

Feasibility of Currency Unions in Asia

- An Assessment Using G-PPP -

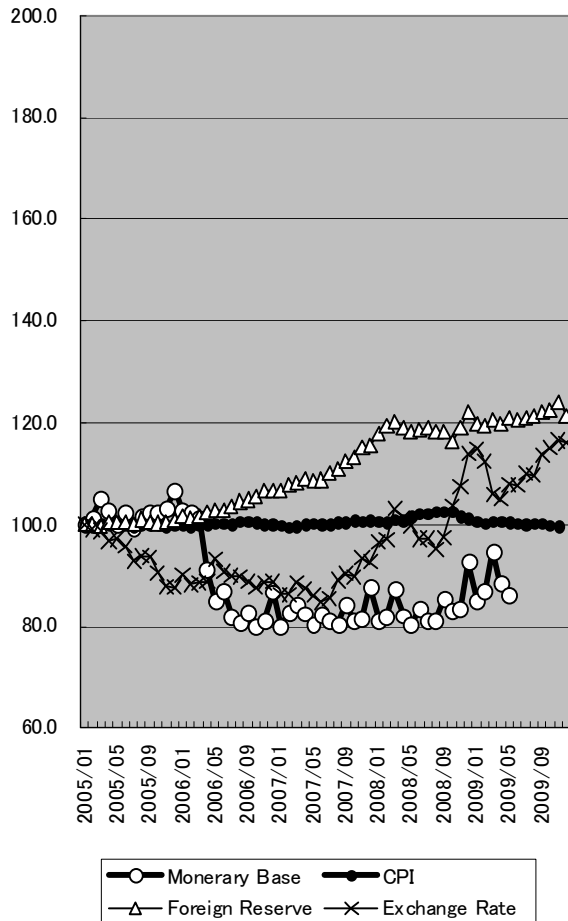
Workshop by ICRIER and MOF-PRI

February 16, 2010

Macroeconomic Issues: Japan, India and China

(Data from IFS, Jan. 2005=100)

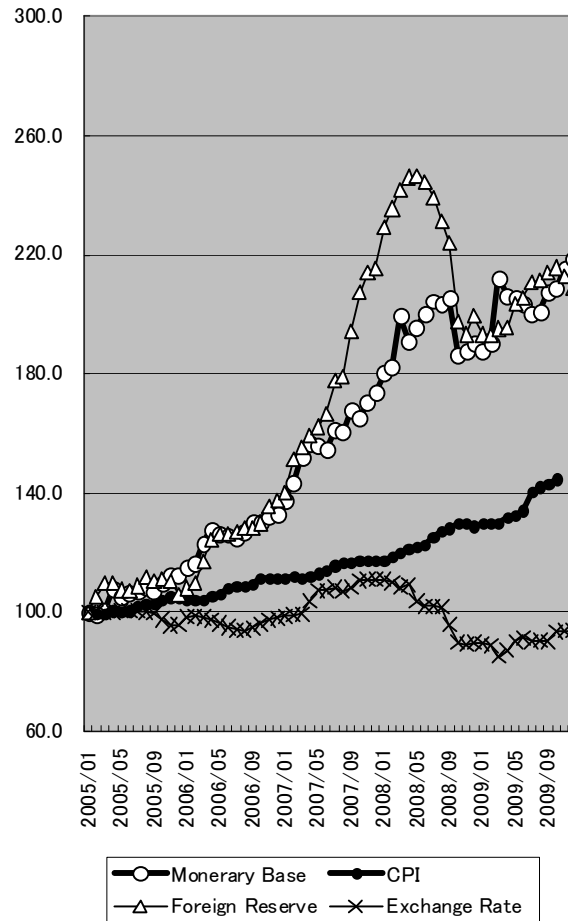
JAPAN



Issues: Deflation (Appreciation)

⇒ **Loosening Money**

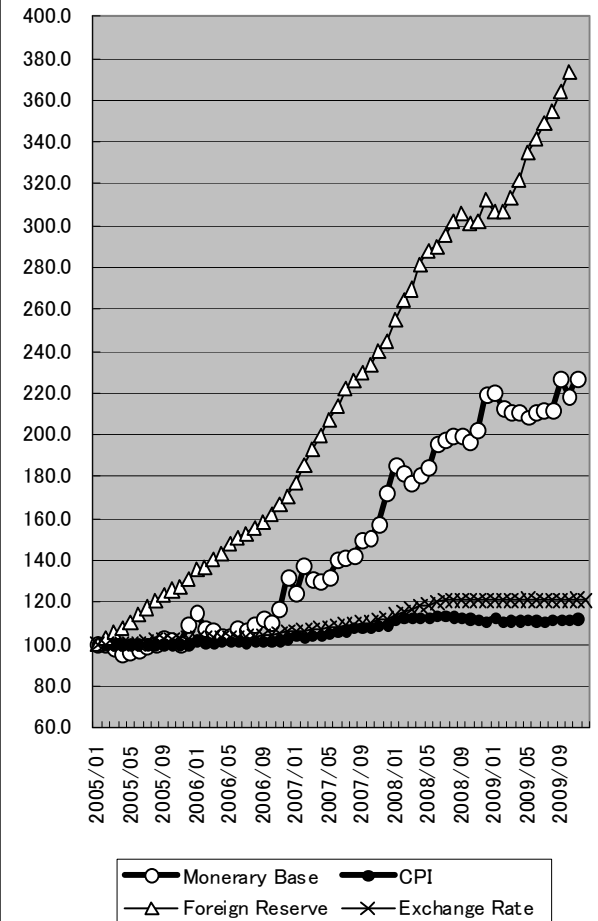
INDIA



Issues: Recent Inflation?

⇒ **Tightening Money?**

CHINA



Issues: Huge Surplus

⇒ **Yuan Appreciation**

Common Structural Issues : How to raise domestic demand ?

Introduction

- Growing concerns with currency regime in Asia
 - economic integration:
 - e.g. intra-regional trade in East Asia: 35%(1980) \Rightarrow 56%(2004)
 - intra-governmental monetary cooperation:
 - e.g. Chiang Mai Initiative in May 2000
- Purpose: to study feasibility of currency union
 - in Asia including south Asia (cf. SAARC)
 - during post-crisis period (cf. pre-crisis dollar peg)
 - by G-PPP (generalized purchasing power parity)
 - \Rightarrow bilateral & multilateral co-integration

Previous Studies – empirically inconclusive in Asia

○ Optimum currency area (OCA)

- Mundell (1961): factor mobility, McKinnon (1963): trade integration

○ Three approaches: similarities in economies

- * S-VAR approach: symmetry of macroeconomic shocks
 - Eichengreen and Bayoumi (1999), Ling and Yuen (2001), Bayoumi et al. (2000) etc.: Northeast & Southeast Asian subgroups
- * G-PPP approach: common trends in real exchange rates
 - Enders and Hurn (1994), Liang (1999): not eligible for OCA
 - Ogawa and Kawasaki (2003): ASEAN5 plus China
 - Choudhry (2005): five Far East countries
 - Ahn et al. (2006): a large group of selected East Asian countries
- * Cluster analysis: grouping countries by economic homogeneities
 - Ibrahim (2008): low homogeneities of ASEAN+3

G-PPP Model — developed by Enders and Hurn (1994)

○ Concept

- Fundamentals non-stationary \Rightarrow real ERs non-stationary
- Within OCA, fundamentals co-integrated \Rightarrow real ERs co-integrated

○ Model Specification

$$r_{12t} = \alpha_{13} r_{13t} + \alpha_{14} r_{14t} + \dots + \alpha_{1m} r_{1mt} + \varepsilon_t$$

- Co-integration among $m-1$ bilateral real ERs \Rightarrow weighted average
- Choice of base country is unimportant \Rightarrow only re-normalizing
- Weight α : broad linkage of trade, technology transfers, immigration and financial movements
- In case that all of $\alpha = 0$, Equation simply becomes ordinary PPP

Data for Estimation

○ Bilateral Real Exchange Rate (ER)

- Base country: US
- $\log(\text{real ER}) = \log(\text{ER}) + \log(\text{CPI}_{\text{local}}) - \log(\text{CPI}_{\text{US}})$, 2005= $\log(100)$
- Data Source: IFS of IMF

○ Sample Countries

- 17 in Asia: Japan, China, Korea, and ASEAN (Indonesia, Thailand, Malaysia, Singapore, the Philippines, Vietnam, Myanmar, Cambodia, and Lao PDR) and SAARC (India, Pakistan, Bangladesh, Sri Lanka and Nepal)

○ Sample Period

- Post- Asian currency crisis period: April 1999 – August 2009
- Turbulent crisis period removed by Reinhart and Ilzetzki (2009)

Estimation Procedures – Two steps

○ Bilateral Co-integration Test

- For observing the de fact bilateral relation about all combinations
- Method of Engle and Granger (1987): i) proving $I(1)$ process of real ERs by the ADF, ii) testing co-integration by the ADF on residuals estimated by OLS on real ERs.

○ Multilateral Co-integration Test

- For examining the eligibility of OCA in the institutional groupings
- Method of Johansen and Juselius (1990): verifying the number of co-integrating vectors by the trace & maximum eigenvalue tests
- Representation theorem \Rightarrow Vector error-correction model (VECM)

$$\Delta r_{12t} = \alpha_{13} \Delta r_{13t} + \dots + \beta_{12}(r_{12t-1} - \lambda_{13} r_{13t-1} - \dots) + \varepsilon_t$$

λ : co-integrating vector (long-run elasticity), the small one shows the similarity, β : speed of adjustment toward equilibrium

Estimation Results

○ Bilateral Co-integration

- ASEAN: Philippines & Malaysia, etc. / south Asia: India & Pakistan, Pakistan & Nepal
- Other Interactions: Thailand & Nepal, Indonesia & Pakistan, etc.
- Japan, China and Korea: no co-integration

○ Multilateral Co-integration

- ASEAN, advanced ASEAN, developing ASEAN, south Asia, south Asia plus advanced ASEAN, and south Asia plus developing ASEAN: verified at least one co-integration vector
- VECM: i) smaller co-integrating vectors of south Asia – Similarity, ii) high speed adjustment: Thailand in advanced ASEAN, Vietnam in developing ASEAN, and Sri Lanka in south Asia

Bilateral Co-integration

	Japan	Korea	China	Singapore	Malaysia	Thailand	Philippines	Indonesia	Cambodia	Lao PDR	Myanmar	Vietnam	India	Pakistan	Nepal	Sri Lanka
Korea	-2.36															
China	-1.94	-1.36														
Singapore	-1.86	-1.25	-2.69*													
Malaysia	-1.99	-1.63	-1.18	-2.10												
Thailand	-1.99	-1.24	-1.08	-2.05	-2.53											
Philippines	-1.95	-1.32	-1.38	-3.04**	-3.51***	-2.72*										
Indonesia	-1.74	-1.54	-0.55	-1.40	-1.88	-2.34	-1.97									
Cambodia	-1.98	-1.24	-3.65***	3.18**	-3.02**	-2.17	-2.76*	-2.01								
Lao PDR	-1.83	-0.33	-1.31	-2.17	-1.78	-2.35	-2.20	-2.49	-3.06**							
Myanmar	-2.34	-0.52	-0.25	-1.56	-1.87	-2.31	-2.20	-2.63*	-1.39	-0.79						
Vietnam	-1.98	-1.19	-1.91	-2.64*	-1.92	-1.64	-1.78	-2.24	-2.67*	-2.02	-0.81					
India	-2.23	-1.44	-0.02	-1.93	-2.05	-2.66*	-2.50	-2.84*	-1.38	-3.15**	-1.21	-0.49				
Pakistan	-2.03	-1.47	-0.23	-1.76	-2.08	-3.12**	-1.63	-4.13***	-1.17	-2.02	-3.48**	-0.63	-3.83***			
Nepal	-2.18	-1.48	-0.59	-2.27	-2.50	-4.10***	-3.00**	-2.64*	-1.61	-2.30	-1.29	-1.60	-2.32	-3.89***		
Sri Lanka	-2.11	-0.74	-1.45	-2.14	-1.87	-1.85	-2.29	-2.13	-2.25	-3.06**	-2.39	-2.66*	-1.24	-2.08	-1.93	
Bangladesh	-2.22	-1.70	-1.01	-2.60*	-1.92	-1.59	-1.58	-1.57	-1.49	-0.90	-0.07	-0.56	-1.11	-1.60	-1.01	-2.71*

Note) ***, **, and * indicate rejection of the null of nonstationarity at the 1 percent, 5 percent, and 10 percent significance levels with critical values.

Multilateral Co-integration

ASEAN		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	290.74 *	68.45 *
At most 1	222.29 *	55.63 *
At most 2	166.65 *	47.98 *
At most 3	118.67 *	40.45
At most 4	78.21 *	29.16
At most 5	49.05	22.46
At most 6	26.58	12.58
At most 7	13.99	10.28
At most 8	3.71	3.71
- Advanced ASEAN		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	77.03 *	33.24
At most 1	43.79	19.22
At most 2	24.57	15.71
At most 3	8.85	4.95
At most 4	3.89	3.89
- Developing ASEAN		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	64.57 *	33.91 *
At most 1	30.65	16.19
At most 2	14.46	9.59
At most 3	4.86	4.86
South Asia		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	87.35 *	38.56 *
At most 1	48.78	22.25
At most 2	26.53	13.23
At most 3	13.30	9.46
At most 4	3.83	3.83
- South Asia + Advanced ASEAN		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	306.68 *	85.12 *
At most 1	221.56 *	56.67
At most 2	164.89	44.39
At most 3	120.50	32.07
At most 4	88.42	25.95
At most 5	65.46	20.45
At most 6	42.00	15.03
At most 7	26.97	12.98
At most 8	13.98	8.51
At most 9	5.46	5.46
- South Asia + developing ASEAN		
Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None	288.56 *	66.74 *
At most 1	221.81 *	57.52 *
At most 2	164.28 *	51.80 *
At most 3	112.47 *	36.12
At most 4	76.35	30.45
At most 5	45.89	19.14
At most 6	26.74	13.19
At most 7	13.55	7.74
At most 8	5.81	5.81

Notes: * denotes rejection of the hypothesis at the 0.05 level.

VECM

	Advanced ASEAN		Developing ASEAN		South Asia	
	Equation for EC	Adj. speed	Equation for EC	Adj. speed	Equation for EC	Adj. speed
Philippines	1.00	-0.04 **				
Malaysia	-0.76	-0.01				
Singapore	2.11 ***	-0.03 *				
Thailand	-2.98 ***	0.04 **				
Indonesia	0.76 ***	-0.07				
Cambodia			1.00	-0.02		
Lao PDR			0.02	0.05		
Myanmar			0.08 ***	0.03		
Vietnam			-1.09 ***	0.11 ***		
India					1.00	0.05
Pakistan					-0.01	0.12 **
Bangladesh					-0.20 **	0.10 **
Nepal					-0.62 ***	0.19 ***
Sri Lanka					-0.06	0.20 ***

Note) ***, **, and * indicate rejection of the null of nonstationarity at the 1 percent, 5 percent, and 10 percent significance levels with critical values.

Summary & Interpretations

- Japan, China and Korea – little candidate for OCA \Rightarrow different economic structure
- ASEAN, south Asia – possible candidate for OCA \Rightarrow consistent with previous works
- Some interesting interaction between ASEAN & south Asia \Rightarrow backgrounds should be investigated

Implication: a smaller local subgroup multi-speed strategy toward a long-run goal of currency union in Asia

References

- Ahn, Changmo, Hong-bum Kim and Dongkoo Chang. 2006. “Is East Asia fit for an optimum currency area? An assessment of the economic feasibility of a higher degree of monetary cooperation in East Asia,” *The Developing Economies*, XLIV-3, pp.288-305.
- Bayoumi, T., B. Eichengreen, and P. Mauro. 2000. “On Regional Monetary Arrangements for ASEAN,” *Journal of the Japanese and International Economies*, v.14, iss.2, pp.121-48.
- Choudhry, Taufiq. 2005. “Asian Currency Crisis and the Generalized PPP: Evidence from the Far East”, *Asian Economic Journal*, Vol.19 No.2 pp:137-157.
- Eichengreen, Barry, and Tamim Bayoumi. 1999. “Is Asia an Optimum Currency Area? Can It Become One? Regional, Global and Historical Perspectives on Asian Monetary Relations.” In *Exchange Rate Policies in Emerging Asian Countries*, ed. Stefan Collignon; Jean Pisani-Ferry; and Yung Chul Park. London: Routledge.
- Enders, Walter, and Stan Hurn. 1994. “Theory and Tests of Generalized Purchasing-Power Parity: Common Trends and Real Exchange Rates in the Pacific Rim.” *Review of International Economics* 2, no. 2: 179–90.
- Engle, R.F. and C. W. J. Granger. 1987, “Co-integration and error correction: representation, estimation, and testing.” *Econometrica*. 55, pp.251-276.
- Johansen, S. and K. Juselius. 1990. “Maximum likelihood estimation and inference on cointegration with applications to the demand for money.” *Oxford Bulletin of Economics and Statistics*. 52 pp.169-210.
- Liang, Hong. 1999. “Do Hong Kong SAR and China Constitute an Optimal Currency Area? An Empirical Test of the Generalized Purchasing Power Parity Hypothesis.” IMF Working Paper no. WP/99/79. Washington, D.C.: International Monetary Fund.
- Ling, Phui, and Hazel Yuen. 2001. “Optimum Currency Areas in East Asia: A Structural VAR Approach.” *ASEAN Economic Bulletin* 18, no. 2: 206–17.
- McKinnon, R. I. 1963. Optimum currency areas. *American Economic Review*, 51, 717–724.
- Mundell, R. A. 1961. A theory optimum currency areas. *American Economic Review*, 51, 657–664.
- Ogawa, Eiji, and Kentaro Kawasaki. 2003. “Possibility of creating a common currency basket for East Asia”, Discussion Paper No. 5. JBIC Institute, Tokyo Japan.
- Reinhart, Carmen M., and Ethan O. Ilzetzki. 2009. “Exchange Rate Arrangements Entering the 21st Century: Which Anchor Will Hold?” <http://www.wam.umd.edu/~creinhar>.