

# Capital Control Policy in a Small Open Economy with Financial Frictions

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- Two policy options in emerging market economies to cope with volatile capital flows: capital control and exchange rate management
- Capital control in Asia:
  - China: Restriction on foreign borrowing in bank
  - Thailand: URR leads a sharp decline in fixed-income portfolio in 2006
  - Korea: Restriction on foreign and domestic banks' dollar borrowing and transactions on FX derivatives

## Recent Views on Capital Controls and exchange rate management. . .

- Schmitt-Grohe and Uribe (2012)
- Farhi and Werning (2012)
- Costinot, Lorenzoni, and Werning (2011) and De Paoli and Lipinska (2013)
- Korinek (2011), Jeanne and Korinek (2010), Bianchi and Mendoza (2013), Bianchi (2011), Benigno, Chen, Otrok, Rebucci, and Young (2013), and Korinek (2013)
- Optimal monetary policy with exchange rate regime: Clarida et al. (2000), Lubik and Schorfheide (2007), and Svensson (2000), De Paoli (2009)

Recent Views on Capital Controls and exchange rate management. . .

- Dilemma not trilemma (Rey 2013)
- Farhi and Werning (2013): capital control is a Pareto improvement even with flexible exchange rate regime
- Kim and Yang (2012)

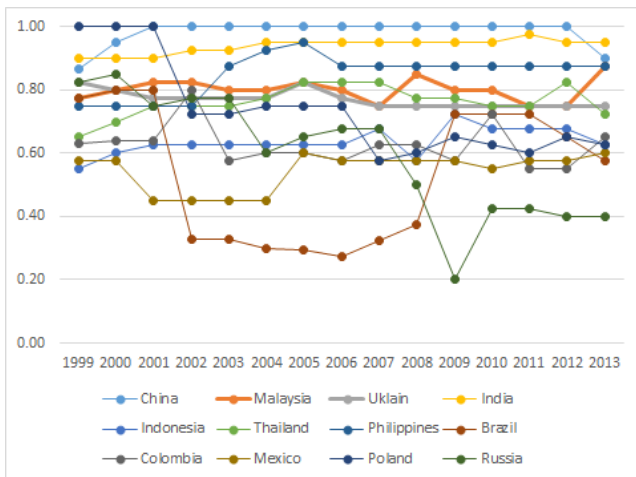
We focus on empirical analysis of the impacts of various external shocks (US shocks) to selected EMEs

- 4 different group of EMEs

# Empirical Analysis

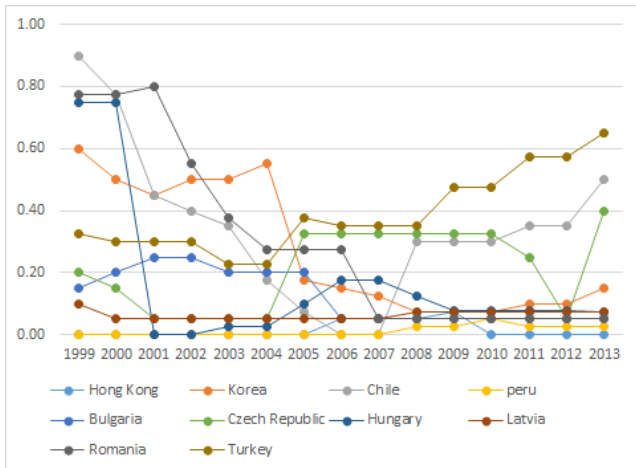
- Degree of Capital Controls

Figure: Higher Capital Control Countries



# Empirical Analysis

Figure: Lower Capital Control Countries

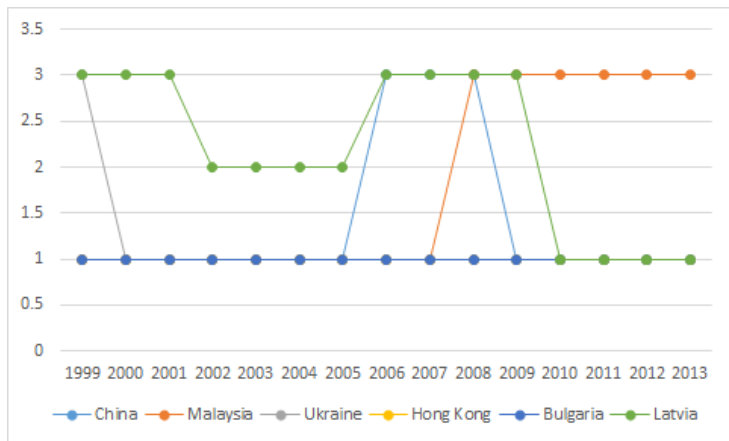




# Empirical Analysis

- Rigid Exchange Rate Regime

Figure: Fixed Exchange Rate Regime Countries



- 2X2 Classification

Table: Classification of EMEs

	Higher Capital Control	Lower Capital Control
Fixer	China, Malaysia, Ukraine	Hong Kong, Bulgaria, Latvia
Floater	India, Indonesia, Thailand, Philippines Brazil, Columbia, Mexico, Poland, Russia	Korea, Chile, Peru, Czech Republic, Romania, Turkey, Hungary,

$$G(L)y^i(t) = d^i + e^i(t), \quad i = 1, 2, \dots, I \quad (1)$$

$$y^i(t) = \begin{bmatrix} y_1(t) \\ y_2^i(t) \end{bmatrix}, \quad G(L) = \begin{bmatrix} G_{11}(L) & 0 \\ G_{21}(L) & G_{22}(L) \end{bmatrix}, \quad (2)$$
$$d^i = \begin{bmatrix} d_1 \\ d_2^i \end{bmatrix}, \quad e^i(t) = \begin{bmatrix} e_1(t) \\ e_2^i(t) \end{bmatrix}$$

$$y^i(t) = c^i + B(L)y^i(t-1) + u^i(t), \quad i = 1, 2, \dots, I \quad (3)$$

$$B(L) = \begin{bmatrix} B_{11}(L) & 0 \\ B_{21}(L) & B_{22}(L) \end{bmatrix}, \quad c^i = \begin{bmatrix} c_1 \\ c_2^i \end{bmatrix}, \quad u^i(t) = \begin{bmatrix} u_1(t) \\ u_2^i(t) \end{bmatrix} \quad (4)$$

Figure: Impulse Responses of G-4 to the US shocks

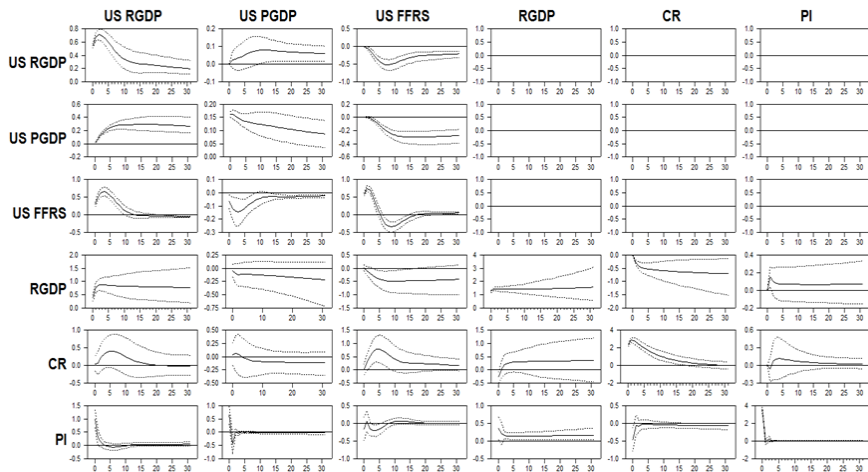


Figure: Impulse Responses of G-3 to the US shocks

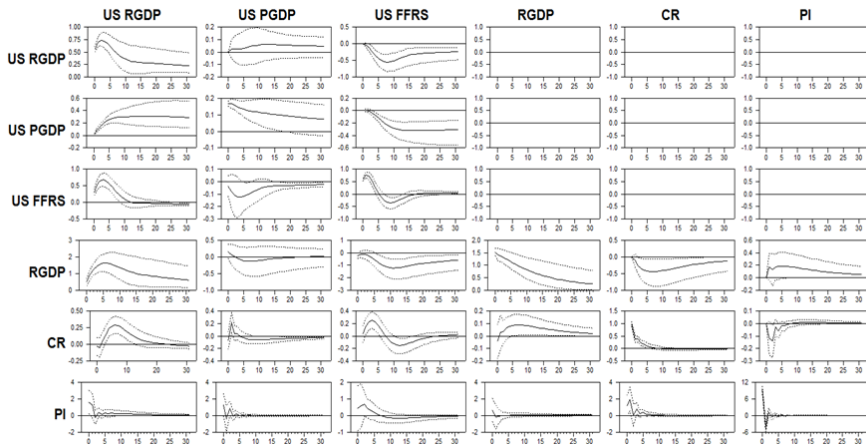


Figure: Impulse Responses of G-2 to the US shocks

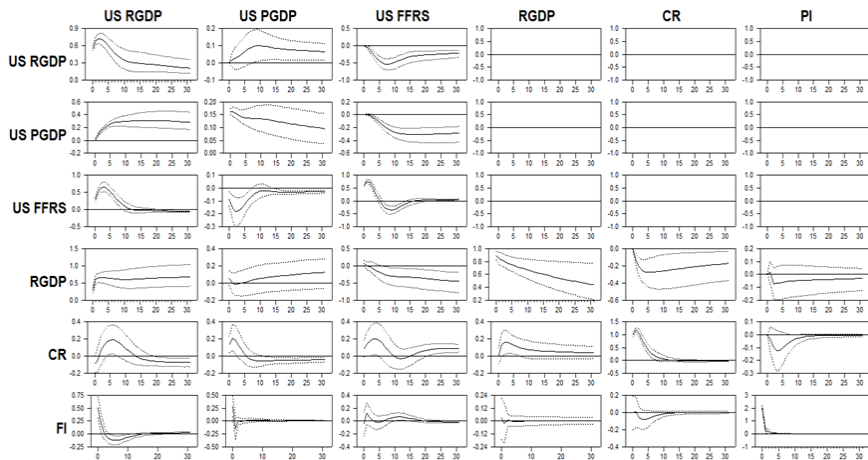
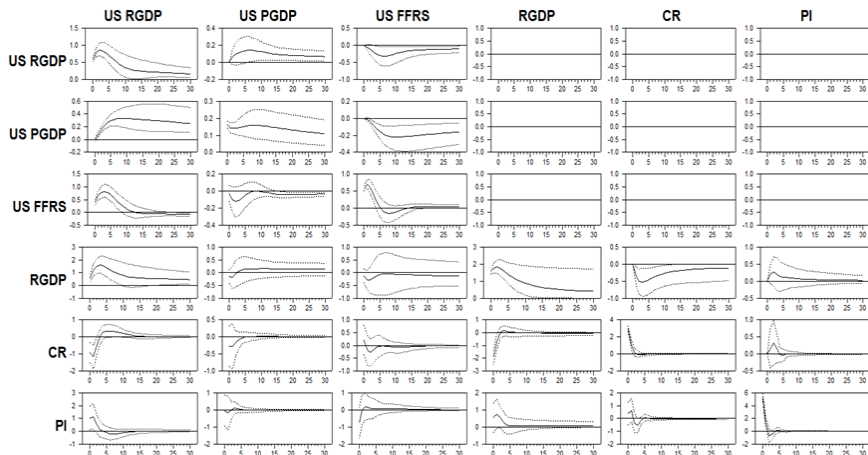


Figure: Impulse Responses of G-1 to the US shocks



- Household

$$E_t \left[ \sum_{i=0}^{\infty} \beta^i \left( \log C_t - \frac{H_t^{1+\nu}}{1+\nu} \right) \right], \sigma \neq 1, \quad 0 < \beta < 1. \quad (5)$$

$$C_t = \left[ \int_0^1 C_t(j)^{\frac{\phi-1}{\phi}} dj \right]^{\frac{\phi}{\phi-1}}, \quad (6)$$



- Household

$$C_t(j) = \left[ \frac{P_t(j)}{P_t} \right]^{-\phi} C_t, \quad (7)$$

$$\begin{aligned} P_t C_t + B_{H,t} + S_t B_{F,t}^* \leq \\ R_{t-1} B_{H,t-1} + S_t \Psi_{t-1} R_{t-1}^* (1 + \tau_{B,t-1}) \ominus \left( \frac{S_t B_{F,t-1}^*}{P_{t-1}} \right) B_{F,t-1} \\ + W_t (1 - \tau_t) N_t + TR_t. \end{aligned} \quad (8)$$

- Firm: domestic firms, importing firms, capital producers
  - Domestic Firms

$$Y_t(j) \leq A_t K_t(j)^\gamma H_t(j)^{1-\gamma}, \quad (9)$$

$$\begin{aligned} V_t &= \gamma MC_t \frac{Y_t(j)}{K_t(j)}, \\ W_t &= (1 - \gamma) MC_t \frac{Y_t(j)}{H_t(j)}, \end{aligned} \quad (10)$$

- Domestic Firms

$$\max E_t \left\{ \sum_{k=0}^{\infty} \alpha^k Q_{t,t+k} [\bar{P}_{Ht,t} Y_{t,t+k}(j) - MC_{t+k} Y_{t,t+k}(j)] \right\}, \quad (11)$$

subject to

$$Y_{t,t+k}(j) = \left( \frac{\bar{P}_{H,t}}{P_{Ht,t+k}} \right)^{-\phi} Y_{t+k},$$
$$P_{H,t}^{1-\phi} = (1-\alpha) \bar{P}_{Ht,t}^{1-\phi} + \alpha P_{H,t-1}^{1-\phi}. \quad (12)$$

- Importing Firms: no price setting role as law of one price holds

$$P_{F,t}(j) = \mathcal{S}_t P_{F,t}^*(j). \quad (13)$$

- Capital Producers

$$K_{t+1} = (1 - \delta_k)K_t + \Phi(l_t, l_{t-1}) = K_{it} + (1 - F(l_t/l_{t-1}))l_t, \quad (14)$$

$$\max_{\{l_{t+j}, K_{t+j}\}} E_t \left[ \sum_{j=0}^{\infty} \beta^j \Lambda_{t+j} (Q_{kt+j} K_{kt+j} + (1 - F(l_{t+j}/l_{t+j-1}))l_{t+j} - Q_{kt+j} \right.$$

$$\left. Q_{kt} F' \left( \frac{l_t}{l_{t-1}} \right) \frac{l_t}{l_{t-1}} + \beta E_t \left[ \frac{\Lambda_{t+1}}{\Lambda_t} Q_{kt+1} F' \left( \frac{l_{t+1}}{l_t} \right) \frac{l_{t+1}}{l_t} \right] \right] = 1. \quad (15)$$

- Financial contract

$$L_t/P_t = Q_{kt}K_{kt+1} - N_t.$$

$$E_t[R_{t+1}^e] = E_t \left[ \frac{r_{kt+1} + (1 - \delta_k) Q_{kt+1}}{Q_{kt}} \right], \quad (16)$$

- Financial intermediaries: domestic borrowing

$$E_t[R_{t+1}^e] = (1 + \chi_t)E_t\left[\frac{R_t}{\pi_{t+1}}\right], \quad (17)$$

where  $\chi_t = \chi\left(\frac{N_t}{Q_{kt}K_{t+1}}\right)$ ,  $\chi'(\cdot) > 0$  and  $\chi(0) = 0$ .

$$N_t = \theta \left[ R_t^e Q_{kt-1} K_t - \left[ \frac{R_{t-1}}{P_t/P_{t-1}} \right] \frac{L_t}{P_{t-1}} \right] + (1 - \theta) D_t^e, \quad (18)$$

- Financial intermediaries: foreign borrowing

$$S_t L_t / P_t = Q_{kt} K_{kt+1} - N_t. \quad (19)$$

$$E_t[R_{t+1}^e] = (1 + \chi_t) E_t \left[ \frac{S_{t+1} P_t R_t^*}{S_t P_{t+1}} \right]. \quad (20)$$

Finally, the evolution of entrepreneurs's net worth,  $N_{it+1}$  is given by

$$N_t = \theta \left[ R_t^e Q_{kt-1} K_t - \left[ \frac{S_t \Psi_{t-1} R_{t-1}^* (1 + \tau_{B,t-1}) \Theta(.)}{S_{t-1} P_t / P_{t-1}} \right] \frac{S_{t-1} L_t}{P_{t-1}} \right] + (1 - \theta) D_t^e. \quad (21)$$



- Quantitative Evaluation

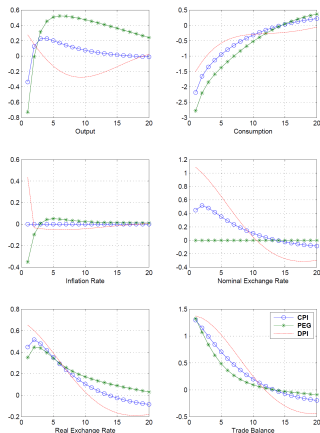
Table: Parameter Values

Parameter	Values	Description and definitions
$\epsilon$	11	Elasticity of demand for a good with respect to its own price
$\sigma$	2	Relative risk aversion parameter
$\eta$	1	Elasticity of substitution between home and foreign goods
$\nu$	1	Inverse of elasticity of labor supply
$\eta_F$	0.02	The elasticity of the country spread to net foreign asset
$1 - \theta_i$	0.0272	Entrepreneur's death rate
$N_{ss}/K_{ss}$	1.2	Leverage ratio
$\bar{p}$	0.0035	Risk spread or External finance spread
$\alpha_i (i = H, N, M)$	0.75	Probability of the price not adjusting
$F^{-1'}$	2	Elasticity of the price of capital to investment
$r$	0.016	Steady state real interest rate

# Dynamic Response under Alternative Policy Regimes

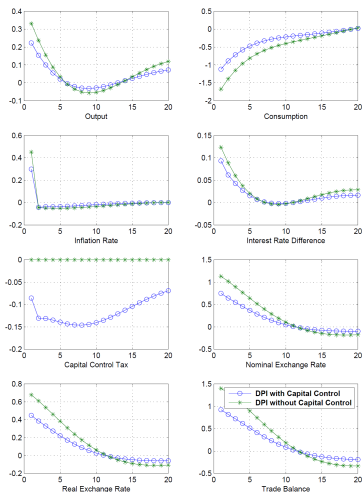
- No Capital Controls and No Financial Frictions

Figure: Impulse Response to a Risk Premium Shock with No Financial Frictions



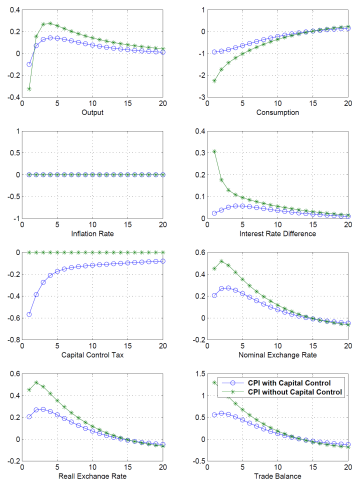
# Dynamic Response under Alternative Policy Regimes

Figure: Impulse Response Function to a Risk Premium Shock under DPI rule



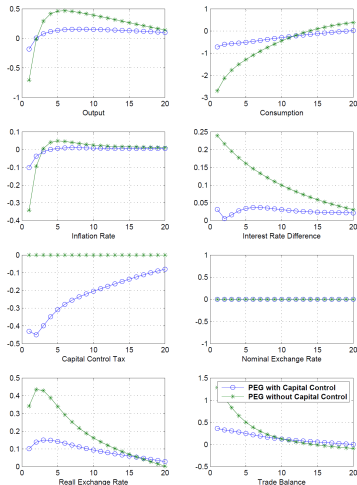
# Dynamic Response under Alternative Policy Regimes

Figure: Impulse Response Function to a Risk Premium Shock under CPI rule



# Dynamic Response under Alternative Policy Regimes

Figure: Impulse Response Function to a Risk Premium Shock under PEG rule



# Conclusion

- EMEs responded capital flows regardless of exchange rate regimes.
- Flexible exchange rate regime with less capital control policy is not the best policy in EMEs to deal with volatile capital flows.
- Capital control policy is countercyclical.
- Combined policy options with fixed and capital control is a better option in EMEs when we have a financial frictions.