East Asian Currency Union

October 2006

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Motivation

Are Current Exchange Rate Arrangements in East Asia Appropriate?

- Before the crisis, most East Asian economies adopted *de facto* U.S. dollar peg systems.
- After the financial crisis, most of the crisis-affected East Asian economies switched to floating exchange-rate regimes.
- But, they tend to intervene heavily in the foreign exchange market.
- 'fear of floating' (Calvo and Reinhart, 2002),
- 'export-led growth strategy' (Dooley et al., 2003)
- The instability of US dollar and the need for intraregion exchange rate stability ask for a new viable regime.

Motivation (Continued) Can a Currency Union be a Choice for East Asia?

- McKinnon and Mundell have proposed a currency union with the US dollar as the common currency.
- Others suggest East Asia can emulate the European experience of monetary integration, leading eventually to the formation of an East Asia-wide Monetary Union with a new currency.
 - There has been a trend toward evolution of currency unions in the world due to:
 - (i) trade and financial globalization, and
 - (ii) emphasis by monetary authorities of price stability over macroeconomic stabilization.(Alesina, Barro and Tenreyro (2002))

Purpose of the Paper (I)

Assess the feasibility of a common currency arrangement in East Asia, particularly compared to the euro area

- We investigate whether East Asia meets the traditional OCA criteria: trade integration, the symmetry of output and price shocks across countries, and commitment to price stability.
- We will also discuss financial integration and political proximity among the East Asian countries, particularly compared to those of European countries.

Purpose of the Paper (II)

- Estimate the welfare effects of joining a currency union for individual East Asian economies.
 - We calculate welfare effects of various types of currency unions, such as a dollar bloc, Euro bloc, Yen bloc, and a new regional currency bloc, for individual East Asian economies.
 - We compare potential benefits from increasing trade with potential costs from the loss of monetary policy independence.
 - We present estimation results from calibrations of a representative consumer model.

Benefits and Costs of Currency Unions

Benefits (of currency unions or credible pegs):

- Provides a nominal anchor for monetary policy and a more credible commitment to price stability.
- Promotes trade and investment by reducing uncertainty and transaction costs.
- Prevents competitive devaluation.
- Avoids speculative bubbles in exchange rates.
- Helps a developing country to increase its access to long-term financing.

Costs:

- Causes loss of independent monetary policy
- Hinders automatic adjustment to external shocks.
- Loss of seigniorage revenue and a lender-of-last-resort capability.

Optimum Currency Area (OCA) Criteria

- Trade openness
- Symmetry of shocks
- Labor mobility
- Speed of adjustment
- History of inflation and variability of relative prices
- Financial integration
- Political proximity

Which Currency Union for East Asia?

- We want to evaluate the costs and benefits of joining a currency union. A potential client country in East Asia may either adopt an existing major currency, such as the US dollar, Euro, or Japanese yen, or create a new regional currency.
 - We adopt the approach suggested by Alesina, Barro and Tenreyro (2002) and uses updated data to assess the feasibility of East Asian currency unions.
 - Financial integration is measured by the size of bilateral international financial asset holdings, based on the IMF, the Coordinated Portfolio Investment Survey (CPIS).
- Political proximity is measured by bilateral vote correlations at the United Nations General Assembly.

Table 1. Average Trade-to-GDP Ratio for East Asia and Europe,1990-2003 (percent)

		Trade Partners					
Country	USA	Europe	Japan	East Asia	World		
China	3.9	3.4	3.7	13.3	20.6		
Hong Kong	12.8	14.0	10.6	63.6	119.8		
Indonesia	3.3	4.1	6.1	14.7	24.7		
Japan	2.1	1.4		3.2	8.3		
Korea	5.5	3.6	4.6	11.5	27.7		
Malaysia	15.3	11.7	13.9	50.8	82.6		
Philippines	9.6	5.3	7.3	20.3	35.7		
Singapore	22.3	18.8	16.6	72.0	141.0		
Taiwan	11.2	6.3	9.2	25.4	51.1		
Thailand	6.7	6.6	8.6	21.3	41.8		
Average	9.3	7.5	9.0	29.6	55.3		
Europe Average	2.3	21.1	0.9	2.5	31.2		
United States		1.9	1.1	3.0	9.0		

Table 2. Mean and Standard Deviation of Annual InflationRates for East Asia and Europe

Country	1975-1989		1990-2003	
	mean	s.d.	mean	s.d.
China	3.8	3.9	5.3	6.7
Hong Kong, China	8.7	4.1	2.6	6.1
Indonesia	13.0	8.9	13.8	17.8
Japan	3.6	2.4	-0.2	1.6
Korea, Rep.	13.3	8.5	5.5	3.4
Malaysia	3.9	5.5	3.3	2.5
Philippines	13.3	11.7	8.2	3.3
Singapore	3.2	3.3	1.2	2.9
Taiwan	4.9	4.8	1.5	2.2
Thailand	5.6	3.2	3.5	3.1
Average	7.3	5.6	4.5	5.0
Europe Average	10.5	4.3	3.3	2.2
United States	5.6	2.6	2.2	0.8

Table 3. Co-Movements of Prices for East Asia andEurope, 1975-1989 and 1990-2000

	1975-1989				1990-2000			
Country	US	Europe	Japan	East Asia	US	Europe	Japan	East Asia
China	0.109	0.138	0.156	0.105	0.148	0.199	0.172	0.195
Hong Kong	0.064	0.097	0.130	0.082	0.032	0.108	0.105	0.138
Indonesia	0.115	0.179	0.189	0.132	0.298	0.308	0.257	0.238
Japan	0.133	0.105		0.139	0.099	0.149	•	0.133
Korea, Rep.	0.090	0.120	0.123	0.088	0.144	0.159	0.111	0.119
Malaysia	0.055	0.110	0.136	0.084	0.149	0.194	0.156	0.141
Philippines	0.073	0.127	0.153	0.083	0.120	0.126	0.123	0.126
Singapore	0.041	0.104	0.125	0.078	0.070	0.099	0.086	0.109
Taiwan	0.087	0.109	0.124	0.087	0.069	0.103	0.096	0.110
Thailand	0.051	0.098	0.119	0.072	0.086	0.110	0.088	0.110
Average	0.082	0.119	0.139	0.095	0.122	0.155	0.133	0.142
Europe Average	0.105	0.064	0.105	0.118	0.113	0.055	0.149	0.155
United States		0.105	0.133	0.082	<u> </u>	0.113	0.099	0.122

Table 4. Co-Movements of Outputs for East Asia andEurope, 1975-1989 and 1990-2003

	1975-1989					1990	-2003	
Country	US	Europe	Japan	East Asia	US	Europe	Japan	East Asia
China	0.062	0.061	0.059	0.065	0.040	0.043	0.040	0.050
Hong Kong	0.040	0.049	0.050	0.049	0.042	0.048	0.035	0.039
Indonesia	0.032	0.040	0.031	0.041	0.052	0.056	0.043	0.039
Japan	0.030	0.025		0.038	0.025	0.027		0.038
Korea, Rep.	0.034	0.044	0.038	0.047	0.057	0.057	0.049	0.046
Malaysia	0.034	0.036	0.038	0.042	0.029	0.035	0.028	0.034
Philippines	0.050	0.042	0.035	0.046	0.033	0.037	0.031	0.039
Singapore	0.041	0.041	0.034	0.042	0.043	0.052	0.043	0.052
Taiwan	0.025	0.037	0.036	0.040	0.024	0.032	0.029	0.041
Thailand	0.028	0.033	0.019	0.037	0.053	0.057	0.045	0.040
Average	0.038	0.041	0.038	0.045	0.040	0.044	0.038	0.042
Europe Average	0.032	0.032	0.025	0.041	0.023	0.026	0.027	0.044
United States	•	0.032	0.030	0.038		0.023	0.025	0.040

Table 5. International Portfolio Asset Holdings by EastAsia and Europe in 2003 . (Percent in GDP)

		Destination Country/Region						
Source Country	USA	Europe	Japan	East Asia	World			
China								
Hong Kong	29.8	57.6	6.7	34.9	213.8			
Indonesia	0.2	0.1	0.0	0.1	0.9			
Japan	14.4	14.1	0.0	0.5	40.0			
Korea	1.3	0.5	0.0	0.2	2.9			
Malaysia	0.3	0.4	0.0	0.7	1.6			
Philippines	3.1	0.9	0.0	0.3	4.6			
Singapore	24.7	61.3	3.8	31.9	157.5			
Taiwan								
Thailand	1.2	0.4	0.0	0.1	1.9			
Average	9.4	16.9	1.3	8.6	52.9			
Europe Average	21.2	62.1	2.5	3.6	108.0			
United States	•	15.1	2.7	4.1	28.6			

Table 6. International Portfolio Assets Invested in East

Asia and Europe in 2005 (Percent in GDP)							
	Source Country/Region						
Destination Country	USA	Europe	Japan	East Asia	World		
China	1.0	0.7	0.2	1.8	3.8		
Hong Kong	24.0	24.2	4.6	7.7	65.0		
Indonesia	2.4	1.5	0.1	1.4	8.5		

Indonesia	2.4	1.5	0.1	1.4	8.5
Japan	6.8	6.2	0.0	0.3	14.9
Korea	8.8	5.9	0.9	3.5	20.5
Malaysia	7.7	7.8	1.6	13.0	31.4
Philippines	6.3	6.0	1.6	4.2	18.4
Singapore	27.4	16.5	3.0	10.1	61
Taiwan					
Thailand	5.1	5.1	0.7	5.1	17.8
Average	9.8	8.1	1.4	5.0	26.4
Europe Average	14.1	59.0	5.7	6.9	90.0
United States		14.6	5.7	6.4	25.8

Table 7. Political Proximity for East Asia and Europe,Average over 1985-1990 and 2000-2005

	1985-1990				2000-	-2005		
Country	US	Europe	Japan	East Asia	US	Europe	Japan	East Asia
China	0.150	0.487	0.489	0.791	0.106	0.532	0.591	0.787
Hong Kong								
Indonesia	0.125	0.473	0.455	0.823	0.120	0.567	0.601	0.821
Japan	0.317	0.757		0.491	0.292	0.836		0.653
Korea, Rep.					0.278	0.805	0.853	0.633
Malaysia	0.143	0.495	0.496	0.849	0.121	0.571	0.610	0.827
Philippines	0.142	0.513	0.488	0.835	0.142	0.587	0.626	0.828
Singapore	0.154	0.524	0.529	0.828	0.137	0.593	0.632	0.818
Taiwan								
Thailand	0.132	0.497	0.490	0.836	0.132	0.615	0.656	0.832
Average	0.166	0.535	0.491	0.779	0.166	0.638	0.653	0.775
Europe Average	0.339	0.762	0.757	0.535	0.365	0.922	0.836	0.639
United States		0.339	0.317	0.166	· · ·	0.367	0.292	0.166

Figure 1. Political Proximity for Selected Country-Pairs, 1980-2005



Figure 1. Continued



Summary: Is East Asia an OCA?

- East Asia is quite favorable for a currency union in terms of its substantial degree of intra-region trade.
- East Asia has less favorable conditions for a currency union, particularly compared to Europe, in terms of business cycle synchronization and financial integration.
- Political proximity in East Asia (*except Japan*) seems fairly high (comparable to that in Europe in the 1980s).
- It is not clear which currency, if they opt for a currency union, East Asian economies should choose as an anchor.
- The endogeineity of OCA criteria: country characteristics affecting OCA conditions can be endogenously determined.

Quantitative Analysis of the Welfare Effects of East Asian Currency Unions

- We calculate welfare effects of a dollar bloc, Euro bloc, Yen bloc, and a new regional currency bloc for East Asia.
- We compare their potential benefits from joining a currency union with their potential costs (relative to those of floating exchange rate regime).
- A currency union, by creating additional trade between member countries, increases growth of output and consumption. The loss of monetary policy independence leads to higher degree of consumption fluctuations.
- Based on calibrations of a representative consumer model, we estimate the welfare gains from increasing consumption growth and the welfare costs of increasing consumption volatility from both normal disturbances and rare disasters.

A Model of a Representative Consumer

A representative consumer with a CRRA utility function,

$$U_{t} = E_{t} \left[\sum_{i=0}^{\infty} e^{-\rho i} (C_{t+i}^{1-\theta} - 1) / (1-\theta) \right]$$

A stochastic consumption stream follows a random walk process:

$$C_t = C_{t-1} e^{\gamma} \varepsilon_t e^{V_t}$$

- ε_t is 'normal' disturbance, iid log-normal.

- v_t is low-probability disasters, such as World War, and financial crises, with a small probability (p), but big consumption contraction (b) (Rietz, 1988 and Barro, 2006).

probability e^{-p}: $v_t = 0$, probability 1- e^{-p}: $v_t = \log(1-b)$.

The expected utility is rewritten by

$$\begin{split} U_t &= V \cdot (C_t)^{1 - \theta} / (1 - \theta), \\ 1/V &= \rho + (\theta - 1) \cdot \gamma - (1/2) \cdot (\theta - 1)^2 \cdot c^2 - p \cdot ((1 - b)^{1 - \theta} - 1) \end{split}$$

A Model of a Representative Consumer: Continued

Welfare loss from an increase in volatility (♂>♂) is measured by compensation parameter λ (Lucas, 1987, 2003):

 $V_{(\sigma)} \cdot ((1+\lambda)C_t)^{1-\theta} = V^{*}(\sigma^{*}) \cdot (C_t)^{1-\theta}$

At the margin, the compensation parameter is,

$$\lambda_{\sigma} = \frac{-\partial U_t / \partial \sigma}{(\partial U_t / \partial C_t) \cdot C_t} = V(\theta - 1)\sigma$$

The compensation for eliminating all normal disturbances:

 $\lambda_{(\sigma^*=0)} = [1 + V_{(\sigma)} \cdot (1/2) \cdot (\Theta \cdot 1)^2 \cdot \sigma^2]^{1/(1-\Theta)}$

Effects of a Currency Union on Growth and Volatility

 An increase in growth rate by trade expansion (Rose, Frankel and Romer)

$$\Delta \gamma = \Delta T R_i^j \cdot \psi = \left[\frac{trade_{i,j}}{GDP_i} \cdot \alpha\right] \cdot \psi$$

- For benchmark calibration, α =0.5 and ψ =0.01
- A (potential) increase in volatility due to loss of monetary stabilization
 - -The monetary authority can stabilize a constant fraction, χ , of consumption fluctuations (e.g. nominal shocks).
 - -When country i adopts country j's currency, the volatility of consumption of country i increases by $\chi \cdot var(\varepsilon_t^i \varepsilon_t^j)$
 - For benchmark calibration, χ =0.3 (Lucas, 2003)

Table 8. Mean and Standard Deviation of Annual PerCapita Real Consumption, 1960-1997

Country	Mean	S. D. of growth	S.D. of	f growth ra currency	te shocks a y union	after a
Country	rate	rate shocks	US dollar	Euro	Yen	East Asia10
China	0.0367	0.0532	0.0614	0.0617	0.0634	0.0603
Hong Kong	0.0569	0.0462	0.0525	0.0523	0.0540	0.0527
Indonesia	0.0359	0.0593	0.0687	0.0698	0.0737	0.0680
Japan	0.0458	0.0322	0.0378	0.0365	0.0322	0.0372
Korea	0.0495	0.0367	0.0433	0.0424	0.0464	0.0410
Malaysia	0.0326	0.0441	0.0532	0.0503	0.0519	0.0497
Philippines	0.0139	0.0338	0.0405	0.0385	0.0410	0.0379
Singapore	0.0480	0.0381	0.0432	0.0424	0.0446	0.0428
Taiwan	0.0628	0.0319	0.0371	0.0362	0.0404	0.0365
Thailand	0.0411	0.0360	0.0420	0.0412	0.0450	0.0406
Average	0.0423	0.0410	0.0478	0.0470	0.0500	0.0465

Table 9. Declines of 10% or More in Real Per Capita GDPin East Asia, 1915-2000

Country	Years	%fall	Country	Years	%fall	
Great Depress	sion		World Wa	r II		
China	1932-34	10	China	1936-50	18	
Indonesia	1929-35	14	Indonesia	1941-49	36	
Malaysia	1929-32	17	Japan	1943-45	52	
Taiwan	1928-31	12	Korea	1937-45	58	
Financial Cri	ses		Malaysia	1942-47	36	
Indonesia	1997-99	12	Philippines	s 1939-46	60	
Philippines	1982-86	17	Taiwan	1942-45	51	
Thailand	1997-98	12				
Mean of 14 major contractions 29						

Table 10. Compensating parameterProportionate change in initial consumption

A. Marginal Effect

(1)	(2)	(3)
Marginal change in:	Welfare effect	Numerical value
normal s.d. (σ)	V·(θ-1)σ	1.1
disaster probability (p)	V·[(1-b) ^{1-θ} -1]/(θ-1)	5.1
disaster size (b)	V•р•(1-b)- ^θ	0.6
growth rate (γ)	-V	-8.6

B. Total Effect

(1)	(2)	(3)
Change in:	Welfare effect	Numerical value
normal s.d. (ठ=0)	$[1 + V \cdot (1/2) \cdot (\theta - 1)^2 \sigma^2]^{1/(1-\theta)}$	2.1
disaster probability (p=0)	$[1+V \cdot p \cdot ((1-b)^{1-\theta}-1)]^{1/(1-\theta)}$	8.5
normal s.d. and disaster probability (o=b= 0)	[1+ V·(1/2)·(θ-1) ² σ ² + V· p·((1-b) ^{1-θ} -1)] ^{1/(1-θ)}	10.3

Table 11. Estimates of Welfare Effects, Baseline Scenario: (ρ=0.03, θ=4, α=0.5, ψ=0.01, χ=0.5, p=0.018, b=0.29)

A. Welfare Effect from Trade Creation

Country	US dollar	Euro	Yen	East Asia C.U. 9	East Asia C.U. 10
China	0.20	0.18	0.19	0.50	0.69
Hong Kong	0.40	0.44	0.33	1.62	1.93
Indonesia	0.18	0.23	0.34	0.48	0.81
Japan	0.08	0.05	0.00	0.00	0.12
Korea	0.20	0.13	0.16	0.24	0.41
Malaysia	0.87	0.67	0.79	2.04	2.77
Philippines	1.36	0.76	1.04	1.83	2.80
Singapore	0.81	0.69	0.61	1.97	2.53
Taiwan	0.31	0.17	0.25	0.44	0.69
Thailand	0.29	0.28	0.37	0.55	0.91

Table 11. ContinuedB. Welfare Effect of Increasing Volatility

Country	US dollar	Euro	Yen	East Asia C.U. 9	East Asia C.U. 10
China	-1.54	-1.60	-1.94	-1.30	-1.30
Hong Kong	-0.60	-0.58	-0.75	-0.64	-0.61
Indonesia	-2.11	-2.37	-3.44	-1.84	-1.92
Japan	-0.46	-0.34	0.00	0.00	-0.40
Korea	-0.58	-0.49	-0.88	-0.35	-0.36
Malaysia	-1.58	-1.04	-1.32	-0.95	-0.92
Philippines	-2.29	-1.52	-2.48	-1.41	-1.34
Singapore	-0.47	-0.39	-0.61	-0.45	-0.42
Taiwan	-0.30	-0.24	-0.51	-0.27	-0.26
Thailand	-0.61	-0.53	-0.96	-0.46	-0.46

Table 11. ContinuedC. Total Welfare Effect of Currency Union(A+B)

Country	US dollar	Euro	Yen	East Asia C.U. 9	East Asia C.U. 10
China	-1.32	-1.41	-1.73	-0.78	-0.58
Hong Kong	-0.19	-0.13	-0.41	1.01	1.36
Indonesia	-1.91	-2.12	-3.05	-1.33	-1.05
Japan	-0.38	-0.29	0.00	0.00	-0.28
Korea	-0.38	-0.36	-0.71	-0.10	0.05
Malaysia	-0.66	-0.35	-0.49	1.16	1.94
Philippines	-0.80	-0.71	-1.33	0.52	1.61
Singapore	0.36	0.31	0.01	1.56	2.15
Taiwan	0.01	-0.07	-0.25	0.18	0.44
Thailand	-0.32	-0.24	-0.58	0.09	0.46

Table 12. Sensitivity of Welfare Estimates

	$(1) \\ \theta = 3$	(2) $\chi = 0.5$	(3) αψ=0.009	(4) p=0.008	(5) b=0.19		
A. US Dollar Currency Union							
China	-0.95	-2.39	-1.15	4.59	4.14		
Hong Kong	0.01	-0.59	0.13	3.63	3.36		
Indonesia	-1.38	-3.41	-1.75	4.38	3.90		
Japan	-0.29	-0.69	-0.31	3.91	3.58		
Korea	-0.24	-0.76	-0.22	3.73	3.42		
Malaysia	-0.16	-1.73	0.06	6.12	5.67		
Philippines	-0.05	-2.35	0.33	13.31	12.45		
Singapore	0.66	0.05	1.00	5.01	4.70		
Taiwan	0.15	-0.19	0.26	3.34	3.10		
Thailand	-0.14	-0.73	-0.08	4.63	4.27		

Table 12. Continued

	$(1) \\ \theta = 3$	(2) $\chi = 0.5$	(3) αψ=0.009	(4) p=0.008	(5) b=0.19		
B. Currency Union of 10 East Asian Economies							
China	-0.18	-1.46	-0.01	5.59	5.16		
Hong Kong	2.02	0.97	2.83	6.23	5.98		
Indonesia	-0.48	-2.37	-0.38	5.58	5.12		
Japan	-0.18	-0.54	-0.18	4.04	3.71		
Korea	0.22	-0.19	0.38	4.29	3.99		
Malaysia	2.63	1.38	4.02	9.57	9.18		
Philippines	1.84	0.78	3.73	15.51	14.74		
Singapore	2.92	1.89	4.03	7.86	7.59		
Taiwan	0.70	0.27	0.98	4.06	3.82		
Thailand	0.77	0.16	1.18	5.79	5.44		

Main Results from the Estimation

- The welfare gain from increasing growth rate due to trade creation is estimated to be substantial.
- Because of their substantial degree of intra-region trade, an East Asian economy would benefit most from forming an East Asia-wide currency union, compared to joining a US dollar bloc, Euro bloc, or Yen bloc independently.
- The potential welfare cost of increasing volatility due to loss of independent monetary policy is also substantial as shocks have a permanent effect on consumption.
- China, Indonesia, Japan, and Korea may lose even with joining an East Asia-wide currency union.
- If joining a East Asia currency union eliminates the probability or size of disasters completely, all East Asian economies would get a net positive welfare gain.

Concluding Remarks

- Judging from OCA criteria, East Asia has less favorable conditions for a currency union, particularly compared to Europe, in terms of business cycle synchronization and financial integration.
- The calibration results shows that most countries in East Asia would obtain a net welfare gain from forming a currency union involving a broad group of East Asian economies.
- The possible negative effect of increasing volatility on growth may cause net welfare losses to larger East Asian economies, especially China, Indonesia, Korea and Japan, even when they join an East Asia-wide currency union.
- The important welfare consequences of a currency union involve its influence on the probability and size of disasters such as wars and financial crises in East Asia.
- The prospect for an East Asian currency union will hinge on future developments of both economic and political conditions, rather than current environments.