: China, Euro zone
- Fundamental results: general mechanism

## 2. net exports vs. net foreign assets?

- Conjecture: desire to manipulate terms-of-trade should depend not on net exports  $nx_t = y_t - c_t$ , but on net foreign assets

$$b_{t+1} = \frac{b_0}{R_{0,t+1}} + \sum_{\tau=0}^t \frac{y_\tau - c_\tau}{R_{0,t+1}}$$

or

$$q_t b_{t+1} = b_t + y_t - c_t$$

- This paper says: no! Manipulate terms of trade only based on  $nx_t$ , not  $b_{t+1}$
- Why? Consider  $y_\tau = y$  for all  $\tau \geq t$  (and  $Y_t \equiv Y$ ). Then

$$c_\tau = y + (1 - \beta)b_t \quad \forall \tau \geq t$$

## 2. net exports vs. net foreign assets?

cont'd

- Is no policy at all optimal when  $y_t \equiv y$ ? Not if  $b_0 \neq 0$ .
- How come?! we just proved for any  $b_t$

$$c_\tau = y + (1 - \beta)b_t \quad \forall \tau \geq t$$

- Turns out this applies only for  $t > 0$ . Conclusion must be modified for  $t = 0$ , if  $b_0 \neq 0$

## 2. net exports vs. net foreign assets?

cont'd

- Unilateral (planning) problem of a country

$$\max_{\{c_t\}} \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$\text{s.t.} \quad b_0 + \sum_{t=0}^{\infty} \underbrace{\frac{\beta^t u'(c_t^*)}{u'(c_0^*)}}_{\equiv Q_{0,t}^*} (y_t - c_t) = 0, \quad c_t + c_t^* \equiv Y.$$

- Rewrite constraint as

$$u'(Y - c_0)[b_0 + y_0 - c_0] + \sum_{t=1}^{\infty} \beta^t u'(Y - c_t)[y_t - c_t] = 0.$$

Note the asymmetry of  $t = 0$

## 2. net exports vs. net foreign assets?

cont'd

- Assume  $y_t \equiv y$  and  $b_0 > 0$
- Optimality

$$u'(c_0) = \mu u'(Y - c_0) \left[ 1 + \frac{u''(Y - c_0)}{u'(Y - c_0)} (b_0 + y - c_0) \right],$$
$$u'(c_t) = \mu u'(Y - c_t) \left[ 1 + \frac{u''(Y - c_t)}{u'(Y - c_t)} (y - c_t) \right], \quad t \geq 1.$$

$\Rightarrow c_t = c_1$  for all  $t \geq 1$  and  $c_0 \neq c_1$

- Budget constraint

$$u'(Y - c_0)(b_0 + y - c_0) + \frac{\beta}{1 - \beta} u'(Y - c_1)(y - c_1) = 0.$$

- Result:
  - $c_0 > c_1$  and  $b_0 + y - c_0 > y - c_1$
  - translates into:  $\tau_0 < \tau_1 = 0$  or  $\theta_0 > 0 = \theta_1$

## 2. net exports vs. net foreign assets?

cont'd

- Optimal policy:
  - $\tau_0 < 0$  and  $\theta_0 > 0$  for  $b_0$
  - $\tau_t = 0$ ,  $\theta_t = 0$  and  $b_t = b_1 \in (0, b_0)$  for all  $t \geq 1$
- $\tau_0 = \tau_t$  cannot be optimal!
- $\theta_t$  is not a function of  $b_t$ : time inconsistency
- time consistent solution:  $\theta(b)$  with  $\theta'(\cdot) > 0$  and  $\theta(0) = 0$ 
  - ▶ characterization
- why time inconsistency?
  - similar to Ramsey taxation with capital?
  - desire for decreasing  $|\tau_t|$  over time (constant  $|\tau_t| > 0$  won't do)
  - step in  $\tau_t$  is optimal, but not time consistent
  - smooth path for  $\tau_t$  is time consistent

### 3. additional questions

- Nothing different from trade distortions? Quantity vs price?
- Wars: prisoner's dilemma? what's the difference from static trade case?
- Generalizes to uncertainty?
- Absolute or relative growth? (how important  $Y = const$ )
- Theory of optimal RER management
- Non-linear distortion rather than counter-/pro-cyclical distortion
  - denote by  $\tau$  both import tariff and export subsidy;  
by  $\theta$  tax on both inflows and outflows
- Generalizes to demand shocks



## Time-consistent solution

- Time-consistent program

$$V(b) = \max_{(c,b')} \{u(c) + \beta V(b')\}$$

$$\text{s.t.} \quad c + qb \leq y + b'$$

$$\text{where} \quad q = \frac{\beta u'(Y - c(b'))}{u'(Y - c)}$$

- equilibrium requirement

$$c(b) = \arg \max_{(c,b')} \{u(c) + \beta V(b')\}$$

- Result:  $c(b)$  such that  $c'(\cdot) < 0$  and  $c(0) = y$