



Analysis of Single Currency Implementation in Asean+3

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Abstract

This research aims to analyze the feasibility of implementing single currency policy in ASEAN+3 countries such as Indonesia, Singapore, Malaysia, Thailand, Philippines, Myanmar, Laos, Cambodia, Brunei Darussalam, Vietnam, China, South Korea, and Japan based on annual data from 1993 to 2017. In this research, the panel data is analyzed using Pooled Least Square regression model and Moving Average forecasting method to predict optimum currency area indices of ASEAN+3 in the period of 2018 to 2022. The results showed that (1) ASEAN+3 region is not ready to implement single currency policy because of an increasing trend of asymmetric shock, lack of business cycle synchronization, and differences in production structure, trade relations, and economy size among ASEAN+3 countries. (2) There are four converged country pairs, which mean higher feasibility of forming optimum currency area for the four country pairs; Brunei Darussalam and Singapore have the most symmetrical foreign exchange volatility among the other country pairs

Keywords: Single Currency, Optimum Currency Area, ASEAN+3.

JEL Classification: E00, F30, O53.

Introduction

More than a decade before the monetary crisis in Asia, Asian countries are shifting from a system that adopts a fixed exchange rate to a flexible exchange rate. However, controlled floating rates are always associated with the US dollar. The traumatic existence of the Asian crisis pushed the countries of East Asia to conduct monetary cooperation in Asia. The form of cooperation is in the form of research and crisis anticipation, the collective application of a currency pegged to the US dollar or yen or the use of a basket of major currencies.

After the Asian crisis, economists supported a two-way solution, namely the fixed exchange rate system, the perfect movement of capital and the independent management of financial policies that could be achieved simultaneously. The purpose of this solution states that only a fixed exchange rate system is the only monetary system that can be sustainable in an environment where mobility of capital is perfect and free floating or a fixed exchange rate such as a currency board system (CBS) or dollarization is suitable in East Asia. The exchange rate system that is halfway between the fixed and free exchange rates is very vulnerable to the monetary and banking crisis. In the process of finding an appropriate alternative monetary system in Asia, particularly from stability, interest in Asian Monetary Union (AMU) is also the right solution. The launching of economic and monetary union of Europe by Asian countries is seen as an unrealistic proposal even though Asian leaders are interested in the same idea.

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This paper will analyze the feasibility of East Asian countries in creating a shared currency as suggested by the Optimum Currency Area (OCA) theory while comparing the situation in East Asia and Western Europe. OCA is one last step towards regional economic integration in financial sector, after integration in both trade and labor. The formation of common union and free trade area can help strengthen and encourage countries in moving towards OCA in the future. This form of financial integration is the result of liberalization of both goods market and capital market (Kusuma and Putranto, 2010).

OCA was discussed for the first time by Mundell (1961) who explained that crisis in balance of payment will increase international economic system facilities as long as the exchange rate, wages, and price level are all fixed to prevent the fulfillment of Terms of Trade in the process of readjusting. In his research, Mundell stated that flexible exchange rate is the correct regime to adopt in modern economies because some aspects of modern economy were developed based on flexible exchange rate regime such as price system, exchange rate, speculation, creditor and debtor protection, and wages), but flexible exchange rate can only work in regional currencies that are part of national sovereignty. This is to say that stability issues in regards of labor movements and capital can only be solved with fixed exchange rate. Moreover, Rose (Rose, 2000) stated that countries who adopted fixed exchange rate regime are three times more likely to trade with each other compared to those who adopted flexible exchange rate. Therefore, if ASEAN satisfy the conditions to form a currency union, we can expect a growth in all the member economies.

Literature Review

The formation of OCA has been done by several European countries who are members of European Union (EU). EU initiated a monetary union called European Monetary System (EMS) in 1979, and have become part of the highest monetary integration within the members of the EU. Furthermore, the EU has successfully established European Economic Community (EEC) in 1 January 1958, with 28 member countries, which became an important step towards establishing a currency area with Euro as the single currency and European Central Bank (ECB) as the common central bank for the member countries. Rose (2000) states that a pair of countries that are part of a currency union have one hundred percent higher trade flows compared to countries that are not members of the currency union. Therefore, the results of this study support that the adoption of Euro can stimulate trade between currency union members. This triggered the formation of other currency areas, such as East African Community, West African Monetary Zone, Bolivarian Alliance for the American (Latin America), Cooperation Council for the Arab State of the Gulf, SAFTA (South Asia), and ASEAN+3 (ASEAN and East Asia).

The 1997 exchange rate crisis and the Asian monetary crisis were the beginning of strengthening and expanding cooperation in finance in ASEAN and East Asia. This then opens up greater desires and opportunities for Asia to carry out monetary integration in forming a currency area to increase the stability of the regional exchange rate (Kusuma & Putranto, 2010). Before the Asian crisis in 1997-1998, ASEAN economic performance was quite good. GDP growth of ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) grows annually reaching an average of 8 percent in a period of 10 years (Siswanto, 2007), until the crisis occurred economic growth in ASEAN+3 countries has decreased and decelerated. Indonesia, Thailand and Malaysia are the countries that experienced a decline of up to 13 percent for Indonesia and 10.51 percent and 7.35 percent respectively for Thailand and Malaysia, while for developed countries like Singapore and East Asia almost all experienced a decline, such as South Korea and Singapore experienced negative economic growth, although not as big as Indonesia, Thailand and Malaysia.

Robert A. Mundell, the godfather of the theory of OCAs, claimed that “in the real world, of course, currencies are mainly an expression of national sovereignty”, therefore, any “actual currency reorganization would be feasible only if it were accompanied by profound political changes” (Mundell, 1961). The European countries could agree on the common piece of paper. They could set up a European Monetary Authority or central bank. This is a possible solution, perhaps it is even an ideal solution. But it is very complicated, almost utopian (Mundell, 1961). The benefit of OCA is elimination of transaction cost and comparability of prices, elimination of exchange rate risk, price transparency and intensified competition, intensified trade, more independent central bank and better quality of monetary policy. The cost of currency area consists of firstly, diversity in currency area is costly because a common currency makes it impossible to react to each and every local particularity. Secondly, the theory of OCA aims to identify these costs precisely.

In addition, the countries which join to OCA must have similarity shock. A demand side shock refers to a situation where each price level is corresponding to a lower quantity (graphically, the demand curve moves to the left). In case of a supply side shock, each quantity is corresponding to higher price (the supply curve moves to the left). The most typical demand side shocks are the following: (1) monetary shock such as the fall in private investment or consumption due to an increase in interest rates; (2) fiscal shock such as the cutting of public spending (mostly in terms of public capital); the increase in taxes or customs; etc; and (3) foreign trade shock such as the drop in foreign demand for domestic products due to the appreciation of national currency; etc.

On the supply side, shocks can be generated by (1) the price mechanism as the increase of costs of manpower exceeds productivity increases; or (2) foreign trade as the price increase of imported goods is transmitted through the domestic economy (e.g. oil as an input). From the perspective of the cost-benefit analysis of adopting a single currency, perhaps the most important distinction is made with regard to its source, i.e., whether the shock is symmetric or asymmetric. A shock is called symmetric if the shock hits each member state of the community and causes relatively similar effects. The Eurozone crisis gives us the important analysis of a similarity shock in OCA. In Eurozone, based on 2011, small countries member has special problems of symmetric shock, starting with Greece, Ireland and Portugal, before infecting the monetary union as a whole (Eichengreen, 2014). As articulated by Mundell (1961), McKinnon (1963), and Kenen (2019), the theory of optimum currency areas emphasized convergence, labor mobility and fiscal integration as preconditions for a smoothly functioning monetary union. Convergence means greater similarity in the economic structures of participating member states, minimizing the kind of asymmetric shocks that might require a different monetary-policy response in different parts of the monetary union; something that would not be possible following the adoption of a common currency, by definition (Eichengreen, 2014).

Jablonski (2017) shows that Germany, France, Italy, and Ireland demonstrated that the loss of monetary independence and flexible exchange rate were not high costs for these key countries. After the examination of productivity, unit labor costs, hourly wage rates, and net export performance as a percentage of GDP of Germany, France, Italy, and Ireland, I argue that there is sufficient, positive economic convergence and performance in terms of international competitiveness under the uniform policy of the European Central Bank (ECB) for these countries since joining the Eurozone.

Asia is the engine of growth in the global economy. Its economic success has been made possible by long-term commitment to open markets and economic integration, underpinned by a rules-based global trading system. Rising protectionism in the North Atlantic, but especially the United States, threatens that system (Amstrong et al., 2018).

Regional cooperation arrangements such as APEC, the ASEAN Plus frameworks or the emergent Regional Comprehensive Economic Partnership (RCEP) are not hardwired

institutionally into ASEAN. But all these regional cooperation frameworks in East Asia and the Pacific were born of the same parentage and are genetically inseparable from the principles and practices that have sustained ASEAN's economic and political success. The diversity in stages of development, economic endowments, institutions, culture, religion and ethnicity may appear to have been an enduring source of regional political fragility. Economically, however, it was a fountain of strength that offered opportunities for specialisation that multiplied gains from trade for growth (Drysdale and Pangestu, 2019). Three developments have emerged from that process of change. First, a great-power game is returning to Southeast Asia. Second, the future of Southeast Asia is increasingly defined by how extra-regional powers interact with each other. And third, key extra-regional powers are beginning to formulate and promote their own visions of regional order (Sukma, 2019: 11).

From an economic point of view, the East Asian nation better meets the feasibility of OCA theory compared to Western Europe, and can form monetary unification without losing monetary independence and policy autonomy.

This theory was developed during the debate over the benefits and disadvantages of the exchange rate regime after World War II. In 1961, Robert Mundell published his first article on the theory of optimal currency regions. However, the importance of this theory will be seen later in 1989 during European monetary union. This article contributes to the development of OCA theory and identifies OCA criteria in the formation of currency pooling.

The optimum currency region criteria include, first, Mobility of Production Factors. (Mundell, 1961) chose the high degree of mobility of factors of production within an area as the main basis of a unified currency region. The high integration of factor markets with a group of state partners can reduce the need to change factors of production such as prices and nominal exchange rates among the countries concerned to respond to any economic turmoil. The assumption underlying the shift in demand is the cause of the balance of payments imbalance. Mundell focuses on conditions under which payment adjustments can minimize the burden on each country.

Second, McKinnon (1963)'s degree of Economic Openness considers that a high degree of openness is an OCA criterion. A higher degree of economic openness will result in faster changes in international prices, which will affect domestic prices, and devaluation will be more quickly transmitted to trade prices and the cost of living. While the nominal exchange rate becomes less useful as an instrument of adjustment.

Third, diversification of production and consumption. The high level of diversification in production and consumption is related to imports and exports, reducing the negative impact of nominal exchange rate volatility.

Fourth, Price and wage flexibility. When nominal prices and wages are more flexible between countries using a single currency, the process of adjusting for economic shocks will be less associated with unemployment in one country and / or inflation in other countries. This will reduce the need for nominal exchange rates and other policies such as a tight fiscal policy or a country's foreign balance sheet expansion.

Fifth, shock similarity. If the supply and demand shock and the pace of economic adjustment are identical among the countries in the region, the need for autonomous policies is reduced and the net benefits from applying a single currency might be higher.

Sixth, the similarity of inflation. Similarity in the inflation rate brings the balance of current and trade account transactions, which reduces the need for nominal exchange rate adjustments. However, the similarity of the inflation rate can be feasible in monetary union but is not a proper prerequisite for monetary union.

Seventh, Financial Market Integration. Financial integration can reduce the need for exchange rate adjustments; provide effective protection against reversal disturbances through capital inflows through loans originating from surpluses in partner countries or the de-

accumulation of domestic assets that can return when shock occurs. Market integration also narrows interest rate differentials.

East Asia is a prime candidate for the currency bloc according to OCA criteria. Even though the economy of East Asia is a small economy, its output is relatively very high. Trade is increasing rapidly, not only among East Asian countries, but also between countries in other parts of the world. As a country whose economy is open and free, the growth and inflation rates are quite high and positively correlated with each other.

The formation of OCA and the establishment of a single currency can be concluded as the next step in completing the integration of ASEAN+3 economies as a form of strategic framework to encourage economic growth in the ASEAN region and East Asia, so that it can face the challenges of economic globalization and subsequent crises.

Therefore, the main objective of this research is to see whether it is feasible to establish a common currency in ASEAN+3 countries.

Data and Methodology

This study uses a quantitative approach by performing mathematical and econometric calculations the results of which will then be interpreted as an explanation and support for the conclusions of the results of this study.

The type of data used in this study is secondary data from ASEAN+3 member countries (Indonesia, Singapore, Malaysia, Thailand, Philippines, Myanmar, Laos, Cambodia, Brunei Darussalam, Vietnam, China, South Korea, and Japan) with sample periods of the Year 1993-2017.

The data is then analyzed using the optimum currency area index equation based on (Bayoumi and Eichengreen, 1996) minus DISSIM variables. The equation can be seen as follows:

$$SD(e)_{ij} = \beta_0 + \beta_1 SD(\Delta Y_i - \Delta Y_j) + \beta_2 TRADE + \beta_3 SIZE$$

$SD(e)_{ij}$ is the standard deviation of changes in the logarithm of the exchange rate between country i and country j . These variable measures the volatility of the nominal bilateral exchange rate between two pairs of countries.

$$SD(e)_{ij} = SD \log e_{ij}^t$$

In calculating this variable, author faced several obstacles in obtaining bilateral exchange rate data between several countries. To meet the data requirements for this research, the triangular arbitrage technique is used. Triangular arbitrage technique is a technique that utilizes the opportunity of arbitrage generated by the price difference between the three currencies in the exchange rate market. Following is the formula used in calculating triangular arbitrage:

$$S_{a/\$} = S_{a/b} S_{b/\$}$$

$S_{a/\$}$ is the exchange rate between the US dollar and the currency of country a . $S_{a/b}$ is the exchange rate between the currency of country a and the currency of country b . $S_{b/\$}$ is the exchange rate between the US dollar and the currency of country b .

$SD(\Delta Y_i - \Delta Y_j)$ is the standard deviation of the difference between the real output logarithm between state i and state j . This variable describes asymmetric shocks at the national level.

$$SD(\Delta y_i - \Delta y_j) = \left\| SD \log \frac{GDP_i^t}{GDP_i^{t-1}} - SD \log \frac{GDP_j^t}{GDP_j^{t-1}} \right\|$$

$TRADE_{ij}$ is the average of the ratio of bilateral exports to domestic GDP between country i and country j . This variable is a proxy for the intensity of trade relations between two pairs of countries.

$$\text{TRADE}_{ij} = \left(\frac{\text{EXP}_i^{tj} + \text{EXP}_j^{ti}}{\text{NGDP}_i^t} \right)$$

SIZE_{ij} is the average of the logarithm of the ratio of GDP between country i and country j measured in US Dollars. These variables measure the size of the economy and assesses the utility of maintaining the national currency.

Countries that experience high symmetric shocks or trade relations tend to have stable exchange rates. In other words, the more OCA criteria are met among member countries, the lower of the exchange rate variability between these countries should be.

Data from the dependent variable in this study is then projected using Moving Average forecasting techniques to see the possibility of convergence of ASEAN+3 countries during 2018-2022.

Result and Discussion

In this study, there are four OCA criterion proxy variables, namely SD (e_{ij}) which illustrates the volatility of bilateral nominal exchange rates, SD($\Delta y_i - \Delta y_j$) describes asymmetric shocks at the national level, TRADE_{ij} is a proxy of the intensity of trade relations between countries i and country j, and SIZE_{ij} describe the economic size of the two pairs of countries and measure the states' utility in maintaining their national currencies.

Table 1 illustrates the exchange rate volatility of ASEAN+3 member countries per 5-year period. From the following table it can be seen that the volatility of the ASEAN+3 exchange rates is generally high, especially when compared to the volatility of the exchange rate in the eurozone which can be seen in Table 2.

The volatility of ASEAN+3 exchange rates is particularly high in Period 4 (2008-2012), which is 0.385. This was caused by the impact of the 2007-2008 international monetary crisis, which continued until 2012, resulting in various countries experiencing recession. Although ASEAN+3 countries in general still experienced GDP growth during this crisis period, the impact of the crisis can still be seen in Asian countries, resulting in lower GDP growth, low equity prices in Asia, increased national debt of Asian countries, and increased volatility in value exchange rates in the region (Filardo, 2011).

Table 1. Volatility of ASEAN+3 Exchange Rates based on Annual Data

Volatility of ASEAN+3 Exchange Rate	
Period 1 (1993-1997)	0.103
Period 2 (1998-2002)	0.124
Period 3 (2003-2007)	0.056
Period 4 (2008-2012)	0.385
Period 5 (2013-2017)	0.064

Source: Research finding, based on exchange rate data.

Note: "Volatility" in this table is the average of the standard deviation of changes in the logarithm of bilateral exchange rates based on annual data.

Table 2. Exchange Rates Volatility of Euro's Based on Annual Data

Volatility Exchange Rates of Euro's European Countries	
1989-1993	0.082
1994-1998	0.048

Source: Komarek et al. (2003)

Note: "Volatility" in this table is the average of the standard deviation of changes in the logarithm of bilateral exchange rates based on annual data.

Moreover, there was a slight increase in the volatility of ASEAN+3 exchange rates in

Period2 (1998-2002) of 0.124 compared to the previous period (0.103). Similar to the increase in exchange rate volatility in Period 4, the increase in Period 2 can also be explained by the 1997-1998 Asian crisis phenomenon. According to Firmansyah and Binhadi (2007), the 1997-1998 crisis had a major impact on the situation and stability of countries in Asia, including the weak exchange rates of ASEAN+3 countries against the US Dollar which subsequently resulted in changes in exchange rate regimes in several ASEAN countries+3. Indonesia, Thailand, Singapore, the Philippines, and South Korea changed their respective currency policy to floating exchange rate. Malaysia changed its currency to be directly pegged with US Dollar, while others adopt independent or regulated currencies. This explains the volatility of currencies in Period2.

One of the OCA criteria is symmetry of shocks as illustrated in Table 3. If the business cycle between the two countries is fully synchronized, then the value of this variable is zero (0). It can be seen that the shock symmetry between the pairs of ASEAN+3 countries is quite symmetrical. The pairing of Brunei Darussalam-Indonesia and Malaysia-Indonesia has the most symmetrical symmetry of shock.

OCA Index

The OCA Index illustrates the logarithmic changes of the exchange rates of two countries in pairs (bilateral exchange rates). Bangake (2008) explains that currency volatility positively affects business cycles and differences in export structure. This is in accordance with the requirements for the formation of an optimum currency area, where there is a need for common business cycles. If the countries in the region have the same business cycle, then it can form a currency area, because it has the same policy in resolving the problem of imbalance.

OCA theory also tries to provide an answer to the question of which exchange rate regime is appropriate for a pair of countries to use based on their individual economic characteristics, even though OCA theory only distinguishes between pure floating exchange rates and fixed exchange rates without considering that it is likely for a country to adopt something that is between the spectrum of the two exchange rate regimes. This indicates that OCA theory does not actually have operational precision for short-term decision making and is more likely to be a theory for the long term. Goldberg (1999) argues that OCA theory is less suitable for use in analyzing countries with transition economies, due to factors of stabilization and transition problems. In analyzing countries with transition economies, one must consider the specific characteristics of these countries.

However, OCA theory can be used to monitor the fulfillment of OCA criteria over time and how OCA criteria significantly influence exchange rate volatility. Here are the results of the regression estimation using the Common Effect or Pooled Least Square OCA index equation:

$$SD(e)_{ij} = 0,254 - 0,57 SD(\Delta Y_i - \Delta Y_j) + 0,003 TRADE_{ij} - 0,002 SIZE_{ij}$$

$$(0,396) \quad (0,128) \quad (0,702) \quad (0,000)$$

This study had a total of 377 observations with R-squared model of 0.25, standard error of regression of 0.32, and the probability of F test of 0.0000. The estimation results show that the OCA Index model for ASEAN+3 can explain changes in the dependent variable by 25 percent. In this study, only one of the three independent variables have a significant effect on the dependent variable, namely TRADE (the ratio of bilateral exports to GDP). Two variables that did not significantly affect the dependent variable were SD ($\Delta Y_i - \Delta Y_j$) and SIZE variables. This is in line with Goldberg's (Goldberg, 1999) argument that the OCA index is considered unsuitable for analyzing countries with a transition economy. The insignificance of these two variables is caused by the varying economic levels of ASEAN+3 countries, some of which are developing (transition) countries and others including developed countries (Japan, South Korea, Singapore). The large economic disparity between ASEAN+3 countries has caused these two proxy variables to be insignificant.

A positive value of 0.254 in the regression results shows that asymmetric shocks in the ASEAN+3 region are increasing. Bayoumi and Eichengreen (1996) explained that integration must increase its symmetrical shocks to become a support the formation of a single currency. This is an indication that increasing asymmetric shocks in the ASEAN+3 region could pose a threat to the formation of a single currency in the region. A negative value on output disruption or business cycle ($SD(\Delta Y_i - \Delta Y_j)$) shows that ASEAN+3 have a less synchronous business cycle; this can be an obstacle in implementing a single currency for the ASEAN+3 region. A synchronous business cycle means that each country's business cycle is the same as the region and continues to be sustainable until it has a large business cycle correlation. This encourages the formation of financial integration. According to Alvarado (2014), a negative value in this case indicates the existence asymmetric structure of production within the member countries, therefore the business cycle correlation is small and will hamper the process of establishing an optimum currency area for ASEAN+3 countries. A positive value on the TRADE variable (trade relations) in the ASEAN+3 region indicates that there is a specialization of production among countries in the ASEAN+3 region which gives rise to the potential for asymmetrical shocks and greater differences in exchange rates. If the trade relationship is negative, this indicates an increase in trade is more homogeneous, so that the business cycle is more harmonious and the nominal exchange rate becomes more stable (Spanikova, 2006).

The SIZE variable that describes the economic size in this study shows a negative value. This indicates that the size of a country in the ASEAN+3 region will not matter in regards to receiving greater benefits from the payment system and storage system of a single currency (Spanikova, 2006).

Table 3. Symmetry of Shocks between ASEAN+3 Countries (1993-2017)

	BRN	CHN	IDN	JPN	KHM	KOR	LAO	MMR	MYS	PHL	SGP	THA	VNM
BRN		0.26	0.05	0.45	0.24	0.42	0.64	0.27	0.27	0.32	0.19	0.38	0.36
CHN			0.62	0.19	0.36	0.18	0.07	0.33	0.34	0.28	0.42	0.21	0.27
IDN				0.24	0.10	0.19	0.41	0.07	0.05	0.10	0.08	0.17	0.48
JPN					0.26	0.44	0.66	0.29	0.28	0.34	0.21	0.41	0.24
KHM						0.11	0.21	0.21	0.21	0.17	0.28	0.13	0.19
KOR							0.40	0.06	0.08	0.09	0.08	0.15	0.23
LAO								0.16	0.16	0.11	0.25	0.06	0.37
MMR									0.39	0.33	0.46	0.26	0.04
MYS										0.06	0.10	0.12	0.08
PHL											0.09	0.14	0.14
SGP												0.08	0.21
THA													0.21
VNM													

Source: Research finding.

Note: "Symmetry of shocks" in this table is the average of the standard deviation changes in bilateral logarithmic exchange rates based on annual data.

With Bayoumi and Eichengreen (1996)'s model of testing the formation of optimum currency areas through index values, the index value is then determined by changes in the value of the domestic currencies of two countries, through forecasting methods if the results show a minimum value then the country can form or be ready to form currency area. Index values are further grouped into three types, namely convergence (already in a convergent state), convergence (towards convergent stages), and non-convergence (do not have exchange rate closeness and are not ready to form the optimum currency area).

Table 4. ASEAN+3 OCA Index (2018-2022)

	BRN	CHN	IDN	JPN	KHM	KOR	LAO	MMR	MYS	PHL	SGP	THA	VNM
BRN		0.03	0.05	0.05	0.05	0.04	0.03	1.14	0.05	0.03	0.00	0.02	0.1
CHN			0.07	0.08	0.04	0.05	0.2	1.14	0.07	0.03	0.03	0.03	0.09
IDN				0.07	0.08	0.07	0.07	1.04	0.04	0.06	0.05	0.04	0.12
JPN					0.09	0.09	0.07	1.15	0.09	0.08	0.05	0.06	0.14
KHM						0.04	0.02	1.14	0.11	0.05	0.05	0.05	0.07
KOR							0.05	1.13	0.08	0.04	0.04	0.04	0.08
LAO								1.14	0.08	0.04	0.04	0.03	0.08
MMR									1.1	1.12	1.14	1.13	1.19
MYS										0.05	0.06	0.05	0.14
PHL											0.04	0.04	0.09
SGP												0.02	0.1
THA													0.09
VNM													

Source: Research finding.

Note: BRN-Brunei Darussalam, CHN-China, JPN-Japan, KHM-Cambodia, KOR-South Korea, LAO-Laos, MMR-Myanmar, MYM-Malaysia, PHL-Philippines, SGP-Singapore, THA-Thailand, VNM-Vietnam, Calculated using Moving Average forecasting from the standard deviation of the logarithm of bilateral exchange rates (Bayoumi et al., 1996).

Table 4 shows the results of the calculation of the OCA index of the ASEAN+3 regions through Moving Average forecasting. Based on the forecasts it is found that there are several pairs of countries that have been converged shown by the minimum index value, so it can be concluded that they are ready to form the OCA. The pairs of countries are Brunei Darussalam and Singapore, Brunei Darussalam and Thailand, Cambodia and Laos, and Singapore and Thailand. Of the four pairs of countries, Brunei Darussalam and Singapore pair has the lowest OCA index value of 0.00, which means that the movements of the Brunei Darussalam and Singapore Dollar currencies are very symmetrical. This shows that the two countries are ready to form an OCA (Alvarado, 2014). The symmetry of the Brunei Darussalam and Singapore currencies can be explained by bilateral agreements between the two countries, namely the Currency Interchangeability Agreement. Ahmad (2005) explained that under the Currency Interchangeability Agreement the two Central Banks of Brunei Darussalam and Singapore accept the currencies of the two countries in each country and have the same exchange rate (B \$ 1 = SG \$ 1). All banks in both countries also accept public and business deposits in each country using the currencies of Brunei Darussalam or Singapore. This unique bilateral monetary relationship shows the step towards economic integration, which is supporting the formation of an OCA between Brunei Darussalam and Singapore.

This finding is different compared to research by Alvarado (2014) and Falianty (2006) who found that the pairs of countries with minimum values and ready to form the optimum currency area in ASEAN5+3 countries are Malaysia and Thailand. The difference between the findings of this study and the two studies is due to the selection of slightly different research subjects, in which this study added five countries that were omitted in previous studies. In addition, in this study it is found that although Indonesia does not have an OCA index value low enough to be called symmetrical with any country, the value of the Indonesian OCA index illustrates that Indonesia is heading towards symmetrical currency movements with other ASEAN+3 member countries.

In this study, only 4 percent of partner countries are converged in ASEAN+3, 70.5 percent of partner countries are converging, and 24.9 percent of partner countries are not converged, which means the pairs of countries are not ready to form the optimum currency area, because they do not have symmetrical currency movements. Alvarado (2014) stated that there was one

percent of converged partner countries in ASEAN+3, 49 percent of convergent partner countries, and 50 percent of non-convergent partner countries. Countries that are not converged are the Philippines, Vietnam, Myanmar, China and Japan.

Although it can be concluded that overall, the ASEAN+3 region is not ready to form an optimum currency area, this does not rule out the possibility of establishing policies that encourage the formation of OCA in some converged ASEAN+3 countries. The formation of a partial single-currency region within the ASEAN+3 regions can be done by following in the footsteps of the European Union in forming the eurozone, where not all members of the European Union directly adopt the single-currency Euro but slowly. This is an alternative for the ASEAN+3 regions to start steps towards establishing a single currency.

Conclusion

This research is intended to see whether the implementation of a single currency in ASEAN+3 countries is possible. Based on the results of this study it can be concluded that the ASEAN+3 region is not ready to form a single regional currency, as indicated by the presence and increase of asymmetric shocks, lack of synchronization of the business cycle, and differences in production structure, trade relations, and economic size. The benefits of establishing a single currency for ASEAN+3 countries also do not have a large impact, despite the size of the economy of a large or small country.

Through the optimum currency area index that looks at changes in bilateral exchange rates between pairs of countries, there are four countries that are converged and have the possibility to form an optimum currency area, namely Brunei Darussalam and Singapore, Brunei Darussalam and Thailand, Cambodia and Laos, and Singapore and Thailand. The Brunei Darussalam and Singapore Pairs have the most symmetrical currency movements among the other countries. This is due to the Currency Interchangeability Agreement adopted by the two Central Banks of Brunei Darussalam and Singapore as a first step in integrating the economy.

Indonesia in general is not ready to form an OCA with any ASEAN+3 member countries, indicated by the Indonesian OCA index value which has not shown that Indonesia is converged with any other countries. The movement of the Indonesian currency with other pair countries is low enough to conclude that Indonesia is still in the process of convergence.

Several suggestions in regards to this research:

1. In order to help monetary integration and regional economic integration that can realize the implementation of a single currency in ASEAN+3 countries, ASEAN+3 member countries must look at the example of the European Union which began the formation of an OCA through politics, namely the alignment of monetary policy and fiscal policy). ASEAN+3 countries must strive to harmonize monetary and fiscal policies in order to create the same policy in dealing with shocks to meet the criteria of an OCA.
2. This study removes one variable in the OCA criteria equation, namely the DISSIM variable because the data is difficult to obtain and process. Future studies are expected to be able to include the DISSIM variable in the regression equation so that its application becomes more effective and provides a more comprehensive picture for the case of the ASEAN+3 regions.

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