Very Preliminary

Currency Baskets for East Asia*

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1. Introduction

Ten years has passed since the Asian currency crisis occurred in 1997. During the 10 years we have been discussing about desirable exchange rates system for East Asian countries. It is recognized that the currency crisis was caused and worsened the crisis-hit economy further under the dollar peg system that the monetary authorities officially or *de facto* adopted before the Asian currency crisis. More flexible exchange rate system such as a currency basket system should be desirable for East Asian countries that have strong economic relationships with not only the United States but also European countries and neighboring Asian countries which include Japan.

Many of East Asian countries tried to shift from a official or *de facto* dollar peg system to more flexible exchange rate systems which include a managed floating exchange rate system immediately after the Asian currency crisis. On the other hand, the monetary authority of Malaysia officially returned to the dollar peg system in September 1998. Moreover, the monetary authority of China had kept the dollar peg system since 1994 even after the Asian currency crisis because Chinese economy faced no currency crisis thank to its own strict capital and foreign exchange controls. Both the monetary authorities of China and Malaysia made announcements of changing their exchange rate system to a managed floating exchange rate system with reference to a currency basket on July 21, 2005. The currency basket includes major currencies with their strong economic relationship in terms of international trade, foreign direct investment, and international finance. The major currencies are the US dollar, the euro, and the Japanese yen.

On one hand, the monetary authorities of East Asian countries have established an initiative for regional monetary cooperation, that is, the Chiang Mai Initiative. The Chiang Mai Initiative includes a network of bilateral currency swaps for management of currency crisis and a surveillance process for prevention of currency crisis in 2000. Especially in the surveillance process, the Financial Deputy Ministers' Meeting focuses on domestic macroeconomic variables such as GDP and inflation rates at their Economic Review and Policy Dialogue. The monetary authorities of East Asian countries should watch exchange rates in the surveillance process for prevention of currency crisis. For the reason, a Regional Monetary Unit (RMU) has been studied by a research group under the ASEAN plus 3 Financial Ministers' Meeting. The RMU is considered as a weighted average of East Asian currencies in contrast with the G3 currencies which that include non-regional currencies such as the US dollar and the euro.

Thus, some of the East Asian countries are adopting a currency basket system by making target or reference to the G3 currencies which include the US dollar, the euro,

and the Japanese yen. At the same time, the ASEAN plus 3 Financial Ministers' Meeting established its research group who studies about a Regional Monetary Unit (RMU) that is a weighted average of East Asian currencies. We have two kinds of concept on currency basket in East Asia. We should reconsider relationship between the two concepts on currency basket. This paper is to explain the two kinds of currency baskets for East Asia and to consider a relationship between them. Relating with the relationship between the two kinds of currency baskets, it is to consider how we utilize the two kinds of currency baskets to strengthen a regional monetary coordination among East Asian countries and how we proceed from the current exchange rate system with individual G3 currencies to a regional monetary coordination based on a regional monetary unit such as the RMU.

2. A Lesson from the Asian Currency Crisis: From dollar-peg to Currency Basket

East Asian countries formally or *de facto* adopted a dollar peg system before the Asian currency crisis in 1997[1]. Calvo and Reinhart (2002) analyzed the exchange rates, foreign reserves, monetary base, and interest rates in Asian countries. They concluded that, although some of the Asian counties announced that they were adopting a floating exchange rate regime, their currencies had strong linkages with the US dollar and the exchange rates were not floating so freely. McKinnon (2001) and McKinnon and Schnabl (2004) analyzed how daily changes in the exchange rates of nine East Asian currencies have a strong relationship with the US dollar. He showed that the movements of the East Asian currencies had a high correlation with the movements of the dollar prior to 1997. These two papers suggest that most Asian countries were not floaters and some of them adopted a de facto dollar peg regime, which is classified as an intermediate exchange rate regime.

Williamson (2000) explains this "revealed preference" of Asian countries as follows: "they see gains in an intermediate regime that they believe outweigh the costs in terms of greater vulnerability to crises and having less simple policy rules to follow." Williamson (2000) believes that the primary benefit of an intermediate exchange rate regime is that it allows policy to be directed to limiting misalignments of exchange rates. Overvaluation of home currencies would weaken the competitiveness of tradable goods industries while undervaluation would cause overheating and imported inflation. Thus, the benefit of a basket currency system would have been significant for Asian countries that have been following export-oriented strategies for their economic growth.

[1] Ito (2007).

However, East Asian countries experienced the Asian currency crisis in the situation where the monetary authorities of East Asian countries formally or *de facto* adopted the dollar peg system. One of the main reasons is that the monetary authorities fixed their home currencies to the US dollar although East Asian economies had close relationships with not only the United States but also European countries and neighboring countries which include Japan.

Not the dollar peg system but a basket currency system should have been adopted in East Asian countries for a viewpoint of keeping trade competitiveness stable[2]. If the export destination is only one country and there is no competitor other than the destination country, it is enough to peg the currency to that of the export destination country as to maintain trade competitiveness. But actually, a country tends to have many export destinations and many competitors all over the world. In addition, the composition of export destination countries has changed over time. Thus it is not easy to decide the weights of the basket.

Taking into account this complexity, some papers suggest the ways to get optimal weights for the currency basket. Ito, Ogawa, and Sasaki (1998) calculated the optimal weights that stabilize variances of trade balance. In the paper, we built a theoretical model in which the Asian firm maximizes its profits, competing with the Japanese and the US firms in their markets. We used a duopoly model to determine export prices and volumes in response to fluctuations of the exchange rate vis-à-vis the Japanese yen and the US dollar. We obtained optimal basket weights that would minimize the fluctuation of the growth rate of the trade balance.

Ito, Ogawa, and Sasaki (1998) stressed the fact that Asian countries' adoption of de facto dollar peg regimes, although their trade weight with Japan was substantial, was one of the most significant factors that induced the crisis. As the Japanese yen depreciated against the US dollar from April 1995 to the summer of 1997, the real effective exchange rates of Asian countries appreciated, causing the countries to lose export competitiveness. Thus exports from those countries declined. For example, the gross export values of Thailand did not grow in 1996, compared with 20% growth a year earlier.

The optimal weights proposed by Ito, Ogawa, and Sasaki (1998) are shown in Table 1. The estimated weights from actual fluctuations of the exchange rates are quoted from Frankel and Wei (1994). The optimal weights of the yen are higher than the estimated weights. It suggests that, if Asian currencies peg to a currency basket with

[2] Ogawa, Ito, and Sasaki (2004) pointed out merits and demerits of the currency basket system.

the optimal weights, the real effective exchange rates of Asian countries would be more stable and a large shock to trade balance can be avoided.

While Ito, Ogawa, and Sasaki (1998) emphasized the trade aspect, exchange rates are likely to be influenced by capital flows. Ogawa and Sun (2001) analyzed how the de facto dollar peg regime before 1997 had influenced capital inflows to Indonesia, Korea, and Thailand—the three countries that will need International Monetary Fund (IMF) financial support later. They conducted a simulation analysis of a counterfactual hypothesis that the monetary authorities had adopted a currency basket peg system instead of the de facto dollar peg system. They assumed that the foreign exchange risks of the home currency against the US dollar would be doubled while foreign exchange risks of the home currency against the yen would be halved under the currency basket peg system.

The regression analysis of the actual capital inflows found that the responsiveness of capital flows to the foreign exchange risk against the US dollar is much larger than the responsiveness of capital flows to the foreign exchange risk against the yen in the case of Korea and Thailand. The simulation analysis by Ogawa and Sun (2001) found that the currency basket peg system would have had a depressing effect on capital inflows to Korea and Thailand.

Sasaki (2002) analyzed whether changes in capital inflows to East Asian countries (Korea, Malaysia, Philippines, Singapore, and Thailand) could be explained by the variance of exchange rates. The results showed that capital inflows to East Asian countries increased when the variance of US dollar rates (i.e., exchange rates risk of the US dollar) decreased. Thus, the de facto dollar peg induced more capital inflows than did under the currency basket or the floating exchange rates regime.

Both Ogawa and Sun (2001) and Sasaki (2002) concluded that the *de facto* dollar peg regime promoted capital inflows to Asian countries and implied that if Asian countries had adopted a basket currency regime (or the floating exchange rate regime), capital inflows might not have been so huge. These two papers do not examine whether huge capital inflows due to de facto dollar peg was good or bad for the economies of those countries in the long run. Capital inflow itself promotes growth and may be good for an emerging country. But huge capital inflows also pose a risk to the countries in the sense that a sudden reversal in the direction of capital flows is a possibility. In fact, the outflow of short-term capital experienced by some of the countries in the region before the crisis was damaging to the firms in Asian countries.

FDI (long-term capital), as opposed to bank liabilities (short-term capital), are not likely to be subject to short-term exchange rate risks. Sasaki (2002) analyzed capital

inflows separately by type: portfolio investments, bank lending, and FDI. The effect of the variance of the US dollar on capital inflows was the strongest in bank liabilities and was not so large in portfolio investments and FDI. It means that if Asian countries had adopted a basket currency regime, bank liabilities would have decreased but portfolio investments and foreign direct investments would not have been affected so much. Thus, moderating capital inflows is thought to be a benefit of a basket currency regime.

Yoshino, Kaji, and Suzuki (2004) examined which currency regime among the basket peg, dollar peg, and floating exchange rate regimes could achieve the lowest in the loss functions corresponding to the different policy objectives. Those policy objectives include stability of GDP, the current account, and the exchange rate against the dollar. They also calculated the optimal weights in a currency basket. They concluded that the optimal choice of an exchange rate regime for a small open economy depended on its policy objective. Gains from adopting a currency basket peg are larger when the country uses the yen in trade with Japan and the dollar in trade with the United States.

Thus, the experience of the Asian currency crisis taught us the lesson that the dollar peg system was dangerous. The lesson pointed out that East Asian countries should not have adopted dollar peg system before the Asian currency crisis. East Asian countries should have taken into account their partners in international trade and financial transactions in choosing their own exchange rate regimes. Some have proposed that it is desirable for East Asian countries to adopt a basket currency regime, in which the monetary authorities should target their home currency to a basket currency, consisting of the US dollar, the Japanese yen, and the euro.

3. Current Exchange Rate Policies of East Asian Countries

An empirical analysis is conducted to investigate what kind of trend of linkages each of the East Asian currencies actually have with three major currencies which include the US dollar, the euro, and the Japanese yen. For the purpose, the empirical analytical method of Frankel and Wei (1994) is to analyze the linkages of each of the East Asian currencies with the three major currencies for each year during a whole sample period from 1999 to 2006.[3] It is covered the ASEAN10 countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines Singapore, Thailand, and Vietnam), China, and South Korea although sample periods for Cambodia, Laos,

[3] Kawai and Akiyama (1998, 2000) conducted the method to investigate exchange rate policy of East Asian countries.

and Myanmar covers only a period from 2003 to 2006 due to data constraints.

According to Frankel and Wei (1994), it is supposed that the Swiss franc as a numeraire in denomination of exchange rates. Daily data of exchange rates are used to conduct regression of log differences of a local currency (in terms of the Swiss franc) on log differences of the three major currencies (in terms of the Swiss franc) for each year of the sample period from 1999 to 2006. The regression for each year of the whole sample period from 1999 to 2006 shows trend linkages of each East Asian currencies with the three major currencies during the period.[4]

The regression equation is the following one:

$$\Delta \log e^{home/SFR} = a_0 + a_1 \Delta \log e^{USD/SFR} + a_2 \Delta \log e^{JPY/SFR} + a_3 \Delta \log e^{euro/SFR} + \varepsilon_t \qquad (1)$$

where $e^{home/SFR}$: exchange rate of a home currency in terms of the Swiss franc, $e^{USD/SFR}$: exchange rate of the US dollar a home currency in terms of the Swiss franc, $e^{JPY/SFR}$: exchange rate of the Japanese yen in terms of the Swiss franc, $e^{euro/SFR}$: exchange rate of the euro in terms of the Swiss franc.

Table 2 shows results of the regression for each of the East Asian currencies that was conducted by Ogawa and Yoshimi (2007). The empirical results show that the linkages with the US dollar has been weakening since 2001 or 2002 for the the Brunei dollar, the Indonesia rupiah, the Korean won, the Philippine peso, the Singapore dollar, and the Thai baht. In addition, the Malaysian ringgit has weakened since 2005 when the monetary authorities of China and Malaysia announced to change their exchange rate system to a managed floating exchange rate system with reference to a currency basket. On the other hand, the Chinese yuan has not yet been changed so much in terms of its linkage with the US dollar. It shows that the monetary authority of China keeps stabilizing the exchange rate of the Chinese yuan against the US dollar.

On July 21, 2005, the Chinese government announced to change the Chinese exchange rate system from the dollar-peg system to a managed floating system with reference to a currency basket. The linkages of the Chinese yuan with the US dollar were completely perfect before the announcement as shown that the coefficients on the US dollar were 1.000 from 1999 to 2004. The linkage with the US dollar was decreased to a level of 0.9399 in 2005 which includes a period after the announcement on Chinese

[4] McKinnon (2001) and Ogawa (2002, 2004) conducted the similar method to investigate the dynamics of the coefficients. Ogawa and Sakane (2006) used the Kalman filter method to investigate the dynamics of the coefficients for the Chinese yuan.

exchange rate system reform. It is statistically significant that the monetary authority of China stopped the dollar peg system because a standard deviation of the estimate (0.9399) was 0.0169 in 2005. However, the coefficient was much higher than Chinese trade shares (about 15%) with the United States in recent years. [5] Moreover, the linkages with the US dollar have increased again to a level of 0.9797. On one hand, the linkages of the Chinese yuan with the euro were statistically insignificant even though the Chinese government announced the exchange rate system reform.

On the other hand, also the monetary authority of Malaysia announced to change its exchange rate system from the dollar-peg system to a managed floating system with reference to a currency basket on the same day when the Chinese announcement on the exchange rate system reform. The linkages of the Malaysian ringgit with the US dollar were completely perfect before the announcement as shown that the coefficients on the US dollar were 1.000 from 1999 to 2004. The linkage with the US dollar was decreased to a level of 0.9399 in 2005 which includes a period after the announcement on changing to the managed floating system with reference to a currency basket. The linkage with the US dollar was 0.8335 while the linkage with the Japanese yen was 0.1105 in 2006. The monetary authority of Malaysia has in fact changed the exchange rate system to a currency basket system.

It is known that the Monetary Authority of Singapore is adopting a currency basket system where it target the Singapore dollar to a currency basket which includes its major trading partners' currencies. The currency basket system reflects in an analytical result that coefficients on the three major currencies were statistically significant almost over the sample period. The linkages of the Singapore dollar with the US dollar were relative high in 1999 and 2000. The linkage with the US dollar has been decreasing from 0.8230 in 2000 to 0.5586 in 2005. On one hand, the linkages with the euro and the Japanese yen have been increasing and have reached to levels of 0.2459 in 2006 for the euro and 0.3312 in 2005 for the Japanese yen, respectively.

Also, the Thai baht has linkages with not only the US dollar but also the euro and the Japanese yen. The coefficient on the US dollar was 0.8615 in 2001 and then has been decreasing to a level of 0.6621 in 2005 and 0.6857 in 2006. On one hand, coefficients on the Japanese yen were always statistically significant while coefficients on the euro were statistically significant in some years which include 1999, 2004, and 2006. The coefficients on the Japanese yen increased from 0.1138 in 1999 to 0.2731 in 2005 while the coefficient on the euro has reached to a level of 0.4301 in 2006.

The IMF classifies that the monetary authority of South Korea adopt an

[5] See Ogawa and Sakane (2006) details of the Chinese exchange rate system reform.

independent floating exchange rate system. The linkages of the Korean won with the US dollar have a decreasing trend over the sample period. The linkage with the US dollar was 0.9845 and the highest in 2000 during the sample period. The linkages have decreased since 2001 and reached to a level of 0.5778 in 2005. The linkages with the Japanese yen have been statistically significant over the sample period. It had the highest level (0.2127) in 2005. Although the linkages with the euro have been not always statistically significant over the sample period, the coefficients were not so low.

All of the three coefficients on the US dollar, the euro, and the Japanese yen are statistically significant for the Brunei dollar, the Singapore dollar, and the Thai baht in 2006. The Brunei dollar follows the Singapore dollar under the Brunei's currency board backed up by the Singapore dollar. The monetary authorities of both Singapore and Thailand are regarded to adopt a currency basket which includes the US dollar, the euro, and the Japanese yen. On one hand, coefficients on the Japanese yen as well as the US dollar are statistically significant for the Cambodian riel, the Korean won, the Malaysian ringgit, the Myanmar kyat in recent years while the linkage of the Korean won has been increasing over the sample period.

4. Regional Monetary Unit for Regional Monetary Coordination in East Asia

The monetary authorities of East Asian countries, especially ASEAN plus 3 have been strengthening their regional monetary cooperation since the Asian Currency Crisis in 1997 through the Chiang Mai Initiative. Under the Chiang Mai Initiative, the monetary authorities of ASEAN plus 3 established a network of bilateral and multilateral swap arrangements for managing a currency crisis in the member countries. Under the Chiang Mai Initiative, the monetary authorities should conduct a surveillance process for preventing a currency crisis in the future. However, the monetary authorities have not any standing institution for carrying out any surveillance process in East Asia. Instead, they regularly meet as the Economic Review and Policy Dialogue in the ASEAN plus 3 Finance Deputy Ministers' Meeting for surveillance over their macroeconomic performance although they focus on only domestic macroeconomic variables which include GDP, inflation, and soundness of financial sector.

The monetary authorities of East Asian countries should prevent biased changes in the relative prices caused by the US dollar depreciation under the different exchange rate systems in East Asian countries. To do so, they have been coordinated in the choice of their exchange rate systems and exchange rate policies. Kawai, Ogawa, and Ito

(2004) suggested the following advices concerning the exchange rate policy in East Asia. First, the monetary authorities of the ASEAN plus 3 should discuss the exchange rate issue as a part of the surveillance process. They should focus on the exchange rate issue as well as on the domestic macroeconomic policies and on the soundness of financial sector: the exchange rates of home currencies against neighboring countries' are indeed linked by its terms of trade and its competitive prices. Each country in the East Asia region has strong economic relationships with the other intra-regional countries as well as the United States and the European countries.

Exchange rates among the intra-regional currencies should affect economic activities in each country of East Asia through intra-regional trade, investments, and finance. The monetary authorities should not only hold under account movements of the exchange rates but also their deviations from the regional averages and, in turn, their exchange rate policies *per se*.

The surveillance process, in itself, might not be sufficiently solid to preserve the regional policy coordination in the long run because the monetary authorities from each country are not committed to the policy coordination. They may make a limited contribution to the policy coordination. It is necessary to have a mechanism that will be able to preserve the regional coordination in the long run by compelling the monetary authorities to be committed to the regional policy coordination.

Regarding the regional policy coordination, it is necessary that all the monetary authorities in the region agree on an arrangement to create a regional common unit of account that consists of a basket of regional currencies. They might make a commitment to follow the regional common unit of account in carrying out their exchange rate policy. It is desirable to create a regional common unit of account to which monetary authorities of East Asian countries should target in conducting their exchange rate policies in order that they should make regional policy coordination for their exchange rate policies with each other. To do so, a Regional Monetary Unit should be introduced as a regional common unit of account into East Asia. For this purpose, a common currency basket that includes regional currencies of the ASEAN plus 3 countries is created. The ASEAN plus 3 Financial Ministers Meeting has launched to make a research group study a Regional Monetary Unit (RMU) for coordinated exchange rate policy.[6]

An Asian Monetary Unit (AMU) that supposed by Ogawa and Shimizu (2005) is an example of the RMU. As a criterion of the new surveillance system, the monetary

[6] The Asian Development Bank also has been studying about a regional common unit of account that is called as an Asian Currency Unit (ACU).

authorities of ASEAN plus 3 should put forward the creation of an AMU and AMU Deviation Indicators for East Asian currencies. These should contribute to the coordination of exchange rate policies in East Asia, thereby enhancing the monetary authorities' surveillance capabilities.

The AMU is calculated as a weighted average of East Asian currencies. The AMU Deviation Indicators for each East Asian currency are measured to show the degree of deviation from the Benchmark Rate for each of the East Asian currencies in terms of the AMU. Moreover, Ogawa and Shimizu (2005) provided and Real AMU Deviation Indicators, which is adjusted to differences in inflation, on a monthly basis as well as the Nominal AMU Deviation Indicators on a daily basis. The Real AMU Deviation Indicators are more appropriate for conducting surveillance on the effects of changes in exchange rates on the real economy while the Nominal AMU Deviation Indicators are more useful for monitoring their day-to-day deviations from the AMU.

The weight of each currency in the currency basket is based on the arithmetic averages of both the countries' respective shares of GDP measured at PPP, and trade volumes (the sum of exports and imports) in the total of sampled countries for the relevant country.[7] We calculate the countries' shares of GDP measured at PPP and their trade volumes for 2001-2003 as the currency shares of the AMU. The average for the past three years on the basis of available data, is used to calculate the currency shares in order to reflect the most recent trade relationships and economic conditions of the thirteen East Asian countries for the calculation of the AMU. Table 3 shows the AMU weights as well as trade volume share, share of GDP measured at PPP, arithmetic shares of both the shares, and the Benchmark Exchange Rates.

A benchmark period is chosen in order to calculate AMU Deviation Indicators. The benchmark period is defined as the following: the total trade balance of member countries, the total trade balance of member countries (excluding Japan) with Japan, and the total trade balance of member countries with the rest of world should be relatively close to zero. Data on trade accounts of the thirteen East Asian countries from 1990 to 2003 indicates that the trade accounts were the closest to balance in 2001. If we assume that a one-year time lag before changes in exchange rates affect trade volumes, we should choose 2000 and 2001 as a benchmark period.

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[7] This type of RMU, that is, AMU, focuses on real aspects of economy to use GDP and trade volume in calculating a weight for each of component currencies. On one hand, it might be important to take into account financial aspects of economy because capital inflows and outflows fluctuate exchange rates in the short-run. Ogawa and Shimizu (2005) calculated also weights based on a financial aspect of economy which includes international reserves.

Regarding currencies with higher inflation rates, inflation rate differentials should be taken into account to calculate an AMU Deviation Indicator in real terms. Real AMU Deviation Indicators are calculated according to the following equation:

$$real\ \ deviation\ \ indicator_i = nominal\ \ deviation\ \ indicator_i - \left(\dot{P}_{AMU} - \dot{P}_i\right) \qquad (2)$$

where $\dot{P}_{AMU}$ is the inflation rate in the AMU area and $\dot{P}_i$ is the inflation rate in country i.

Consumer Price Index (CPI) data is used as the price index in calculating the Real AMU Deviation Indicator because there are data constraints for some of the sampled countries where we have no alternative data but to use the CPI data as a price index. As the CPI data are only available on a monthly basis, we calculate the Real AMU Deviation Indicator per month. As for the inflation rates in the AMU area, we calculate a weighted average of the CPI for the AMU area by using the AMU shares, which is the combination of shares in terms of trade volumes and GDP measured at PPP.

Figure 3 shows movements in the Real AMU Deviation Indicators on a monthly basis for each of the East Asian currencies, given that price index data are limited to monthly data. It is easy to find some differences between the Nominal and Real AMU Deviation Indicators by comparing Figures 2 and 3. In the case of Indonesia rupiah, the Real AMU Deviation Indicator has been rather appreciating since July 2003 while the Nominal AMU Deviation Indicator has been depreciating from July 2003 onwards. The differences reflect a higher inflation rate in Indonesia. Higher inflation tends to cause the appreciation of home currency even though it is depreciating. The Lao kip has been appreciating in terms of the Real AMU Deviation Indicator although it has been depreciating in terms of Nominal AMU Deviation Indicator. In contrast, both the Korean won and the Thai baht have been appreciating in terms of Real AMU Deviation Indicators by reflecting the appreciation in terms of Nominal AMU Deviation Indicators. Moreover, the Japanese yen has been depreciated so much in terms of real exchange rates while it has been not so depreciating in terms of nominal exchange rate.

Thus, the monetary authorities should monitor the Real AMU Deviation Indicators rather than the Nominal AMU Deviation Indicators in order to consider the effects of exchange rates on real economic variables such as trade volumes and real GDP. On the other hand, the Nominal AMU Deviation Indicators are more useful than the Real AMU Deviation Indicators when we consider both frequency and time lags as important for monitoring these measures. Accordingly, we should use the Nominal and Real AMU Deviation Indicators as complementary measures for scrutinizing the exchange rate

policies and related macroeconomic variables and, in turn, for devising coordinated exchange rate policies among the East Asian currencies.

5. Multi-step toward a Regional Monetary Coordination: From G3 currency baskets to RMU

Some of the East Asian countries are adopting a currency basket system by making target or reference to the G3 currencies which include the US dollar, the euro, and the Japanese yen. At the same time, the ASEAN plus 3 Financial Ministers' Meeting established its research group who studies about a Regional Monetary Unit (RMU) that is a weighted average of East Asian currencies. We have two kinds of concept on currency basket in East Asia. We should reconsider relationship between the two concepts on currency basket.

It is suggested that currency basket systems in East Asia will be gradually developed from the current situation of adopting an individual currency basket in each East Asian country to a situation of adopting a common currency basket based on either the G3 or the RMU as developing countries catch up developed countries in East Asia to align development stages among them and then all of the countries in East Asia becomes an Optimum Currency Area (OCA)[8].

At the first step, the monetary authorities of ASEAN plus 3 will launch to have policy dialogue about exchange rates and exchange rate policies for coordinated exchange rate policies among them. At the time, the RMU and the RMU-based Deviation Indicators of regional currencies should be used to conduct surveillance over the exchange rates and exchange rate policies as well as domestic macroeconomic situation at the Economic Review and Policy Dialogue of ASEAN plus 3 Finance Deputy Ministers Meeting. The surveillance process based on the RMU should include all of the ASEAN plus 3 countries. Accordingly, all of the ASEAN plus 3 currencies should be included in the RMU because the RMU is used as a deviation indicator at the surveillance process of the Economic Review and Policy Dialogue.

At the second step, the monetary authorities of ASEAN plus 2 (China and Korea) will adopt a managed floating exchange rate system with reference to its own individual G3 currency (the US dollar, the euro, and the Japanese yen) basket for managed floating countries. It is not difficult for especially the Chinese monetary authority to adopt the managed floating exchange rate system with reference to its own individual G3 currency basket because the Chinese government announced its adoption of the

[8] Ogawa and Shimizu (2007)

exchange rate system on July 21, 2005.[9] On one hand, at the same time, the monetary authorities of AESAN plus 3, which include Japan, should keep conducting the surveillance process by using the RMU and the RMU-based Deviation Indicators of regional currencies.

At the third step, the monetary authorities of ASEAN plus 2 shifted to a managed floating exchange rate system with reference to a common G3 currency basket for managed floating countries. At the same time, the monetary authorities of AESAN plus 3 should keep conducting the surveillance process by using the RMU and the RMU-based Deviation Indicators of regional currencies. At the second and third steps, the Japanese yen is one of the G3 currencies that the monetary authorities of ASEAN plus 2 target in conducting their exchange rate policies.

At the forth step, some countries of ASEAN+3 (that may be called as "core countries") would peg to a common regional currency basket, that is the RMU, in order to stabilize intra-regional exchange rates among the core countries of ASEAN plus 3. They should conduct coordinated monetary policies in order to stabilize intra-regional exchange rates. At the time, the core countries should be limited to those that adopt the RMU peg system.

At the fifth step, some of ASEAN plus 3 would introduce a bilateral Grid method based on the RMU to conduct some intervention in foreign exchange markets of the relevant intra-regional exchange rates. An Asian Exchange Rate Mechanism should be established for their coordinated intervention. It is a kind of Exchange Rate Mechanism under the European Monetary System (EMS) before introducing the euro.

Relating with the relationship between the two kinds of currency baskets, East Asian countries have to take gradually a multi-step toward a regional monetary coordination. Currency basket system in East Asian countries should be developed from an individual G3 currency basket to a common G3 currency basket under the current G3 currency basket while the monetary authorities of East Asian countries should use the RMU for surveillance over stability of intra-regional exchange rates among the East Asian currencies. At next steps, East Asian countries should go toward further regional monetary coordination based on the RMU.

[9] In contrast, the Korean monetary authority is adopting a flexible exchange rate system without any intervention in foreign exchange markets in the recent years. It is pointed out that it might be difficult for the Korean monetary authority to return to any managed floating exchange rate system unless it mind volatility nor misalignments of exchange rates of the Korean won against other East Asian currencies.

6. Conclusion

Exchange rate systems in East Asian countries have been changing from the dollar peg system to more flexible exchange rate systems since the Asian currency crisis. Especially, a currency basket system is regarded as a candidate of desirable exchange rate systems in East Asia. Regarding the currency basket system, the currency basket might be the G3 currencies which include the US dollar, the euro, and the Japanese yen. At the same time, the ASEAN plus 3 Financial Ministers' Meeting established a research group to study possibility of introducing a common regional monetary unit into the East Asia.

Relating with the relationship between the two kinds of currency baskets, East Asian countries have to take gradually a multi-step toward a regional monetary coordination. At the present time, some of East Asian countries are adopting a currency basket system, that is, a managed floating exchange rate system with reference to an individual G3 currency basket. The monetary authorities of East Asian countries should use the RMU for surveillance over stability of intra-regional exchange rates among the East Asian currencies while they adopt the individual currency basket system. The monetary authorities should take the important first step of introducing the RMU into their surveillance process under the Chiang Mai Initiative for the moment.

Currency basket system in East Asian countries should be developed from an individual G3 currency basket to a common G3 currency basket under the current G3 currency basket in order to stabilize the intra-regional exchange rates among the regional currencies. At next steps, East Asian countries should go toward further regional monetary coordination based on the RMU in order to stabilize intra-regional exchange rage among East Asian currencies like the European Currency Unit (ECU) under the European Monetary System (EMS) before introducing the euro into some EU states. These stages would be a preparatory one toward a common currency in East Asia in the long future.

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Table 1: Optimal Weights for a Currency Basket for East Asian Countries

	Actual Weight		Optimal Weight	
Currency	USD (%)	JPY (%)	USD (%)	JPY (%)
Thai baht	91	5	35.3	64.7
Indonesia rupiah	95	16	77.9	22.1
Korean won	96	-10	45.7	54.3
Taiwan dollar	96	5	7.3	92.7
Singaporean dollar	75	13	51.0	49.0
Philippine peso	107	-1	72.8	27.2

Notes: Actual weights were estimated from actual movements of exchange rates. Asian currencies (in terms of the Swiss franc) were regressed on the US dollar (in terms of the Swiss franc) and the Japanese yen (in terms of the Swiss franc). Optimal weights were derived to minimize fluctuations of growth rate of the trade balance

Sources: Frankel and Wei (1994) and Ito, Ogawa, and Sasaki (1998)

Table 2: Linkages of East Asian currencies to three main currencies

Brunei dollar	US dollar		euro		Japanese yen		Adj R2
1999	0.8175	***	0.4343	***	0.0961	***	0.821
	0.0339		0.1068		0.0198		
2000	0.8335	***	0.0456		0.1151	***	0.909
	0.0282		0.0541		0.0207		
2001	0.7973	***	0.0644		0.1804	***	0.877
	0.0306		0.0582		0.0259		
2002	0.6629	***	−0.0006		0.2008	***	0.841
	0.0265		0.0768		0.0231		
2003	0.6834	***	0.1589	**	0.1558	***	0.844
	0.0321		0.0684		0.0302		
2004	0.6082	***	0.2695	***	0.1912	***	0.889
	0.0249		0.0677		0.0226		
2005	0.5742	***	0.1543	*	0.2418	***	0.840
	0.0271		0.0853		0.0288		
2006	0.5986	***	0.2768	***	0.1898	***	0.811
	0.0312		0.0883		0.0307		
Cambodia riel	US dollar		euro		Japanese yen		Adj R2
1999							
2000							
2001							
2002							
2003	0.9534	***	−0.3878		0.0257		0.736
	0.1091		0.3024		0.1048		
2004	0.9864	***	0.1569	*	−0.0261		0.876
	0.0333		0.0905		0.0302		
2005	0.9214	***	0.1191		−0.0194		0.607
	0.0632		0.1989		0.0672		
2006	0.9191	***	−0.1765		0.1248	***	0.685
	0.0554		0.1564		0.0547		
Chinese yuan	US dollar		euro		Japanese yen		Adj R2
1999	1.0002	***	0.0006		−0.0002		1.000
	0.0004		0.0012		0.0002		
2000	1.0001	***	0.0000		−0.0002		1.000
	0.0006		0.0011		0.0004		
2001	1.0002	***	−0.0007		0.0000		1.000
	0.0005		0.0009		0.0004		
2002	1.0004	***	−0.0005		−0.0004	*	1.000
	0.0002		0.0007		0.0002		
2003	1.0000	***	0.0002		0.0002		1.000
	0.0002		0.0005		0.0002		
2004	1.0003	***	−0.0004		−0.0001		1.000
	0.0002		0.0006		0.0002		
2005	1.0001	***	−0.0035		−0.0026		0.999
	0.0024		0.0073		0.0026		
2006	0.9797	***	0.0231		−0.0002		0.984
	0.0107		0.0303		0.0105		

Indonasia rupiah	US dollar		euro		Japanese yen		Adj R2
1999	0.6829	***	1.8011	**	0.2781	*	0.143
	0.2283		0.7182		0.1332		
2000	1.1070	***	0.4676	*	0.1481		0.436
	0.1343		0.2578		0.0985		
2001	1.2880	***	-0.3345		-0.0310		0.286
	0.1649		0.3136		0.1395		
2002	0.7556	***	0.1575		0.0264		0.308
	0.0898		0.2603		0.0784		
2003	0.8526	***	0.1052		0.1078	*	0.669
	0.0603		0.1283		0.0567		
2004	0.7479	***	0.1292		0.1965	***	0.622
	0.0630		0.1713		0.0572		
2005	0.7353	***	-0.0348		0.1579		0.316
	0.1007		0.3166		0.1070		
2006	0.7060	***	0.5174	**	-0.0682		0.331
	0.0921		0.2607		0.0906		
South Korean w	US dollar		euro		Japanese yen		Adj R2
1999	0.9199	***	0.1876		0.0645	**	0.672
	0.0528		0.1660		0.0308		
2000	0.9845	***	-0.0923		0.1456	***	0.675
	0.0737		0.1415		0.0541		
2001	0.8703	***	0.0362		0.3039	***	0.726
	0.0595		0.1132		0.0503		
2002	0.6853	***	-0.3222		0.2373	***	0.428
	0.0711		0.2061		0.0621		
2003	0.7408	***	0.2136		0.2001	***	0.551
	0.0757		0.1611		0.0712		
2004	0.7516	***	0.2433	*	0.1915	***	0.767
	0.0456		0.1240		0.0414		
2005	0.5778	***	0.1611		0.2127	***	0.574
	0.0524		0.1649		0.0557		
2006	0.7845	***	0.1477		0.1062	*	0.594
	0.0608		0.1719		0.0597		
Laos kip	US dollar		euro		Japanese yen		Adj R2
1999							
2000							
2001							
2002							
2003	0.9717	***	-0.3510		0.0035		0.774
	0.0993		0.2752		0.0954		
2004	0.9900	***	0.0391		-0.0241		0.965
	0.0166		0.0450		0.0150		
2005	0.9381	***	0.0618		-0.0015		0.767
	0.0238		0.0651		0.0221		
2006	0.8424	***	0.2448		0.0592		0.631
	0.0594		0.1680		0.0584		

Malaysian ringgit	US dollar		euro		Japanese yen		Adj R2
1999	1.0078	***	0.0346	***	-0.0042	*	0.997
	0.0040		0.0127		0.0024		
2000	1.0005	***	-0.0003		-0.0004		1.000
	0.0004		0.0007		0.0003		
2001	1.0001	***	-0.0001		-0.0002		1.000
	0.0017		0.0033		0.0015		
2002	1.0003	***	0.0028		0.0002		0.999
	0.0023		0.0066		0.0020		
2003	1.0004	***	-0.0083		0.0024		0.997
	0.0047		0.0100		0.0044		
2004	1.0045	***	0.0001		-0.0035		0.999
	0.0026		0.0070		0.0023		
2005	0.9890	***	0.0149		-0.0107		0.940
	0.0212		0.0667		0.0225		
2006	0.8335	***	0.1383		0.1105	*	0.627
	0.0599		0.1695		0.0589		
Myanmar kyat	US dollar		euro		Japanese yen		Adj R2
1999							
2000							
2001							
2002							
2003	0.9695	***	-0.3268		0.0029		0.794
	0.0940		0.2605		0.0903		
2004	0.9922	***	0.0449		-0.0136		0.975
	0.0142		0.0386		0.0129		
2005	0.9485	***	0.0863		-0.0185		0.926
	0.0228		0.0716		0.0242		
2006	0.8732	***	0.0692		0.0723	**	0.842
	0.0340		0.0962		0.0334		
Philippine peso	US dollar		euro		Japanese yen		Adj R2
1999	0.8660	***	0.2347		0.0928	***	0.646
	0.0548		0.1724		0.0320		
2000	1.0592	***	-0.2352		-0.0640		0.544
	0.0850		0.1632		0.0624		
2001	0.9673	***	0.0033		0.1864	*	0.431
	0.1094		0.2081		0.0926		
2002	0.8208	***	-0.0542		0.0671		0.620
	0.0510		0.1479		0.0445		
2003	0.9465	***	0.0232		0.0617		0.731
	0.0546		0.1162		0.0513		
2004	0.9107	***	0.0001		0.0660	***	0.932
	0.0229		0.0622		0.0208		
2005	0.8646	***	0.0088		0.1100	***	0.833
	0.0351		0.1104		0.0373		
2006	0.8622	***	-0.0620		0.0399		0.581
	0.0626		0.1771		0.0615		

Singapore dollar	US dollar		euro		Japanese yen		Adj R2
1999	0.8045	***	0.3951	***	0.1226	***	0.789
	0.0380		0.1194		0.0221		
2000	0.8230	***	0.0753		0.1392	***	0.910
	0.0285		0.0548		0.0209		
2001	0.7645	***	0.0348		0.2188	***	0.880
	0.0301		0.0572		0.0254		
2002	0.6783	***	-0.0155		0.2933	***	0.875
	0.0255		0.0739		0.0223		
2003	0.6455	***	0.2198	***	0.2388	***	0.882
	0.0288		0.0613		0.0271		
2004	0.5782	***	0.1606	***	0.2730	***	0.910
	0.0228		0.0620		0.0207		
2005	0.5586	***	0.1405	*	0.3312	***	0.870
	0.0254		0.0800		0.0270		
2006	0.5948	***	0.2459	***	0.3105	***	0.875
	0.0268		0.0758		0.0263		
Thai baht	US dollar		euro		Japanese yen		Adj R2
1999	0.7517	***	0.6589	***	0.1138	***	0.478
	0.0746		0.2348		0.0435		
2000	0.8489	***	0.1678		0.1782	***	0.691
	0.0651		0.1249		0.0477		
2001	0.8615	***	-0.0031		0.1868	***	0.865
	0.0343		0.0652		0.0290		
2002	0.6685	***	-0.0052		0.1499	***	0.540
	0.0538		0.1559		0.0470		
2003	0.7217	***	0.1223		0.2164	***	0.814
	0.0393		0.0837		0.0370		
2004	0.7271	***	0.1921	***	0.1924	***	0.896
	0.0271		0.0738		0.0247		
2005	0.6621	***	0.1050		0.2731	***	0.824
	0.0327		0.1028		0.0347		
2006	0.6857	***	0.4301	***	0.1387	**	0.607
	0.0577		0.1632		0.0567		
Vietnamese don	US dollar		euro		Japanese yen		Adj R2
1999	0.9984	***	-0.0051		-0.0003		0.999
	0.0021		0.0066		0.0012		
2000	0.9961	***	0.0067		0.0011		0.998
	0.0040		0.0076		0.0029		
2001	0.9991	***	0.0048		-0.0003		0.998
	0.0035		0.0066		0.0029		
2002	1.0044	***	-0.0079		-0.0017		0.999
	0.0029		0.0085		0.0026		
2003	0.9988	***	0.0063		0.0053		0.996
	0.0057		0.0122		0.0054		
2004	0.9970	***	-0.0200		0.0035		0.996
	0.0056		0.0151		0.0051		
2005	0.9934	***	-0.0166		0.0058		0.996
	0.0055		0.0172		0.0058		
2006	0.9969	***	0.0129		-0.0043		0.995
	0.0060		0.0169		0.0059		

*: significant level of 10%, **: significant level of 5%, ***: significant level of 1%.

Source: Ogawa and Yoshimi (2007)

Table 3: AMU Shares and Weights of East Asian Currencies

(revised in 9/2007****, benchmark year=2000/2001)

	Trade volume* %	GDP measured at PPP** ,%	Arithmetic average shares % (a)	Benchmark exchange rate*** (b)	AMU weights (a)/(b)
Brunei	0.33	0.33	0.33	0.589114	0.0056
Cambodia	0.19	0.23	0.21	0.000270	7.6219
China	23.99	51.70	37.85	0.125109	3.0251
Indonesia	6.47	5.31	5.89	0.000113	522.9228
Japan	24.79	25.28	25.04	0.009065	27.6235
South Korea	13.01	6.66	9.83	0.000859	114.4362
Laos	0.08	0.08	0.08	0.000136	5.7474
Malaysia	8.10	1.72	4.91	0.272534	0.1801
Myanmar	0.32	0.32	0.32	0.159215	0.0202
Philippines	2.66	2.56	2.61	0.021903	1.1926
Singapore	11.71	0.81	6.26	0.589160	0.1063
Thailand	6.36	3.46	4.91	0.024543	2.0005
Vietnam	1.98	1.55	1.76	0.000072	246.5203

* The trade volume is calculated as the average of total export and import volumes in 2002, 2003, and 2004 taken from DOTS (IMF).

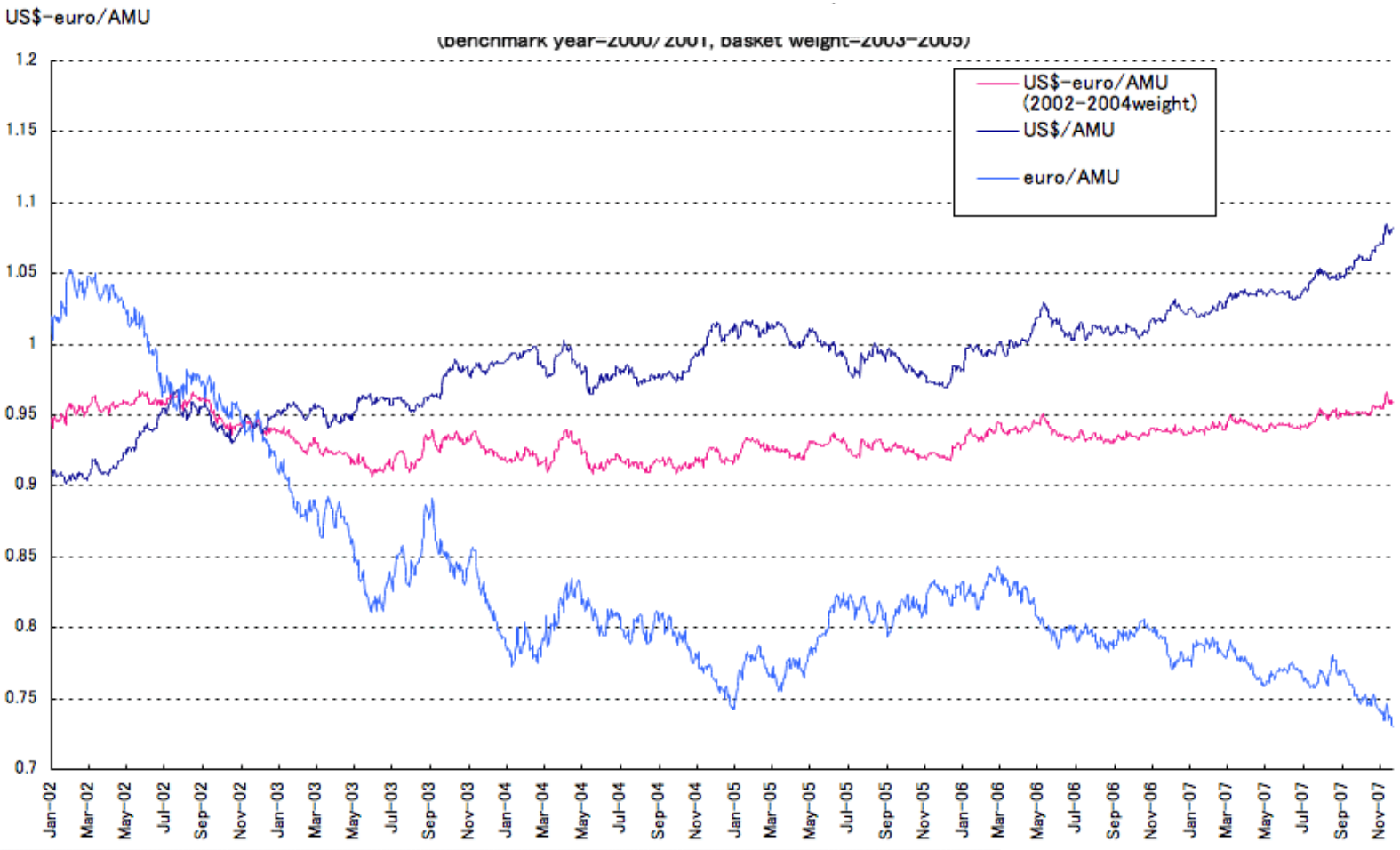
** GDP measured at PPP reflects the average of that data from 2003, 2004, and 2005 taken from the *World Development Report* (The World Bank). For Brunei and Myanmar, we again use the same share of trade volume since no GDP data are available for these countries.

*** The benchmark exchange rate ($-euro/Currency) is the average of the daily exchange rate in terms of US$-euro in 2000 and 2001.

**** AMU shares and weights were revised in Sept. 2007. This is the third version.

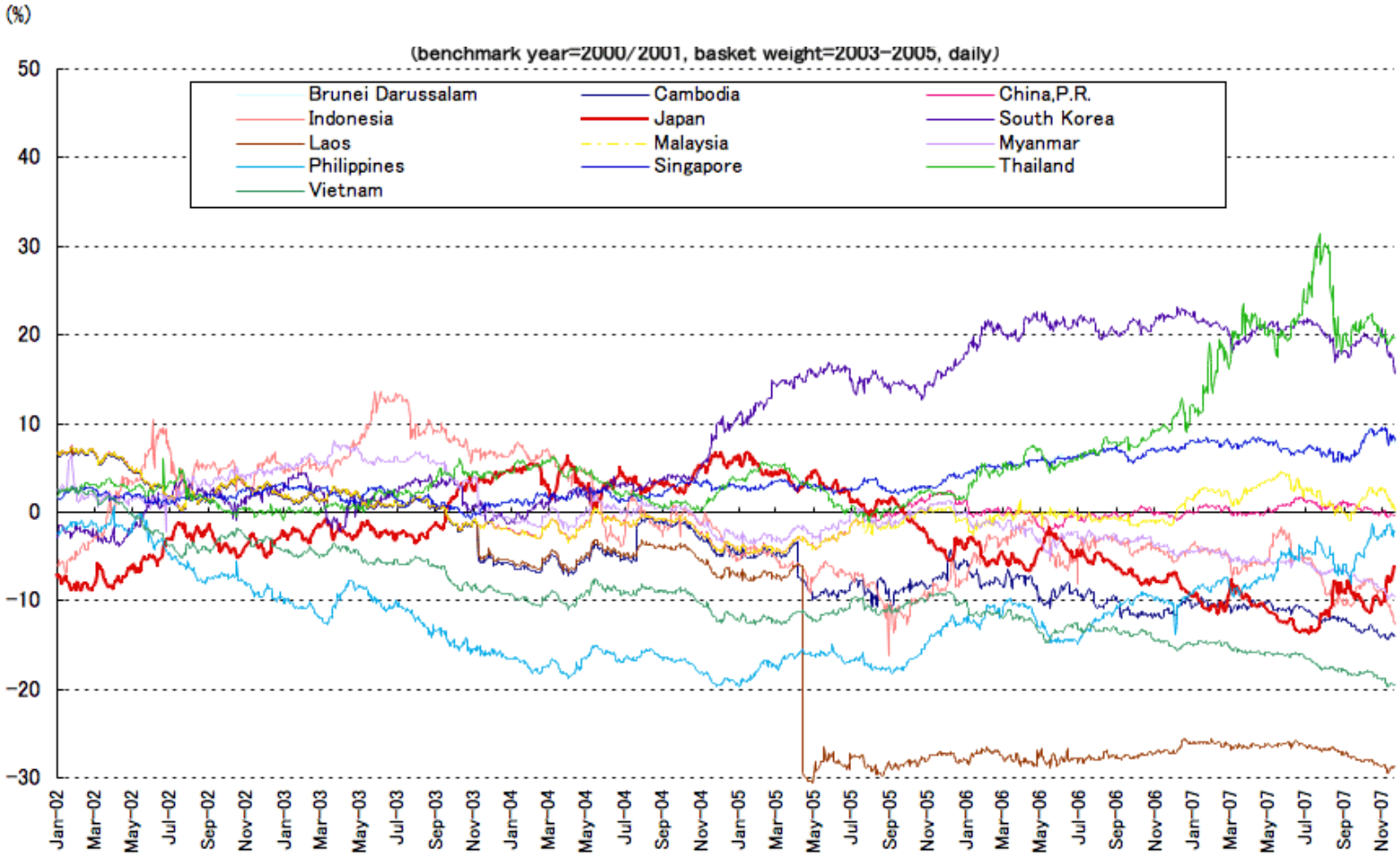
Source: http://www.rieti.go.jp/users/amu/en/index.html

Figure 1: Movements of AMU



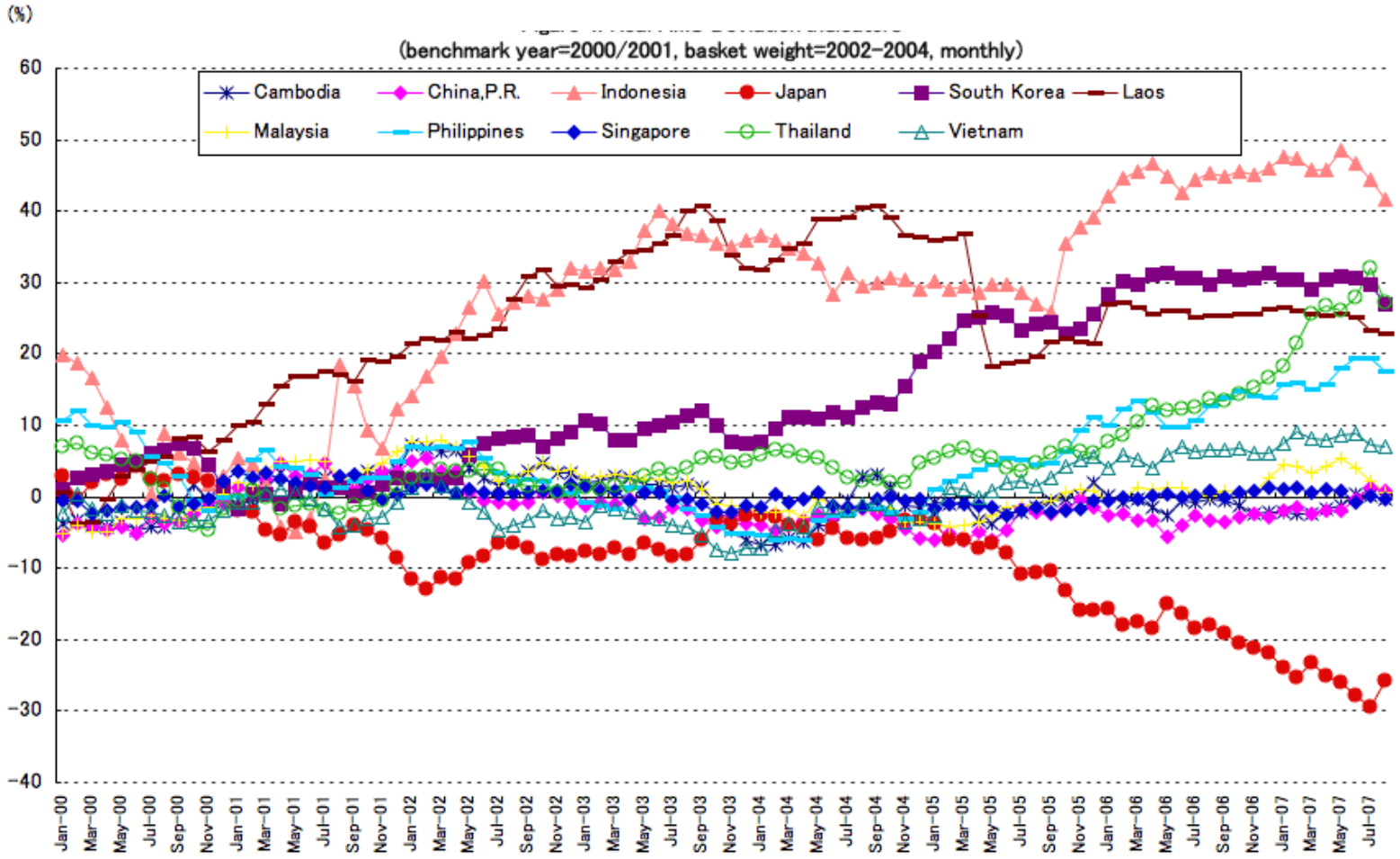
Source: http://www.rieti.go.jp/users/amu/en/index.html

Figure 2: Nominal AMU Deviation Indicators



Source: http://www.rieti.go.jp/users/amu/en/index.html

Figure 3: Real AMU Deviation Indicators (monthly)



Source: http://www.rieti.go.jp/users/amu/en/index.html