

Rounding the Corners of the Trilemma: A Simple Framework

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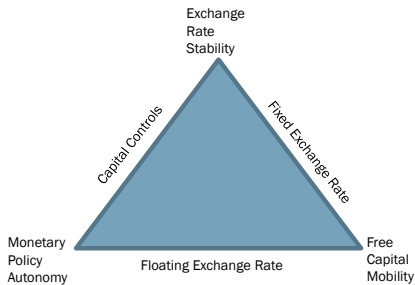


Figure: Mundell's trilemma

- In the real world, many countries float and at the same time use capital controls or FXI
 - what Klein and Shambaugh (2015) call “rounding the corners of the trilemma”

Introduction

- Capital flow management (CFM) endorsed by the IMF after the global financial crisis
 - John Williamson, *The Management of Capital Inflows* (1995); *Curbing the Boom-Bust Cycle* (2005)
 - CFM mostly understood as capital controls
- The IMF is developing an “integrated policy framework” (IPF) to analyze how EMEs should use the policy instruments at their disposal (Gopinath, 2019; Basu et al, 2020; Adrian et al, 2020)
 - integrates a wide range of policy instruments
- Rey (2013) argued that exchange rate flexibility brings little gains in terms of insulation from the GFC and countries should use capital controls

Introduction

- I present a simple micro-founded macroeconomic model to understand why one might want to “round the corners”
- A range of normative models with various frictions have been proposed
 - financial frictions: Bianchi (2011), Jeanne and Korinek (2010), Korinek (2008), Benigno et al (2016)
 - nominal frictions: Farhi and Werning (2014), Alla, Espinoza and Ghosh (2016), Liu and Spiegel (2015)
 - both frictions: Basu et al (2020), Coulibaly (2020), Aoki, Benigno and Kiyotaki (2018), Gourinchas (2017)
- My model has nominal frictions only
- I will use the model as a vehicle for a tour of the literature

Roadmap

- 1 Model
- 2 Fixing vs. floating
- 3 Capital flow management
- 4 Instruments

Model

- Small open economy with tradable and non-tradable sectors
- Infinite time but we will focus on periods 1 and 2
 - steady state from $t = 2$ onwards
- Fixed nominal wage
- No “divine coincidence”
 - tradeoff between stabilizing the tradable sector and stabilizing the nontradable sector

- Preferences

$$\mathbb{E}_1 \sum_{t=1}^{+\infty} \beta^{t-1} [u_N(C_{Nt}) - v_N(L_{Nt}) + u_T(C_{Tt}) - v_T(L_{Tt}) + \zeta]$$

Preferences are GHH for the tradable sector

- Production: $Y_{Nt} = f_N(L_{Nt})$ and $Y_{Tt} = f_T(L_{Tt})$
- Nominal wage stickiness

$$W_{Nt} = \bar{W}_N, W_{Tt} = \bar{W}_T, \forall t \geq 1$$

- Home residents can trade bonds denominated in foreign currency (dollar) and home currency (peso)

Natural allocation

- First-order conditions of social planner problem

$$\begin{aligned}u'_N(f_N(L_N)) f'_N(L_N) &= v'_N(L_N) \\ f'_T(L_T) &= v'_T(L_T)\end{aligned}$$

The natural levels of employment and output are constant in both sectors, Y_N^n and Y_T^n

- Profit maximizing condition for firms in the N sector, $f'(L_N) = \overline{W}_N/P_{Nt}$, implies constant P_{Nt} ; Euler equation $u'(C_{Nt}) = \beta(1+i_t)u'(C_{Nt+1})$ and $C_{Nt} = Y_{Nt}$ then imply

$$i_t = r$$

where $r = 1/\beta - 1$

- **Natural allocation in the nontradable sector requires a constant peso interest rate**

Natural allocation (cont'ed)

- The peso price of the tradable good is equal to the peso-per-dollar exchange rate, E_t
- Profit maximization in the T sector implies $f'(L_{Tt}) = \bar{W}_T/E_t$

$$E^n = \frac{\bar{W}_T}{f'(L_T^n)}$$

- **The natural allocation in the tradable sector requires a constant exchange rate**
- Achieving the natural allocation in both sectors is not going to be consistent with international financial integration

Specification

$$\begin{aligned}u_N(C) &= u_T(C) = \frac{C^{1-\sigma} - 1}{1 - \sigma} \\v_N(L) &= \frac{L^{1+\psi}}{1 + \psi}, \quad v_T(L) = \nu \frac{L^{1+\psi}}{1 + \psi} \\f_N(L) &= f_T(L) = L^{1-\alpha}\end{aligned}$$

with $\sigma = 2$, $\psi = 3$, $\alpha = 0.3$, $\nu = 1$

Fixing vs. Floating

- We assume free capital mobility
- What is the optimal monetary/exchange rate policy?
- How does it adjust to changes in the dollar interest rate?

Fixing vs. Floating

- Under financial integration the home policymaker minimizes the loss

$$\min \omega_N y_N^2 + \omega_T y_T^2$$

subject to

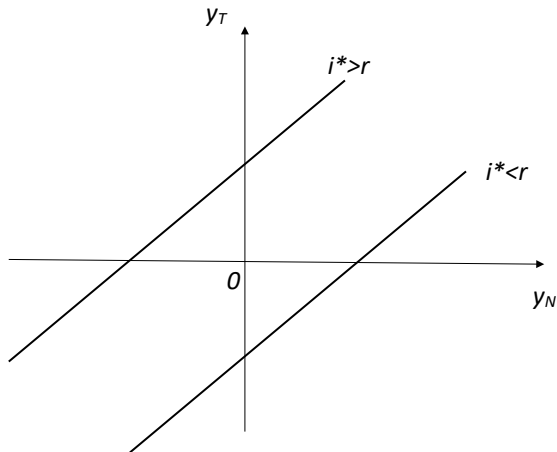
$$\begin{aligned} y_N &= -\frac{1}{\sigma + \gamma} (i - r) \\ y_T &= \frac{e}{\gamma} \\ i + e &= i^* \end{aligned}$$

where y_N and y_T are the output gaps and $\gamma = \alpha/(1 - \alpha)$

- The loss can be set to zero if $i^* = r$ but if $i^* \neq r$ the home policymaker must trade off the output gaps in the two sectors

Fixing vs. Floating

$$\gamma y_T = (\sigma + \gamma)y_N + i^* - r$$



Fixing vs. Floating

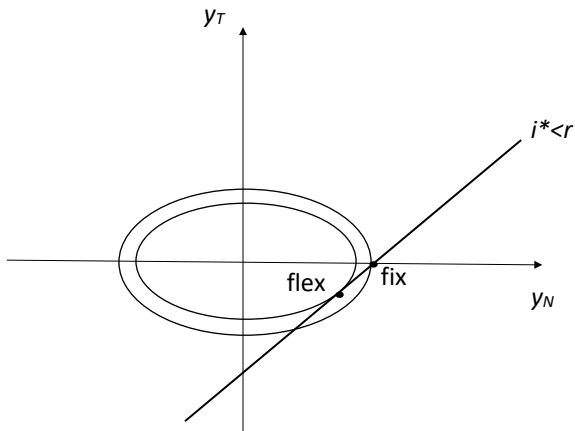


Figure: Optimal policy

The loss is smaller under floating than under fixing, but it is not zero

Fixing vs. Floating

- Floating gives autonomy: the peso interest rate moves in the same direction as the dollar interest rate, but less than one for one
- Mostly consistent with the empirical literature: with floating i responds to i^* , but less than with a fixed regime
 - Klein and Shambaugh (2015), Obstfeld (2015), Obstfeld, Ostry, and Qureshi (2019)
 - Aizenman, Chin and Ito (2010) find evidence consistent with the trilemma
- At the same time, monetary autonomy does not mean monetary insulation
 - the SOE can complain about US monetary policy if $i^* \neq r$, because it leads to domestic imbalances that cannot be fully resolved even under floating

Divine coincidence

- My model relies on the fact that there is one instrument for two sectoral output gaps
 - so no divine coincidence
- One can deviate from divine coincidence in many ways: sticky wages and prices (Erceg et al, 2009), terms of trade manipulation (Farhi and Werning, 2014), financial frictions (Coulibaly, 2020; Aoki et al, 2018), etc.
- My model is somewhere on the simplicity/realism efficiency frontier
 - Benigno, Converse and Fornaro (2015) find that episodes of large capital inflows are associated with (i) a currency appreciation; (ii) an economic boom; (iii) a reallocation of labor from the tradable sector to the nontradable sector
 - resonates with tradeoff described by policymakers (e.g. Brazil in 2009)

Capital flow management

- We first look at the problem of a social planner who sets the volume of capital inflows
 - what is the difference with laissez-faire?
- We then discuss the policy instruments for implementation

Capital flow management

- Assume that the home policymaker can set capital inflows kY_T^n in period 1
- Policymaker's problem

$$\min \omega_N y_N^2 + \omega_T y_T^2$$

subject to

$$y_N = -\frac{1}{\sigma + \gamma} (i - r)$$

$$y_T = \frac{e}{\gamma}$$

$$i + e = r - \sigma k$$

- Capital inflows ($k > 0$) are associated with appreciation pressure ($e < 0$) and capital outflows ($k < 0$) with depreciation pressure ($e > 0$)
- The loss can be set to zero only if $k = 0$

Capital flow management

- Welfare of individual j

$$U_j = V(k_j, i^*) - \frac{\omega_{reg} k^2}{2}$$

where $V(k_j, i^*)$ captures the welfare impact of the individual's own k_j and $reg = fix$ or $flex$ is the exchange rate regime

- Under laissez-faire, private agents maximize $V(k_j, i^*)$, making capital flows responsive to external financial conditions (i^*)
- They do not internalize the impact of capital flows on macroeconomic stabilization
- The social planner wants to stabilize capital flows relative to the laissez-faire level

Capital flow management

- Welfare of individual j

$$U_{1j} = V(k_j, i^*) - \frac{\omega_{reg} k^2}{2}$$

- The macro cost of capital flow volatility is lower under floating than under fixing, but it is not zero under floating

$$0 < \omega_{flex} < \omega_{fix}$$

- There is a larger need for capital flow management under fixing than under floating
- But there is a need for capital flow management under both regimes
- Rey argues that ω_{flex} is not that much lower than ω_{fix}
- The empirical evidence is mixed
 - floating offers a degree of instrument independence
 - the evidence is less clear for the outcomes (Rose, 2011)

Instruments

- The macroeconomic tradeoff is improved if one manages to disconnect the nominal interest rate from the exchange rate
- So it makes sense to focus on the wedges in UIP

$$i + e = i^* + \tau + \rho$$

where τ is a tax on capital flows and ρ is a premium

- The home policymaker can attempt to smooth ρ with foreign exchange interventions

Optimal tax on capital flows

- A tax on capital flows is not free because it distorts private consumption/saving allocations
- The home policymaker problem is to minimize the loss

$$\min \omega_N y_{N1}^2 + \omega_T y_{T1}^2 + \omega_\tau \tau^2$$

subject to

$$y_{N1} = -\frac{1}{\sigma + \gamma} (i_1 - r)$$

$$y_{T1} = \frac{e_1}{\gamma}$$

$$i_1 + e_1 = i_1^* + \tau$$

- The optimal tax is countercyclical (it partially offsets changes in i^*)
- The peso interest rate and exchange rate respond less to i^* than under free capital mobility

- Taxes on capital flows are more popular in theory than in practice
 - stigma
 - gates vs. walls (Klein and Shambaugh, 2015); circumvention (Garcia and Chamon, 2016); little evidence that capital controls are used countercyclically (Fernandez, Rebucci and Uribe, 2015)
- Foreign exchange interventions are more popular in practice than in theory
 - less stigma or circumvention
 - evidence more positive than for capital controls (Adler, Blanchard and Carvalho Filho, 2015)

- Foreign exchange interventions in my model: assume that the capital account is closed except for trade in peso bonds between the government and foreign investors who ask a time-varying quantity elastic premium

$$i + e = i^* + \theta\rho(B)$$

where θ captures the “risk aversion” of foreign investors and B is the government’s supply of peso bonds to foreign investors

- Then the optimal policy is to vary the supply of B so as to keep $i^* + \theta\rho(B)$ equal to r
- The theoretical literature on reserves interventions need financial frictions for the interventions to work (Chang, 2017; Fanelli and Straub, 2021; Cavallino, 2020)
- We understand at an abstract level why capital flow management policies may be welfare improving but this has not been translated this into precise rules for policymaking
 - “instrument frictions”

Conclusions

- I have focused on the macroeconomic aspects of capital flow management
- Things that I have not discussed: large financial risks (rollover crises, default, etc.), ex-ante vs. export interventions,

THANK YOU!