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The Regionalization of the RMB in Southeast Asia:

Coupling or Decoupling of Local Currency/Dollar Exchange Rates with the RMB/Dollar Exchange Rate*

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Ⅰ. Introduction

Since the early 2000s and especially after the global economic crisis of 2008, China's neighboring economies have gradually endorsed the Renminbi (RMB) as a medium of exchange for international payments (Cheng & Zhang 2011; Wang & Li 2006). Thus, a sizeable amount of RMB is believed to be circulating in Southeast Asia, especially in the region bordering the Chinese mainland—the so-called Greater Mekong Sub-region (GMS). China's growing geopolitical strategic interests in ASEAN and accelerating economic integration between the two has paved the way for the RMB's circulation throughout Southeast Asia.

As a result, residents in these countries would usually have increased

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their holdings of the RMB to shield the real values of their wealth. The RMB is used along with domestic currencies in these countries as a means of payment, a unit of account, and a store of value. Thus, mainly in the context of ASEAN economies, RMB internationalization[1], perhaps better described as *RMB regionalization*, has been prominent and has drawn the attention of many studies in recent years both at home and abroad (Cohen 2012; Cheng & Zhang 2011; He 2007; Gao & Yu 2009; Li 2010; Liu 2011; Liu & Xu 2003; Park & Song 2012; Peng & Shu 2010; Song & Song 2012; Wang & Li 2006; Wu 2009).

Trade between China and ASEAN, the primary driving force of RMB regionalization, has continued to boom. During 2011, ASEAN's total exports to China grew by 86 percent (US$141.8 billion in total), and ASEAN's total imports from China grew by 63 percent (US$166.8 billion in total) compared to 2010. If we acknowledge a large increase in the border trade between China and GMS countries like Laos, Myanmar, and Vietnam, then China's trade with ASEAN has been much larger than the official statistics show. If we assume that regionalization of the RMB in ASEAN and economic integration between China and ASEAN

1) An international currency is one that is used outside its home country. The classical three functions of money domestically—a medium of exchange, a store of value, and a unit of account—can be transferred to the level of international money. For example, over the last a few decades, developing and transitional economies have usually increased their holdings of foreign currencies, i.e., the U.S. dollar, to shield the real values of their wealth. U.S. dollars are used along with domestic currencies in these countries as a means of payment, a unit of account, and a store of value. Thus, mainly in the context of developing and transitional economies, the dollarization phenomenon has been prominent and has drawn the attention of many studies over the last two decades (Ra 2007; Kompas & Suiwah 1999; Leung & Ngo 1999; Sahay & Végh 1996; Agénor & Khan 1992; Clements & Gerd 1992; Giovannini & Turtleboon 1992; Guidotti & Rodriguez 1992). Based on the previous research, theoretical and empirical studies on the international use of the RMB can be performed.

is positively correlated, we can model the movement of local currency/dollar exchange rates of ASEAN countries vis-à-vis the RMB/dollar exchange rate.

Adopting autoregressive equation analysis, we examine whether local currency/dollar exchange rates move together with the RMB/dollar exchange rate in a way that implicitly shows the realization of RMB regionalization in the region. Also, we examine whether GMS countries show more sensitivity to the RMB/dollar exchange rate compared to other ASEAN countries, which would imply a degree of sensitivity are proportional to the degree of integration of the economy in question with China. The proportions of trade with China to total are 16.5%, 31.6%, and 19.6% respectively in 2011. These figures outnumber those of the other 7 ASEAN countries (7.5% for Brunei, 15.6% for Cambodia, 12.9% for Indonesia, 13.1% for Malaysia, 11.2% for the Philippines, 10.4% for Singapore, 12.7% for Thailand).[2)]

Actually, we can find plenty of literature on the relationship between exchange rate policies and currency substitution, usually dollarization.[3)] However, there are few theoretical and empirical studies to explain the relationship between exchange rate policies and RMB internationalization, or regionalization. To our knowledge, this study is the first to examine this relationship regarding the RMB.

Our empirical results present co-movements (coupling) of local currency/dollar exchange rates with the RMB/dollar exchange rate before the global financial crisis (2005.8-2008.6). The coupling of two

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2) The numbers are calculated from <TableA1> of <Appendix1>.

3) Baliño, Bennett, & Borensztein 1999; Berg & Borensztein 2000a, 2000b; Calvo 1985; Calvo & Végh 1992; Ra 2007; Rojas-Suarez 1992; Savastano 1996.

exchange rates may imply ASEAN countries manage their local currency/dollar exchange rates proportionately to a change the in RMB/dollar exchange rate to stabilize the effective exchange rate. Conversely, the movements of the two have become decoupled since the crisis (2010.7-2012.6). For this, we can say that the governments of ASEAN have intervened in the foreign exchange market to manage their local currency/dollar exchange rates inverse proportionately to the change (appreciation) in the RMB/dollar exchange rate to promote exports in order to overcome the global economic recession, especially since 2011. It may be mainly due to competition with Chinese commodities in both domestic and world markets.

Thus, this may imply the priority of the governments of ASEAN in terms of exchange rate policy has changed from the maintaining of stability of exchange rates to the promoting of price competitiveness after the global economic crisis. Furthermore, the phenomena of coupling and decoupling were more evident for GMS countries in order to reveal that RMB regionalization and price competition are more severe for these countries.

In the next section, we briefly overview the current situation of RMB regionalization, its past and prospects, and the theoretical reasoning of ASEAN's exchange rate policy regarding on RMB regionalization. In Section 3, we propose a model for an analysis on the effect of RMB regionalization on the exchange rate policy of ASEAN countries. Also we examine data for an estimation of this effect. Section 4 presents the empirical results from the estimations and suggests several implications. Finally, section 5 summarizes the main findings and presents a conclusion.

Ⅱ. RMB regionalization and exchange rate policy

As mentioned above, RMB regionalization for ASEAN is basically attributed to the rapid expansion of trade between China and ASEAN countries. It is natural that an increasing amount of trade facilitates the use of the RMB in settlements on a large scale. RMB use in international trade settlements dates back to the early 2000s between China and some adjacent ASEAN countries.

For example, based on the statistics for Yunnan Province from 2001 to 2003, the RMB has already been playing a crucial role in settlements for bilateral trade between China and Vietnam, Laos, and Myanmar (Liu & Xu 2003). Also, as a result of the rapid growth of China's trade with its neighboring countries, the amount of RMB circulation in Vietnam, Laos, Myanmar, and Cambodia has multiplied since 2000 (Yu & Gao 2009). Table 1 shows the trend of RMB settlements in these countries. In particular, the percentage of RMB use in these countries was quite large for imports. For Myanmar, the percentage of RMB use for imports reached almost 80% in 2003.

Table1. RMB use in trade settlements

	Import (%)			Export (%)		
	2001	2002	2003	2001	2002	2003
Laos	29.1	37.4	54.6	5.9	3.5	6.2
Myanmar	49.6	59.9	78.7	16.1	12.3	10.7
Vietnam	28.3	48.0	51.5	21.8	11.8	10.4

Source: Liu & Xu 2003, p142-143.

Table 2 shows the proportions of RMB deposit volumes in GMS countries to China's circulating cash from 1992 to 2004. The number increased rapidly at the beginning of the 2000s. Thus, even though updated data are not accessible, after almost a decade, we predict that the percentage would be much larger than before. The RMB has gained its reputation in surviving the global financial crisis, and hence countries are confident in the RMB and are willing to hold it as their primary foreign exchange.

Table2. The proportion of RMB deposit volume in GMS countries to China's circulating cash

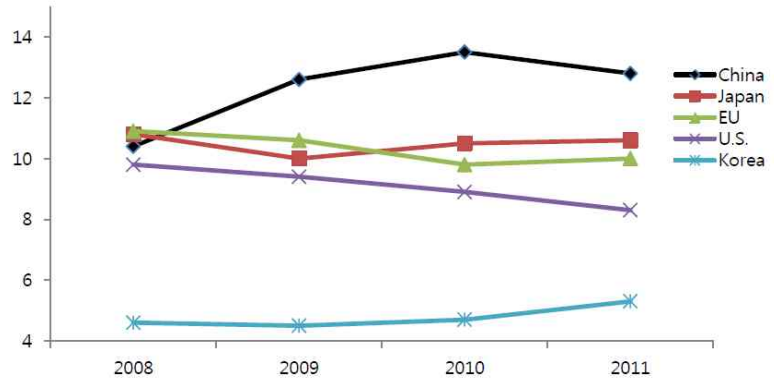
Year	1992	1994	1996	1998	2000	2001	2002	2003	2004
Proportion (%)	0.0	0.016	0.035	0.072	0.065	0.109	0.130	0.138	0.157

Source: Wang & Li 2006. p.1,711.

Since 2009, China has become the largest trade partner to ASEAN. <Figure1> shows ASEAN's major trading partners in recent years. The proportion of trade with China rose from 10.4% of total trade in 2008 to 13.5% in 2010, before dropping to 12.8% in 2011. Japan, the EU, and the U.S. are the next highest ranked trading partners, respectively.[4] In particular, in 2009, right after the global financial crisis, only the proportion of trade with China increased, implying RMB regionalization accelerated during this period.

4) <TableA1> of <Appendix1> presents major trading partners and their ranks for each ASEAN country.

<Figure1> Trend of ASEAN's major trading partners (%)



Source: Direction of Trade Statistics, July 2012, IMF.

Adding the large increase in border trade between China and GMS countries, the trade between the two regions is believed to have been much larger than the official statistics reveal. In particular, since the China-ASEAN FTA became effective in January 2010, there is little doubt that a reduction in tariffs and commercial barriers occurred, and closer economic relations between the two sides were established. Since the FTA took effect, there has been a phenomenal increase in trade between China and ASEAN.[5] Thus, as can be expected, the expansion of trade between China and ASEAN would be accompanied by a remarkable increase in settlements using the RMB.

For example, during the first six months of the *RMB pilot program* in

5) The effects of the FTA on additional trade creation are reinforced by the growing influence of ethnic entrepreneurs, their family businesses, conglomerates, and networks, which play a significant role in the regional economic integration of China and ASEAN. It is known that no less than a 60% increase in bilateral trade in differentiated products between countries in ASEAN was assigned to ethnic Chinese networks in the 1990s (Rauch & Trindade 2002).

2009,[6] the share of RMB invoicing registered was less than 0.3% of China's total trade. However, in 2010, it shot up to almost 2.5% (PBC 2011, January 30). Actually, RMB regionalization has been driven by strategic considerations of the Chinese government to consolidate and promote China's economic and political interests in Southeast Asia by helping to make the RMB widely used as another anchor currency in the region. Furthermore, this development may have prompted the internationalization program to legalize and better control its offshore holdings of the RMB. The pilot program has been shown to further stimulate and broaden its area of use in Southeast Asia.

Also, with the expansion of RMB use in international trade settlements, attempts to promote RMB regionalization in international financial markets have been made as well. Although being reluctant in opening financial and capital markets, China has created an offshore market in Hong Kong for issuance of RMB bonds and has developed international monetary cooperation. In September 2009, RMB-dominated sovereign

6) In 2009, the Chinese government launched a so-called Pilot Program for RMB settlement, starting from Shanghai, Guangzhou, Shenzhen, Zhuhai, and Dongguan. Up to the end of 2009, there had been 409 transactions using the RMB in settlements. The total amount was 3.58 billion Yuan. Since June 2010, the areas which could conduct trade settlements with the RMB expanded from the five aforementioned cities to 20 provinces/municipalities. Under the Pilot Program, any foreign trading firm can receive the RMB as the settlement currency when it exports to a Chinese enterprise in the pilot region. And if a foreign firm wishes to pay in RMB for imports from China, its Chinese trading partner must be among the designated enterprises in one of the pilot regions (BBVA research 2011). The number of companies using the RMB in trade settlements has increased from 365 companies to 67,724. At the end of 2010, there had been more than 500 billion Yuan conducted in trade settlements, estimated at 2% of the total amount of international trade. It was 48 times more than the amount in the previous year.

bonds amounting to RMB 6 billion were issued in Hong Kong,[7] following a previous semi-public issuance of RMB bonds by five state-owned Chinese banks, HSBC, Asian Development Bank, and even multilateral companies.[8]

In addition, China has signed bilateral currency swap program agreements with eight economies[9] and actively participates in the Chiang Mai Initiative (CMI), which provides fundamental agreement on bilateral currency swap exchanges of up to 240 billion dollars.[10] China has reached agreements involving 76.8 billion dollars. The issuance of RMB-dominated bonds and bilateral currency swap agreements allow for the financial market participants and the parties of treaties to swap the RMB with their own currencies to be able to use the RMB more conveniently and efficiently for international financial transactions,

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7) Hong Kong plays a primary role in practicing RMB internationalization. Hong Kong has developed a well-operated RMB settlements system. It has the highest percentage of RMB amounts abroad and the highest variety in functions for the RMB.

8) China Development Bank launched about 5 billion Yuan in bonds in Hong Kong in 2007. In the following two years, China's financial institutions—including the Export-Import Bank of China, Bank of China, China Construction Bank, and Bank of Communications—have sold more than 20 billion Yuan bonds. In 2009, the Bank of East Asia (China) and HSBC (China) launched 5 billion Yuan bonds in Hong Kong. The Ministry of Finance also launched 6 billion in national debt in Hong Kong in the same year. In 2010, various institutions have launched 35.86 billion Yuan in bonds in Hong Kong, which accounts for about 50% of the grand total circulation of RMB bonds since 2007. Apart from the banks in mainland China and Hong Kong as the main participants, the international financial institutions like Asian Development Bank and companies like McDonald's Cooperate also raise funds by launching RMB bonds.

9) South Korea (2008, 180 billion Yuan), Hong Kong (2009, 200 billion Yuan), Malaysia (2009, 80 billion Yuan), Belarus (2009, 20 billion Yuan), Indonesia (2009, 100 billion Yuan), Argentina (2009, 70 billion Yuan), Iceland (2010, 3.5 billion Yuan), Singapore (2010, 150 billion Yuan)

10) In May 2012, ASEAN+3 (China, Japan, and South Korea) agreed to double the size of the Chiang Mai Initiative, the swap line that can be tapped in times of financial crises, to 240 billion dollars from 120 billion dollars.

resulting in more rapid internationalization of the RMB.

Regarding exchange rate policies, which are the main concern of this paper, we argue that with fast growing trade with China and rapid expansion of RMB regionalization, the weight of the RMB in the baskets for managing exchange rates of ASEAN countries will increase. Other things being equal, the increase in RMB weight would result in closer movements of exchange rates vis-à-vis the RMB. For example, in response to the appreciation of the RMB against the U.S. dollar, ASEAN governments need to increase the value of local currencies against the dollar to stabilize their nominal effective exchange rates (Park & Song 2011).

However, in spite of ongoing RMB regionalization, the priority of exchange rate policy is placed on prompting price competiveness to increase exports. In particular, to cope with the global economic recession, ASEAN countries have been carrying out expansionary economic policy to boost their economies. Considering the growth of ASEAN economies has relied heavily on exports, we believe that ASEAN countries manage their exchange rates to maintain price competitiveness. Because China became the largest trade partner to ASEAN, it could bring about the depreciation of exchange rates against the RMB as well as the U.S. dollar. In particular, when the global economic recession intensified in the beginning of 2011, the local currency/dollar exchange rates showed a trend of depreciation in many cases for ASEAN countries.[11] If we follow the reasoning, the movements of exchange rate would be opposite or at least different with the previous case (coupling).

11) See <FigureA2> in <Appendix2>.

For exchange rate regimes, we may say that, overall, ASEAN countries manage their exchange rates against their trade-weighted baskets to stabilize their real effective exchange rates, and intervene in foreign exchange markets to fulfill their policy goals when it is necessary (Ma & McCauley 2010; Nasution 2010). According to the <FigureA1> and <FigrueA2> of <Appendix2>, it seems for Cambodia, Laos, Myanmar, and Vietnam to implement more rigid managed exchange rate schemes (a tight basket pegging system). Acknowledging that exchange rates are not decided freely in the market, we assume that ASEAN countries manage their exchange rates for certain policy objective of governments.

In the next section, we present a model and estimates to examine whether increases in intra-regional trade and RMB regionalization has reinforced the coupling of local currency/dollar exchange rates against RMB/ dollar exchange rates, or whether the integration of two economies brings about more fierce price competition which usually attributes to upholding the depreciation policies of ASEAN countries.

Ⅲ. Model and Data

1. Model

We assume that a government (usually the central bank) has two primary objectives in terms of exchange rate policy. One is stabilizing the foreign exchange market, and the other is prompting exports for economic growth. The weight of these two objectives would change

according to the economic situation. If the economy is booming, the government would prefer to manage the effective exchange rate to stabilize the foreign exchange market. On the contrary, if the economy is in recession, the government would chose to depreciate the exchange rate to prompt exports to sustain the economy.

Following the first line of reasoning, we assume that ASEAN countries adopt basket pegging exchange rate regimes to manage their exchange rates against their trade-weighted basket. Then, we assume that as economic integration and RMB regionalization get stronger, the weight of the RMB in the baskets of ASEAN countries would increase. Thus, we propose that the increase in RMB weight results in co-movement or coupling of their exchange rates vis-à-vis the RMB/dollar exchange rates. We believe that the appreciation of the RMB/dollar exchange rate causes the central banks of ASEAN countries to engage the foreign exchange market to increase the value of the local currency against the dollar in order to stabilize the effective exchange rates. The higher the RMB weight, the stronger the coupling needed to stabilize bilateral (the local currency/RMB) exchange rates.

If we follow the second line of reasoning, especially for a period of recession, we can assume that a government intervenes in the foreign exchange market to bring down the value of a local currency systemically. This is also partly due to rivalry among ASEAN countries in trade with China, resulting in a government's policy not to lose price competiveness for their exporters. It may result in a different movement of exchange rates compared with the first line of reasoning. Thus, we propose that, even though RMB regionalization goes on, if a government puts more weight on the second goal, then decoupling of the

local currency/dollar exchange rate against the RMB/dollar exchange rate would form the main stream of foreign exchange markets.

Combining the above arguments, we introduce the autoregressive equation model to see the movement or (de)coupling of local currency/dollar exchange rates with the RMB/dollar exchange rate.[12] We divide the sample period into two timelines, August 2005-June 2008 and July 2010-June 2012. China managed a basket exchange rate regime during mid-2006 to mid-2008, returning to a dollar pegged system after the global economic crisis triggered in September 2008. China again adopted a managed floating exchange rate regime in mid-2010 up to now. The period during July 2008-June 2010, therefore, is excluded from the estimation to remove the impact of the global economic crisis and to avoid a sample bias caused by China's return to a dollar pegging system.

Then, to examine whether ASEAN countries have adjusted their local currency/dollar exchange rates in response to changes in the RMB/dollar exchange rate, the following representative autoregressive equation is estimated:

$$X_t^i = C + \sum_{k=1}^{l} \alpha_k X_{t-k}^i + \sum_{\beta}^{\omega} \sum_{k=1}^{l} \beta_k Y_{t-k}^i + \varepsilon_t \qquad (1)$$

where X_t^i is the local currency/dollar exchange rate of the ith country at time t, Y_t^i is the exchange rate of a major foreign currency such as the RMB, Yen, or Euro, etc. which the ith country places in the basket

12) We could consider VAR (Vector Autoregression) method as an alternative way for the estimation, but the results are not sufficient to satisfy our assumptions.

against the dollar at time t. ϵ_t is the error term from the relationship, where ϵ_t is distributed as N(0, σ_t^2). All variables are transformed in a natural log. Thus, for example, if ith country puts the RMB, Yen, or Euro into the basket then the equation estimated is as follows in (2):

$$X_t^i = C + \sum_{k=1}^{l} \alpha_k X_{t-k}^i + \sum_{k=1}^{l} \beta_k RMB_{t-k}^i + \sum_{k=1}^{l} \gamma_k Yen_{t-k}^i + \sum_{k=1}^{l} \delta_k Euro_{t-k}^i + \varepsilon_t \quad (2)$$

For an estimation of equation (2), if some or all of the variables follow non-stationary processes, estimation in levels may not be meaningful because of a spurious regression problem. However, if the variables are cointegrated, the long-run relationship would be captured through cointegrating relationships in levels, and an appropriate dynamic model can be estimated in an error correction setting. We consider commonly used cointegration estimation methods, such as Johansen's method, to examine cointegrating vectors. We estimate two different time periods: the pre-crisis period (2005.8-2008.6), and the post-crisis period (2010.7-2012.6). To deal with outliers during the crisis, we exclude the period 2008.7-2010.6 from the estimations mentioned above.

For the model, we need to perform unit root tests and determine whether the variables are integrated or not. If the variables involved are integrated, we perform cointegration tests to examine whether the variables in the models have a stable long-run relationship. An error correction model using Johansen's method would be adopted to include a long-run equilibrium process in short-run dynamics if the variables are cointegrated. The error correction model has cointegration relations built into its specifications, so that it restricts the long-run tendency of the cointegrated variables to converge on their cointegrating

relationships. The error correction term captures gradual adjustment of the model to the long-run equilibrium through a series of partial short-run adjustments. The coefficient of the error correction term measures the speed of adjustment of the variables towards equilibrium. Thus, we introduce the error correction model (ECM), represented by equation (3), to capture both the short-term dynamics and the long-term relationship among the variables (Engel and Granger, 1987; Edwards, 1983 and 1984; Elbadawi, 1990; Ford and Huang, 1994).

Furthermore, once the cointegrating relationship has been estimated, the following short-run dynamics among the variables could be is constructed and estimated to determine the short-run impact of the explanatory variables on the local currency/dollar exchange rate:

$$\Delta X_t^i = C + \lambda ECT_{t-1} + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^i + \sum_{\beta}^{\omega} \sum_{k=1}^{l} \beta_k \Delta Y_{t-k}^i + \varepsilon_t \quad (3)$$

where Δ denotes the first differentiation of the variable, meaning the change in the variable. ECT in equation (3) represents error correction terms that are induced from cointegration vectors. All the other symbols are the same as in equation (1). Thus, for example, if the ith country puts the RMB, Yen, or Euro into the basket then the equation to see the short run dynamics of the local currency/dollar exchange rate in response to the dynamics of RMB/dollar, Yen/dollar, Euro/dollar exchange rates would be estimated as follows in (4):

$$\Delta X_t^i = C + \lambda ECT_{t-1} + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^i + \sum_{k=1}^{l} \beta_k \Delta RMB_{t-k}^i + \sum_{k=1}^{l} \gamma_k \Delta Yen_{t-k}^i + \sum_{k=1}^{l} \delta_k \Delta Euro_{t-k}^i + \varepsilon_t \quad (4)$$

We may expect, following the first line of reasoning, that the coefficient β (which is the main concern) would be proportional to the degree of regionalization of the RMB in a country, because as regionalization of the RMB keeps going on, the government is more willing to harmonize the local currency/dollar exchange rate in response to the RMB/dollar exchange rate. Thus, the government would be able to stabilize the effective exchange rate.

On the other hand, to maintain price competitiveness or even induce more price competitiveness the government would manage the exchange rate policy with a depreciation scheme. Then, β would be systemically negative or proportionally inverse to the movement of the RMB/dollar exchange rate to payoff the effect of appreciation of local currency against RMB. In doing so, the government could promote and maintain price competitiveness in trade with China in terms of global market, especially in a period of recession, to promote exports for sustaining economic growth.

In a simple way, to confirm the results of the ECM above, we can use the dynamic ordinary least squares (DOLS) method, which is an alternative way of ECM and estimate the coefficients in short-run dynamics among variables to avoid the spurious regression problem. Then, the estimations would be as in equation (5).

$$\Delta X_t^i = C + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^i + \sum_{k=1}^{l} \beta_k \Delta RMB_{t-k}^i + \sum_{k=1}^{l} \gamma_k \Delta Yen_{t-k}^i + \sum_{k=1}^{l} \delta_k \Delta Euro_{t-k}^i + \varepsilon_t \quad (5)$$

We can reasonably assume that the countries adjacent to China by border or frontier trade, like the GMS countries, are likely to be more

cautious to the movement of the value of the RMB or more sensitive to the movement of the RMB/dollar exchange rate. This is because it is believed that in GMS countries that border China, the degree of the RMB's circulation is much higher than that in other ASEAN countries because of border trade and the economic power of China in the region.

Thus, utilizing the pooled data set of the three GMS countries and the other seven countries, we can use the DOLS method and estimate the coefficients in short-run dynamics among variables for the case of GMS countries and for the other seven countries. Then, the estimations would be as in equations (6) and (7).

$$\Delta X_t^{GMS} = C + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^{GMS} + \sum_{k=1}^{l} \beta_k \Delta RMB_{t-k}^{GMS} + \sum_{k=1}^{l} \gamma_k \Delta Yen_{t-k}^{GMS} + \sum_{k=1}^{l} \delta_k \Delta Euro_{t-k}^{GMS} + \varepsilon_t \quad (6)$$

$$\Delta X_t^{ASEAN7} = C + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^{ASEAN7} + \sum_{k=1}^{l} \beta_k \Delta RMB_{t-k}^{ASEAN7} + \sum_{k=1}^{l} \gamma_k \Delta Yen_{t-k}^{ASEAN7} + \sum_{k=1}^{l} \delta_k \Delta Euro_{t-k}^{ASEAN7} + \varepsilon_t \quad (7)$$

Finally, structural break tests are conducted using the DOLS method by adding dummy variables. Hayashi (2003) shows that the dynamic ordinary least squares system can be augmented to allow for structural breaks by including dummy variables.[13] To test these dummy variables,

13) There are a number of alternative tests for structural change under cointegration. For instance, Quintos and Phillips (1993) develop tests for parameter constancy in cointegrating relations in a single-equation setting. Gregory and Hansen (1996) develop residual-based, single-equation methods; however, they have weak efficacy, like residual-based tests, because they tend to ignore equation dynamics (Maddala & Kim 1998). Full information maximum likelihood methods based on the multivariate Johansen (1995) procedure, such as those in Hansen (2003), may be superior to single equation methods for addressing problems of simultaneity. However, performance is typically poor in small samples (Gangnes & Parson 2004).

we also follow the previous two hypotheses. If the global economic crisis caused detectable changes in the government's approach to RMB/dollar exchange rate movement, the coefficients of the dummy variables for the second period (2010-2012) would be negative and statistically significant. In other words, if the effects of RMB regionalization are offset or overwhelmed by the depreciation effect in the post-crisis period, the results would be different from the previous period. Thus, we can test whether there has been a structural break after the global economic crisis compared with the pre-crisis period of 2005-2008. Then, the equation will be:

$$\Delta X_t^i = C + C_{k,T+} dum_{k,T+} + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^i + \sum_{k=1}^{l} \alpha_{k,T+} \Delta X_{t-k}^i dum_{k,T+} + \sum_{\beta}^{\omega} \sum_{k=1}^{l} \beta_k \Delta Y_{t-k}^i + \sum_{\beta}^{\omega} \sum_{k=1}^{l} \beta_k \Delta Y_{t-k}^i dum_{k,T+} + \varepsilon_t \quad (8)$$

where, dummy variables begin in period *T*. We use data from 2005.8.1-2008.6.30 for the pre-crisis and 2010.7.1-2012.6.30 for the post-crisis periods. Thus, *T* will be 2010.7.1.

If we consider equation (8) above for an individual country, then the equation will be:

$$\Delta X_t^i = C + C_{k,T+} dum_{k,T+} + \sum_{k=1}^{l} \alpha_k \Delta X_{t-k}^i + \sum_{k=1}^{l} \alpha_{k,T+} \Delta X_{t-k}^i dum_{k,T+} + \sum_{k=1}^{l} \beta_k \Delta RMB_{t-k}^i + \sum_{k=1}^{l} \beta_{k,T+} \Delta RMB_{t-k}^i dum_{k,T+}$$
$$+ \sum_{k=1}^{l} \gamma_k \Delta Yen_{t-k}^i + \sum_{k=1}^{l} \gamma_{k,K+} \Delta Yen_{t-k}^i dum_{k,T+} + \sum_{k=1}^{l} \delta_k \Delta Euro_{t-k}^i + \sum_{k=1}^{l} \delta_{k,T+} \Delta Euro_{t-k}^i dum_{k,T+} + \varepsilon_t \quad (9)$$

2. Data

The estimations are conducted on the daily local currency/dollar exchange rate data for ten ASEAN countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Singapore, Thailand, the Philippines, and Vietnam; and other major currency exchange rates against the dollar: RMB/dollar, Yen/dollar, and Euro/dollar exchange rates. The exchange rates cover the periods of October 1, 2005 to June 30, 2008, and July 1, 2010 to June 30, 2012, respectively. All exchange rate data are collected from the database provided by the Korea Center for International Finance (KCIF).

It is important to understand clearly the components of the local currency/dollar exchange rate, which is the dependent variable for estimating equations (1)-(9). The local currency/dollar exchange rate is not wholly determined by the government's intention because there are other factors that influence the exchange rate in the foreign market if the government does not operate a rigid fixed exchange rate regime. There is no necessary one-on-one relation between the value of the local currency against the dollar and that of the target exchange rate of the government, but we may assume implicitly that the local currency/dollar exchange rate changes proportionally in response to policy intervention by the government either to harmonize the local currency/dollar exchange rate to the RMB/dollar exchange rate in order to stabilize the price indicator, or to depreciate the exchange rate to improve price competitiveness. Table 3 presents a description of the data for analysis.

Table3. Description of the data set

Variables	Definition	Data Source	Time Series	Frequency
X^{Brunei}	log value of the exchange rate of the local currency of Brunei(Brunei dollar) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Cambodia}$	log value of the exchange rate of the local currency of Cambodia(Riel) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Indonesia}$	log value of the exchange rate of the local currency of Indonesia(Rupiah) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
X^{Laos}	log value of the exchange rate of the local currency of Laos(Kip) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Malaysia}$	log value of the exchange rate of the local currency of Malaysia(Ringgit) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Myanmar}$	log value of the exchange rate of the local currency of Myanmar(Kyat) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Philippines}$	log value of the exchange rate of the local currency of the Philippines(Peso) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Singapore}$	log value of the exchange rate of the local currency of Singapore(Singapore dollar) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Thailand}$	log value of the exchange rate of the local currency of Thailand(Baht) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
$X^{Vietnam}$	log value of the exchange rate of the local currency of Vietnam(Dong) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
RMB	log value of the exchange rate of the local currency of China(RMB) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
YEN	log value of the exchange rate of the local currency of Japan(Yen) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily
EURO	log value of the exchange rate of the local currency of EU(Euro) against U.S. dollar	KCIF	2005.8.1-2006.6.30; 2010.7.1-2012.6.30	daily

Notes: The data are available at the website,
http://www.kcif.or.kr/front/data/interExchange.do.

Ⅳ. Empirical results

Augmented Dickey-Fuller unit root tests are performed to test on the stationarity of the data. Neither unit root test rejects the unit root in levels, but both reject the unit root in the differenced data. Thus, the variables have an I(1) process, which means the data are non-stationary in levels.[14)]

Because all of the variables have unit roots, cointegration tests are performed to examine whether the variables have a stable long-run relationship. The presence of a long-run relationship between the variables (the cointegrating vector) can be detected by performing unit root tests with the residuals of the OLS estimation of reserve demand. If the I(1) variables are cointegrated, it is known that the OLS estimates are super-consistent (Davidson & MacKinnon 1993; Hamilton 1994). However, the standard t-statistics or F-statistics would not be valid. Different critical values should be used to test for the significance of the estimates. Significance levels are based on the critical tau values, as computed by Engel and Granger (1987).[15)] To confirm the results obtained from the single-equation OLS estimations, Johansen (1988 and 1991) cointegration tests are also applied.[16)]

The results show that the null hypothesis of the unit root is rejected at the 1 or 5% significance level. This implies that the variables in our estimations are cointegrated. The Johansen cointegration tests also

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14) See <TableA2> in <Appendix1>.

15) They are well summarized in Davidson and MacKinnon (1993). Furthermore, we acknowledge that the residual-based test has weak efficacy because it ignores equation dynamics and concentrates on error dynamics (Maddala & Kim 1998, pp.203-205).

16) An intercept is included, but a trend is not included in the cointegration equations.

confirm the presence of cointegrating vectors.[17] Both trace statistics and maximum eigenvalue statistics indicate the presence of one cointegrating vector.

Based on the cointegrating test, the estimates of the cointegrating vectors using Johansen's method are reported in Table 4 and Table 5. As the estimation equation is a log-linear form, each coefficient of the variable represents the respective elasticity. For instance, in Table 4, the coefficient of the *RMB* for the case of Brunei, 0.900 from the pre-crisis period, implies that a 1% increase in the RMB/dollar exchange rate brings a 0.9% increase in the local/dollar exchange rate. For the pre-crisis period, an impressive nine out of ten (except Indonesia) of the coefficients of the estimations are consistent with our predictions on regionalization of the RMB (first hypothesis), and are statistically significant. On the contrary, for the post-crisis period, nine out of ten (except Indonesia) of the coefficients of the estimations present negative values that are consistent with the second hypothesis supporting the argument that the effect of RMB regionalization is offset by the effect of the depreciation policy, in general.

17) See Appendix1, Table A3 (pre-crisis) and Table A4 (post-crisis), for the results of the Johansen cointegration tests.

Table4. Estimates of the cointegrating vectors by the Johansen's method (pre-crisis)

Time period	2005.8-2008.6		
Variables	*RMB*	*YEN*	*EURO*
X^{Brunei}	0.900*** (0.182)	0.293*** (0.058)	0.933*** (0.101)
$X^{Cambodia}$	0.814*** (0.282)	—0.095 (0.090)	0.471*** (0.155)
$X^{Indonesia}$	—2.975 (3.447)	1.064 (1.043)	—3.186 (1.942)
X^{Laos}	0.712*** (0.236)	0.310*** (0.075)	0.672*** (0.130)
$X^{Malaysia}$	1.169* (0.836)	0.073 (0.252)	0.832** (0.470)
$X^{Myanmar}$	0.230*** (0.044)	0.070*** (0.014)	0.064*** (0.024)
$X^{Philippines}$	6.114*** (2.578)	1.967*** (0.784)	3.358** (1.452)
$X^{Singapore}$	1.227* (1.030)	—0.021 (0.308)	0.770* (0.576)
$X^{Thailand}$	2.166*** (0.853)	1.273*** (0.255)	2.267*** (0.478)
$X^{Vietnam}$	1.276*** (0.339)	0.115 (0.228)	—0.326*** (0.133)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; EURO is the log of the Euro/dollar exchange rate.

Table5. Estimates of the cointegrating vectors by the Johansen's method (post-crisis)

Time period	2010.7-2012.6		
Variables	*RMB*	*YEN*	*EURO*
X^{Brunei}	—1.003*** (0.216)	0.263** (0.146)	0.575*** (0.080)
$X^{Cambodia}$	—0.596*** (0.099)	0.497*** (0.067)	—0.077*** (0.037)
$X^{Indonesia}$	0.253* (0.147)	—0.095 (0.099)	0.607*** (0.054)
X^{Laos}	—0.894*** (0.074)	0.046 (0.050)	—0.229*** (0.028)
$X^{Malaysia}$	—0.801*** (0.226)	0.604*** (0.153)	0.432*** (0.084)
$X^{Myanmar}$	—0.001 (0.010)	—0.010* (0.007)	—0.007*** (0.004)
$X^{Philippines}$	—0.637*** (0.156)	0.178* (0.105)	0.191*** (0.058)
$X^{Singapore}$	—1.082*** (0.220)	0.378*** (0.149)	0.589*** (0.081)
$X^{Thailand}$	—0.017 (0.266)	0.312** (0.179)	0.404*** (0.098)
$X^{Vietnam}$	—2.586*** (0.831)	—0.090 (0.253)	0.792** (0.470)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. X is the log of the local currency/dollar exchange rate; RMB is the log of *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate.

Since the previous cointegration tests detected one long-run equilibrium relationship for our model, the error correction model illustrated in equation (4) can be estimated to determine the short-run dynamics of exchange rate determination. Tables 6 and 7 show the results from the estimated error correction model. For the pre-crisis period, seven out of ten (except Brunei and Malaysia) of the coefficients for the *RMB* present positive values, which are consistent with our first hypothesis and the long-run relationship illustrated in Table 4. On the contrary, for the post-crisis period, seven out of ten (except Brunei, Cambodia, and Thailand) of the coefficients for the *RMB* present negative values, which are consistent with our second hypothesis and the long-run relationship illustrated Table 5.[18)]

Table6. Estimates of the short-run dynamics using Johansen's method (pre-crisis)

Time period	2005.8-2008.6				
Variables	*ECT*	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{Brunei}	−0.035*** (0.010)	−0.297 (0.125)	0.022 (0.028)	−0.072*** (0.028)	−0.225*** (0.036)
$\Delta X^{Cambodia}$	−0.014** (0.008)	0.171* (0.112)	0.018 (0.020)	−0.070*** (0.025)	−0.105*** (0.037)
$\Delta X^{Indonesia}$	−0.002*** (0.001)	0.157 (0.191)	0.040 (0.035)	−0.077** (0.042)	−0.083*** (0.036)
ΔX^{Laos}	−0.024*** (0.008)	0.072 (0.104)	−0.005 (0.019)	−0.075*** (0.023)	−0.124*** (0.036)
$\Delta X^{Malaysia}$	−0.014 (0.037)	−0.002 (0.002)	0.237*** (0.100)	0.002 (0.018)	−0.085*** (0.022)
$\Delta X^{Myanmar}$	−0.122*** (0.021)	0.124* (0.078)	−0.014 (0.014)	−0.043*** (0.178)	−0.169*** (0.037)
$\Delta X^{Philippines}$	−0.003*** (0.001)	0.322*** (0.143)	−0.027 (0.026)	−0.056** (0.032)	−0.173*** (0.036)
$\Delta X^{Singapore}$	0.002 (0.002)	0.102 (0.091)	0.019 (0.017)	−0.082*** (0.020)	−0.059* (0.039)
$\Delta X^{Thailand}$	−0.016*** (0.005)	0.149 (0.281)	0.018 (0.051)	−0.084 (0.061)	−0.223*** (0.036)
$\Delta X^{Vietnam}$	−0.002*** (0.001)	0.022 (0.039)	0.004 (0.007)	0.002 (0.009)	0.076*** (0.036)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of the RMB/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

18) We consider only first time lag for the variables for simplification. Also, we acknowledge that the significance levels of quite a number of coefficients are low. It is probably due to the fact that the adjustment process of exchange rates is not fully and instantly operated in daily basis.

Table7. Estimates of the short-run dynamics using Johansen's method (post-crisis)

Time period	2010.7-2012.6				
Variables	*ECT*	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{Brunei}	−0.072*** (0.014)	0.133 (0.177)	0.001 (0.044)	0.069** (0.036)	−0.181*** (0.043)
$\Delta X^{Cambodia}$	−0.177*** (0.028)	0.056 (0.196)	0.054 (0.049)	0.018 (0.038)	−0.323*** (0.042)
$\Delta X^{Indonesia}$	−0.063*** (0.013)	−0.182* (0.116)	0.009 (0.029)	−0.028 (0.024)	−0.152*** (0.043)
ΔX^{Laos}	−0.112*** (0.024)	−0.169* (0.109)	−0.040* (0.027)	0.019 (0.022)	−0.403*** (0.041)
$\Delta X^{Malaysia}$	−0.038*** (0.011)	−0.033 (0.132)	0.029 (0.033)	0.004 (0.026)	−0.009 (0.041)
$\Delta X^{Myanmar}$	−1.017*** (0.064)	−0.030 (0.111)	−0.003 (0.027)	−0.011 (0.022)	0.006 (0.045)
$\Delta X^{Philippines}$	−0.056** (0.032)	−0.113 (0.117)	0.010 (0.029)	−0.113*** (0.023)	−0.046 (0.043)
$\Delta X^{Singapore}$	−0.051*** (0.010)	−0.030 (0.132)	0.050* (0.032)	0.015 (0.027)	−0.064* (0.044)
$\Delta X^{Thailand}$	−0.028*** (0.007)	0.155* (0.096)	0.023 (0.024)	0.007 (0.019)	0.032 (0.044)
$\Delta X^{Vietnam}$	−0.003 (0.009)	−0.227** (0.131)	0.056** (0.032)	−0.036* (0.026)	−0.091*** (0.046)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

Next, we employ the DOLS method illustrated in equation (5) for the robustness test to confirm the short-run dynamics for both periods. Tables 8 and 9 present the results, which are not much different from the results for the error correction model. For the pre-crisis period, nine out of ten (except Brunei) of the coefficients for the *RMB* present positive values, which are consistent with our first hypothesis and the short-run relationship from Table 6. On the contrary, for the post-crisis period, eight out of ten (except Brunei and Thailand) of the coefficients for the *RMB* present negative values, which are consistent with our second hypothesis and not much different from results illustrated in Table 7.[19]

19) Further, we perform diagnostic tests on the residuals for tables 5-8, respectively. Then, $Q(15)$ and ARF statistics present no autocorrelation, and $Q^2(15)$ and ARCH-F present no ARCH effect, implying that the model is correctly specified. Overall, our diagnostic tests indicate that there are no significant concerns about the specification.

Table8. Estimates of the short-run dynamics using the DOLS method (pre-crisis)

Time period	2005.8-2008.6			
Variables	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{Brunei}	−0.075 (0.125)	0.014 (0.023)	0.014 (0.028)	−0.240*** (0.036)
$\Delta X^{Cambodia}$	0.184* (0.111)	0.017 (0.020)	−0.075*** (0.025)	−0.113*** (0.036)
$\Delta X^{Indonesia}$	0.103 (0.190)	0.039 (0.035)	−0.069* (0.042)	−0.079** (0.036)
ΔX^{Laos}	0.040 (0.104)	−0.011 (0.019)	−0.082*** (0.023)	−0.133*** (0.037)
$\Delta X^{Malaysia}$	0.221** (0.099)	0.002 (0.018)	−0.085*** (0.022)	−0.015 (0.037)
$\Delta X^{Myanmar}$	0.162** (0.080)	−0.017 (0.014)	−0.048*** (0.179)	−0.233*** (0.036)
$\Delta X^{Philippines}$	0.239* (0.143)	−0.031 (0.026)	−0.057* (0.032)	−0.159*** (0.036)
$\Delta X^{Singapore}$	0.114 (0.090)	0.020 (0.017)	−0.081*** (0.020)	−0.058 (0.039)
$\Delta X^{Thailand}$	0.021 (0.280)	−0.002 (0.051)	−0.010 (0.062)	−0.224*** (0.036)
$\Delta X^{Vietnam}$	0.043 (0.039)	0.004 (0.007)	0.002 (0.009)	0.090** (0.036)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. X is the log of the local currency/dollar exchange rate; *RMB* is the log of the *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

Table9. Estimates of the short-run dynamics using the DOLS method (post-crisis)

Time period	2010.7-2012.6			
Variables	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{Brunei}	0.172 (0.181)	−0.002 (0.045)	0.029 (0.036)	−0.201*** (0.044)
$\Delta X^{Cambodia}$	−0.131 (0.203)	−0.015 (0.050)	0.031 (0.040)	−0.403*** (0.041)
$\Delta X^{Indonesia}$	−0.207* (0.118)	0.009 (0.029)	−0.055 (0.023)	−0.164*** (0.044)
ΔX^{Laos}	−0.116 (0.111)	−0.039 (0.027)	0.033 (0.022)	−0.457*** (0.040)
$\Delta X^{Malaysia}$	−0.037 (0.134)	0.022 (0.033)	−0.011 (0.026)	−0.020 (0.045)
$\Delta X^{Myanmar}$	−0.017 (0.136)	−0.023 (0.033)	0.085 (0.027)	−0.501*** (0.039)
$\Delta X^{Philippines}$	−0.104 (0.119)	0.010 (0.029)	−0.131*** (0.023)	−0.062 (0.044)
$\Delta X^{Singapore}$	−0.010 (0.135)	0.045 (0.033)	−0.016 (0.026)	−0.064 (0.045)
$\Delta X^{Thailand}$	0.142 (0.098)	0.025 (0.024)	−0.006 (0.019)	0.040 (0.045)
$\Delta X^{Vietnam}$	−0.228* (0.131)	0.057* (0.032)	−0.036 (0.026)	−0.093** (0.046)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of the *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

Furthermore, following equations (6) and (7), Tables 10 and 11 present the results from the estimations in the differenced form of the variables for the pooled sample for pre- and post- crisis periods, respectively. The panel unit root tests show that all variables are non-stationary. Thus, we use the first differenced data set to make the data stationary.[20] For the pooled sample cases, we can see that the results are, overall, consistent with our first hypothesis for the pre-crisis period and our second hypothesis for the post-crisis period.

One thing that worth noting is the values of the *RMB* for GMS countries are bigger than those for the other seven ASEAN countries for the pre-crisis period and smaller for the post-crisis period. This means that, as we suggest above, the GMS countries became more sensitive to the volatility of the RMB/dollar exchange rate to decide the local exchange rate for both stabilizing the exchange rate and depreciation, implying a deepening dependency on the Chinese economy compared to that for the other seven ASEAN countries.

Table10. Estimates of the short-run dynamics using the DOLS method (pre-crisis, pooled sample)

Time period	2005.8-2008.6			
Variables	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{ASEAN}	0.156*** (0.114)	0.011 (0.008)	—0.049*** (0.010)	—0.157*** (0.011)
ΔX^{GMS}	0.233* (0.144)	—0.010 (0.008)	0.004 (0.010)	—0.152*** (0.021)
ΔX^{ASEAN7}	0.023** (0.012)	0.020* (0.011)	—0.072*** (0.013)	—0.160*** (0.014)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of the *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

20) See <TableA5> of Appendix 1 for the results of the panel unit root test.

Table11. Estimates of the short-run dynamics using the DOLS method (post-crisis, pooled sample)

Time period	2010.7-2012.6			
Variables	ΔRMB_{t-1}	ΔYEN_{t-1}	$\Delta EURO_{t-1}$	ΔX_{t-1}
ΔX^{ASEAN}	—0.037 (0.045)	0.002 (0.011)	—0.014 (0.009)	—0.244*** (0.014)
ΔX^{GMS}	—0.124* (0.074)	0.002 (0.018)	—0.006 (0.015)	—0.373*** (0.024)
ΔX^{ASEAN7}	—0.003 (0.056)	0.002 (0.014)	—0.017 (0.011)	—0.198*** (0.017)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of the *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

Finally, Table 12 presents the estimation results from the structural break tests as mentioned in equation (9). We can see that the coefficient of the *RMB* for nine out of ten countries shown in Table 12 present positive values not different from the previous results; on the other hand, the coefficient of the *RMBdum* for seven out of ten countries in Table 12 present negative values. For instance, in Table 12, the coefficient of the *RMBdum*, 0.258, implies a 0.258% decrease in the RMB/dollar exchange rate in the post-crisis period compared to that of the pre-crisis period. The result implies that the government's priority has moved toward depreciation for boosting the economy but for the continuation of regionalization of the RMB in the country and economic integration with China.

Table12. Estimates using the DOLS structural beak test

Time period	2005.8-2008.6 & 2010.7-2012.6					
Variables	ΔRMB_{t-1}	$\Delta RMB_{t-1}dum$	ΔYEN_{t-1}	$\Delta YEN_{t-1}dum$	$\Delta EURO_{t-1}$	$\Delta EURO_{t-1}dum$
ΔX^{Brunei}	−0.061 (0.117)	0.101 (0.158)	0.014 (0.022)	−0.010 (0.034)	0.013 (0.027)	0.009 (0.038)
$\Delta X^{Cambodia}$	0.200* (0.123)	0.042 (0.167)	0.017 (0.023)	−0.041 (0.037)	−0.076*** (0.028)	0.127*** (0.040)
$\Delta X^{Indonesia}$	0.113 (0.167)	−0.309 (0.227)	0.039 (0.031)	−0.032 (0.049)	−0.070* (0.038)	0.087* (0.054)
ΔX^{Laos}	0.025 (0.109)	−0.156 (0.147)	−0.011 (0.020)	−0.015 (0.032)	−0.081*** (0.025)	0.099*** (0.035)
$\Delta X^{Malaysia}$	0.225* (0.119)	−0.258* (0.160)	0.001 (0.022)	0.019 (0.035)	−0.086*** (0.027)	0.072* (0.038)
$\Delta X^{Myanmar}$	0.154 (0.112)	−0.184 (0.151)	−0.017 (0.021)	−0.004 (0.033)	−0.048* (0.025)	0.098*** (0.036)
$\Delta X^{Philippines}$	0.248* (0.138)	−0.315* (0.187)	−0.031 (0.025)	0.037 (0.040)	−0.057* (0.031)	0.065 (0.044)
$\Delta X^{Singapore}$	0.118 (0.116)	−0.126 (0.157)	0.019 (0.022)	0.025 (0.034)	−0.082*** (0.026)	0.088** (0.037)
$\Delta X^{Thailand}$	0.045 (0.226)	0.081 (0.305)	−0.003 (0.041)	0.026 (0.066)	−0.099** (0.050)	0.124* (0.072)
$\Delta X^{Vietnam}$	0.033 (0.092)	−0.181 (0.125)	0.004 (0.017)	0.050* (0.027)	0.001 (0.020)	−0.040 (0.030)

Notes: Significance levels are 10% *, 5% **, and 1% ***. The number in parenthesis is the scaled standard error. *X* is the log of the local currency/dollar exchange rate; *RMB* is the log of the *RMB*/dollar exchange rate; *YEN* is the log of the Yen/dollar exchange rate; *EURO* is the log of the Euro/dollar exchange rate. Δ denotes the first difference.

From the estimated results, we can draw several implications. First, overall, before the global economic crisis, our empirical results present coupling between the local currency/dollar exchange rate and the RMB/dollar exchange rate, which implies the primary goal of ASEAN countries was to stabilize their exchange rates in response to the expansion of RMB regionalization. By using Johansen's method and the DOLS method we can see the local currency/dollar exchange rate move together with the RMB/dollar exchange rate in terms of both the short run and the long run as implied by our first hypothesis.

Second, after the global economic crisis, the exchange rate policy of ASEAN seems to have shifted toward a growth-oriented depreciation policy, resulting in different or opposite outcomes compared with those

of the pre-crisis period. Although the global economic crisis seems to have elevated the RMB's status in the region, the economic recession after the global economic crisis induced ASEAN countries to place policy priority on export promotion rather than stabilization of exchange rates.

Third, GMS countries—Laos, Myanmar, and Vietnam—seem to have stronger sensitivity to the RMB/dollar exchange rate compared to the other ASEAN countries. This may be mainly because the RMB's circulation is rapidly accelerated in these three countries by border trade and the economic influence of China. As we see above, our estimation results support this reasoning.

In brief, our estimation results imply that before the global economic crisis ASEAN countries had followed our first line of reasoning, in which the local currency/dollar exchange rate moves together with the RMB/dollar exchange rate. We can regard the regionalization of the RMB as one of the main factors affecting exchange rate policy. However, the priority of ASEAN has shifted toward export promotion since the global economic crisis, which is in accord with our second proposition.

V. Conclusion

In this paper, we model the movement of local currency/dollar exchange rates of ASEAN countries vis-à-vis the RMB/dollar exchange rate to see how ASEAN countries behave in response to the acceleration of RMB regionalization. We divide the time period series into two, pre-

and post- global economic crisis, and examine whether the behavior of ASEAN countries was consistent or changed after the crisis.

For our analysis, based on autoregressive equation analysis, we examine whether the local currency/dollar exchange rate moves together with the RMB/dollar exchange rate, which would implicitly reveal the realization of RMB regionalization in the region. Our empirical results present coupling between the local currency/dollar exchange rate and the RMB/dollar exchange rate before the crisis. However, after the crisis we can notice decoupling of the two exchange rates, which implies RMB regionalization is no longer the crucial factor determining the exchange rate; rather export promotion is. The influence of RMB regionalization seems to be not so strong as to offset the tendency toward export promotion during the economic recession. This may be attributed to the government's policy to overcome the economic recession. Furthermore, we can see that GMS countries—Laos, Myanmar, and Vietnam—are much more sensitive to RMB regionalization.

In conclusion, we propose that as economic integration between China and ASEAN accelerated, the RMB's regionalization seemed to become one of the crucial factors that ASEAN countries should consider for exchange rate policy. Nonetheless, the effect of RMB regionalization on exchange rate policy, resulting in coupling of the exchange rate of local currency/dollar with RMB/dollar exchange rate, seemed to be diluted by the economic recession after the global economic crisis.

In this paper, we do not examine the benefits and costs of RMB internationalization (regionalization) for China and ASEAN or the issue of whether the countries need to continue RMB regionalization. RMB

regionalization could bring stability to exchange rate and inflation, but it also may generate difficulties for central banks in running an effective monetary policy, as the RMB is an additional variable to monitor—not an alternative to the dollar. The prevailing literature also shows that RMB regionalization may act as a transmission mechanism through which a currency block of China-ASEAN could be formed. The question of the benefits and costs of RMB internationalization (regionalization) and the issue of a China-ASEAN currency block is a subject for further research.

Key words: Southeast Asia, regionalization of RMB, exchange rate policy, coupling, decoupling, local currency/ dollar exchange rates, RMB/dollar exchange rate

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<Appendix 1>

TableA1. Top ten trading partners of ASEAN countries and trade volume in 2011

<Brunei> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Japan	5,190	Singapore	1,753
2	Korea	1,826	India	986
3	Australia	1,309	China	819
4	Indonesia	926	Korea	647
5	India	583	Malaysia	599
6	China	511	Germany	508
7	New Zealand	392	United States	203
8	Singapore	182	Japan	157
9	Thailand	121	Thailand	149
10	Malaysia	45	Indonesia	90
	Total	11,252	Total	6,267

<Cambodia> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	United States	2,552	Thailand	3,161
2	Canada	528	China	2,550
3	Germany	502	Singapore	1,000
4	United Kingdom	486	Hong Kong	770
5	Japan	280	Viet Nam	545
6	Singapore	173	Korea	496
7	China	168	Indonesia	285
8	Spain	161	Malaysia	284
9	Thailand	160	Japan	226
10	Italy	129	United States	204
	Total	6,174	Total	10,732

<Indonesia> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Japan	33,715	China	26,212
2	China	22,941	Singapore	25,965
3	Singapore	18,444	Japan	19,437
4	United States	16,498	Korea	13,000
5	Korea	16,389	United States	10,834
6	India	13,336	Thailand	10,405
7	Malaysia	10,996	Malaysia	10,405
8	Thailand	5,897	Saudi Arabia	5,427
9	Australia	5,583	Australia	5,177
10	Netherlands	5,132	India	4,322
	Total	203,501	Total	177,451

<Laos> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Thailand	1,029	Thailand	3,035
2	China	729	China	519
3	Viet Nam	297	Viet Nam	244
4	United Kingdom	95	Korea	170
5	Japan	88	France	147
6	Germany	71	Japan	86
7	United States	55	Singapore	38
8	Netherlands	29	Germany	38
9	India	22	Belgium	34
10	Italy	20	Hong Kong	32
	Total	2,958	Total	4,603

<Malaysia> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	China	29,853	China	24,716
2	Singapore	28,831	Singapore	24,060
3	Japan	26,129	Japan	21,369
4	United States	18,873	United States	18,145
5	Thailand	11,703	Indonesia	11,481
6	Hong Kong	10,225	Thailand	11,295
7	India	9,222	Korea	7,585
8	Korea	8,446	Germany	7,180
9	Australia	8,209	Hong Kong	4,441
10	Indonesia	6,806	Australia	4,188
	Total	227,196	Total	187,837

<Myanmar> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Thailand	2,975	China	5,307
2	China	1,525	Thailand	3,095
3	India	965	Singapore	1,334
4	Japan	539	Korea	734
5	Korea	271	Malaysia	616
6	Malaysia	213	Japan	558
7	Bangladesh	142	India	482
8	Viet Nam	105	Indonesia	395
9	Singapore	78	Russian Federation	251
10	Germany	76	Australia	79
	Total	7,964	Total	13,637

<Philippines> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Japan	8,866	Japan	6,510
2	United States	7,107	United States	6,505
3	China	6,102	China	6,059
4	Singapore	4,278	Singapore	4,893
5	Hong Kong	3,699	Korea	4,392
6	Korea	2,196	Thailand	3,462
7	Thailand	1,904	Saudi Arabia	3,223
8	Netherlands	1,745	Malaysia	2,635
9	Germany	1,729	Indonesia	2,372
10	Malaysia	1,099	United Arab Emirates	1,729
	Total	48,189	Total	60,149

<Singapore> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	Malaysia	50,019	United States	39,536
2	Hong Kong	45,156	Malaysia	39,131
3	Indonesia	42,832	China	38,020
4	China	42,764	Japan	26,235
5	United States	22,362	Korea	21,769
6	Japan	18,432	Indonesia	19,300
7	Australia	16,092	Saudi Arabia	17,620
8	Korea	15,482	India	14,142
9	India	14,117	United Arab Emirates	11,634
10	Thailand	14,100	Thailand	11,389
	Total	411,870	Total	366,003

<Thailand> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	China	27,113	Japan	42,225
2	Japan	23,811	China	30,633
3	United States	21,659	United Arab Emirates	14,498
4	Hong Kong	16,300	United States	13,486
5	Malaysia	12,265	Malaysia	12,347
6	Singapore	11,327	Korea	9,217
7	Indonesia	9,971	Switzerland	8,869
8	Australia	7,916	Australia	7,948
9	Viet Nam	6,985	Singapore	7,801
10	India	5,128	Saudi Arabia	7,402
	Total	226,380	Total	228,878

<Vietnam> (US$ Million)

Rank	Export		Import	
	Country	Value	Country	Value
1	United States	16,777	China	31,997
2	Japan	10,534	Korea	14,906
3	China	10,098	Singapore	11,255
4	Korea	4,622	Japan	10,561
5	Germany	4,161	Thailand	7,684
6	Malaysia	3,071	Hong Kong	6,524
7	Australia	2,925	United States	4,775
8	Hong Kong	2,291	Malaysia	4,201
9	Indonesia	2,166	India	3,060
10	United Kingdom	2,152	Germany	2,603
	Total	87,847	Total	126,546

Source: Direction of Trade Statistics, July 2012, IMF.

TableA2. The ADF unit root tests on the variables

	Level	1st difference	Level	1st difference
X^{Brunei}	-1.262	-20.163***	-2.526	-28.239***
$X^{Cambodia}$	-2.637*	-23.677***	-1.088	-16.012***
$X^{Indonesia}$	-2.244	-21.522***	-0.240	-19.708***
X^{Laos}	-1.746	-30.892***	-0.372	-23.244***
$X^{Malaysia}$	-0.497	-27.064***	-2.530	-23.093***
$X^{Myanmar}$	-0.558	-16.087***	-22.732***	-15.321***
$X^{Philippines}$	-1.696	-31.578***	-3.511***	-23.766***
$X^{Singapore}$	0.402	-27.040***	-2.892**	-24.126***
$X^{Thailand}$	-1.514	-34.557***	-2.248	-22.201***
$X^{Vietnam}$	1.067	-5.007***	-2.178	-24.149***
RMB	3.996	-32.231***	-1.825	-26.234***
YEN	-1.412	-28.326***	-2.738*	-22.785***
EURO	0.414	-27.665***	-1.740	-22.285***
Time period	2005.8-2008.6		2010.7-2012.6	

Notes: Significance levels are 10% *, 5% **, and 1% ***. We selected the augmentation lags for each Dickey-Fuller regression in order to minimize the Schwarz Information Criterion (SIC). Each regression contains an intercept but no time trend.

TableA3. The Johansen tests for cointegration (pre-crisis, 2005.8-2008.6)

	Hypothesized Number of Cointegrating Vectors	Eigenvalues	Trace Statistics	Maximum Eigenvalue Statistic
Brunei	0	0.086	81.798** (40.175)	65.343** (24.159)
	≤ 1	0.015	16.455 (24.276)	11.105 (17.797)
	≤ 2	0.006	5.351 (12.321)	4.552 (11.225)
	≤ 3	0.001	0.799 (4.130)	0.799 (4.130)
Cambodia	0	0.182	228.512** (60.061)	145.965** (30.440)
	≤ 1	0.085	82.547** (40.175)	64.844** (24.159)
	≤ 2	0.016	17.702 (24.276)	11.589 (17.797)
	≤ 3	0.008	6.114 (12.321)	6.050 (11.225)
	≤ 4	0.000	0.064 (4.130)	0.064 (4.130)
Indonesia	0	0.086	89.335** (40.175)	68.118** (24.159)
	≤ 1	0.021	21.217 (24.276)	16.221 (17.797)
	≤ 2	0.006	4.995 (12.321)	4.948 (11.225)
	≤ 3	0.000	0.048 (4.130)	0.048 (4.130)

	Hypothesized Number of Cointegrating Vectors	Eigenvalues	Trace Statistics	Maximum Eigenvalue Statistic
Laos	0	0.176	218.556** (60.061)	140.238** (30.440)
	≤ 1	0.083	78.318** (40.175)	63.165** (21.159)
	≤ 2	0.015	15.154 (24.276)	10.676 (17.797)
	≤ 3	0.006	4.477 (12.321)	4.197 (11.225)
	≤ 4	0.000	0.280 (4.130)	0.280 (4.130)
Malaysia	0	0.083	78.278** (40.175)	65.782** (24.159)
	≤ 1	0.010	12.497 (24.276)	7.963 (17.797)
	≤ 2	0.006	4.534 (12.321)	4.233 (11.225)
	≤ 3	0.000	0.301 (4.130)	0.301 (4.130)
Myanmar	0	0.088	87.032** (40.175)	67.450** (24.159)
	≤ 1	0.067	19.582 (24.276)	12.220 (17.797)
	≤ 2	0.009	7.362 (12.321)	6.934 (11.225)
	≤ 3	0.000	0.429 (4.130)	0.429 (4.130)
Philippines	0	0.051	68.952** (40.175)	39.325** (24.159)
	≤ 1	0.023	29.028 (24.276)	17.055 (17.797)
	≤ 2	0.014	11.072 (12.321)	11.050 (11.225)
	≤ 3	0.000	0.022 (4.130)	0.022 (4.130)
Singapore	0	0.086	91.626** (40.175)	67.483** (24.159)
	≤ 1	0.018	24.144 (24.276)	13.567 (17.797)
	≤ 2	0.011	10.607 (12.321)	8.462 (11.225)
	≤ 3	0.003	2.145 (4.130)	2.145 (4.130)
Thailand	0	0.090	85.862** (40.175)	70.875** (24.159)
	≤ 1	0.013	14.987 (24.276)	9.989 (17.797)
	≤ 2	0.007	4.998 (12.321)	4.937 (11.225)
	≤ 3	0.000	0.061 (4.130)	0.061 (4.130)
Vietnam	0	0.096	99.871** (40.175)	76.535** (24.159)
	≤ 1	0.019	23.335 (24.276)	14.258 (17.797)
	≤ 2	0.008	9.078 (12.321)	6.369 (11.225)
	≤ 3	0.004	2.709 (4.130)	2.709 (4.130)

Notes: Significance levels are 5% * and 1% **. The variables of cointegration test are X, *RMB*, *YEN*, and *EURO*. The number in parenthesis is a critical value at the 0.05 level. Each specification for the pre-, and post-crisis period includes one lag, respectively, assuming a trend in the series but not in the cointegrating relationships.

TableA4. The Johansen tests for cointegration (post-crisis, 2010.7-2012.6)

	Hypothesized Number of Cointegrating Vectors	Eigenvalues	Trace Statistics	Maximum Eigenvalue Statistic
Brunei	0	0.055	45.750** (40.175)	28.043** (24.159)
	≤ 1	0.022	17.707 (24.276)	11.043 (17.797)
	≤ 2	0.011	6.664 (12.321)	5.521 (11.225)
	≤ 3	0.002	1.142 (4.130)	1.142 (4.130)
Cambodia	0	0.079	61.526** (40.175)	41.079** (24.159)
	≤ 1	0.020	20.447 (24.276)	10.042 (17.797)
	≤ 2	0.014	10.405 (12.321)	6.800 (11.225)
	≤ 3	0.007	3.604 (4.130)	3.604 (4.130)
Indonesia	0	0.057	52.727** (40.175)	30.016** (24.159)
	≤ 1	0.025	22.711 (24.276)	12.447 (17.797)
	≤ 2	0.015	10.264 (12.321)	7.623 (11.225)
	≤ 3	0.005	2.641 (4.130)	2.641 (4.130)
Laos	0	0.060	51.709** (40.175)	30.625** (24.159)
	≤ 1	0.025	21.084 (24.276)	12.579 (17.797)
	≤ 2	0.012	8.506 (12.321)	5.945 (11.225)
	≤ 3	0.005	2.561 (4.130)	2.561 (4.130)
Malaysia	0	0.051	45.115** (40.175)	25.856** (24.159)
	≤ 1	0.020	19.259 (24.276)	10.049 (17.797)
	≤ 2	0.012	9.210 (12.321)	6.122 (11.225)
	≤ 3	0.006	3.088 (4.130)	3.088 (4.130)
Myanmar	0	0.340	226.467** (47.856)	206.584** (24.159)
	≤ 1	0.021	20.136 (24.276)	10.717 (17.797)
	≤ 2	0.013	9.418 (12.321)	6.341 (11.225)
	≤ 3	0.006	3.078 (4.130)	3.078 (4.130)
Philippines	0	0.050	44.694* (40.175)	25.697* (24.159)
	≤ 1	0.018	18.998 (24.276)	9.181 (17.797)
	≤ 2	0.011	9.817 (12.321)	5.471 (11.225)
	≤ 3	0.009	3.346 (4.130)	3.346 (4.130)
Singapore	0	0.058	48.085** (40.175)	29.509** (24.159)
	≤ 1	0.018	18.576 (24.276)	8.949 (17.797)
	≤ 2	0.013	9.627 (12.321)	6.400 (11.225)
	≤ 3	0.006	3.227 (4.130)	3.227 (4.130)
Thailand	0	0.060	49.412** (40.175)	30.777** (24.159)
	≤ 1	0.019	18.634 (24.276)	9.671 (17.797)
	≤ 2	0.011	8.963 (12.321)	5.572 (11.225)
	≤ 3	0.007	3.391 (4.130)	3.391 (4.130)
Vietnam	0	0.060	48.393** (40.175)	29.379** (24.159)
	≤ 1	0.021	19.014 (24.276)	9.990 (17.797)
	≤ 2	0.013	9.025 (12.321)	6.373 (11.225)
	≤ 3	0.006	2.651 (4.130)	2.651 (4.130)

Notes: Significance levels are 5% * and 1% **. The variables of cointegration test are *X*, *RMB*, *YEN*, and *EURO*. The number in parenthesis is a critical value at the 0.05 level. Each specification for the pre-, and post-crisis period includes one lag, respectively, assuming a trend in the series but not in the cointegrating relationships.

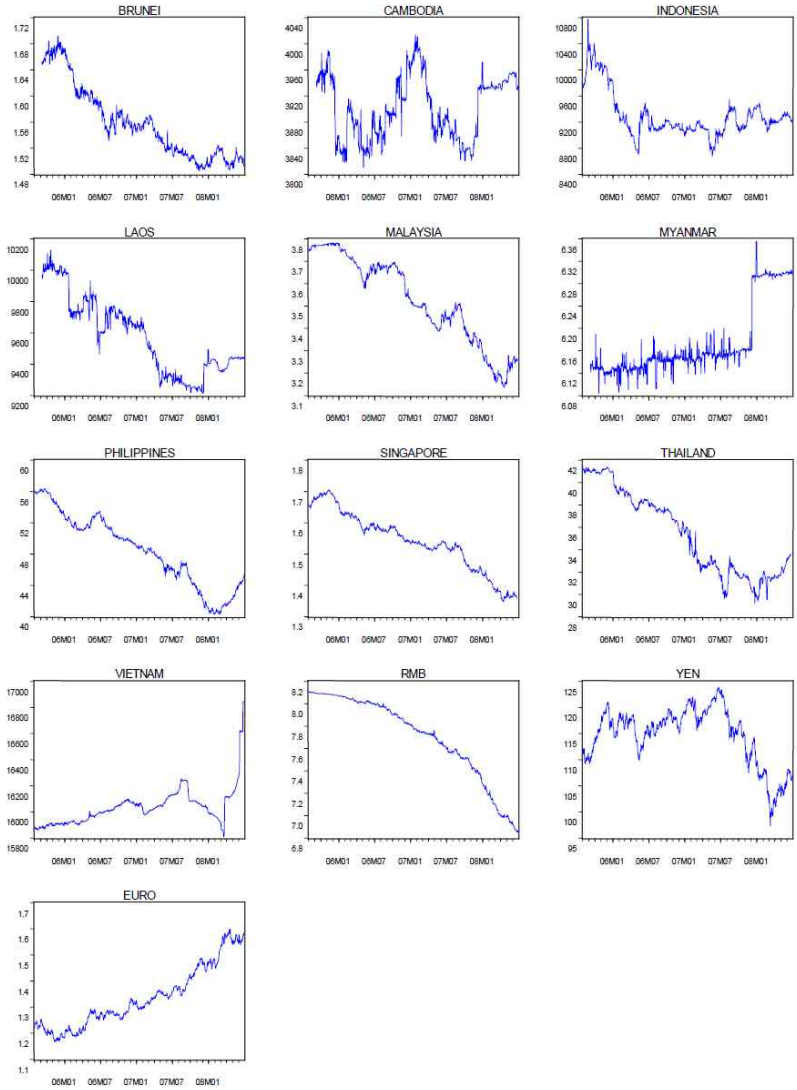
TableA5. Results of panel unit root tests on exchange rates

	Pre-Crisis		Post-Crisis	
	Level	1st difference	Level	1st difference
Levin, Lin and Chu	—0.167	—97.639***	—3.460***	—78.733***
Breitung	2.314	—49.142***	0.836	—35.296***
Fisher-ADF	14.372	1425.28***	202.890***	1589.33***
Fisher-PP	18.883	1151.95***	212.505***	1157.54***
Hadri	31.349***	—0.407	37.584***	0.223

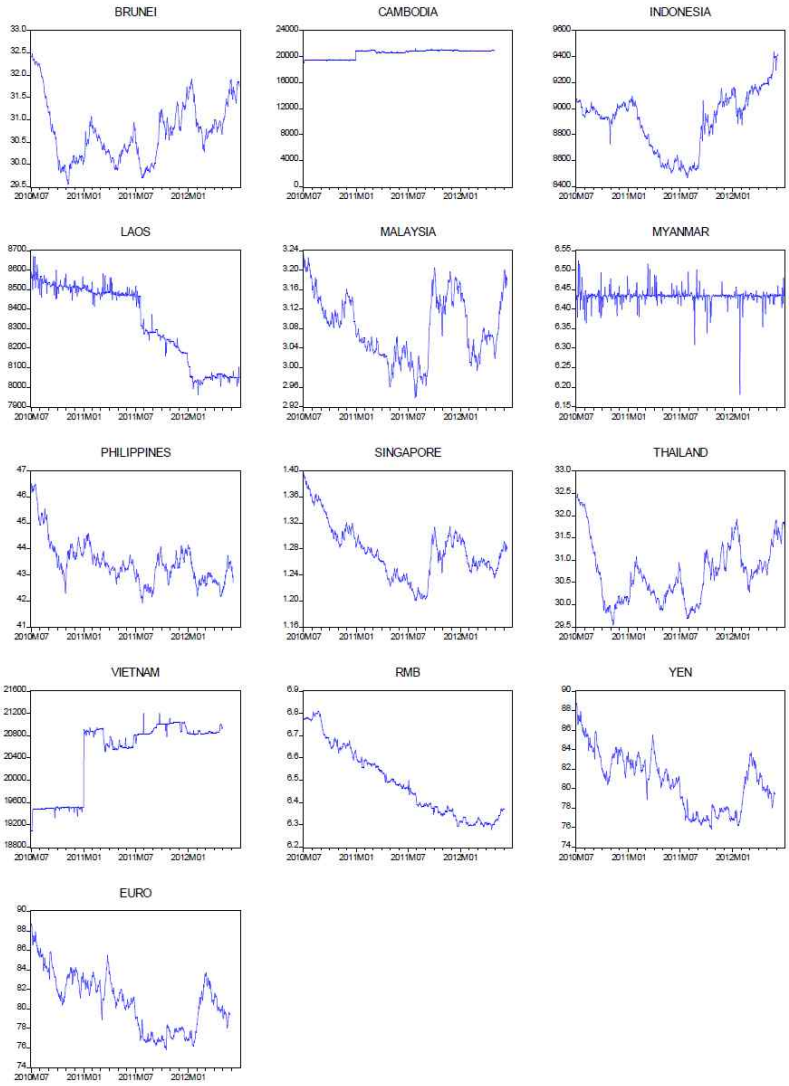
Notes: Significance levels are 10% *, 5% **, 1% ***. Each panel unit root test contains an intercept but no time trend.

<Appendix 2>

FigureA1. Trend of exchange rate of pre-crisis period (2005.8-2008.6)



FigureA2. Trend of exchange rate of post-crisis period (2010.7-2012.6)



<국문요약>

동남아시아에서의 위안화 국제화:
위안화 환율에 대한 개별국가 환율의 동조화 또는 비동조화 현상을 중심으로

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중국의 위안화 국제화(지역화)는 중국경제의 성장 및 중국정부의 전략적, 정책적 지원에 따라 가속화되고 있다. 특히 최근 ASEAN과 중국 간 경제통합이 빠르게 진행됨에 따라 동남아시아 지역에서 중국 위안화의 유통이 확대되고 있다. 본 논문은 이러한 위안화 유통의 확대와 관련하여 위안화 국제화(지역화)가 동남아시아 국가들의 환율정책에 미치는 영향을 분석하고자 한다. 동 지역에서 위안화의 유통의 확대(위안화 국제화)가 유의미하다면 달러화 대비 위안화 환율과 달러화 대비 동남아시아 개별국가통화 환율 간에 인과적 관계를 보일 것이다. 왜냐하면 환율정책의 중요한 목적 중 하나는 환율의 안정적 운영인데 환율결정에 있어 위안화의 비중이 크다면 그만큼 달러화 대비 개별국가통화 간 환율의 영향도 커지기 때문이다. 본 논문은 이러한 가설을 바탕으로 두 환율변수 간 공적분 분석 등 계량분석을 통해 가설검정을 실시하였다. 분석 결과 2008년 글로벌 금융위기 이전(2005.8~2008.6)에는 두 환율변수 간 동조화 현상이 나타나는데 비해 그 이후(2010.7~2012.6)는 비동조화 현상이 나타나는 것으로 나타났다. 이는 2010년 이후 유럽의 재정 위기 등 글로벌

경기침체로 인해 동남아시아 국가들의 환율 정책 우선순위가 환율의 안정적 운영에서 경기회복을 위한 수출증가 및 이를 위한 개별국가 통화의 환율절하로 전환하였음을 의미한다고 할 수 있다. 또한 중국과의 국경무역 등 경제적 영향이 상대적으로 큰 GMS(라오스, 미얀마, 베트남)국가들의 경우 그 외 아세안 7개국들에 비해 두 환율변수 간 동조화 현상이 강하게 나타나는 것으로 분석되었다. 이는 이들 국가들이 상대적으로 기타 국가들에 비해 위안화 국제화에 대한 민감도가 높다는 것을 의미한다. 향후 동남아시아 국가들의 경기가 회복되고 위안화의 국제화가 가속되면 두 환율 간 동조화 기조는 강화될 것으로 예상된다.

주제어: 동남아시아, 위안화 국제화(지역화), 환율정책, 동조화, 비동조화, 달러화 대비 개별국가 통화 환율, 달러화 대비 위안화 환율