DOLLAR BLOC OR YEN BLOC IN EAST ASIA?

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Abstract: *The current study investigates the viability of creating an optimum currency area (OCA) in East Asian countries, namely, Indonesia, Malaysia, the Philippines, Singapore, Thailand, China, Hong Kong, Korea, and Taiwan. In doing so, we develop a three-variable structural vector autoregression model. Results reveal that forming an OCA for all the countries in East Asia is premature and costly. However, two sub-regions among these countries exhibit the potential to form an OCA because the supply shocks of these sub-regions are symmetric. Dollar is found to be a suitable anchor for these countries, except for China.*

Keywords: *Common currency peg in East Asia; Optimum currency area; Country-specific shocks vs. regional shocks; Economic and monetary union*

JEL classification: *F33; F41*

1. INTRODUCTION

The formation of a yen bloc in East Asia, which means a switch in economic allegiance (from the United States to Japan) of the countries in this region, is increasingly receiving much attention. This bloc forms in parallel with the formation of blocs in the Western Hemisphere and Europe. The European Community agreed to strengthen the economic integration in the 1980s, especially with the Single Market Act of 1985 and other initiatives included in 1992. This objective was encouraged by the successful European Monetary System founded in 1979 and the European Monetary Union that agreed in Maastricht in December 1991.

In the case of the Western Hemisphere, the policy dialogue on expansion is almost clear and strong. For example, the trade side consists of Canada and the United States. Mexico has been added as a North American Free Trade Area, which is currently under negotiation for further expansion to other Latin American countries. However, integration in currency is not as strong as in Europe. In East Asia, the lack of explicit policy initiatives is notable. The phrase "yen bloc" implies the concentration on trade

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and direct investment relations in East Asia rather than its role as the common currency in the region. These two interpretations of "yen bloc" are not necessarily in competition as one may cause the other (Frankel, 1994).

Currency links and trade links are less accommodated and less studied subjects in policy initiatives in East Asia. We consider the stabilization of exchange rates against the yen as one of the causes of the increase in intraregional trade. Furthermore, we try to identify to what extent the increased role of the yen has been orchestrated by the Japanese government or enhanced by other governments in the region. The theory of an optimum currency area (OCA) suggests that small trade-oriented countries may stabilize the foreign exchange value of their currencies, which is an indication of the single currency formation. In East Asian countries, although they are trade oriented (Guillaumin, 2009; Bajou *et al.*, 2006), the major foreign currency that should be considered as anchor is not clear.

East Asia needs to develop and foster the idea of monetary integration to prevent the harmful effects of another crisis in the region. Some scholars in this field of study argue that East Asian countries are the most suitable countries in forming OCA (Bayoumi *et al.*, 2000; Lim, 2005; Huang & Guo, 2006; and Lee & Azali, 2010). However, some studies show that this region is not yet ready to form a single currency union (Chow & Kim, 2003; Zhang *et al.*, 2004). Therefore, the main objective of the current study is to investigate whether creating a common currency in East Asia is viable or not. Additionally, this study attempts to identify a suitable anchor currency for this region. The objectives are assessed using the OCA theory through a structural vector autoregressive (SVAR) model. Three relevant shocks are considered by this model, namely, global, regional, and country-specific (local) shocks. Regional shocks are important in establishing a currency peg (if symmetric). However, if country-specific shocks are more important and are not correlated with all the countries, a currency peg will be costly and difficult to sustain. If global shocks are predominant, a global arrangement can be a better choice. In East Asia, we consider Japan to represent the region, with the assumption that Japan plays the major role in the region. The United States represents the global economy.

To anticipate the empirical results, the domestic outputs of these countries are identified as influenced by country-specific shocks. Therefore, East Asian countries may be structurally different from one another and experience asymmetric shocks. The OCA theory reveals that a currency peg in East Asia will be costly.

The rest of the paper is organized as follows: Section 2 illustrates the model; Section 3 reports the empirical results; and Section 4 presents the discussion and the conclusion.

2. METHODOLOGY

To achieve the objectives of the current study, we suggest that the proposed model for regional integration should consist of the minimum three types of shocks: global supply, regional supply, and country-specific supply shocks:

$$x_t = \left(y_t^g, y_t^r, y_t^d \right)' \tag{1}$$

where *y* is the output and the superscripts *g, r,* and *d* refer to the global, regional, and domestic shocks, respectively.

Generally, global shocks affect economies inside and outside the regional boundaries; regional shocks are common to economies within the region; and country-specific shocks are unique to a particular economy. These shocks may be generated from aggregate demand shocks or supply shocks. Aggregate demand shocks are generally associated with monetary or fiscal policies, whereas aggregate supply shocks are associated with productivity or with the terms of trade (Bayoumi & Eichengreen, 1993).

Regional shocks are important in an economy with an economic structure similar to its trading partners or neighbors. For a country that is considering membership in a currency union, the prevalence of regional shocks should provide a positive impetus. However, if dominant shocks are country-specific shocks, the costs that are imposed to each country because of the loss of monetary independence and flexible exchange rate adjustments may be high. External shocks have the potential to extend the regional boundary. If supply shocks can affect all the countries in the same direction, a global arrangement may be a better course of action to deal with such shocks rather than a regional arrangement. In the case of East Asia, if global shocks (US output) are relatively more important than regional shocks (Japan output), forming a dollar bloc is a better policy; however, if regional shocks are more important than global shocks, forming a yen bloc is preferred (Frankel & Shang-Jin, 1994).

Bayoumi and Eichengreen (1993) applied the aggregate demand–aggregate supply model and argued that supply shocks are more structural and less sensitive to the type of exchange rate arrangement. If supply shocks are correlated (symmetric) within the region, then the region will be a good candidate for currency union. However, if supply shocks show asymmetry or a low level of correlation, the region will not be a proper candidate for monetary union. Frankel and Rose (1998) argued that when trade increases, countries are likely to face more similar shocks. Therefore, supply shocks may become more correlated when economic integration progresses.

The structural form of Eq. 1 can be written as

$$x_t = A(L)\varepsilon_{jt}^k \tag{2}$$

and *k = g, r, d,* and *j* = supply shock

where ε shows different types of serially uncorrelated and orthonormal shocks. *A* is a 3×3 matrix that defines the impulse response of the endogenous variables to the structural shocks. Thus,

$$A(L) = \begin{bmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{bmatrix} \tag{3}$$

Imposing at least three restrictions on the structural model is necessary to *identify* this matrix. If n shows the number of variables in the VAR model, then we need to impose $[(n^2 - n) / 2]$ restrictions on the VAR to identify the structural model from the estimated model. The following identification restrictions are required: (i) regional and country-specific shocks should have no long-run effects on the global output, and (ii) country specific shocks should have no long-run effects on the regional output. These restrictions are usually made in international economics because they are the generalizations of small economy assumptions. Therefore, an economy is small in a region, and the region is only a small part of the global economy (Bernanke, 1986; Sims, 1986; Blanchard and Quan, 1989; Chow and Kim, 2003). The long-run restrictions of the above model are as follows:

$A_{12}(L) = A_{13}(L) = 0$

$A_{23}(L) = 0$

Therefore, we can rewrite the recursive system as

$$\begin{pmatrix} \Delta y_t^g \\ \Delta y_t^r \\ \Delta y_t^d \end{pmatrix} = \begin{pmatrix} A_{11}(L) & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{pmatrix} \cdot \begin{pmatrix} \varepsilon_t^g \\ \varepsilon_t^r \\ \varepsilon_t^d \end{pmatrix} \tag{4}$$

The reduced form of the VAR model for estimation is

$$x_t = B(L)x_{t-1} + \xi_t \tag{5}$$

where ξ_t is the vector of the reduced form error term. The above described model is an application of the SVAR method developed by Blanchard and Quah (1989) and King *et al.* (1991).

3. EMPIRICAL RESULTS

This section reports the estimated results of the attainment of the two main objectives First, with respect to the correlation of supply shocks (which is obtained from estimated SVAR model among East Asian countries), we test whether creating an OCA is viable or not. Generally, if supply shocks are correlated or symmetric (positive impact) within the region, that is, $corr(\xi_{jt}^y, \xi_{it}^y) > 0; \forall_{i,j}$, then this region can be a proper candidate for a currency union. Second, by examining the correlation between (i) the regional output and the country-specific output and that between (ii) the global output and country specific output, which currency can be used as an anchor, whether yen or dollar, can be identified for this area. If the global supply shocks are relatively more

important in the region, then the dollar bloc formation may be a better policy and vice versa (Chow and Kim, 2003).

DATA SET

Time series unit root tests are applied in the current study to examine the stationarity properties of the data by using the Phillips–Perron and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test. Regarding the data, the gross domestic product (GDP) is the real output expressed in US dollar; and expressed in logarithm form and are drawn from the *International Financial Statistics* published by the International Monetary Fund (IMF) over the period of 1999Q1–2013Q4 for Indonesia, Malaysia, the Philippines, Singapore, Thailand, China, Korea, Hong Kong, Taiwan, Japan, and the United States. The Japanese output is used as a proxy for regional output and the US output represents the global economy. The constructed model assumes that all outputs are non-stationary and that the set of global, regional, and domestic outputs is non-cointegrated for each economy (the result of the cointegration test is available upon request from the authors). Table 1 reports the stationary results. Evidently, all the GDP data are stationary in their first differences.

Table 1
Unit Root Tests Results

Countries	Test	Level		First Difference	
		Constant	Constant + Trend	Constant	Constant + Trend
HK	PP	-1.17	-5.23*	-11.06*	-10.92*
	KPSS	0.958	0.115*	0.108*	0.105*
ID	PP	3.80	-2.49	-10.82*	-33.73*
	KPSS	0.951	0.276	0.413**	0.223
KR	PP	-1.49	-3.65**	-6.49*	-6.74*
	KPSS	0.967	0.107*	0.159*	0.061*
MY	PP	0.93	-4.06**	-10.00*	-11.43*
	KPSS	0.968	0.156***	0.200*	0.133**
PH	PP	-0.44	-9.70*	-39.22*	-60.59*
	KPSS	0.962	0.298	0.447**	0.272
CH	PP	-1.92	-11.47*	-22.03*	-24.33*
	KPSS	0.961	0.183***	0.290*	0.167***
SG	PP	-0.03	-2.60	-7.40*	-7.37*
	KPSS	0.952	0.128**	0.059*	0.036*
TH	PP	-0.19	-5.40*	-13.76*	-13.57*
	KPSS	0.956	0.181***	0.114*	0.105*
TW	PP	-1.13	-6.07*	-11.39*	-11.20*
	KPSS	0.874	0.114*	0.312*	0.132*
JP	PP	-2.48	-4.90*	-6.96*	-6.74*
	KPSS	0.827	0.100*	0.301*	0.133*
US	PP	-1.65	-1.94	-4.81*	-4.91*
	KPSS	0.917	0.159***	0.147*	0.101*

Note: ***, ** and * denote significant at 10%, 5% and 1%, respectively. CN: China, HK: Hong Kong, ID: Indonesia, JP: Japan, KR: Korea, MY: Malaysia, PH: Philippine, SG: Singapore, and TH: Thailand, and TW: Taiwan.

Table 2 reports the variance decomposition (VDC) of forecast errors at the 4- and 20-quarter forecast horizons for the global, regional, and local shocks. The responses of 4- (20-) quarter are taken as short-term (long-term) effects. For all countries, the SVAR model is estimated through three lags. In consideration of the large number of countries and the cases to be estimated, a uniform lag length is used for convenience. Table 2 shows the VDC only for domestic output because global output and regional output are mainly explained by global and regional shocks, respectively.

Table 2
Variance Decompositions for Domestic Output

Country	Quarters	Global shocks	Regional shocks	Local shocks
CH	4	3.86	30.15	65.97
	20	3.66	13.40	82.93
HK	4	10.54	6.29	83.16
	20	5.01	8.99	85.98
ID	4	0.30	3.49	96.19
	20	0.20	5.88	93.90
KR	4	32.92	8.45	58.57
	20	32.53	10.90	56.55
MY	4	22.41	1.05	76.53
	20	20.65	0.85	78.49
PH	4	6.01	0.48	93.50
	20	4.54	0.71	94.73
SG	4	25.57	6.01	68.40
	20	25.37	7.08	67.54
TH	4	11.60	12.41	75.97
	20	9.44	14.31	76.23
TW	4	7.18	14.08	78.73
	20	5.63	14.51	79.85

Among the nine East Asian countries, regional shocks are more important than global shocks for most cases in both short term and long term. Specifically, the importance of regional shocks is highest in China, Hong Kong, Indonesia, Thailand, and Taiwan. However, the effects of global shocks (in both short run and long run) are minimal in these countries except for Hong Kong, where global shocks explain a higher portion of output variation in the short run. In other words, regional shocks in these five countries explain a larger percentage of output variation than global shocks. Regional shocks are less important in Korea, Malaysia, the Philippines, and Singapore in both short run and long run. By contrast, country-specific shocks are dominant over regional and global shocks in all the countries as it explains more than 60% of the output variations in all the countries.

We estimate and analyze the correlation among supply shocks using the SVAR model. According to the OCA theory, if the correlation among shocks is positive, then these shocks are considered symmetric. However, if the correlation is negative or zero, then the shocks are categorized as asymmetric. Table 3 shows the correlation among supply shocks for the nine East Asian countries.

Table 3
Correlation of Supply Shocks

	CH	*HK*	*ID*	*KR*	*MY*	*PH*	*SG*	*TH*	*TW*
CH	1.000								
HK	0.037	1.000							
ID	-0.097	0.201	1.000						
KR	-0.083	0.137	-0.080	1.000					
MY	-0.108	**0.516**	**0.346**	0.011	1.000				
PH	-0.125	**0.304**	**0.327**	-0.085	**0.447**	1.000			
SG	-0.101	**0.587**	0.088	**0.377**	**0.435**	**0.299**	1.000		
TH	-0.342	0.199	-0.116	0.032	**0.330**	**0.277**	**0.234**	1.000	
TW	**0.478**	**0.396**	0.016	0.112	**0.458**	0.150	**0.355**	0.072	1.000

Note: bold faces denotes correlation of supply shocks

The most significant finding in Table 3 shows that all of these countries cannot form a currency area together. One of the most likely reasons is the differences in their monetary policy implemented by their respective central banks. For example, Singapore and Thailand have different types of monetary policies. The Monetary Authority of Singapore uses the intervention operation in foreign exchange markets as its instrument to achieve price stability. Bank of Thailand adopts the IMF program of inflation targeting. Inflation targeting enables the monetary policy to manage the impact of internal and external shocks on the Thai economy. Moreover, Indonesia has experienced growth that is sufficiently different from that of other countries. A high level of inflation is another characteristic of Indonesia. Therefore, on the basis of the above analysis and the OCA theory, creating a common currency area among all these East Asian countries is costly and difficult to sustain. This finding supports that of Chow and Kim (2003).

However, other East Asian countries are suitable candidates to create OCA. Table 3 shows that the correlation among supply shocks is symmetric among Malaysia, the Philippines, Singapore, and Taiwan, and that another group involving Taiwan, China, Hong Kong, Malaysia, and Singapore can create two sub-areas for a single currency. Therefore, they should peg their exchange rate on the OCA and float to the rest of the world. The next step is to find the best bloc for this area. Table 4 shows the regional and global correlations in the region.

Table 4
Correlation of External Supply Shocks

	CH	*HK*	*ID*	*KR*	*MY*	*PH*	*SG*	*TH*	*TW*
JP	0.678	-0.218	-0.121	-0.231	-0.068	0.045	-0.253	-0.376	0.429
US	-0.022	**0.317**	**0.048**	**0.449**	**0.312**	**0.082**	**0.337**	**0.069**	**0.260**

Note: bold faces denotes correlation of supply shocks

Perhaps the most striking result from Table 4 is the negative China–United States supply correlation. Evidently, only dollar can be a suitable anchor for these countries,

with the exception of China. These findings do not agree with those of Alesina and Barro (2001), Moosavi and Azali (2014), and Lim (2005). Therefore, the higher correlation between the United States and the East Asian countries shows that the US dollar can be a better anchor for an optimum currency union. Furthermore, these results show that only Taiwan and China have a positive and symmetric correlation with Japan.

SIZE OF DISTURBANCES

The size of disturbances affecting each country is worthy of further investigation because larger shocks result in higher instability of endogenous variables that hinder the feasibility of currency union. The impulse response function is used for this purpose for global supply, regional supply, and country-specific supply shocks. To compute the size of supply disturbances, we use the average absolute value of the long-run (20-quarter horizon) effect of a unit shock on real output changes as supply shocks have a permanent effect on output. The smaller the size of shocks, the more feasible is the formation of monetary union. These computations are in accordance with those reported by Zhang, Sato, and McAleer (2004), Huang and Guo (2006), and Bayoumi and Eichengreen (1993). Table 4 shows the estimated size of supply shocks. The sizes of the shocks are small compared with those reported by Huang and Gou (2006) using the data from 1970 to 2002. This finding suggests that the formation of a currency union has become more feasible with the recent economic developments in the region.

Table 5
Size and Speed of Adjustments

Country	Global shocks		Regional shocks		Local shocks	
	Size	Speed	Size	Speed	Size	Speed
CN	0.0022	1.08	0.0039	1.02	0.0100	1.38
HK	0.0019	1.27	0.0031	0.86	0.0095	1.77
ID	0.0001	1.90	0.0011	1.09	0.0037	0.49
KR	0.0007	3.05	0.0004	2.38	0.0007	0.94
MY	0.0030	2.07	0.0005	2.56	0.0055	0.06
PH	0.0015	0.27	0.0006	1.36	0.0076	0.68
SG	0.0014	4.48	0.0007	2.24	0.0018	1.44
TH	0.0019	2.26	0.0030	0.94	0.0073	18.11
TW	0.0028	1.51	0.0046	1.20	0.0110	2.38
Average	0.0017	1.98	0.0019	1.51	0.0063	3.02

The speed of adjustment is computed as the response share after the third year of the 20-quarter long-run effect: the faster the adjustment to disturbances, the lower is the cost of forming a monetary union. According to Table 4, the speed of adjustment in East Asia is high. That is, these economies adjust rapidly to disturbances, indicating the feasibility of a currency union formation in the region. According to the OCA literature, countries become candidates for a monetary union if their shocks are

correlated and small, and if these economies adjust quickly to disturbances (Lee & Koh, 2012; Bayoumi & Eichengreen, 1994; and Huang & Guo, 2006).

4. CONCLUSION

We developed a three-variable SVAR model in this study and used three types of shocks, namely, global supply shocks, regional supply shocks, and country-specific supply shocks, to achieve the two main objectives of the study. These two objectives are to evaluate the underlying shocks to determine the feasibility of forming an OCA in the East Asia region and to find the most suitable currency bloc for this region. In other words, we applied the OCA theory to examine whether pegging to a common currency is possible in East Asia. According to the OCA literature, establishing a pegged exchange rate will be reasonable if an economy is mainly subject to common regional shocks. Such pegging will be costly if the dominant shocks are country specific. According to the VDC results, dominant shocks are country-specific and regional shocks are less important in East Asia. Therefore, an implication of the current study is that a currency peg will be costly in East Asia, although some indications show that regional shocks have become important recently than before, unlike in the study of Chow and Kim 2003, among others.

The results from the correlation among supply shocks show that the formation of OCA for all East Asian countries is costly and difficult to sustain. We identified two sub-regions that could form OCA. The first sub-region includes Malaysia, the Philippines, Singapore, Thailand, and Taiwan, and the second sub-region consists of Taiwan, China, Hong Kong, Malaysia, and Singapore, which have symmetric supply shocks. The findings further reveal that the dollar is the only suitable anchor for the region because the correlation among supply shocks in these countries and the United States is higher than that with Japan. The result of impulse response function shows that the formation of OCA in East Asia has become more feasible because the size of disturbances is small and the speed of adjustment to these shocks is high. Furthermore, the VDC result suggests that variation in output is explained by regional shocks rather than by global shocks in most of the countries. This finding indicates that the increasing role of Japan is affecting the region.

The policy recommendation of this study is for these countries to set up a proper arrangement to successfully undergo this transition by (i) having a proper regional exchange rate mechanism, (ii) establishing a supra-national organization for policy coordination, and (ii) constructing a regional legislation framework.

Acknowledgement

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