

An Optimum Currency Area in ASEAN 5 Countries: Is it Appropriate to Use American Dollar as the Standard Currency?

Feri Dwi Riyanto¹, Bunga Hidayati², Aji Purba Trapsila³

¹Islamic University of Maulana Malik Ibrahim, Malang, Indonesia

² Faculty of Economics, Universitas Negeri Malang, Indonesia

³ Doctoral Students at Universiti Malaysia Terengganu, Malaysia

Email: fery.riyan@uin-malang.ac.id

Received: April 17, 2021; Accepted: July 22, 2021; Published: November 4, 2021

Permalink/DOI: <http://dx.doi.org/10.17977/um002v13i22021p052>

Abstract

ASEAN countries experienced an economic crisis in 1997/1998 and a financial crisis in 2008. The similar patterns of the problem among those countries make some researchers conduct studies about single currency unification. This research aims to analyze the currency impact of ASEAN 5 (Rupiah, Ringgit, Singapore Dollar, Baht, and Peso) on a currency shock in the other ASEAN countries. The concept of this study uses the exchange rate approach based on ASEAN countries with American Dollars and Singapore Dollars. Furthermore, this research analyzes a symmetrical currency response to the currency shock in another country. The study methods are short and long-term Vector Autoregression (VAR) models using monthly data in actual exchange rate variables from 1990 to 2019. The impulse response function (IRF) findings showed that responses to ASEAN currency pegged the currency to Singapore Dollars rather than US Dollars.

Keywords: ASEAN 5 countries, Optimum Currency Area, Exchange Rate, Single Currency

JEL Classification: E02; E50; F60

INTRODUCTION

Economic globalization forces countries to be open in many things, particularly economics and finance, so openness causes economic integration. Therefore, a study about economic integration and single currency unification, particularly in ASEAN countries (Association of South East Asia Nations), Indonesia, Malaysia, Thailand, Singapore, and the Philippines, becomes more interesting. The regions have many trading agreements and economic growth that is above the average of the world economy (Kurniati, 2007; Shimizu & Sato, 2018; Sima, 2018; Nguyen, 2020).

In the 1980s, most of East Asia's countries began the open economic commitment by liberating their financial variables. The results were divided into two significant economic problems; the improvement in trading, economic growth, and market connection (Awokuse et al., 2009; Achsani et al. 2009; Achsani & Prastiwi, 2010; Lee & Azali, 2010; Mishra & Sharma, 2010; Lee & Azali, 2012; Chaiphath, 2017; Gauchan & Sarin, 2018; Ong & Sato, 2018; Caporale et al., 2019;

Nguyen, 2019; Ha & Hoang, 2020; Riyanto et al., 2021) in one hand and the other one was the financial crisis in 1997/1998 in those regions (Kawai, 2005; Yoshitomi, Shirai, & Asian Development Bank Institute, 2000). Each dimension implied that the cross-country spill created ventilation. With the trust in the optimum currency hypothesis, the crisis needed a regional financial union, starting from the arrangement of Chiang Initiative Mai exchange (Awokuse et al., 2009; Achsani et al., 2009; Achsani & Prastiwi, 2010; Lee & Azali, 2010; Mishra & Sharma, 2010; Lee & Azali, 2012; Chaiphath, 2017; Gauchan & Sarin, 2018; Ong & Sato, 2018; Caporale et al., 2019; Nguyen, 2019; Ha & Hoang, 2020; Riyanto et al., 2021).

However, as mentioned in the Mundell-Fleming model, an open economy or global economy means that a country should adopt strategic decisional making action in solving macro-economy variable volatility, particularly the exchange rate (Fleming, 1962; Mundell, 1961; 1963; Lee & Azali, 2010; Mishra & Sharma, 2010; Lee & Azali, 2012; Chaiphath, 2017; Gauchan & Sarin, 2018; Ong & Sato, 2018; Caporale et al, 2019; Nguyen, 2019; Ha & Hoang, 2020; Riyanto et al., 2021). It happens because the volatility of the exchange rate influenced the investment return and lessened the trust in cross-border trade. Therefore, as suggested in the theory of optimum regional currency, the nations with intensive work and similar fundamental economic can create mutual money, where the “intrinsic” stability of the exchange rate is reached, and the “midst” volatility of the exchange rate is permitted. For that reason, empirical research studied the appropriateness of a group of East Asia countries that created the monetary union, at least the optimum currency areas. Some literature showed that the dependence rate in the ASEAN region has increased since the 1980s reached a significant relation in the world.

Mundell (1961) in his well-known theory of optimum currency areas (OCA) stated that one of the integrated economic realizations is by creating a single currency. It is a union of single currency from countries as the integrated monetary policy. Creating a single currency has the advantage of controlling and mitigating the economic confusion of adopting countries. A government can implement flexible exchange rate policies or classify them into actual cash or weighted currency case in two extreme cases. The traditional theory of OCA was formed by the contribution of Kenen (1969); McKinnon (1963); Mundell (1961). In short, the OCA approach is to identify the main economic characteristics that make the currency a boundary. In some articles, Bayoumi and Eichengreen (1993; 1997a; 1997b; 1998) provided empirical strategy to analyze OCA.

According to Mundell (1961), some criteria need to be considered by countries that want to adopt a single currency; one of them has an asymmetrical shock or similar symmetrical shock. McKinnon (1963) stated that similar symmetrical shock among countries that adopt theoretical principles of OCA can be found in the same responses with the exchange rate (Lee and Azali., 2010; Chaiphath, 2017; Gauchan & Sarin, 2018; Ong & Sato, 2018; Caporale et al, 2019; Nguyen, 2019; Ha & Hoang, 2020).

Multiple matches rely on their currencies to Singapore as a leader of ASEAN countries and Japan as a leader of outside ASEAN countries. For particular ASEAN countries, it is possible to join the currencies based on Singapore Dollars, while outside ASEAN countries, the coins are suited to Japan Yen (Lee and Azali., 2010; Chaiphath., 2017; Gauchan and Sarin., 2018; Ong and Sato., 2018); Caporale et al., 2019; Nguyen., 2019; Ha and Hoang., 2020).

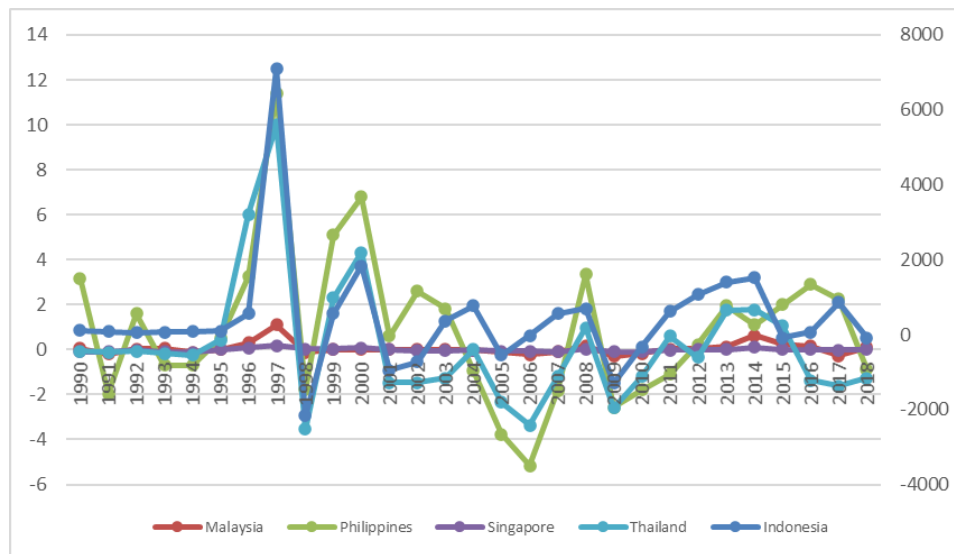


Figure 1. The Exchange Rate Index of ASEAN 5 Countries
 Source: World bank (data processed 2020)

Figure 1 shows that the fluctuations in the exchange rate index of ASEAN 5 countries. Indonesia has the most fluctuating exchange rate index compared to other countries. Meanwhile, Singapore is the country with the least fluctuating exchange rates.

Some previous studies by Caporale et al. (2019); Nguyen (2019); Ha and Hoang (2020) studied factors behind the co-movement on the currency exchange rate of ASEAN 4 countries. The research findings concluded that co-movement identified on the currencies of ASEAN 4 countries was not *robust*. It means that not the same. The OCA and bivariate model correlation explain that IDR is the dependent variable (IDR-SGD, IDR-PHP, and IDR-THB). The other bivariate model consists of SGD-PHP SGD-THB and PHP-THB. Therefore, it is concluded that a single currency consists of some currencies. Results of many studies about the idea of the combination through exchange rate approach in regional countries have variation conclusions. Partisiwi (2008) analyses the possibility of currency unification in ASEAN+3 (Indonesia, Singapore, Malaysia, Philippines, Thailand, Japan, China, and South Korea) by using exchange rate variation variables and pegging those currencies to American Dollars. Doddy and Warjiyo's (2010) study aligned with Bagus and Dwi's (2010) analysis of the relationship between exchange rate volatility ERV to OCA criteria. The researchers should know the shock that will explain the involvement of ERV and OCA's requirements. The study variables are the nominal exchange of currencies in ASEAN 5+3 to Dollar, namely Yuan/SD, Yen/SD, Won/SD, RM/SD, Bath/ SD, Peso/SD, and Rp/SD. As a result, ASEAN 5+3 is not ready yet for a single currency.

From the preliminary description and the different findings of studies, the researchers want to explore a new research rate pegged to two developed countries, namely Singapore and the United States. The observers should relate the movement

to the prerequisite suitability as the unification criteria of a single currency. In Bayoumi and Eichengreen (1997), the currency exchange rate stability will be the criteria of countries with a high economic integrated level. In line with Optimum Currency Area theory from Mundell (1961), countries in OCA's requirement will lessen the shock of exchange rate fluctuation if the values of price and wage are flexible.

METHOD

Vector Autoregression (VAR) is a forecasting algorithm that can be used when two or more time-series affect each other. That is, the relationship between the time series involved is bidirectional. In this research, we will look at the concept, the intuition behind the VAR model and consider a comprehensive and correct method for looking at shocks between exchange rate variables. In this model, the independent variable is the lag of the dependent variable. On the other hand, each dependent variable also becomes an independent variable in the system of equations. Thus, all variables in the VAR model are endogenous systems of Nachrowi and Usman (2006). VAR with order lag (p) and variance (n) at time t can be modeled as follows:

$$Y = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \dots + \alpha_p Y_{t-p} + \epsilon_t \dots \dots \dots (1)$$

Where:

- Yt = dependent variable vector (y1t, y2t, ..., ynt) sized n x 1
- α0 = intercept vector n x 1
- αi = parameter matrix sized n x m for each i = 1,2, ...p
- εt = residual vector (εt, ε2t, ε3t, ..., εnt)
- n = Total rows in matrix n x m
- m = Total rows in matrix n x m

Singapore Base Country Long-Term Research Model

$$\begin{aligned} \Delta LMAL_{1t} &= \alpha_1 + \alpha LMAL\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{11} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{12} \Delta LPHIL_{t-j} + \sum_{j=1}^n \alpha_{13} \Delta LTHAI_{t-j} \\ &\quad + \sum_{j=1}^n \alpha_{14} \Delta LINA_{t-j} + \beta_1 Dummy_t + \epsilon_{LMAL_{1t}} \\ \Delta LPHIL_{1t} &= \alpha_2 + \alpha LPHIL\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{21} \Delta LPHIL_{t-j} + \sum_{j=1}^n \alpha_{22} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{23} \Delta LTHAI_{t-j} \\ &\quad + \sum_{j=1}^n \alpha_{24} \Delta LINA_{t-j} + \beta_2 Dummy_t + \epsilon_{LPHIL_{1t}} \\ \Delta LTHAI_{1t} &= \alpha_3 + \alpha LTHAI\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{31} \Delta LTHAI_{t-j} + \sum_{j=1}^n \alpha_{32} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{33} \Delta LPHIL_{t-j} \\ &\quad + \sum_{j=1}^n \alpha_{34} \Delta LINA_{t-j} + \beta_3 Dummy_t + \epsilon_{LTHAI_{1t}} \end{aligned}$$

$$\begin{aligned} \Delta LINA_{1t} = & \alpha_4 + \alpha LINA\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{41} \Delta LINA_{t-j} + \sum_{j=1}^n \alpha_{42} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{43} \Delta LPHIL_{t-j} \\ & + \sum_{j=1}^n \alpha_{44} \Delta LTHAI_{t-j} + \beta_4 Dummy_t + \epsilon_{LINA_{1t}} \end{aligned}$$

US Base Country Long-Term Research Model

$$\begin{aligned} \Delta LSIN_{2t} = & \alpha_1 + \alpha LSIN\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{11} \Delta LSIN_{t-j} + \sum_{j=1}^n \alpha_{12} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{13} \Delta LPHIL_{t-j} \\ & + \sum_{j=1}^n \alpha_{14} \Delta LTHAI_{t-j} + \sum_{j=1}^n \alpha_{15} \Delta LINA_{t-j} + \beta_1 Dummy_t + \epsilon_{LSIN_{2t}} \end{aligned}$$

$$\begin{aligned} \Delta LMAL_{2t} = & \alpha_2 + \alpha LMAL\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{21} \Delta LMAL_{t-j} + \sum_{j=1}^n \alpha_{22} \Delta LSIN_{t-j} + \sum_{j=1}^n \alpha_{23} \Delta LPHIL_{t-j} \\ & + \sum_{j=1}^n \alpha_{24} \Delta LTHAI_{t-j} + \sum_{j=1}^n \alpha_{25} \Delta LINA_{t-j} + \beta_2 Dummy_t + \epsilon_{LMAL_{2t}} \end{aligned}$$

$$\begin{aligned} \Delta LPHIL_{2t} = & \alpha_3 + \alpha LPHIL\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{31} \Delta LPHIL_{t-j} + \sum_{j=1}^n \alpha_{32} \Delta LSIN_{t-j} + \sum_{j=1}^n \alpha_{33} \Delta LMAL_{t-j} \\ & + \sum_{j=1}^n \alpha_{34} \Delta LTHAI_{t-j} + \sum_{j=1}^n \alpha_{35} \Delta LINA_{t-j} + \beta_3 Dummy_t + \epsilon_{LPHIL_{2t}} \end{aligned}$$

$$\begin{aligned} \Delta LTHAI_{2t} = & \alpha_4 + \alpha LTHAI\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{41} \Delta LTHAI_{t-j} + \sum_{j=1}^n \alpha_{42} \Delta LSIN_{t-j} + \sum_{j=1}^n \alpha_{43} \Delta LMAL_{t-j} \\ & + \sum_{j=1}^n \alpha_{44} \Delta LPHIL_{t-j} + \sum_{j=1}^n \alpha_{45} \Delta LINA_{t-j} + \beta_4 Dummy_t + \epsilon_{LTHAI_{2t}} \end{aligned}$$

$$\begin{aligned} \Delta LINA_{2t} = & \alpha_5 + \alpha LINA\hat{e}_{t-1} + \sum_{j=1}^n \alpha_{51} \Delta LINA_{t-j} + \sum_{j=1}^n \alpha_{52} \Delta LSIN_{t-j} + \sum_{j=1}^n \alpha_{53} \Delta LMAL_{t-j} \\ & + \sum_{j=1}^n \alpha_{54} \Delta LPHIL_{t-j} + \sum_{j=1}^n \alpha_{55} \Delta LTHAI_{t-j} + \beta_5 Dummy_t + \epsilon_{LINA_{2t}} \end{aligned}$$

Description:

Dummy_t = dummy variable (0 = period before crisis and 1= period after crisis)

Δ = *first different* notation

α = constant

α_{mn,l} = parameters of the variables in the given equation

ê = error correction trem of long-term balanced regression

ε = error trem of each equation

LSIN = natural logarithm of Singapore's real exchange rate

LMAL = natural logarithm of Malaysia's real exchange rate

PHIL = natural logarithm of Philippines' real exchange rate

LINA = natural logarithm of Indonesia's real exchange rate

LTHAI = natural logarithm of Thailand's real exchange rate

RESULTS AND DISCUSSION

The discussion will show the stages of testing the VAR model, namely 1) static testing; 2) IRF testing; 3) FEDV testing. The focus of this research aims to consider the short-term responses of the shocks caused by the currencies of ASEAN countries against the ones of other ASEAN countries.

Stationary Test

Table 1. Results of Data Stationary Test on Singapore Base Country

<i>In Level</i>			
Variable	ADF Value	Critical Value 5% Mckinnon	Description
LINA	-2.512405	-2.902953	Not Stationary
LMAL	-2.058396	-2.902953	Not Stationary
LTHAI	-4.035376	-2.903566	Stationary
LPHIL	-2.702338	-2.904198	Not Stationary
<i>In First Difference</i>			
LINA	-6.108058	-2.903566	Stationary
LMAL	-5.316201	-2.903566	Stationary
LTHAI	-5.545541	-2.904198	Stationary
LPHIL	-6.262812	-2.904198	Stationary

Table 2. Results of Data Stationary Test on US Base Country

<i>In Level</i>			
Variable	ADF value	Critical value 5% Mckinnon	Description
LINA	-2.983173	-2.902953	Stationary
LMAL	-2.347001	-2.902953	Not Stationary
LTHAI	-2.659712	-2.903566	Not Stationary
LPHIL	-2.937510	-2.903566	Stationary
LSIN	-0.143139	-2.902953	Not Stationary
<i>In First Difference</i>			
LINA	-6.168725	-2.903566	Stationary
LMAL	-5.116324	-2.903566	Stationary
LTHAI	-5.785959	-2.903566	Stationary
LPHIL	-5.145358	-2.903566	Stationary
LSIN	-6.869377	-2.903566	Stationary

Table 1 and Table 2 explain the results of data stationery based on the base country of Singapore and the base country of America. It can be seen that almost all variables are not stationary at the level except the Thailand exchange rate (LTHAI). This is because the ADF statistical value is greater than the McKinnon critical value by using a 5% decree. Therefore, it is necessary to carry out a unit root test again at the next level, namely the first difference level, so that the results obtained that all data to be used for analysis are stationary at the level of = 5%. In the static test at the first derivative level, all variables are inactive. The next stage can test the variables to see responses and shocks by calculating the Impulse Response Function (IRF) and Forecasting Error Variance Decomposition (FEVD) values.

The Analysis of Impulse Response Function (IRF) of ASEAN 5 Singapore Base Countries

Impulse Response is the response of a dependent variable if it gets a shock or an independent variable innovation of one standard deviation. We will concentrate on the response of each exchange rate to the surprises in five ASEAN countries, both based on Singapore and the United States of America. The ordering of variables in the IRF analysis in this exchange rate analysis is also based on Cholesky's factorization that will think about the exchange rate response given to the shocks in the other countries before and after the crisis. The Currency Response of ASEAN 5 Countries to Exchange Rate Shocks at Singapore Based Country.

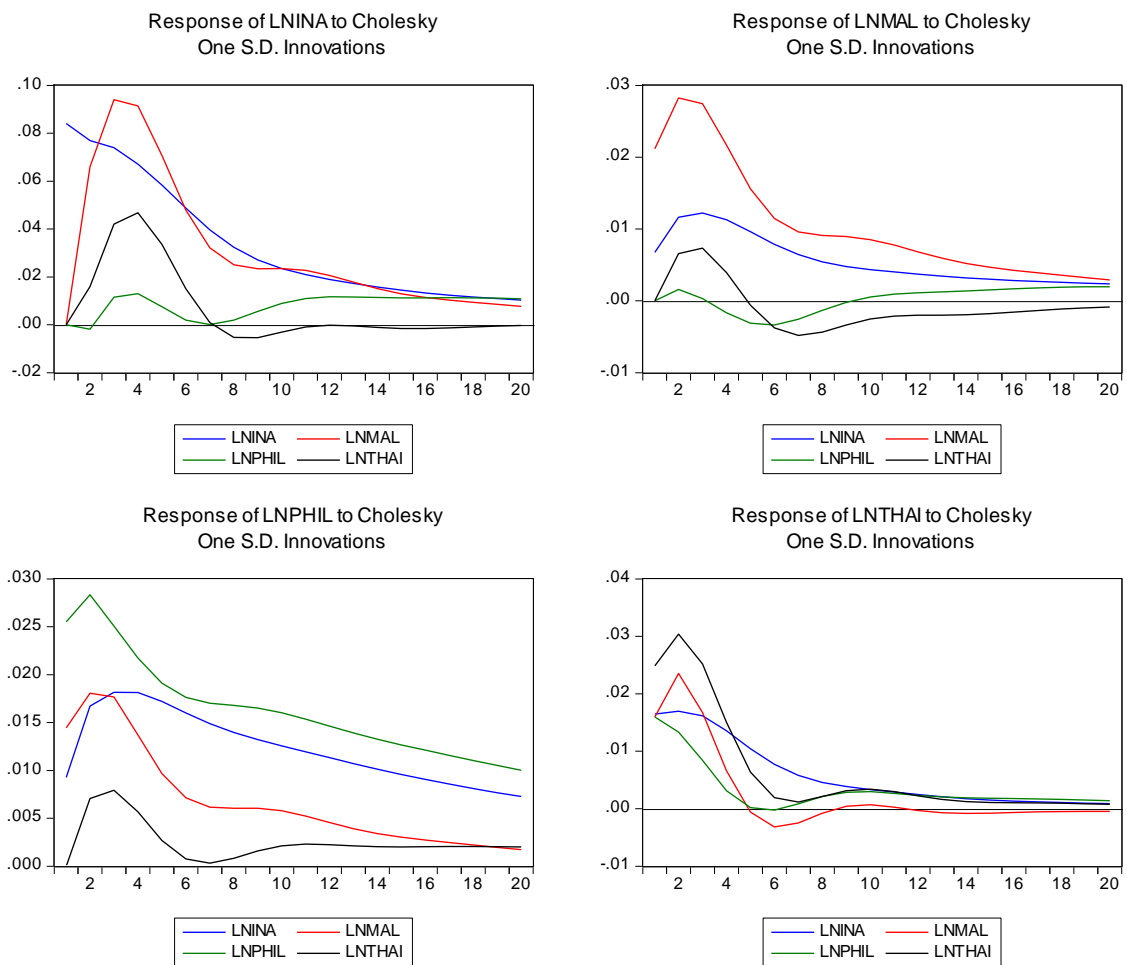


Figure 2: Exchange Rate Response of ASEAN 5 Countries at Singapore Based

Analysis of ASEAN 5 America Base Countries

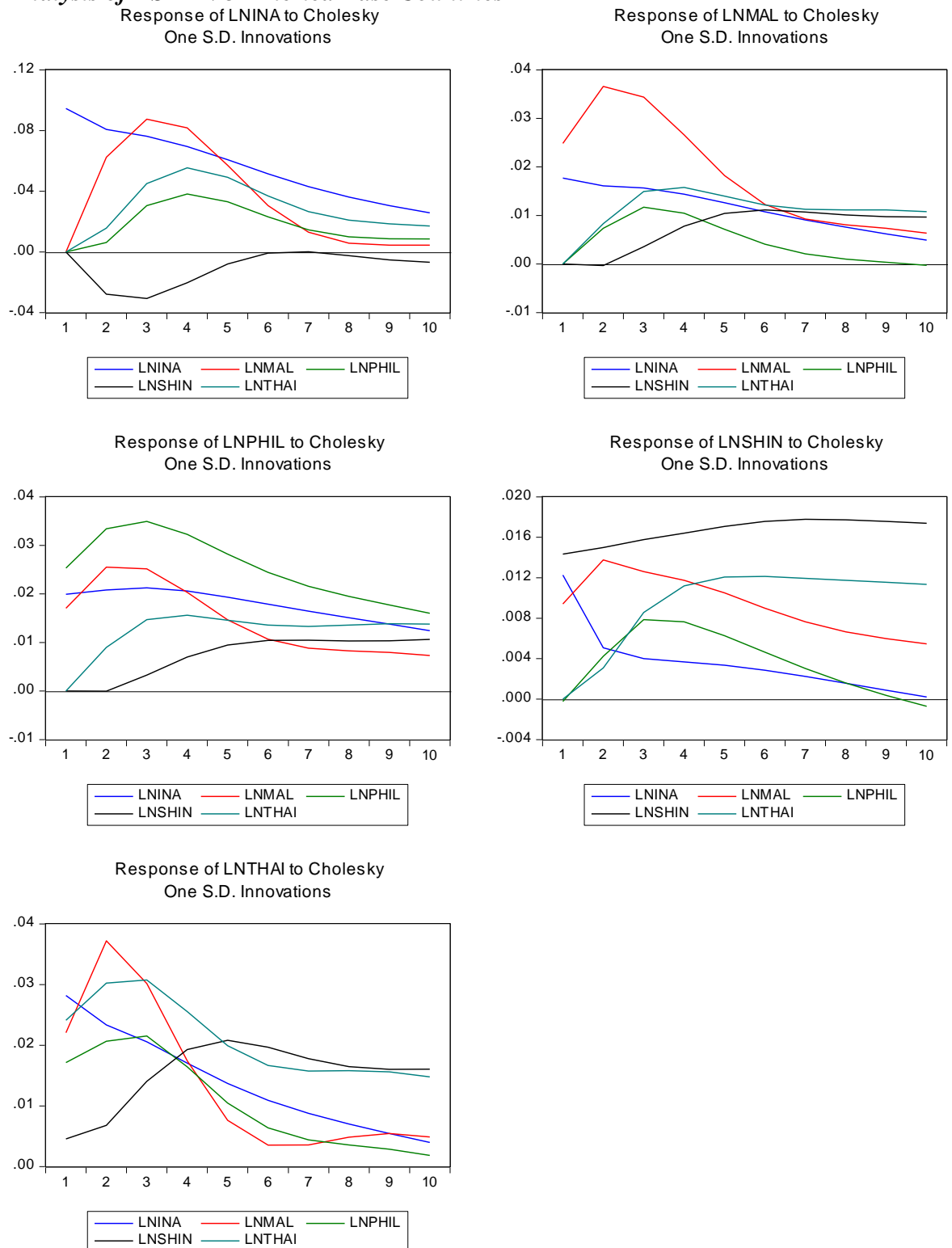


Figure 3: Figure 2: Exchange Rate Response of ASEAN 5 Countries at America Based

Analysis of Forecasting Error Variance Decomposition (FEVD) at ASEAN 5

The following discussion is to see the amount of contribution in explaining each change in the variables studied.

Table 3. Average 20 Horizon Value FEDV at Singapore Base Country

		Rupiah	Ringgit	Peso	Baht
Before Crisis	Rupiah	63.8477	20.1459	3.70398	12.3024
	Ringgit	13.948	75.4908	4.32994	6.23123
	Peso	18.1706	13.9149	63.4545	4.45999
	Baht	16.5753	17.8285	17.7481	47.8482
		Rupiah	Ringgit	Peso	Baht
After Crisis	Rupiah	54.8868	34.1346	1.55804	9.42057
	Ringgit	25.8468	64.4117	0.92805	8.81347
	Peso	6.62735	16.4281	73.1232	3.82134
	Baht	9.34124	10.2849	15.5135	64.8603

Table 3 describes the average value of FEDV over 20 times horizons, while the numbers in bold are the average value of the contribution of exchange rate variability to itself. Based on the table above, the average donation of the rupiah in explaining the variability of its exchange rate during the pre-crisis period was 63.84 percent, while after the crisis period, the contribution of the rupiah decreased to 54.88 percent and the second-largest contribution to the rupiah was explained by Ringgit. Its highest assistance in explaining the variability of the exchange rate itself was 75.49 before the crisis and decreased to 64.41 percent. Similar to Ringgit, Rupiah ranks as the second-largest contribution in explaining Ringgit. Both Peso and Baht have increased donations to themselves in explaining variations in their exchange rates.

Ringgit and Peso have very dominant contributions in explaining their variabilities, ranging from 60 to 75 percent in the long run. In the case of Malaysia, it is natural to consider the fixed exchange rate regime. In the event of shocks from the other countries, its monetary policy will maintain the exchange rate not to fluctuate. As Thailand is still a developing country, the variability is primarily dominated by itself, especially after the crisis. This is due to the vigilance of other ASEAN 5 countries against fluctuations in the Baht. Therefore, the slightest shock to the Baht will be immediately responded to by ASEAN 5 countries because they do not want to repeat the 1997 Asian financial crisis. In addition, Thailand has learned a lot from the crisis and be trying hard to restore its economy to normal. Currently, Thailand has sufficient competence in the import substitution industry. Product competitiveness is relatively high in the international market, and the composition of imported raw materials is rather tiny (Achsani & Prastiwi, 2010).

Table 4. Average of 20 Horizon FEDV Values in America Base Country

		Rupiah	Ringgit	Peso	Dollar	Baht
Before Crisis	Rupiah	71.9933	2.80194	19.1288	4.96473	1.11131
	Ringgit	14.101	39.3163	37.9587	6.96652	1.65746
	Peso	30.5861	12.5567	53.6281	1.7816	1.44747
	Dollar	41.2145	8.82902	24.0678	23.3608	2.52788
	Baht	40.6143	1.45162	37.456	5.03939	15.4387
		Rupiah	Ringgit	Peso	Dollar	Baht
After Crisis	Rupiah	72.8334	2.09138	17.8553	5.89722	1.32273
	Ringgit	19.2681	45.361	28.747	4.41737	2.20653
	Peso	36.0022	10.3266	51.1287	1.33541	1.20713
	Dollar	52.7422	8.16132	18.2694	18.5036	2.32339
	Baht	43.8568	0.97593	34.8185	5.11059	15.2382

Table 4 explains the average FEDV values for the 20-time horizon, while the bold printed numbers are the average values of exchange rate variability. Based on the table above, the average variability of the rupiah's contribution and the variability of the Ringgit against itself increased in the pre-crisis and post-crisis periods. The variability of the rupiah increased by 1.9 percent, and the Ringgit increased by 6 percent. On the other hand, it is shown by the variability of the Peso and Singapore Dollar that the variability against itself has decreased by 2.5 percent and 4.8 percent, respectively. At the same time, the average variability of the Baht is relatively stable, which is in the range of 15 percent.

Another interesting object that can be discussed with the American base country both in the short and long term. Peso and Rupiah have very dominant contributions in explaining their variabilities with values ranging from 50-72 percent in a long time, which means that Peso and Rupiah can be stable in the face of economic growth, exchange rate shocks from other countries. Moreover, in the case of the Philippines, in terms of the exchange rate regime, the Philippines applies the exact exchange rate regime as Indonesia, namely the free-floating exchange rate regime. This can happen because the Philippines already had sufficient competence in the import substitution industry, relatively high product competitiveness in the international market, and a relatively small composition of imported raw materials (Achsani et al., 2009).

The next exciting object that needs to be discussed is the Singapore Dollar. Before and after the crisis contributed to its small variability, ranging from 18.2-23.3 percent. The variability of the Singapore Dollar is mainly explained by the contribution of the rupiah by 40-52 percent. This is because Singapore is a small country that depends on international trade transactions (export-import). In addition, Singapore is a country with the largest export capacity in technology and service commodities. With the most significant trading partners Indonesia and East Asian countries, it is not surprising that the rupiah more or less explains the Singapore dollar's contribution to variability.

The Analysis of Single Currency Suitability Singapore Base Country and America Base Country

Based on the discussion above, one of the criteria in ASEAN 5 countries adopt the single currency is the symmetrical shock. However, different findings appeared in line with Impulse Response Function (IRF) countries-based Singapore and countries-based America. The results of the IRF in the Singapore base country stated that Rupiah responses to exchange rate shock from ASEAN 5 countries and the exchange rate response from ASEAN 5 countries to rupiah shows that the results have almost the same patterns (symmetrical). In other words, if the rupiah is shaken, then the exchange rate of another country will be appreciated and depreciated, and vice versa. Generally, in pre-and post-crisis periods, the pattern of responses of ASEAN 5 countries in responding to Rupiah shock can be stable starting from the 10th period. This is a speedy period for a country to reach a state of stability. This means that with the convergence of exchange rates among ASEAN 5 countries, namely by creating their respective exchange rates on the Singapore Dollar, these countries will be much more stable in the face of shocks.

Meanwhile, the results of the IRF in the American base country show different findings from the IRF Singapore base country. IRF response to rupiah against exchange rate shocks from other ASEAN 5 countries and vice versa has very fluctuating and different (asymmetric) patterns. Exchange rate fluctuation between ASEAN 5 countries shows different results in response to the Rupiah exchange rate shocks. Sometimes appreciated, then sharply depreciated, then enjoyed again, there is no similar pattern. Based on before and after the fourth crisis, the exchange rate convergence in America is difficult to achieve a certain level of stability.

The Forecasting Error Variance Decomposition (FEVD) analysis results for the base country of Singapore and America have different effects. In achieving the highest cooperation, namely currency union, it is necessary to have a balanced exchange rate variability in each of these countries (approximately 50%). It means that the country's contribution to the exchange rate shock in its government must be around 50%. The rest is explained by each of the other ASEAN 5 countries. Therefore, based on Singapore's base country (Table 3) for 20 horizons, the post-crisis period reflects a more balanced contribution than the pre-crisis period. This means that the period after the crisis has a proportional impact on the *expected economic share* among ASEAN countries. Meanwhile, before and after the crisis (Table 4) for 20 horizons shows a different contribution. There is an exchange rate shock where the government itself explained below 50%.

Then we conclude that Indonesia should base its exchange rate on the Singapore Dollar rather than US Dollar. By making Singapore the base country, the similarities in trade patterns between Indonesia and other ASEAN 5 countries will be more visible. Relations between those countries can create symmetrical shocks and influence or contribute to their international trades and other economic activities. This follows the theory presented by Bayoumi and Eichengreen (1997) that groups of countries with symmetric shocks tend to have the same policy response. Therefore, there is an excellent opportunity to form a common currency area. In addition, this conclusion is also in line with the theory put forward by McKinnon (1963) that an optimum currency area is formed from countries with high trade openness. This is shown by the exchange rate between Indonesia and

other ASEAN 5 countries, which base the exchange rate on the Singapore Dollar. There is a strong interplay between them and not just a one-way relationship, but a two-way relationship.

Regional trade relations between ASEAN 5 countries and Singapore are closer than those of the United States today. This phenomenon also shows a comparative advantage in regional trade in the ASEAN 5 region, getting closer. In addition, the plan to unify this region into an Asian Single Market in 2015, which will make this region one of the main poles of the world economy apart from America and the European Union. As a result, Indonesia is more suitable to use the Singapore Dollar as a peg for its international trade relation than the Singapore Dollar.

CONCLUSION

The response and contribution of exchange rates for ASEAN 5 countries showed that the exchange rates of the other four countries appreciated at the beginning of the period before the crisis period then experienced sharp depreciation at the end of the period due to the Rupiah shock. After the crisis, both Ringgit and Baht showed a similar response before the problem. In this period, the reactions of the four other ASEAN 5 currencies to the shock of the Rupiah also showed an answer that tended to fluctuate and vary. Indonesia and the ASEAN 5 countries' responses have a powerful dependence effect. Through IRF and FEDV considerations, it was concluded that both Indonesia and other ASEAN 5 countries are more suitable to base their exchange rates against the Singapore Dollar. They have a similar trading pattern as reflected by the common trend share between ASEAN 5 countries. This study lies limitations to considering fundamental macroeconomic variables as control variables in each of the sample countries.

REFERENCES

- Achsani, N.A., Arie, J.F.A.F., and Piter, A. (2009). Keterkaitan Inflasi Dengan Nilai Tukar Riiil: Analisis Komparatif Antara Asean + 3, Uni Eropa Dan Amerika Utara. *Economic Magazine Vol.19. No 3. pp 231-260*
- Achsani, N.A., Prastiwi, T. (2010). The Feasibility of Asean+ 6 Single Currency: A Vector Error Correction Model. *International Research Journal of Finance ends Economics*. ISSN 1450-2887. Vol 37. Pp. 69-75
- Bagus, D. dan Arief, D. (2010). Penerapan Kriteria Optimum Currency Area dan Volatilitasnya: Studi Kasus ASEAN-5+3. *Bulletin of Monetary, Economics and Banking of Bank Indonesia*. April 2010 Edition. Pp. 194-222
- Bayoumi, T. and Eichengreen. (1997). Even Closer to Haven? An Optimum Currency Area index for European Countries. *European Economic Review*. Vol 41. Pp. 761- 770
- Caporale, G. M., You, K., & Chen, L. (2019). Global and regional stock market integration in Asia: A panel convergence approach. *International Review of Financial Analysis*, 65, 101381.
- Chaiphath, C. (2017). Feasibility of an optimum currency area in ASEAN-5 countries. *Kasetsart Journal of Social Sciences*, 38(2), 549-561.
- Doddy, Moch. Ariefianto dan Warjiyo. 2010. Pergerakan Bersama Mata Uang ASEAN 4 Periode 1997-2005: Suatu Aplikasi Teori Optimal Currency Area dengan Menggunakan Model Vector Error Correction. *Bulletin of*

- Banking Monetary Economics of Bank Indonesia*. October Edition. 2010. Pp. 482-514
- Elisabeth, C. R. (2018). Does Asean5+ 3 Need Common Currency? (Analysis of Optimum Currency Area Index 2008-2016). *Journal Economics & Business Atmajaya Indonesia*, 2(1), 1-12.
- Eichengreen, B.J. and Bayoumi.T. (1998). Is Asia an Optimum Currency Area? Can It Become One? Regional, Global and Historical Perspectives on Asian Monetary Relations. Working Paper Asia
- Euistina. (2007). Analisis Pergerakan Nilai Tukar Rupiah terhadap Dollar, Yen, Yuan dan Won [Skripsi]. Faculty of Economics and Management, Bogor Agriculture Institute.
- Falianty, T.A. (2006). Feasibility OF Forming Currency Union in ASEAN 5 Countries. *Research Laboratory of Economic, University of Indonesia*
- Gauchan, B., & Sarin, V. (2018). Is South Asia an Optimum Currency Area? *Journal of Economic Integration*, 33(3), 572-603.
- Girardin, E. and Alfred, S. (2008). *Regional Monetary Units for East Asia: Lessons from Europe*. No. 116. ADB Institute Discussion Paper.
- Ha, D. T. T., & Hoang, N. T. (2020). Exchange Rate Regime and Economic Growth in Asia: Convergence or Divergence. *Journal of Risk and Financial Management*, 13(1), 9.
- Hassan, I. B., Azali, M., Chin, L., & Azman-Saini, W. N. (2017). Macroeconomic linkages and international shock transmissions in East Asia: A global vector autoregressive approach. *Cogent Economics & Finance*, 5(1), 1370772.
- Kurniati, Y. (2007). Kerjasama Nilai Tukar. Elex Media Komputindo, Jakarta.
- Lee, G. H., & Azali, M. (2010). The endogeneity of the optimum currency area criteria in East Asia. *Economic Modelling*, 27(1), 165-170.
- Lee, G. H., & Azali, M. (2012). Is East Asia an optimum currency area? *Economic Modelling*, 29(2), 87-95.
- McKinnon, R.I. (1963). "Optimum currency areas." *The American Economic Review* (1963): 717-725.
- Mishra, R. K., & Sharma, C. (2010). Natural exchange rate behavior and optimum currency area in East Asia: Evidence from Generalized Purchasing Power Parity. *International Review of Financial Analysis*, 19(3), 205-213.
- Mundell, R. (1961). A Theory of Optimum Currency Areas. *The American Economic Review*. Vol. 15 No. 4: Pp. 657-664.
- Nachrowi, D. dan Hardius, U. (2006). *Econometrica*. Publisher Institute of Economics Faculty of Indonesia University, Jakarta.
- Nguyen, V. T. H. (2019, January). Exchange Rate Variability and Optimum Currency Areas: Evidence from ASEAN. In *International Econometric Conference of Vietnam* (pp. 1132-1141). Springer, Cham.
- Nguyen, V. T. H., Hoang, T. T. T., & Nguyen, S. M. (2020). The Effect of Trade Integration on Business Cycle Synchronization in East Asia. *The Journal of Asian Finance, Economics, and Business*, 7(8), 225-231. Tidak ada di body
- Ong, S. L., & Sato, K. (2018). Regional or global shock? A global VAR analysis of Asian economic and financial integration. *The North American Journal of Economics and Finance*, 46, 232-248. Ong dan Sato (2018)

- Sangaré, I. (2021). Exchange Rate Regimes in the ASEAN. *Journal of Economic Integration*, 36(1), 72-102.
- Shimizu, J., & Sato, K. (2018). A currency basket and future exchange rate arrangements in Asia. *Economic and Political Studies*, 6(1), 53-68.
- Sima, B. S. (2018). Can The ASEAN Regional Integration Lead To A Single Currency In South East Asia? *WANUA: Journal of International Relationship*, 1(2), 129-146.
- Riyanto, F. D., Erlando, A., & Haryanto, T. (2021). The Synchronization of ASEAN+ 3 Business Cycles: Prerequisites for Common Currency Union. *The Journal of Asian Finance, Economics, and Business*, 8(3), 781-791.
- Tran, L. N. H. (2018). An economic analysis of the feasibility of a potential ASEAN single currency: Exchange rate integration-A VAR Approach.
- Woldie, G. A., & Siddig, K. (2019). Macroeconomic and distributional impacts of exchange rate devaluation in Ethiopia: A computable general equilibrium approach. *Heliyon*, 5(12), e02984.
- World Bank. (2013). *World Data Bank*. <http://databank.worldbank.org/data/home.aspx>. Accessed on January 21st, 2021.
- Zerihun, M. F., & Breitenbach, M. C. (2018). Is SADC an optimal currency area? Evidence from the generalized purchasing power parity test. *Economic Change and Restructuring*, 51(2),