

## Monetary Integration and Optimum Currency Area in ASEAN+3: What We Need for a New Framework?

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**ABSTRACT:** 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, Korea, Malaysia, and the Philippine with symmetric supply shocks can create the OCA. The findings also show that both dollar and yen can be suitable anchor for these countries, but with the exception of Indonesia all other countries are better potential clients of dollar. The final point of this study described the proper arrangements that this region should set up to be successful in this transition. Proper regional exchange rate mechanism and establish supra-national organization and the regional legislation framework seems to be the most important things that this region should be focused on them.

**Keywords:** Monetary Integration; Optimum Currency Area; Currency Boards; ASEAN+3

**JEL Classifications:** F15; F36

### 1. Introduction

Before 1997, few people would have seriously advocated monetary cooperation in East Asia especially the “ASEAN”<sup>1</sup> Countries. But the East Asian crisis 1997-1998 and the fragility of financial sectors in these countries revealed the need of a new framework for the regional financial cooperation. Since that crisis, there have been a huge number of proposals to advocate for fostering ASEAN monetary and financial integration.

Establishment of currency swaps and repurchase agreement in November 1999, agreement to have a closer monetary and financial cooperation through the “Chiang Mai Initiative” in May 2000, considering the possibility of creating an “ASEAN Economy Community” (AEC) by 2015 in November 2002, and expansion of the ASEAN+3’s bilateral currency swap into “multilateralization” in May 2005 are all show some efforts of the government of these countries. Therefore, these steps are now widely envisioned to provide a significant basis for regional monetary integration with the possible formation of a single common currency.

Most economic analysts argued that the ASEAN+3<sup>2</sup> countries can be the reasonable candidates for an optimum currency area (Bayoumi et al., 2000; Lim, 2005; Huang and Guo, 2006; Lee and Azali, 2010). It seems if these countries follow the specific agenda they can satisfy major conditions and criteria for forming a single currency bloc.

The objectives of this paper are in the following aspects. First we formulate a vector autoregressive (VAR) model to evaluate the underlying shocks (domestic, regional and global) for ASEAN+3 countries to make an assessment for the feasibility of creating an optimum currency area.

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<sup>1</sup>. Association of South East Asian Nations. It contains: Indonesia, Malaysia, Singapore, Thailand, the Philippine, Brunei, Vietnam, Laos, Cambodia, and Myanmar.

<sup>2</sup>. ASEAN+3 Countries Contain: ASEAN countries + Japan, China and Korea.

According to Mundell (1961) and McKinnon (1963) -that are two seminal works on optimum currency area- the intensive for two economies to peg their bilateral exchange rate rise with the bilateral intensity of trade, flexibility of factor markets and symmetry of underlying shocks. However, it is generally accepted that the correlation of shocks is the most important criterion in a country's decision to join a currency union (Huang and Guo, 2006). Mundell (1961) argued that countries facing positively correlated economic shocks (symmetric) will be better for making a currency union, because they would allow the use of the same policies to adjust any imbalances. Second we want to find the currency bloc which is more suitable for ASEAN+3 countries. Finally this paper will suggest a framework that the ASEAN+3 countries need to follow to extend the economic integration among them and make a monetary cooperation lead to a single common currency.

The reminder of the paper organized as follows. Section 2 describes the academic background of the subject. Next section details the specification of our VAR model. Section 4 shows our empirical findings. And finally, summary and conclusion remarks end this paper.

## **2. Academic Background**

However, John Stuart Mill knew the idea of choosing peculiar currency with all independent countries as a barbarian reflection and said:

“So much of barbarism, however, still remains in the transactions of most civilized nations, that almost all independent countries choose to assert their nationality by having, to their own inconvenience and that of their neighbors, a peculiar currency of their own” (quoted in Mundel, 2005:466).

Or, Cesarano (2005) and Dellas and Tavlas (2009) have believed that the Mundell's theory of optimum currency area is the other trying to advocate the Friedman's flexible exchange rate by the early 1950s, but as Bayoumi and Eichengreen (1997) stated, serious work on this subject started by semantic paper of Mundell (1961) and continued by two brilliant papers by Mckinnon (1963) and Kenen (1969).

Mundell (1961) argued that the optimum currency area (hereafter OCA) is a region not the world. He proposed three criteria in his paper for OCA:

1. Factor mobility.
2. Price flexibility.
3. Symmetry of underlying shocks.

The elimination of borders among countries would not mean an OCA established. A single currency area needs a single central bank and regional monetary and fiscal policies.

McKinnon (1963) developed the idea of openness of the economy as a new criterion that should be added to the Mundell's criteria. He argued if a shock changes the relative tradable non-tradable price, the exchange rate will be changed, and then the general price level that includes both tradable and non-tradable prices will be fluctuated more in the relatively open economy, so the openness affecting the economic policies. He believed this idea should be modified the OCA can affect external prices.

Kenen (1969) proposed diversification to the theory of OCA. He argued in the presence of factor mobility among countries, the countries with similar structures of production are more suitable candidate to establish an OCA. It seems in the well-diversified economies, sector-specified shocks affect them symmetrically.

After these seminal papers that made a framework for the theory of OCA, the theory changed as a serious and debatable academic subject. In this part we want to describe some of important articles that have been written in this area of study.

Bayoumi and Eichengreen (1997) developed a procedure to find the relationship between OCA and the volatility of nominal exchange rate. They argued that nominal interest rate can provide a better and of course easier benchmark for comparison. He found that economic integration make the countries of the region ready to increase their bilateral trade and accept the monetary integration.

Frankel and Rose (1998) employed a cross-country covariance of output to found the impact of integration (reducing the barriers) on business cycles. They argued that because the effect of integration on business cycle is ambiguous, we should resolve it empirically. There finding showed that “countries with closer trade links have tightly correlated business cycle”. On one hand, countries with “symmetric cycle” are more suitable to make an OCA. They argued that however, European data

shows that some of these countries can be poor candidate for entry to OCA, but due to highly correlated business cycles shaping OCA in Europe can be acceptable.

Bayoumi et al. (2000) analyze the ASEAN+3 countries to form an OCA. They employed the methodology of Bayoumi and Eichengreen (1994) and after analyzing and comparing the ASEAN+3 countries with EMU, they argued that however these countries are less suitable to form an OCA but they are not significantly in worse position than the EU before the Maastricht Treaty. They believed that the most important condition to shape an OCA is political rather than economical, thus commitment of each countries can have the important role for this attempt.

Frankel and Rose (2002) employed the well known gravity model to find the impacts of common currencies on trade and income. They used the data of over 200 countries and dependencies. Their model is based on Mankew, Romer, and Weil (1992). They found that currency union has a large impact in creating trade. On the other hand, countries belonging to this union are more open than the other countries. This indicates that the currency union should include important trade partners, because the magnitude of this effect is depend on the countries in the union. They also found that openness has a linear positive and significant effect on income per capita.

Chow and Kim (2003) investigated the feasibility of an OCA in East Asian Countries by employed a three-variable VAR model with global, regional and local outputs. They assumed that regional and local shocks do not have any long run effects on global output and local shock do not have any effects on regional output. On the other hand, local countries are small in the region and region is small on the global economy. The results showed that based on the OCA indicators, it is costly for East Asian Countries to form a common currency union.

Zhang et al. (2004) employed a three-variable structural VAR model to test the symmetry of structural shock in East Asian Countries. They focus on this criterion to analyze the feasibility of forming OCA in the above countries. They found that the estimation results do not show that East Asian Region has viability to form an OCA.

Khamfula and Huizinga (2004) employed a Generalized Auto-Regressive Conditional Heteroscedasticity (GARCH) Model to investigate whether a monetary union is viable among the Southern African Development Community (SADAC). They found that there is a strong asymmetry of real exchange rate shocks among most of the SADAC countries. On the other hand they found that the volatility of real exchange rate of SADAC members is more in the long run than short run. Thus, they summarized that based on the above criterion the SADAC countries cannot form a monetary union.

Lim (2005) used three different methods to test the viability of OCA in East Asian region. Co-movement of prices, test for converging currency trend, and co-integration analysis are these methods. The result of the first method indicated that except Indonesia all other East Asian countries have co-movement with both dollar and yen. In other word, both dollar and yen can be suitable anchor for these countries. He also found from the currency converging test that at least the currency of five countries namely Hong Kong, Indonesia, Malaysia, the Philippine and Thailand move at a constant rate from the yen. Co-integration method showed that apart from Hong Kong none of the East Asian countries had a long run relationship by yen.

Buigut and Valev (2005) employed a simple two-variable VAR model assessed the suitability of the East African Countries (EAC) to forming a monetary union. At first they found that due to high trade link with euro zone, pegging a common EAC currency to the euro can be beneficial. The results of the VAR analysis indicated that the shocks among EAC are asymmetric. This means EAC countries are the poor candidates to forming an OCA.

Huang and Guo (2006) employed a four-variable structural VAR model to make an assessment of the viability of creating an OCA in East Asia. There results showed that the 1997 financial crisis may help ASEAN countries to improve the correlation of supply shocks in the region. The findings also support that Japan has a leading role in the capital markets in East Asia. There founding confirmed Bayuomi and Eichengreen (1994) that argued whole of this region does not have enough readiness to form an OCA. They proposed that at first Korea, Hong Kong, Indonesia, Malaysia, Singapore and Thailand create a currency union.

Zhang et al. (2008) focused on the shocking aspect (only internal shocks) of monetary union. They wanted to analyze the feasibility of "Grater China" (Chinese trio: Taiwan, Hong Kong, and Mainland China) to move toward a currency union. They employed a three-variable VAR model including real effective exchange rate (demand shock), money supply (monetary shock), and real

output (supply shock). Results showed that increasing the symmetry of shock among Great China makes it possible that the Chinese trio to create a currency union.

Zhao and Kim (2009) used a three variable structural VAR to modeling the national outputs determined by three different shocks to find if CFA franc zone is an OCA. They employed the model that developed by chow and Kim (2003) in which the domestic output affected by global, regional and domestic shocks. They use the regional shocks as a suitability key indicator of a country to join in an OCA. The results showed that among the members of the CFA franc zone there is a little convergence in the economic structure. It means that creating an OCA is costly in this zone.

Lee and Azali (2010) employed a system of Generalized Method of Moments (GMM) approach to test the endogeneity of OCA criteria in East Asia. The results showed that increased in trade among the region can lead to more synchronized business cycle. They also found that there is a scope for “ASEAN-5 plus 3” to form a monetary union.

### 3. Structure of the Model

After brilliant work of Sims (1980), vector autoregressions (VARs) have become the most important toolkit to analyze empirically the multivariate time series. He developed VAR as an alternative to the traditional simultaneous equation systems. As Sims (1980), Milles (1998), Stock and Watson (2001), and others described VARs providing a reasonable approach to summarize data, data description, forecasting and policy analysis. It means that VARs can cover all the things that we need to do in macroeconomics. On the other hand, VAR can help to estimate the effect of unpredictable disturbances in the economy, too.

Sims (1986), Bernanke (1986), and Blanchard and Quah (1989)’s structural vector autoregressive (SVAR) are among the first models that underlying the structural shocks. After these seminal papers Bayoumi and Echingreen (1993) employed a variant of this model to deal with the issue of macro disturbances through the econometric estimations.

As we described in the academic background, the empirical literatures on the OCA mostly are based on the small-scale VARs. Stock and Watson (1996) argued small-scale VARs are often unstable and poor predictors of the future. In this paper we employ a ten-variable VAR model to examine the correlation and the size of the disturbances. As we know countries by small size and more correlated of disturbances are better candidates for OCA. We developed Chow and Kim (2003)’s model. In our study we consider three types of shocks: internal, regional and global. The regional shocks affect the area countries from the inside of that area but the global shocks affect the countries from outside of the area. On the other hand, we consider three external regional and three external global shocks that affect the economy - supply shocks, demand shocks and monetary shocks. Internal shocks can be divided into supply shocks, demand shocks, monetary shocks and financial shocks. So our model can be written as:

$$x_t = (y_t^g, p_t^g, i_t^g, y_t^r, p_t^r, i_t^r, y_t^d, p_t^d, i_t^d, e_t^d)' \quad (1)$$

where  $y$  is the output,  $p$  shows the price level,  $i$  is the interest rate, and  $e$  is the real exchange rate. The superscripts  $g, r, d$  refer to global, regional and domestic, respectively. Our structural model can be written as:

$$x_t = A(L)\varepsilon_{jt}^k \quad k = g, r, d ; j = S, D, M, F \quad (2)$$

where  $\varepsilon$  shows different types of serially uncorrelated and orthonormal shocks and the subscript  $j = S, D, M, F$  shows supply, demand, monetary and financial shocks, respectively.  $A = [A_{ij}(L)]$  is a  $10 \times 10$  matrix that defines the impulse response of the endogenous variables to the structural shocks. Thus:

As we know to identify this model, it is necessary to impose 45 restrictions on the structural model<sup>3</sup>. Thus for the structural model we have the following restriction:

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<sup>3</sup>. If  $n$  shows the number of variables in the VAR model then for identifying the structural model from the estimated model, we need to impose  $\frac{n^2 - n}{2}$  restrictions on the structural VAR.

$$A_{ij} = 0; \quad \forall i < j$$

The reduced form of VAR model for estimation is as follow:

$$x_t = B(L)x_{t-1} + \xi_t \quad (3)$$

where in the above equation  $\xi_t$  is the vector of reduced form error term<sup>4</sup>.

#### 4. Empirical Results

In this part we estimate and report our results. This part accomplishes two main objectives. First, with respect to correlation of supply shocks –which is obtained from estimating our VAR model among ASEAN+3 countries, we examined whether creating an OCA is viable to sustain or not. As we know if the supply shocks are highly correlated or symmetric (positive impact) within the region i.e.  $corr(\xi_{jt}^y, \xi_{it}^y) > 0; \forall i, j$ , then this region can be a proper candidate for a currency union. Second, by using the correlation between regional and global supply shocks among countries we want to find that which currency bloc (yen or dollar) is more suitable for this area? If the global supply shocks are relatively more important than regional ones then forming a \$-bloc may be a better policy choice than yen-bloc. On the other hand, a high (low) correlation of supply shocks between the home and the anchor country suggests that the economies are subject to symmetric (asymmetric) shocks are good (poor) candidate for a currency union (Chow and Kim, 2003)<sup>5</sup>.

##### 4.1. Data Description

We use quarterly data from the first quarter of 1993 until fourth quarter of 2010. The availability of data in our scope countries -especially china- influences our choice of sample period. We collected our data from data stream. As we already mentioned the scope countries are ASEAN-5+3 (hereafter AMFPT) which contain Indonesia, Malaysia, Singapore, Thailand, the Philippine, Japan, Korea, and China (main land). We begin our analysis by examining the integration of our data. We used the Phillips-Peron test. This test shows that except interest rate in Japan and GDP in Indonesia which are stationary i.e.  $\sim I(0)$ , it is impossible to reject the null hypothesis of one unit root for each of our series i.e.  $\sim I(1)$ .

##### 4.2. VAR Estimation:

We estimate separate VAR model to find the correlation of the underlying supply shocks. The number of lags in the model is equal to one and based on the Shwartz-Baysian Information Criterion. The stability test represent that all of our VAR estimation for each countries have fulfilled this properties.

##### 4.3. Main Findings:

From this point on, we want to estimate and analyzing the underlying of the supply shocks and the correlation between these shocks within a VAR model. As we have already described if the correlation is positive then we have symmetric shocks, on the other hand, if the correlation is negative or zero then the shocks are categorized as asymmetric.

We start with domestic supply shocks among countries. Table 1 displays the cross-correlation of the supply shocks for AMFPT.

The results show that the correlation among Japan, China, Korea, Malaysia, and the Philippine are symmetric. The first important finding is that all the countries in this region cannot shape an OCA. Singapore and Thailand have different types of monetary policy. The Monetary Authority of Singapore (MAS) is the central bank of Singapore and carried out a full range of central banking functions. The MAS uses the intervention operation in the foreign exchange markets as its instruments to achieve the final goal of central bank that is price stability. Bank of Thailand (BOT) accepted the IMF program in May 2000. The main property of this program is inflation targeting. It seems this program have changed the monetary transmission mechanism. However, the inflation targeting allows the monetary policy to manage the impact of internal and external shocks on the Thai economy. Indonesia has growth experiences that are sufficiently different from the other countries. High level of inflation is another property of this country.

4. For more details, see: Moosavi (2011).

5. Statistically if  $corr(\xi_t^g, \xi_{it}^d) > corr(\xi_t^r, \xi_{it}^d); \forall i \Rightarrow$  \$-bloc is more suitable.

**Table 1. Cross Correlation of Supply shocks: AMFPT Countries**

Countries	China	Indonesia	Korea	Malaysia	Philippine	Singapore	Thailand
China	1.00000						
Indonesia	0.21580	1.00000					
Korea	0.28519	0.07306	1.00000				
Malaysia	0.48535	0.29837	0.37378	1.00000			
The Philippine	0.73302	-0.00826	0.50021	0.21605	1.00000		
Singapore	-0.17477	0.24472	-0.06996	0.18744	-0.20551	1.00000	
Thailand	0.49101	-0.34214	0.36193	-0.04042	0.70772	-0.18525	1.00000

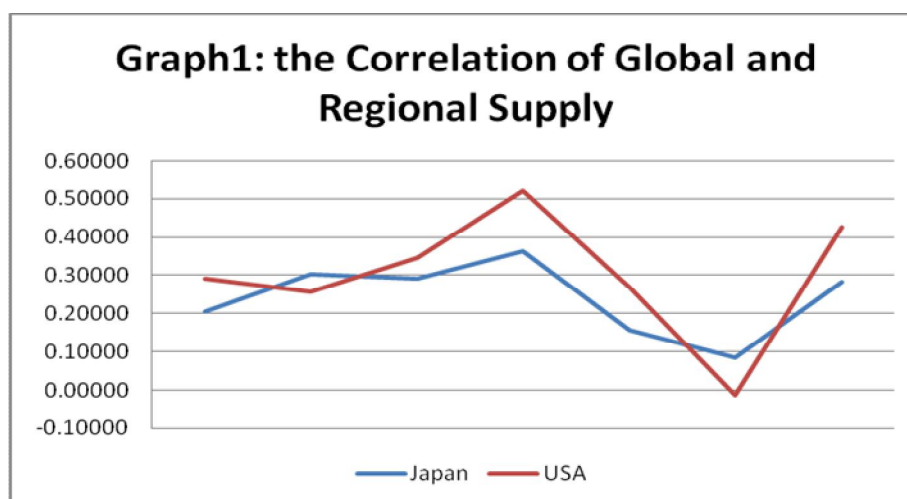
The above analysis and based on OCA theories, creating a common currency area among all of AMFPT countries is costly and difficult to sustain. This finding supports Chow and Kim (2003). But as it seems East Asian Countries are the most suitable to create the second serious OCA. We propose that the five countries called Japan, China, Korea, Malaysia, and the Philippine with symmetric supply shocks make a sub-area that accepts to create a single currency area. At first they should peg their exchange rate in the OCA and float with the rest of the world. The other countries in the area should form a currency union (or currency board) -like CFA franc zone- but in the zone of the first sub-area. These countries should recover their economy and wait until to be a good candidate to join the OCA.

Now we want to find the best bloc for this area. Table 2 and gharph1 show the regional and global correlation in the region.

**Table 2. Global and Regional Correlation of Supply Shocks:**

Countries	China	Indonesia	Korea	Malaysia	Philippine	Singapore	Thailand
Japan(Regional)	0.28309	0.08455	0.15503	0.36421	0.29219	0.30294	0.20568
USA (Global)	0.42661	-0.01323	0.26800	0.51972	0.34584	0.25683	0.29064

Perhaps the most striking result of table 2 is the negative Indonesia-USA correlation. As we can see both dollar and yen can be suitable anchor for these countries, but with the exception of Indonesia all other AMFPT countries are better potential clients of dollar. This finding supports Alesina and Barro (2001) and Lim (2005). On the other word, the higher correlation between the USA and the AMFPT countries show that the US dollar can be a better anchor for an optimum currency union. However, the Regional correlation of supply shocks is positive, too. It means yen can be the second best potential client.



But as we know the fluctuations in the yen-dollar exchange rate is the most important source of disturbances in this area (Kwan, 1994). On the other hand, most of the AMFPT countries have small and open economy and foreign exchange market can be the most important source of shocks. Due to this problem we strongly recommended that the region should peg their common currency to the basket of the most important potential anchor: dollar, yen, and euro. It can help to reduce the impact of probable international shocks in this OCA.

## **5. What AMSPT Needs to do?**

This part describes a framework that can be used by AMFPT to organize this transition. The structure of this framework is based on three objectives.

### **5.1. The Regional Exchange Rate Mechanism:**

As we have already mentioned all countries in this region cannot shape an OCA. The most suitable sub-region contains: Japan, China<sup>6</sup>, Korea, Malaysia, and the Philippine. These countries should create the OCA with a single currency and peg their exchange rate in the sub-area to the basket of the most important currencies (dollar, euro, and yen) and float their common currency to the rest of the world. The second sub-region can be the trio of Singapore, Thailand, and Indonesia. The economic level of these three countries is nearer to the first sub-region. It seems that they can join to the OCA sooner than the other countries. This trio should form a currency boards (lock local currencies to the common currency of the first group) in the zone of the first sub-region. The third sub-region contains: Brunei, Vietnam, Laos, Cambodia, and Myanmar. These countries have growth and development that are sufficiently different from the above duet sub-regions. These countries again can form a currency boards or dollarized<sup>7</sup> their currencies and used the common currency of the first sub-region.

### **5.2. The Regional Institutional Arrangements:**

The accurate and strong regional institutional arrangements for managing and organizing this important transition are the other important things that this area needs. As we know countries with different level of growth and development -like AMFPT- need a high capability with designing a very efficient management to conduct fiscal and monetary policy of the region. Seigniorage<sup>8</sup> (government revenues from money issuance), commitment to accept the single currency, commitment to stay in the region, commitment to removing their barriers (factors and goods mobility in the region), regional fiscal and monetary policies cooperation, all in all are the things that need the supra-national organizations. As we have already mentioned AMFPT countries have different level of growth and development and integration of such countries need to design a very strong and efficient conductor.

### **5.3. The Regional Legislation Arrangement:**

Like a country the currency area needs rules, laws and different types of act. A legislation parliament can be the only legal place to create these rules and laws.

## **6. Conclusions**

After the crisis 1997-1998 and the financial fragility of this region, the perspective of the East Asian countries about economic integration completely changed. They accepted that this region needs to develop and foster the idea of monetary integration among these countries. There are pros and cons for the viability of AMFPT to make the second OCA. Some of the scholars in this field of study argued that the AMFPT countries shape the most suitable region to create the second OCA in the world (Bayoumi et al., 2000; Lim; 2005, Huang and Guo; 2006, Lee and Azali; 2010). On the other hand, we can find some studies that their results show these area does not have enough viability to form a single currency union. (Chow and Kim; 2003, Zhang et al., 2004).

This study developed the Chow and Kim (2003)'s model. We employed a ten-variable VAR model and based on it we consider three groups of shocks: three external global shocks, three external regional shocks and four internal (domestic) shocks to focus on two important objectives. At first we

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<sup>6</sup>. Studies show that Chinese trio (mainland, Taiwan, and Hong Kong) can make a currency union (Zhang et al., 2008). Thus it would be possible to expand the first sub-region to Grate China.

<sup>7</sup>. As we know dollarization means use of another countries currency that may not be the US dollar.

<sup>8</sup>. Buitier (2000) argued when a country accept to be a member of an OCA, it loses the national seigniorage. Thus, this country should gain a proper share of the regional seigniorage.

evaluated the underlying shocks to find the feasibility of forming an OCA in AMFPT region. Then we find the most suitable currency bloc for this region.

The results from the correlation of supply shocks show that forming an OCA for all of the countries in the region is costly and difficult to sustain. We categorized this region into three sub-regions. At first, five countries called Japan, China, Korea, Malaysia, and the Philippine with symmetric supply shocks can create the single currency area. The rest of the countries in the region should accept to form a currency boards in the zone of the above single currency. It seems the remaining countries also should be categorized into a duet sub-region. Thus the second sub-region contains Singapore, Thailand and Indonesia that show more harmony with the first five countries. The third sub-region that has growth and development that is different from the former sub-regions contains: Brunei, Vietnam, Laos, Cambodia, and Myanmar.

The findings also showed that both dollar and yen can be suitable anchor for the region. But due to higher cross-correlation between global and domestic shocks we proposed that dollar must be the first best choice. But again and because the foreign exchange market can be the most important source of international volatility, we strongly recommend that these countries use a basket of dollar, yen and euro as there anchor.

The final point of this study described the proper arrangements that the AMFPT countries should set up to be successful in this transition. Proper regional exchange rate mechanism and establish supra-national organization for conducting policies and the regional legislation framework seems to be the most important things that this region should focus on them.

Obviously, as many of the scholars in this field of study argued the most important reason for a monetary union to accept an OCA is a political rather than economical process (Bayoumi et al., 2000; Frankel and Rose, 2002). Thus, it seems the time to build the second OCA in the world is reached, and as we have already mentioned the AMFPT countries can be the most suitable region for it.

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