Analysis of the Optimum Currency Area for ASEAN and ASEAN+3

Sylvia Alvarado

Universidad Andina Simón Bolívar, Quito, Ecuador

This paper performs an analysis of the optimum currency area (OCA) for ASEAN (Association of Southeast Asian Nations) and ASEAN+3 for the period of 2003-2012. The applied method is based on the model developed by Bayoumi and Eichengreen for the European countries. Regarding the two groups of study, the document contents the integration roots as well as some theories and empirical data about the currency areas. The obtained results based on the OCA indexes showed that nearly half of the country members have moved symmetrically, although the effect of the four independent variables was found different in each case. In conclusion, the monetary convergence is significantly influenced by the output disturbances and the trade linkages in both regions; while the size of the economy only becomes significant in ASEAN+3 and the synchronic advantage is not contributing and even insignificant for ASEAN+3.

Keywords: OCA (optimum currency area), OCA indexes, ASEAN (Association of Southeast Asian Nations) integration, ASEAN+3 integration

On the way to the formation of the ASEAN (Association of Southeast Asian Nations) Economic Community (2015) and considering the Chiang Mai Initiative (CMI) (2000), it is interesting to analyze the economic integration between the ASEAN and ASEAN+3 members. In spite of the European Community (EC) trajectory, ASEAN has not discussed the introduction of a common currency, not even at the ASEAN+3. However, the employment of some of the techniques originally used for the European Market Union (EMU) could be useful to determine the regional symmetric movements for the period under investigation, analyzing it in terms of the model proposed by Bayoumi and Eichengreen (1997).

ASEAN and ASEAN+3 Integration Roots

Pike (2011) wrote that in 1961, the leaders sought to develop regional relationships through the creation of the Association of Southeast Asia (ASA). This organization later changed its name to the ASEAN after the inclusion of Indonesia and Philippines in 1967. Eventually, it would be ASEAN rather than Southeast Asia Treaty Organization (SEATO), which becomes the more important regional forum in the area.

But the Charter of the ASEAN was only ratified by 2007 and was followed by the elaboration of the Roadmap for the ASEAN Community 2009-2015, whose three major areas are: ASEAN Political-Security Community (APSC), ASEAN Economic Community (AEC), and ASEAN Socio-Cultural Community (ASCC).

Corresponding author: Sylvia Alvarado, Eng. Mgr., food engineer, Universidad Técnica de Ambato, magister in international economic relationships, Universidad Andina Simón Bolívar; research fields: international economic relationships, economic integration, and food economy. E-mail: sylcristina@hotmail.com; sylviadeponce@yahoo.com.

In the Economic Community Blueprint, the leaders affirmed their strong commitment to accelerate the establishment of the community by 2015. They particularly agreed to hasten the establishment of the AEC by 2015 and to transform ASEAN into a region with free movement of goods, services, investment, skilled labor, and free flow of capital.

Regarding the ASEAN+3 group, the CMI indeed refreshed the boundaries among the members when, after the crisis of 1997-1998 and since May 2000, the finance ministers of ASEAN plus Japan, China, and Korea announced that they had agreed to develop a network of currency swap and repurchase agreements, known as the CMI (Hamilton-Hart, 2006).

It is necessary to consider that prior to this crisis, all East Asian economies generally limited the movements of their currencies against the dollar. Most responded very little to changes in other currencies, such as is the case of the yen as reported by Gordon De Brower (2001). Afterwards, all major countries in the region have already accepted some significant limits on their autonomy in order to reach the benefits of economic integration and therefore, and opened the chances of closer monetary integration in East Asia on the grounds of unyielding political rivalry and sovereignty concerns (Hamilton-Hart, 2006).

Ogawa and Kawasaki (2007) confirmed that since the Asian currency crisis of 1997, the monetary authorities of East Asian countries became responsible for regional monetary coordination to prevent and manage currency crises. After the ASEAN+3 Financial Ministers Meeting, the currency swap arrangements have been strengthened under the CMI.

Indeed, after the Asian financial crisis, East Asia has already tried to deepen regional financial cooperation and become the second example for financial regionalism after Europe, according to Shimizu (2013). Furthermore, paralleling the AEC negotiation, another step was accomplished in November 2012, when ASEAN, Australia, China, India, Japan, South Korea, and New Zealand (ASEAN+6) announced the beginning of the Regional Comprehensive Economic Partnership (RCEP) as reported by the Ministry of Economy, Trade and Industry of Japan.

Some Theories About Currency Areas

Mundell (1961) proposed a system of national currencies connected by flexible exchange rates. For him, the optimum currency area (OCA) is a region. If regions cut across national boundaries or if countries are multiregional, then the argument for flexible exchange rates is only valid if currencies are reorganized on a regional basis. An essential ingredient of a common currency, or a single currency area, is a high degree of economic factors mobility.

The monetary unification reached by the European Community in 2000 is the deepest level of economic integration and several authors have proposed models to study the feasibility of OCA among its members. Bayoumi and Eichengreen (1997), for example, developed an equation where the bilateral currency proximity was the function of four variables [real output differences, dissimilitude in merchandise trade, fraction of exports in GDP (Gross Domestic Product), and size of the economies], which will be applied in this study.

But as long as the determination of OCA depends on a complex web of variables and interactions, different models result, although the most important topic remains to determine how seigniorage is allocated and whether transfers between members of a union are feasible, which Alesina and Barro (2002) have observed.

The economic benefits of a higher economic integration are the reduction of the transaction costs and the higher levels of trade and investment as a result of the exchange rate stability; the costs are the loss of monetary

autonomy which limits the macroeconomic policy options available to stabilize activity in the face of unexpected macroeconomic shocks as noted by Bayoumi and Mauro (1999), among others.

Because of the disadvantages and by studying the exchange rates in emerging countries, Edwards (2011) concluded: (1) that different regimes are likely to be appropriate for different countries; (2) that rigid approaches to defend a specific currency value are dangerous; (3) that more flexibility is conducive to better performance; and (4) that the fear of flexible rates leading to high inflation is misplaced. Even under floating rates, it is possible for the real exchange rate to become overvalued and overvaluation is very costly, etc.

But above all, it is political will that is shaping the integration process. In the case of the ASEAN, Bayoumi and Mauro (1999) in 1999 saw a firm political commitment as the key ensuring that an attempt to form regional currency arrangement shall not be viewed as simply another fixed exchange rate regime, open to speculative crises.

In general, developing countries feel it necessary to maintain greater control over exchange rate movements in order to manipulate the current account. According to Obiyathulla Ismath Bacha (2008) cited by Thiumsak (2014), this argument applies to ASEAN countries where central banks did not adopt free floating exchange rate system and the correlation of several ASEAN currencies to the US dollar to be as high as 70%.

By 2006, Eichengreen (2006) observed that Asian countries possess neither the willingness to subordinate other policies to imperatives nor the solidarity needed to offer extensive financial supports. For him, a system of Asian currency pegs would consequently be fragile and crisis prone. He suggested the governments should create an Asian Currency Unit (ACU), constituted as a weighted average of Asian currencies and allow it to circulate alongside their national currencies.

There are many recommendations from the academic point of view based on research—some are included in Table 1, and there will be more as far as the relationships among these groups of countries in many areas tighten.

Some Conclusions and Suggestions of the Currency Approaching Analysis of the ASEAN Members

Table 1

Results of Research Regarding the Currency Approaching Analysis of the ASEAN Members

Author	Countries and periods	Method	Results
Bayoumi and Eichengreen (1999) cited by Lee and Azali	East Asia 1968-1998	OCA indexes	Indexes comparable to Western Europe: S-M, S-T, S-HK, S-W, HK-W. But I, K, and P did not rank well and the M-T pair displays a very weak score More or less plausible candidates for internationally harmonized monetary policies while do not satisfy all the standard OCA criteria
Kwan (1998) cited by Lee and Azali	Asian: K, W, HK, S, I, M, P, T, H, J 1982-1996	OCA as correlation of economic structures and of policy objectives	Asian trade structures are less similar than the West European. By inflation rates, East Asia qualifies as an OCA as West Europe. Low inflation countries (S, W, M, T, K) which also have higher income are more appropriate for forming a yen block
Calderón, Chong, and Stein (2002)	147 countries 1960-1999	Study if OCA indexes are the same for developing countries when cyclical asymmetries occur	Countries with higher bilateral trade have higher business cycle synchronization; the ones with more asymmetric structures of production have smaller business cycle correlation. The impact of the integration on business cycles is higher for industrial countries. The impact of trade intensity on cycle correlation is smaller when the production structure asymmetries between the countries are greater.

Table 1 continued

Author	Countries and periods	Method	Results
Lee, Park, and Shin (2003)	East Asia 10 countries, Europa 16, North America 2 1978-1999	Judge prospects of forming currency union in East Asia, focusing on trade integration and financial liberalization	1990s region common shocks are comparable to European ones, then East Asia is well prepared for regional currency union. Two most important determinants of business cycle synchronizations are intra-region trade share and trade structure similarity which shall put more pressure on forming a currency arrangement. Financial liberalization has rapidly occurred in East Asia and leads to more global integration rather than regional one.
Telisa Aulia (2008)	ASEAN-5 1971-2003	OCA indexes By the pair wise method	Closest to fulfill OCA: M-T, S-T, and S-M. Most converged: M. Most divergence: P OCA means are bigger to EMU means. Endogeneity exists. Economic convergence shall increase. Leader country (S) varies depend on the bench-mark country and the period of research.
Kraiwinee and Eugene (2003) cited by Thiumsak (2014)	ASEAN	Convergence model to determine OCA	ASEAN may not be suitable to form a single currency area. Suggest to start with a sub-group OCA arrangement of ASEAN-6 (B, I, P, T, M, and S), which have similar level of income and supporting framework.
Ogawa and Kawasaki (2007)	East Asia 1999-2005	OCA index	Not ready for an OCA (maybe gradual) Suggest policy dialogue on exchange rates, adoption of managed floating exchange rate system (G3 currency basket which becomes the Regional Monetary Unit) and coordinated intervention in foreign exchange markets intra-regionally.
Vu Tuan Khai (2008) cited by Thiumsak (2014)	ASEAN less Brunei D.	Feasibility of a single currency by symmetry of shocks analysis [Structural Vector Autoregressive (VAR) and OCA]	A group of I, M, P, S, and T with high correlation of structural shocks and high speed of adjustment to those shocks is appropriate to form an OCA
Obiyathulla Ismath Bacha (2008) cited by Thiumsak (2014)	ASEAN, ASEAN+5	Possibility of an OCA by VAR and synchrony analysis correlation	Region-wide monetary union for ASEAN and ASEAN+5 may not be possible and that the integration should begin with paired clusters: M-S, J-K, I-T, and A-Z
Moe Chint, Rizov, and Willenbockel (2008)	East Asian five countries: H, I, M, P, and T 1982-2006	Examined the impact of bilateral real exchange rate volatility on real exports by gravity model	Exchange rate volatility has a negative impact on the exports of emerging countries. Increase in competitiveness has positive impact on exports, but the magnitude is relatively inconsequential. Should focus on stabilizing their exchange rates *vis-à-vis* rather than solely pursuing regional monetary and exchange rate policy cooperation in the short run.
Volz (2010)	J and its 19 leading trading partners 1976-1995	OCA indexes	Very small and open economies of the region (HK and S) most appealing to peg to other East Asian ones. OCA index approaches West European: S-M, S-T, S-HK, S-T, and HK-T. Meanwhile I, SK, and, P indexes are weaker. Attempt for a common peg by first five East Asian Countries would be complicated.
Achsani and Partisiwi (2010)	ASEAN+3, 1997-2007	OCA indexes related to US dollar and clusters	The integration process would start by unifying Singaporean Dollar and Malaysian Ringgit followed then by Japanese Yen, Chinese RMB, Korean Won, Philippines Peso, and Thailand Bath. Indonesia may be the only country not ready yet for ASEAN+3 currency integration and Singaporean Dollar is the most stable currency in the region.
Wiranata and Putranto (2010)	ASEAN+5	Exchange rate volatility (ERV) to form OCA	ASEAN+5 are considered not really ready to form OCA. The different economic structure and policies are becoming some barriers and challenging area to synchronize in the following time

Table 1 continued

Author	Countries and periods	Method	Results
Han and Lee (2010)	East Asian monetary integration 1965-2005	The composite index of OCA criteria	Approach may start with homogeneous small sub-groups beginning with M, S, and HK or with these 3+T or with this 4+W and B (they showed sufficient degree of convergence). In the process of forming a currency area, political factors are important.
Khan P. Ngo (2012) cited by Thiumsak (2014)	ASEAN 5	Monetary union by descriptive statistics using trade for OCA criteria, ordinary least square and Granger causality	ASEAN founders are not ready to adopt a monetary union. Despite evidences of increase in economic integration from ASEAN at the moment, the group should pursue more effective policies that aim to increase labor and capital mobility and trade within the region.
Kawasaki (2012)	ASEAN 5+ 2000-2010	OCA	The combination of the ASEAN 5 (I, M, P, S, T) +1—K or J can form the common currency area, the combinations ASEAN 5 +2—H and J, or K and J, or H and K can form a common currency area; and that ASEAN 5 +3 have come closer to OCA
Lee and Azali (2012)	East Asia 1970-2007	Examined the symmetry in business cycles as satisfying one precondition for forming an OCA	Regional factor is largest for K, M, S, and T, then coordinated policy could respond to economic disturbances. The increased importance in the regional factor could be due to financial and trade integration deepening. Regional cooperation initiatives could lead to the right track if monetary union becomes a goal.
Shimizu (2013)	East Asia	OCA criteria	Neither the whole East Asia fulfills the OCA criteria or the sub-groups of interconnected economies (J-SK, M-S). The exchange rates correlation among some leading ASEAN+3 and the rivalry between H and J for regional leadership motivate to collectively defend the regional financial and exchange rates stability emphasizing a regular regional surveillance.
Alvarado (2014)	ASEAN 2001-2012	Least significant differences and OCA indexes criteria	Although all the members are different when talking about GDP, population, merchandise exports, services exports, employment population ratio, and GDP per capita; the variation of these indicators is alike. It is pointed out that the stronger differences were found for employment and population. According to the OCA analysis for 2007-2010 these economies converge or tend to converge to a single currency.
Thiumsak (2014)	ASEAN 5 2001-2013	Feasibility of OCA by the Dynamic Conditional Correlation (DCC) model	There is a structural break for most conditional correlation of country pairs of the two variables (industrial production index and short term interest rate) after the implementation of integration policy in 2008 and that most of the conditional correlations decrease over time. The feasibility of OCA has decreased.

Notes. B—Brunei Darussalam, C—Cambodia, H—China, I—Indonesia, J—Japan, L—Lao PDR, M—Malaysia, N—Myanmar (Burma), P—Philippines, S—Singapore, K—South Korea, T—Thailand, V—Viet Nam, HK—Hong Kong, W—Taiwan, A—Australia, Z—New Zealand.

Method

The model proposed by Bayoumi and Eichengreen (1997) for the European Community is the following:

$$SD(e_{ij}) = \alpha + \beta_1 SD(\Delta y_1 - \Delta y_j) + \beta_2 DISSIM_{ij} + \beta_3 TRADE_{ij} + \beta_4 SIZE_{ij} \tag{1}$$

Where $SD(e_{ij})$ is the standard deviation of the change in the logarithm of the end-year bilateral exchange rate between countries i and j, $SD(\Delta_i - \Delta_j)$ is the standard deviation of the difference in the logarithm of real output between i and j, $DISSIM_{ij}$ is the sum of the absolute differences in the shares of agricultural, mineral, and manufacturing trade in total merchandize trade, $TRADE_{ij}$ is the mean of the ratio of bilateral exports to

domestic GDP for the two countries, and $SIZE_{ij}$ is the mean of the logarithm of the two GDPs measured in US dollars.

For the European Community 1983-1992, estimation yielded the data reported by the authors that are included in Table 2 with the results calculated for ASEAN and ASEAN+3 period of 2003-2012.

Table 2

Terms of the Equation Proposed by Bayoumi and Eichengreen (1997) for OCA Indexes Toward the EMU and the Ones of ASEAN and ASEAN+3

	EMU	ASEAN	ASEAN+3
	Bayoumi and Eichengreen		
	1983-1992	2003-2012	2003-2012
Samples "n"	210	45	78
Model		Significant $F_{0.05}$	Significant $F_{0.05}$
R^2	0.51	0.5056	0.4080
Standard error	0.027	0.010959	0.011466
"α"	-0.09	0.23424	-0.01562
Standard error	0.02		
"β_1" $SD(\Delta i-\Delta j)$	1.46	0.017621	0.012142
Standard error	0.21	0.012392	0.017662
Effect to the model		Significant $T_{0.10}$	Significant $T_{0.11}$
"β_2" $DISSIM_{ij}$	0.022	-0.00072	-0.0000011
Standard error	0.006	0.282545	0.42993
Effect to the model		Significant $T_{0.10}$	Not significant
"β_3" $TRADE_{ij}$	-0.054	-0.47622	-0.26109
Standard error	0.006	0.000755	0.001594
Effect to the model		Significant $T_{0.10}$	Significant $T_{0.11}$
"β_4" $SIZE_{ij}$	0.012	0.000462	0.003714
Standard error	0.001	0.031918	0.061634
Effect to the model		Not significant	Significant $T_{0.11}$

Data sources and calculations are as follows:

(1) The quarterly exchange rate of each of the countries as SDR (Special Drawing Rights) was retrieved from the International Monetary Fund (IMF) except for Philippine Peso, Lao Kip, Burmese Kyat, and Vietnamese Dong that were obtained from XE web[1]. With these values, the annual average was determined later the bilateral rate expressed in logarithms, its change and finally the standard deviation value of the period $SD(e_{ij})$;

(2) GDP values retrieved from the World Bank except for Myanmar (IMF) were used to calculate the real output of the countries, the bilateral differences expressed in logarithms and finally the standard deviation of the period $SD(\Delta_i-\Delta_j)$;

(3) The shares of agricultural, mineral, and manufacturing trade in total merchandize trade reported by the World Trade Organization (WTO) [except the ones for Laos PDR calculated with data form OEC (Observatory of Economic Complexity) Massachusetts Institute of Technology (MIT) as well as Myanmar 2003-2007 and for all members 2003] were used to determine the absolute bilateral differences and to plus them for all the period;

---

[1] The World Favorite Currency Site. Retrieved from http://www.xe.com/.

(4) The bilateral exports values are reported by the OEC with this and the GDP from the World Bank (Myanmar IMF) allows calculating TRADE$_{ij}$ the period mean of the fraction of total bilateral exports over the total GDP;

(5) SIZE$_{ij}$ data were calculated with the GDP data from the World Bank and IMF for Myanmar.

Results

In Table 3, the results for OCA indexes for ASEAN and ASEAN+3, period of 2003-2012, calculated with the model by Bayoumi and Eichengreen are reported in ascendant order. Criteria of "convergence" respected the one proposed by the authors, therefore only the pairs with OCA indexes up to one model standard error (MSE) are considered converged and are in bold characters; meanwhile, the pairs with values no bigger than 2.5 times MSE that could be considered as converging ones are in italics.

Table 3

OCA Indexes for ASEAN and ASEAN+3 Calculated for the Period of 2003-2012 by the Model Proposed by Bayoumi and Eichengreen (1997)

ASEAN				ASEAN+3					
Pairs	OCA	Pairs	OCA	Pairs	OCA	Pairs	OCA	Pairs	OCA
MT	**0.005512**	*LS*	*0.027324*	**MS**	**-0.00072**	*CN*	*0.02739*	BH	0.029753
IS	*0.012284*	IP	0.027772	*MT*	*0.01523*	*LP*	*0.027434*	NS	0.029778
MS	*0.012354*	NS	0.027866	*PS*	*0.021767*	*LN*	*0.027602*	KT	0.029911
PS	*0.017527*	LM	0.027966	*IS*	*0.022058*	*IL*	*0.027671*	BL	0.029963
NT	*0.018947*	PT	0.028002	*ST*	*0.02257*	*LK*	*0.02772*	HT	0.030223
ST	*0.019946*	CM	0.028145	*SV*	*0.022736*	*BI*	*0.027752*	HN	0.030303
BM	*0.020163*	CS	0.028177	*CV*	*0.022894*	*PT*	*0.027788*	HV	0.030424
BT	*0.020197*	LP	0.028647	*NT*	*0.024225*	*CP*	*0.027984*	PK	0.030574
BS	*0.020209*	PV	0.029211	*LT*	*0.024626*	*BK*	*0.028055*	KV	0.0307
BC	*0.020214*	IV	0.030143	*LV*	*0.024651*	*CI*	*0.028061*	IP	0.030731
SV	*0.02026*	NV	0.030464	*CL*	*0.025072*	*CK*	*0.028133*	HP	0.030742
BV	*0.021282*	IL	0.030705	*CT*	*0.025219*	*IK*	*0.028158*	MP	0.03098
CV	*0.021608*	IN	0.030717	*BC*	*0.025246*	*NP*	*0.028562*	HI	0.031485
IM	*0.023183*	MP	0.031327	*CS*	*0.025707*	NK	0.028935	BN	0.031697
BP	*0.023802*	LN	0.033004	*BS*	*0.025888*	HS	0.02896	JK	0.032102
LT	*0.024085*	CP	0.033158	*MV*	*0.025962*	IN	0.028966	JT	0.032817
BI	*0.024515*	BL	0.033578	*LM*	*0.025987*	PV	0.028979	JM	0.033034
MN	*0.025357*	BN	0.035081	*BV*	*0.025989*	HL	0.029083	TV	0.033941
MV	*0.025481*	TV	0.035969	*LS*	*0.026076*	HJ	0.029174	JN	0.034289
CN	*0.025558*			*BM*	*0.026097*	BP	0.029299	JV	0.034749
NP	*0.02556*			*CM*	*0.026232*	NV	0.029408	JP	0.035023
CI	*0.025922*			*HK*	*0.027035*	IT	0.029456	CJ	0.035184
LV	*0.025975*			*BT*	*0.027101*	CH	0.029519	JL	0.035292
IT	*0.02611*			*IM*	*0.027207*	MK	0.029699	JS	0.035701
CT	*0.026663*			*SK*	*0.027218*	IV	0.029723	BJ	0.035784
CL	*0.026878*			*MN*	*0.027273*	HM	0.02975	IJ	0.038158

Notes. B—Brunei Darussalam, C—Cambodia, H—China, I—Indonesia, J—Japan, L—Lao PDR, M—Malaysia, N—Myanmar (Burma), P—Philippines, S—Singapore, K—South Korea, T—Thailand, V—Viet Nam.

Discussion

For both groups and for the considered period of 2003-2012, the applied model is statistically significant at F = 0.05. In the case of ASEAN with a response of 51% of the variables change, the closeness of the currencies is indeed affected at t = 0.10 by the output disturbances, the dissimilitude of the merchandise specific shares and the importance of the trade linkages and it is not affected by the size of the members. In the case of ASEAN+3, the variable change response was less (41%) and the closeness of the currencies is significantly affected at t = 0.11 by the output disturbances, the importance of trade linkages and the size, but not by the dissimilitude of the merchandise specific shares.

Calderón, Chong, and Stein (2002) remind that some key criteria in the OCA literature are that countries should join a currency union if they have closer international trade links and more symmetric business cycles. According to Lee, Park, and Shin (2003), two of the most important determinants of business cycle synchronizations are intra-region trade share and trade structure similarity.

In the present study, the sign of the dissimilitude of merchandise specific shares is negative (-) in both cases and according to the model, conception shall be positive (+), additionally, it is not significant in the case of ASEAN+3. The negative sign for this term was also reported by Ramírez (2011) when applied this model to study the integration process of Latin America. The reason may be that countries with more asymmetric structures of production have smaller business cycle correlation as concluded by Calderón et al. (2002).

The calculated OCA indexes are comparable but smaller in comparison to the reported for European Community (EC). The standard error of both models is less than half of the one obtained for the EC, then the "convergence" parameter is stricter. According to the calculated OCA indexes, during this period: in ASEAN, 2% of the bilateral pairs are converged economies (Malaysia-Thailand opposed to the results by Bayoumi and Eichengreen 1968-1998), 58% are converging and 40% are not ready; in ASEAN+3, converged pairs are 1% (Malaysia-Singapore), converging are 49%, and not ready are 50%.

In the ASEAN group, the economies are more or less moving symmetrically considering the participation frequency in the converged and converging pairs that are led by Singapore, Brunei, and Thailand followed by Cambodia and Malaysia. Vietnam and Indonesia are in the middle. Laos and Myanmar are among the not converged with Philippines (the more far). In ASEAN+3 group, Cambodia leads integrating the converged and converging pairs followed by Singapore and Malaysia, then Laos, afterwards Thailand than Brunei. In the middle is Indonesia and Korea. Meanwhile, more frequently integrating the not converged pairs is Philippines, Myanmar, Vietnam and the more far economies are China followed by Japan.

Singapore is definitely one of the economies that is moving close with the others in both groups as already predicted with the same or different methodologies. It is also remarkable that the tendency to symmetrical currency movement observed from Brunei and Thailand among the ASEAN members and from Cambodia among ASEAN+3 members. And the countries that are converging are also mentioned in several papers, particularly in the ones that recommended a gradual process.

In the group of 10, Philippines is clearly identified as not ready yet for OCA like other authors already have reported. In the group of 13 also but sharing the stage with Myanmar and Vietnam and not as far as China and Japan. In fact, according to the present analysis, the yen bloc in ASEAN+3 is the least possible peg, opposite to the results reported by Kwan (1998) quoted by Lee and Azali (2007).

Considering just the "α" values and directly evaluating them against the US dollar up to 2.5 times, the standard error of the models, 70% of the ASEAN currencies and 67% of the ASEAN+3 ones are moving symmetrically with it. This was also reported by Obiyathulla Ismath Bacha (2008) cited by Thiumsak (2014).

But it is a fact that depending on the method applied and the grouping of countries and the period of study, the results may vary.

Conclusions

Many authors study the feasibility of OCA, but the conclusions of this paper do not pretend to suggest any political decisions regarding a single currency, just to establish some facts about economic integration by using the empirical model proposed by Bayoumi and Eichengreen. According to the results, from 2003 to 2012, nearly half of the ASEAN and ASEAN+3 members have moved symmetrically when analyzing their OCA indexes as function of the four proposed economic variables whose significant effect changes according to the characteristics of each group.

Among 10 or 13 members of these two groups, the output disturbances and the trade linkages are important to understand the symmetry of their currency movements as the theory predicts. Nevertheless, also observed by some researchers, the synchronic advantage that may be reflected in the shares of merchandise exports is not favoring the closeness of their currencies and for the ASEAN+3 has not even a significant effect. Finally, the size of the economies is not a significant matter when talking among the ASEAN members, but becomes important in ASEAN+3 and according to the theory in such conditions, smaller countries may benefit more.

It is clear that according to the OCA criteria applied and the model used as well as the period of study, the conclusions may vary, and therefore extrapolations are risky. Further studies must be done, especially if ASEAN may become a region with free movement of goods, services, investment, skilled labor, and free flow of capital.

References

Achsani, N. A., & Partisiwi, T. (2010). Teasing the feasibility of ASEAN+3 single currency comparing optimum currency are and clustering approach. *International Research Journal of Finance and Economics*. Retrieved from http://achsani.blog.mb. ipb.ac.id/files/2010/08/irjfe_37_08.pdf

Alesina, A., & Barro, R. (2002). Currency unions. *Quarterly Journal of Economics, 117*(2), 409-436.

Alvarado, S. (2014). Inference of the ASEAN integration towards AEC 2015. Proceedings from *the 3rd International Conference on Business and Communication. Entrepreneurship Beyond Boundaries: Towards ASEAN Economic Community 2015*. April 23-24, Malaysia. Retrieved from http://icbc.atmajaya.ac.id/wp-content/uploads/2014/Proceedings_of_the_3rd_ICBC 2014.pdf

Association of the Southeast Asian Nations (ASEAN). (2009). *Road map for ASEAN community 2009-2015* (p. 112). Proceedings from *ASEAN Summit*. March 1, Cha-am, Thailand.

Association of the Southeast Asian Nations (ASEAN). (2013). *The ASEAN community 2015*. The ASEAN Secretariat, Public Outreach and Civil Society Division, Jakarta, Indonesia.

Bayoumi, T., & Eichengreen, B. (1997). Ever closer to heaven? An optimum-currency-area index for European countries. *European Economic Review, 41*, 761-770. Retrieved from http://www.ecares.org/ecare/personal/sapir/evercloser.pdf

Bayoumi, T., & Mauro, P. (1999). The suitability of ASEAN for a regional currency arrangement. International Monetary Fund Working Paper 1999, WP/99/162. Retrieved from http://www.imf.org/external/pubs/ft/wp/1999/wp99162.pdf

Calderón, C., Chong, A., & Stein, E. (2002). Trade intensity and business cycle synchronization: Are developing countries any different? Chilean Central Bank, Working Papers, 195. 12/2002. Retrieved from http://www.bcentral.cl/ eng/studies/working-papers/195.htm

Edwards, S. (2011). Exchange rates in emerging countries: Eleven empirical regularities from Latin America and East Asia. National Bureau of Economic Research Working Paper 17074. 5/2011. Retrieved from http://www.nber.org/papers/w17074

Eichengreen, B. (2006). *The parallel currency approach to Asian monetary integration* (p. 13). Retrieved from https://www.aeaweb.org/assa/2006/0107_1015_1303.pdf

Gordon De Brower. (2001). Debating financial markets and policies in East Asia. In Gordon De Brower (Ed.), *Financial markets and policies in East Asia*. New York, USA: Routledge.

Hamilton-Hart, N. (2006). The Chiang Mai Initiative and the prospects for closer monetary integration in East Asia. In B. Fort and D. Webber (Eds.), *Regional integration in East Asia and Europe. Convergence or Divergence?* (pp. 109-128). Oxon, Great Britain: Routledge.

Han, K., & Lee, Y. (2010). East Asian monetary integration and the composite index of OCA criteria. *Korean and the World Economy, 11*(2), 297-339. Retrieved from http://www.akes.or.kr/akes/downfile/4_2.pdf

Kawasaki, K. (2012). *Are the ASEAN plus three countries coming closer to an OCA*. Retrieved from http://www.rieti.go.jp/en/publications/summary/12050008.html

Lee, G., & Azali, M. (2007). *A currency union in East Asia* (p. 10). Department of Economics, Faculty of Economics and Management, Universiti Putra Malaysia. Retrieved from http://econ3.upm.edu.my/kelasmaya/sumberkursus/A01765/ECN4149/Optimum_Currency_Area_upm.doc

Lee, G., & Azali, M. (2012). Is East Asia an optimum currency area? *Economic Modelling, 29*(2), 87-95 Retrieved from http://ssrn.com/abstract=2139231

Lee, J., Park, Y., & Shin, K. (2003). A currency union in East Asia. *ISER Discussion Paper, 571*. Retrieved from http://ssrn.com/abstract=396260

Moe Chint, M., Rizov, M., & Willenbockel, D. (2008). Exchange rate volatility and exports: New empirical evidence from the emerging East Asian economies. Middlesex University Business School, Institute of Development Studies ant University of Sussex. March 2008. Retrieved from http://mpra.ub.uni-muenchen.de/9014/1/MPRA_paper_9014.pdf

Mundell, A. R. (1961). A theory of optimum currency areas. *American Economic Review, 51*(4), 657-665. Retrieved from https://www.aeaweb.org/aer/top20/51.4.657-665.pdf

OEC (Observatory of Economic Complexity). (2014). Retrieved from http://atlas.media.mit.edu/

Ogawa, E., & Kawasaki, K. (2007). *East Asian currency cooperation* (p. 16). Japan. Retrieved from http://aric.adb.org/pdf/seminarseries/SS10paper_East_Asian_Currency.pdf

Pike, F. (2011). *Empires at war: A short history of modern Asia since World War II* (p. 225). London: I.B. Tauris & Co. Ltd.

Ramírez, X. (2011). The Latin America integration processes: Comparative analysis from the optimal currency areas theory. Doctoral thesis. Department of Economy and Finances. Retrieved from http://www.tdx.cat/bitstream/handle/10803/9315/Tesis_XRR_%2810-12-13%29.pdf?sequence=2

Saltos, H. A. (1986). *Statistical inference* (p. 116). Ambato, Ecuador: PIO XII Ed.

Saltos, H. A. (1993). *Experimental design* (p. 171). Ambato, Ecuador: PIO XII Ed.

Shimizu, K. (2013). Regional cooperation for financial and exchange rates stability in East Asia. German Institute for International and Security Affairs. Working paper. Retrieved from http://www.swp-berlin.org/fileadmin/contents/products/arbeitspapiere/WP_FG7_2013_01_Dezember_Kenichi_Shimizu.pdf

Telisa Aulia. (2008). *Feasibility of forming currency union in ASEAN-5 countries* (p. 28). Research Laboratory of Economics, Department of Economics, Faculty of Economics, University of Indonesia, Indonesia. Retrieved from http://staff.ui.ac.id/system/files/users/telisa.aulia/publication/currencyuniontelisa.pdf

Thiumsak, T. (2014). The feasibility of optimal currency area for ASEAN after adopting the ASEAN Economic Community Blueprint in 2008. Does it facilitate the region to move closer to a single currency area? MSc thesis in finance. School of Economics and Management, Lund University. Retrieved from http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=4457848&fileOId=4457859

Volz, U. (2010). The standard approach: The theory of optimum currency areas. *Prospects for monetary cooperation and integration in East Asia* (pp. 49-102). USA: Masachusetts Institute of Technology.

Wiranata, D. B., & Putranto, A. D. (2010). Implementation of optimum currency area criteria and its volatility: Case study ASEAN 5+3. *Bulletin of Monetary, Economics and Banking*. Retrieved from http://www.academia.edu/647811/IMPLEMENTATION_OF_OPTIMUM_CURRENCY_AREA_CRITERIA_AND_ITS_VOLATILITY_CASE_STUDY_ASEAN-5_3

Testing the Feasibility of ASEAN+ 3 Single Currency Comparing Optimum Currency Area and Clustering Approach. March 2010. International Research Journal of Finance and Economics 37:1450-2887. Â ASEAN+3 single currency. The currency integration is expected to optimize the cooperation itselfÂ may be seen as an optimum currency area suitable for establishing a single currency. The paper will. explore the possibility of currency integration in ASEAN+3 regions by employing the so-called. exchange rate variability approach (Bayoumi and Eichengreen, 1998). In this sense, we will adopt the. In this paper at first we investigate the viability of creating an optimum currency area (OCA) in the East Asia. The results of a ten-variable VAR model show that forming an OCA for all of the countries in the region is costly and difficult to sustain. But at first five countries called Japan, China Full description. Saved in: Bibliographic Details. Main Authors: Mohseni, Reza Moosavi, Azali, M. This paper studies the feasibility of ASEAN+3 Monetary Union by investigating the homogeneities of the countries. Utilizing techniques of cluster analysis on two sets of criteria, the Optimum Currency Area (OCA) and the adjusted Maastricht Treaty (MTC), reveals that homogeneities of ASEAN+3 are low and the immediate formation of a monetary union would entail serious potential costs. Furthermore, our findings suggest that grouping differ between pre-crisis and post-crisis periods which could be due to the different impact of the crisis on the economic structure of these countries. To annotate the abstract at the left please login. (?) classification. E52, F32, F41. keywords. optimum currency area; cluster analysis; East Asia. journal. Journal of Economic Integration. The theory of optimum currency areas pioneered by Mundell was further complemented by McKinnon and again by Kenen.2 The theory addresses the question of under which circumstances a country benefits from membership in a currency union. According to the OCA theory, a country that considers membership in a currency union has to balance the economic stability loss (i.e. losing national monetary policy) against the monetary efficiency gain (i.e. a competitiveness gain due to a decline in the general price level, stimulated aggregate demand and enhanced exports) of a single currency.Â There are considerable income gaps between EMU countries and the euro area average, ranging from 65% of the eurozone average in Slovakia to 115% in Finland. Analysis of the Optimum Currency Area for ASEAN and ASEAN+3. Sylvia Alvarado. Universidad Andina SimÃ³n BolÃvar, Quito, Ecuador. This paper performs an analysis of the optimum currency area (OCA) for ASEAN (Association of Southeast Asian Nations) and ASEAN+3 for the period of 2003-2012. The applied method is based on the model developed by Bayoumi and Eichengreen for the European countries. Regarding the two groups of study, the document contents the integration roots as well as some theories and empirical data about the currency areas. The obtained results based on the OCA indexes showed that ...