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Stability of East Asian Currencies during the Global Financial Crisis

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Stability of East Asian Currencies during the Global Financial Crisis*

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Abstract

In this study, we investigate the movements of the nominal effective exchange rates (NEER) of East Asian currencies and the Asian Monetary Unit (AMU), which is the weighted average of East Asian currencies, during the course of the global financial crisis. We found that the NEER were more stable in countries that adopted the currency basket system even during the financial crisis. Comparisons made between the NEER and a combination of the AMU and AMU Deviation Indicators show intra-regional exchange rates among the East Asian currencies, and that there have been strong relationships between them before and after the global financial crisis. Accordingly, monitoring both the AMU and the AMU Deviation Indicators is effective in stabilizing the NEER of East Asian currencies. In this respect, our findings indicate that the AMU Deviation Indicators as well as the AMU will play a very important role in the surveillance of the stability of intra-regional exchange rates.

Keyword: currency basket system, effective exchange rate, global financial crisis, East Asian currencies

JEL Classification: F31, F36

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1. Introduction

The global financial crisis that started in the United States in the summer of 2007 has had a great impact on domestic as well as Asian economies. The crisis also raised the possibility of growing production networks in East Asia undergoing large-scale restructuring. Large currency fluctuations, not only against the US dollar but also against currencies of neighboring countries, are undesirable for Asian countries. It is essential to transition into a system that stabilizes intra-regional exchange rates within Asia while allowing those values to fluctuate against the US dollar and the euro in order to determine the economic impact of exchange rate fluctuations on intra-regional trade.

In this paper, we present a report of our investigation on the movements of nominal exchange rates, nominal effective exchange rates (NEER) of East Asian countries, and the Asian Monetary Unit (AMU), which is the weighted average of Asian currencies, as proposed by Ogawa and Shimizu (2005), during the course of the recent global financial crisis. We focus on analyzing the differences among these three kinds of exchange rate data in order to determine what kind of currency regime is desirable to stabilize the NEER for each of the East Asian currencies affected by the financial crisis. In addition, we investigate the relationships among the NEER, the AMU, and the AMU Deviation Indicators for each of the East Asian countries, which have been studied by Ogawa and Shimizu (2005).

The AMU is the weighted average of East Asian currencies while the AMU Deviation Indicators show how much each of the East Asian currencies deviates from a benchmark rate in terms of the AMU. Both the AMU and the AMU Deviation Indicators are considered measurements for surveillance under the Chiang Mai Initiative and coordinated exchange rate policies of East Asian countries. If the movements of the

AMU Deviation Indicators for each of the East Asian currencies are strongly related to their NEER, monitoring the indicators and keeping them within a certain band is considered to be an effective exchange rate policy for the region. Ogawa and Shimizu (2006) have already investigated the relationships among the NEER, the AMU, and the AMU Deviation Indicators. In this paper, we extend the sample period to include the period of the global financial crisis in order to conduct the same analysis to determine possible changes in the relationships among these three factors.

The rest of the paper is organized as follows: Section 2 contains an overview of previous research on desirable currency regimes in East Asian countries; Section 3 investigates Asian currency movements during the global financial crisis; Section 4 focuses on the volatilities of the NEER of each of the East Asian currencies, so as to compare the relationships between their weights of the effective exchange rates in East Asian countries and their currency regimes; Section 5 investigates the relationships among the NEER, AMU, and AMU Deviation Indicators for each of the East Asian currencies; Section 6 describes how to use the AMU Deviation Indicators to promote regional exchange rate coordination; and Section 7 summarizes the results and presents a conclusion.

2. What is a desirable currency regime for East Asia?

Although the Asian currency crisis of 1997 taught us the important lesson that the *de facto* dollar peg is dangerous for East Asian countries, the monetary authorities of these countries still tend to choose this system rather than the currency basket peg system. As McKinnon (2000) and Ogawa (2002, 2008) pointed out, the link of East

Asian countries with the US dollar has continued even after the Chinese currency regime reform of July 2005.[1] Ogawa (2008) presented empirical results showing that the monetary authority of China continues to stabilize the Chinese yuan against the US dollar despite making announcements of adopting a managed floating exchange rate system with reference to a currency basket, while links between the home currency and a currency basket are found in some East Asian countries. Such a coordination failure regarding exchange rate policies among the authorities of the East Asian countries can increase the volatility and misalignments of the intra-regional exchange rates of their currencies.

With the growing dependency of intra-regional trade in East Asian countries, what is essentially needed is a currency system that reduces exchange rate risks in international trade and investments within the region. One way to achieve this is to create a common currency basket through the joint efforts of the monetary authorities of all East Asian countries. Ogawa and Shimizu (2005) proposed the AMU as the weighted average of thirteen East Asian currencies (the ASEAN countries along with China, Japan, and South Korea) and developed AMU Deviation Indicators for a surveillance process under the Chiang Mai Initiative. The AMU Deviation Indicators are used as a benchmark so that the monetary authorities of the East Asian countries can coordinate regarding the exchange rate policies such that each of the East Asian currencies do not deviate from the common currency basket or the AMU. In this way, the countries can achieve stability of intra-regional exchange rates with joint floating against outside currencies, which include the US dollar and the euro.

Some East Asian countries such as Singapore, China, and Malaysia (from July

[1] Ogawa and Ito (2000) regarded these movements as a kind of coordination failure.

2005), actually adopted a currency system near the BBC rule.[2] As an indicative proposal, Ogawa and Shimizu (2007) presented a step-by-step approach to move from the individual currency basket system to a common currency basket system in East Asia. Ma and McCauley (2008) also discussed that intra-Asian exchange rate stability might be based on similar national policies of managing currencies against their respective baskets.

On the other hand, McKinnon (2005) proposed the so-called "East Asian dollar standard" according to which East Asian countries should coordinate their policies to keep their exchange rates stable against the US dollar. He described the collective macroeconomic consequences of all East Asian governments individually opting to peg to the US dollar. According to McKinnon, East Asian countries should coordinate their policies to keep their exchange rates stable against the US dollar. McKinnon and Schnabel (2009) also suggested that China should rigidly maintain the nominal peg of the Chinese yuan to the US dollar in order to maintain monetary and financial stability.

In a normal period, most of the Asian currencies are strongly correlated with the US dollar and are, in other words, stable vis-à-vis the US dollar. However, in comparison, these currencies fluctuate vis-à-vis the euro and the Japanese yen. Accordingly, their effective exchange rates are not stable. The Bank of Thailand clearly states on their website that they aim to ensure the value of the Thai baht under the condition of "maintaining national competitiveness, as measured through not just the US Dollar but the nominal effective exchange rate, which includes currencies of important trading partners for Thai economy."

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[2] The BBC rule, where BBC stands for basket, band, and crawling, proposed by Williamson (2000), is the pegging of a currency to the central rate of a currency basket (basket) within a pre-determined band from a central rate (band) and adjusting its central rate in order to neutralize inflation differential (crawling).

After the bankruptcy of the Lehman Brothers on September 15, 2008, a number of Asian currencies sharply depreciated vis-à-vis the US dollar, with the Japanese yen and the Chinese yuan being notable exceptions. The monetary authorities of East Asian countries have recognized that stability against the US dollar is no longer enough for their economies. They should now determine which option is more desirable for the regions—to stabilize their exchange rates against the US dollar or against a currency basket. Moreover, they should also consider coordinating their exchange rate policies with each of the other East Asian countries as a way to make progress.

3. Exchange rate movements during the global financial crisis

Let us begin by studying the latest movements in Asian currencies vis-à-vis the US dollar. Figure 1 shows the index of Asian currencies vis-à-vis the US dollar (January 2008 = 100) from January 2008 to March 2009. Since September 2008, Asian currencies have been depreciating sharply against the US dollar as a result of the sell-off of local currencies accompanying the capital outflows related to deleveraging by US and European financial institutions. The only exception has been the Japanese yen, which has appreciated substantially against the US dollar. The Chinese yuan has stayed relatively stable in this period due to its strong relationship with the US dollar. Evidently, China's monetary authority adopted a de facto dollar peg policy.The Singapore dollar and the Malaysia ringgit have also not depreciated largely against the US dollar due to their currency basket system. The South Korean won has had a larger depreciation than any other Asian currency. Other Asian currencies, particularly the Thai baht, have also lost value due to the subprime crisis and fallout from the Lehman Brothers' bankruptcy.

Next, we compare the volatilities of the AMU, which is the weighted average of East Asian currencies, and each East Asian currency vis-à-vis the US dollar, the euro, and the Japanese yen. We calculate the standard deviation of the daily nominal exchange rates by year. All of the exchange rates have been downloaded from Datastream, while the AMU is available on the RIETI.[3] Figure 2 shows the volatilities of nominal exchange rates vis-à-vis the US dollar. Basically, there are large fluctuations in floating currencies (the Japanese yen, the South Korean won, the Indonesian rupiah) and comparatively small fluctuations in *de facto* US dollar-pegged currencies (the Chinese yuan) and currency basket-pegged currencies (the Singapore dollar). The standard deviation of the AMU is the second lowest in 2006-2008. Most of the East Asian currencies fluctuate more against the US dollar than the AMU, with the exception of the Chinese yuan.

Figure 3 shows the volatilities of nominal exchange rates vis-à-vis the euro. As a whole, the volatilities of Asian currencies vis-à-vis the euro are higher than those vis-à-vis the US dollar. The AMU is the second lowest while the Singapore dollar was the lowest. The fluctuation of the Malaysian ringgit is also relatively lower compared with other East Asian currencies. Figure 4 shows the volatilities of nominal exchange rates vis-à-vis the Japanese yen. In this case, the AMU is the lowest relative to the East Asian currencies while the Chinese yuan is the second lowest.

As a whole, we can summarize the above results as follows: the volatilities of the exchange rates of East Asian currencies vis-à-vis the three major currencies increased sharply in 2008. However, there were comparatively smaller fluctuations in currency basket-targeted currencies (the Singapore dollar and the Malaysian ringgit) especially

[3] RIETI is the Research Institute of Economy, Trade, and Industries. Daily data on the AMU and the AMU Deviation Indicators is freely available on the RIETI website (http://www.rieti.go.jp/).

vis-à-vis the euro and the Japanese yen, with the volatilities of the AMU being lower than most of the East Asian currencies.

4. The NEER of East Asian currencies

In this section, we investigate movements in the NEER of the East Asian currencies. Monthly data on the NEER are downloaded from BIS (2005 = 100). Figure 5 shows the movements in the NEER of the East Asian currencies from January 2000 to March 2009. Figure 5 tells us that the NEER of the Chinese yuan has fluctuated even before the Chinese currency regime reform in July 2005. Since mid-2007, the NEER started to fluctuate more widely for most of the East Asian countries. Since September 2008, the NEER of the Japanese yen and the Chinese yuan have appreciated sharply while that of the South Korean won has depreciated dramatically.

Why did the NEER of some East Asian currencies exhibit such a volatile fluctuation during the global financial crisis? In order to answer this question, we must begin with checking the weights on the effective exchange rates of trade-counter countries. Figure 6 shows the weights of an effective exchange rate for the East Asian currencies in 2005–2007, according to BIS statistics.[4] As Ma and McCauley (2008) pointed out, we find that patterns of the weights in effective exchange rates are similar among all the East Asian currencies. Weights on the US dollar are between 12.1% in Indonesia and 21.0% in China. Weights on the euro are between 16.1% in Indonesia and 24.1% in China. Weights on the East Asian currencies (the Japanese yen, the Chinese yuan, the HK dollar, the South Korean won, the ASEAN currencies, and the Taiwanese

[4] BIS revises the effective exchange rate weights every two years.

dollar) are between 47.1% in Japan and 68.63% in Taiwan. The weight on the East Asian currencies is the lowest in China (40.7%) because this does not include a weight on its home currency. We also observe that the weight on the US dollar is not the highest for all of the East Asian currencies. The weight on the euro is the highest for the Chinese yuan. The weight on the Chinese yuan (and the HK dollar) is the highest for the Japanese yen, the South Korea won, and the Taiwanese dollar. The weight on the Japanese yen is the highest for the Thai baht, the Philippine peso, and the Hong Kong dollar. The weight on the ASEAN currencies is the highest for the Singapore dollar, the Malaysian ringgit, and the Indonesian rupiah. These results indicate that the weights of the East Asian currencies are high for the East Asian currencies. It means that their effective exchange rates might be stable if their intra-regional bilateral exchange rates are stable against each other.

We now investigate the relationships between the weights on East Asian currencies in terms of their effective exchange rates and the volatilities of the NEER for each of the East Asian currencies. To do so, we plotted a scatter diagram with the extent of the volatilities of the NEER (on a monthly basis) on the vertical axis and the effective exchange rate weights on East Asian currencies on the horizontal axis. The volatility of the NEER is calculated as a standard deviation of the monthly data on the NEER. We divided the sample period into two sub-sample periods—a normal period from January 2000 to December 2006 and the period of the global financial crisis from January 2007 to March 2009.

Figure 7 shows the results of this analysis. In the normal period, we can find no clear relationship between the weights on the East Asian currencies in the NEER and the volatilities of the NEER. However, during the period of the global financial crisis, the

volatilities of the NEER were smaller than 5% when the weights on the East Asian currencies in the NEER were approximately above 60%, with the exception of the Indonesian rupiah. Furthermore, the volatilities of the NEER were approximately above 7% when the weights on the East Asian currencies in the NEER were smaller than 55%. This implies that when the weights on the East Asian currencies in the NEER are higher, the volatilities of the NEER become lower. In other words, the NEER of East Asian currencies with high weights on the US dollar and the euro were relatively more volatile than those of the others.

Next, we investigate how the currency regime affects the volatilities of the NEER. It is often said that the currency regimes vary among the East Asian countries. We compare the volatilities of the NEER in the normal period with those during the global financial crisis and thereby investigate their relationships with the currency regimes. Table 1 shows the current exchange rate policy of East Asian countries. Only the monetary authority of Hong Kong has adopted the hard peg system or "currency board." Five countries have adopted a managed floating exchange rate system while three countries have adopted a free floating exchange rate system. However, these classifications only show their *de jour* currency regime. In order to find out their *de facto* currency regime, we apply the estimation methodology of Frankel and Wei (1994), which estimates the coefficients of the implicit basket weights of each East Asian currency on three anchor currencies—the US dollar, the euro, and the Japanese yen.[5] The estimated equation is as follows:

$$\dot{e}_{i/Sfr} = a_0 + a_1 \cdot \dot{e}_{USD/Sfr} + a_2 \cdot \dot{e}_{Euro/Sfr} + a_3 \cdot \dot{e}_{JPY/Sfr} + \varepsilon ,$$

[5] Frankel and Wei (2007) confirmed that the de facto regime in China remained pegged to the dollar throughout 2005. However, they indicated that there was a modest but steady increase in flexibility subsequently.

where $\dot{e}_{i/Sfr}$ is the rate of change in the daily exchange rate of the currency *i* in terms of the Swiss franc, which is a numeraire currency.[6] The value $\dot{e}_{USD/Sfr}$ is the rate of change in the daily exchange rate of the US dollar in terms of the Swiss franc, $\dot{e}_{Euro/Sfr}$ is the rate of change in the daily exchange rate of the euro in terms of the Swiss franc, and $\dot{e}_{JPY/Sfr}$ is the rate of change in the daily exchange rate of the Japanese yen in terms of the Swiss franc.

In the above equation, the coefficients a_1, a_2, a_3 are interpreted as weights of the three anchor currencies in an implicit basket peg system. If these coefficients are significantly estimated and they are positive then it means that currency *i* pegs to a basket of the three major currencies. If only the coefficient a_1 is significantly estimated and close to one whereas all others are not significant then it is identified that the currency *i* pegs to the US dollar. In this way, we analyzed nine East Asian currencies (the five ASEAN currencies, the Chinese yuan, the South Korean won, the Hong Kong dollar, and the New Taiwan dollar). The sample period was from January 2007 to the end of May 2009. We estimated the above equation every six months, so a total of five sub-sample periods were analyzed. All daily exchange rates were derived from Datastream.

The results are presented in Table 2. We found that the Chinese yuan was still pegged to the US dollar even after China announced its exchange rate reforms in July 2005. Its coefficients of the US dollar were 98% during the sample period, except for the second sub-sample period (July 2007 to December 2007), and its size of adjusted R-squared was also very high. These results indicate that the Chinese yuan has

[6] When analyzing the Asian currencies, the Swiss franc is usually used as a numeraire currency.

continued its strong linkage with the US dollar even during the global financial crisis. All other East Asian currencies, except for the Indonesian rupiah and the South Korean won, also showed a strong linkage with the US dollar with US dollar coefficients above 80% during the financial crisis. On the other hand, the Singapore dollar pegged to a currency basket with the US dollar and the euro throughout the sample period. Except for the Chinese yuan and the Hong Kong dollar, the other East Asian currencies pegged to a currency basket with the US dollar and the euro in most of the sub-sample periods. Some of the Japanese yen's coefficients were significantly estimated; however, most of them were negative.

From the above results, we can see how the *de facto* currency regime affects the volatilities of the NEER. Figure 8 shows the scatter diagram that indicates the relationship between the *de facto* currency regime and the volatilities of the NEER. The vertical axis indicates the size of the volatilities of the NEER (on a monthly basis) while the horizontal axis indicates the *de facto* currency regime arranged from a hard peg (the Hong Kong dollar) to a free floating exchange rate system (the Japanese yen). Between the Hong Kong dollar and the Japanese yen, we see the rest of the East Asian currencies arranged by size of US dollar coefficient.

In the normal period (January 2000 to December 2006), the volatility of the NEER of the Singapore dollar was at its lowest. The volatilities of the NEER of the US dollar-pegging countries such as Hong Kong, China, and Taiwan were higher than Singapore. The volatilities of the NEER of the free-floating countries were higher than those of the other countries. During the global financial crisis (January 2007 to March 2009), the volatilities of the NEER of the Japanese yen, the South Korean won (free-floating countries), and the Chinese yuan increased. It is noteworthy that the

volatility of the NEER of the Singapore dollar did not change. Additionally, the volatilities of the NEER of the Malaysian ringgit, the Thai baht, and the New Taiwan dollar decreased. This implies that the currency basket system could keep the NEER stable or lower even during the global financial crisis.

Considering these results collectively, we found that the NEER of the country whose effective exchange rate's weights on the East Asian currencies are high (Taiwan and Hong Kong) and that executes a currency basket system (Singapore, Malaysia, Thailand, and Taiwan), which was stable during the global financial crisis. However, those countries whose effective exchange rate's weight on the US dollar and the euro are relatively high (like Japan, China, and South Korea) should adopt a currency basket type exchange rate policy in order to stabilize their NEER.

5. The relationship between the NEER, the AMU, and the AMU Deviation Indicators

Ogawa and Shimizu (2005) proposed the creation of an Asian Monetary Unit (AMU) as the weighted average of all East Asian currencies and calculated AMU Deviation Indicators that show how much each of the East Asian currencies deviates from a benchmark rate in terms of the AMU. Both the AMU and the AMU Deviation Indicators are considered to support coordinated exchange rate policies in East Asia. Ogawa and Shimizu (2006) investigated the relationship between the NEER of the AMU composite currencies and the AMU and AMU Deviation Indicators. If the movements of the AMU Deviation Indicators are strongly related to their NEER, monitoring these indicators and keeping them within a certain band is considered to be

an effective exchange rate policy in the region. Ogawa and Shimizu (2006) used data during the sample period from January 1999 to December 2004 and found strong relationships between the AMU Deviation Indicators and the effective exchange rates, except in the case of some currencies.[7]

In this study, we extended the sample period to include the period of the global financial crisis and conducted the same empirical analysis. We regressed the monthly percentage change of the NEER on the monthly percentage change of the AMU and the monthly difference of its AMU Deviation Indicator for each of the East Asian currencies to investigate how the movement of the AMU and each AMU Deviation Indicator explains the movement in the NEER for each of the East Asian currencies.[8] We estimated the following regression equation:

$$\Delta(\log EER_i) = \alpha_0 + \alpha_0 \cdot \Delta(\log AMU) + \alpha_0 \cdot \Delta(AMUDI_i)$$

We divided the entire sample period (1/2000-3/2009) into two sub-sample periods: the normal period (January 2000 to December 2006) and the period of the global financial crisis (January 2007 to March 2009).

Table 3 shows the results of this analysis. Both the coefficient of the AMU and the AMU Deviation Indicators are significant and positive. The adjusted R-squared are also high in both sub-sample periods. Even in the global financial crisis period, the coefficients of the AMU and the AMU Deviation Indicators are significant and positive.

[7] In Ogawa and Shimizu (2006), the coefficients of the AMU are significant and positive for the Japanese yen and the Chinese yuan, and the coefficients of the AMU Deviation Indicator are positive and significant for the eight East Asian currencies.

[8] We conducted this regression analysis not in level but in percent change because the data on nominal effective exchange rates, the AMU, and the AMU Deviation Indicator is not stationary in level but is stationary in percent of change (in 1st difference for the AMU Deviation Indicator). We transposed the data on the AMU Deviation Indicators into first difference since they are quoted in terms of percent of change.

In China, Indonesia, Japan, and South Korea, the coefficients of the AMU Deviation Indicators are higher during the global financial crisis than during the normal period. These results imply that a coordinated exchange rate policy by monitoring the AMU and the AMU Deviation Indicators would be effective to stabilize the NEER of the East Asian currencies.

6. Coordinated exchange rate policies with the AMU and the AMU Deviation Indicator

How can we promote coordinated exchange rate policies by using the AMU and the AMU Deviation Indicators? Ogawa and Shimizu (2007) proposed the following step-by-step approach to achieve regional monetary coordination:

- Step 1:
  - Policy dialogue about exchange rates and exchange rate policies
  - Surveillance using the AMU and the AMU Deviation Indicators in economic reviews and policy dialogues
- Step 2:
  - Establishing a managed floating exchange rate system with reference to an individual currency basket
  - Surveillance using the AMU Deviation Indicators

We have recognized that policy dialogue especially concerning coordinated exchange rate policies in East Asian countries are needed in order to achieve regional policy coordination. Under the current circumstances, however, it is difficult to even begin this process because the governments of these countries do not agree on the coordinated

exchange rate policies. So do we need a policy consensus at all? Some East Asian countries have already adopted the individual currency basket system, as mentioned in the previous section. In addition, we found that the NEER of these currencies were stable even during the global financial crisis. As Ma and McCauley (2008) pointed out, coordination is not a necessary condition to reduce intra-Asian currency volatilities; the first and second steps might be executed now if each of the monetary authorities are to adopt a policy that keeps their own effective exchange rates stable.

For example, we can show a coordinated exchange rate policy by using the AMU Deviation Indicators. Figure 9 shows the movement of the AMU Deviation Indicators from January 2000 to March 2009. When we determined +/-15% as a fluctuation band of the AMU Deviation Indicators, which is the same as the currency band of the Exchange Rate Mechanism (ERM) under the European Monetary System (EMS) after 1992 and the ERM II, except for the Danish crone, we found that all of the East Asian currencies except for the Philippine peso and the Lao kip fell within the band from 2000 to mid-2005. This means that the exchange rates of the East Asian currencies were naturally managed within the band without any coordinated exchange rate policies. However, since 2006, the AMU Deviation Indicator of the South Korean won has started to appreciate beyond the uppermost band level of 15%, while at the same time the AMU Deviation Indicator of the Japanese yen has fallen below zero. The AMU Deviation Indicators of the Thai baht and the Singapore dollar have also followed the South Korean won.

What motivated those currencies to deviate from the benchmark? It is found that yen carry trades between the Japanese yen and the appreciating currencies destabilized the AMU Deviation Indicators (Ogawa and Yoshimi (2009)). These phenomena suggest

that coordinated monetary policies should also be considered along with coordinated exchange rate policies. Table 4 shows the latest policy interest rate and money market rate (for 3 months) in East Asian countries. There are still large differences between the lowest country (Japan) and the highest country (Indonesia). However, the differences between the 3 months' rates are reducing due to the latest global financial crisis. This is a good opportunity to discuss coordinated monetary policies as well as the coordinated exchange rate policies.

7. Conclusion

In this study, we investigated the movement of nominal exchange rates, the NEER of East Asian currencies, and the AMU during the recent global financial crisis. We found that the volatilities of the exchange rates of the East Asian currencies vis-à-vis the three major currencies increased sharply in 2008. However, there are comparatively small fluctuations in basket-pegged currencies especially vis-à-vis the euro and the Japanese yen. Moreover, the volatilities of the AMU were mostly lower than those of the East Asian currencies. We also found that the NEER of most of the East Asian currencies have started to fluctuate since 2007. Since September 2008, the NEER of the Japanese yen and the Chinese yuan have increased sharply while the NEER of the South Korean won has depreciated dramatically. The relationship between the NEER's volatilities and weights on the East Asia currencies in terms of the effective exchange rate suggests that when the weights on the East Asian currencies are higher, the volatilities of the NEER reduce. We also found that a currency basket system could stabilize the NEER even during a global financial crisis.

An analysis of the relationship between the NEER, the AMU, and the AMU Deviation Indicator showed a strong relationship between the NEER of East Asian currencies and the AMU and AMU Deviation Indicators. These relationships remained largely unchanged during the global financial crisis. Accordingly, monitoring both the AMU and the AMU Deviation Indicators is effective in stabilizing the NEER of the East Asian currencies.

Under current circumstances, the individual basket system is desirable for Asian countries. Because weights in the NEER are more or less similar among all the East Asian currencies, a similar policy of stabilizing the home currency against their NEER can, for a while, lead to a coordinated exchange rate policy without any consensus. In the future, however, coordinated monetary policies should also be considered with the coordinated exchange rate policies.

Turmoil in the U.S. financial markets is still expected to have significant impacts on East Asian countries. Although the direct impact of the global financial crisis was relatively small in East Asia, the region has begun experiencing significant subprime mortgage fallout with domestic economies affected by declining exports to the United States, falling stock prices, and so forth. Sudden changes in capital flows caused by the global financial crisis have had a large effect on foreign exchange rates as well. Under these circumstances, it is necessary to keep a close eye on foreign exchange rate movements. What must also be kept in mind are currency measurements in terms of effective exchange rates rather than focusing solely on their nominal exchange rate vis-à-vis the US dollar. In this respect, the AMU Deviation Indicators, which show intra-regional exchange rates among the East Asian currencies, play a very important role.

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Figure 1. Changes in the Exchange Rates of Asian Currencies Against the US dollar

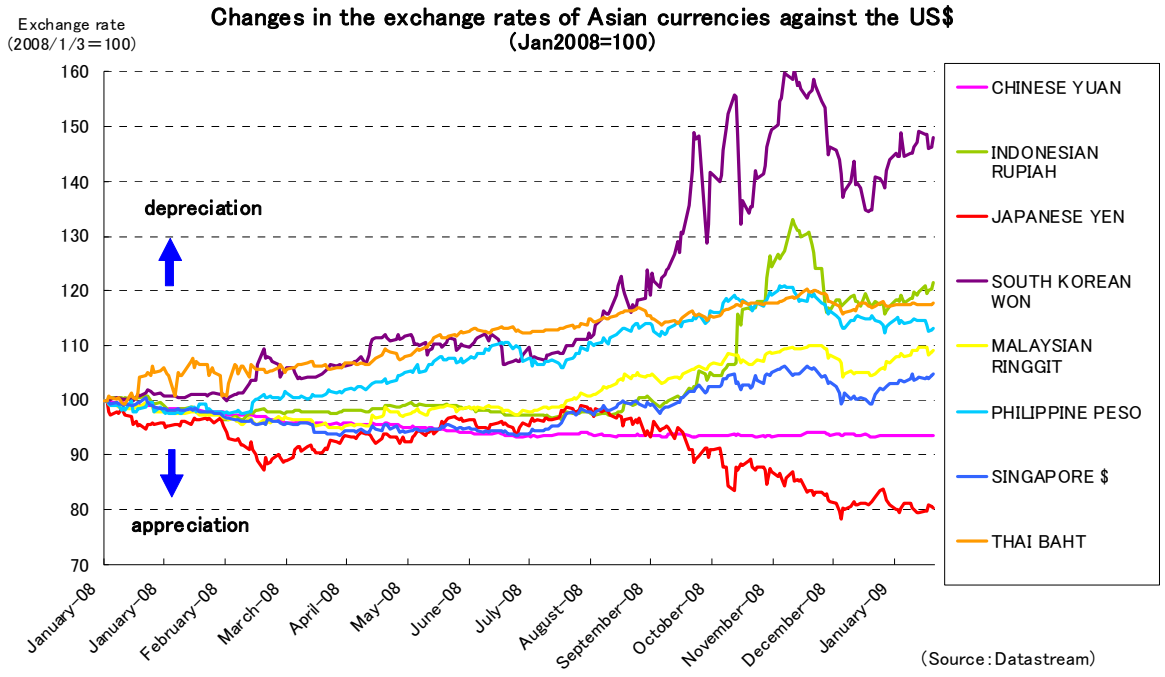
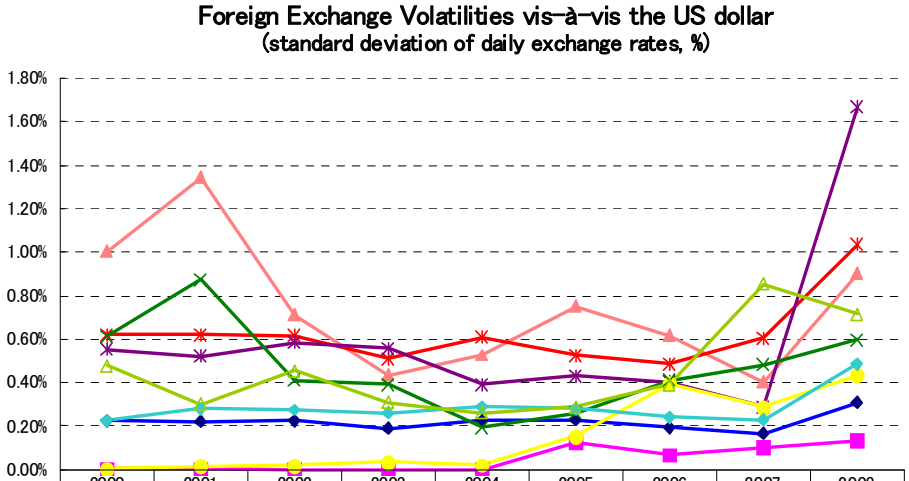


Figure 2. Foreign Exchange Volatilities vis-à-vis the US dollar

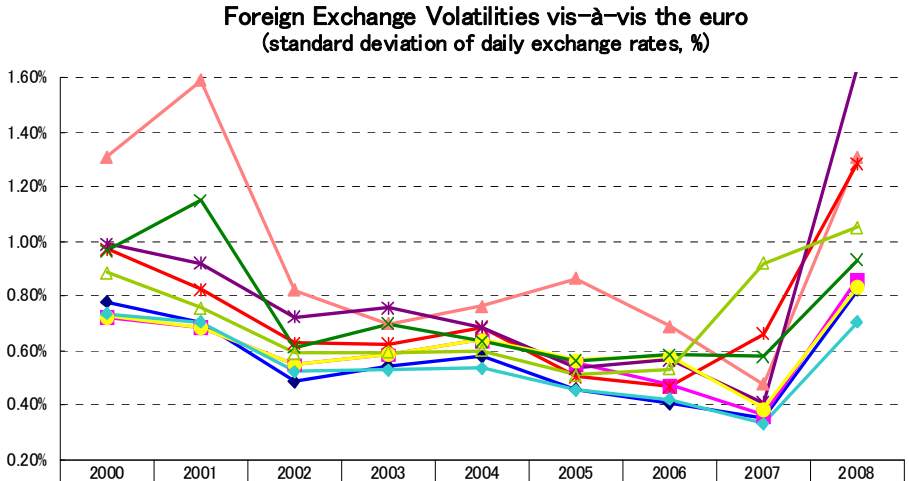


	2000	2001	2002	2003	2004	2005	2006	2007	2008
AMU	0.22%	0.22%	0.23%	0.19%	0.22%	0.23%	0.19%	0.17%	0.31%
China	0.00%	0.00%	0.00%	0.00%	0.00%	0.13%	0.07%	0.10%	0.14%
Indonesia	1.00%	1.34%	0.71%	0.44%	0.53%	0.75%	0.62%	0.40%	0.90%
Japan	0.62%	0.62%	0.62%	0.51%	0.61%	0.53%	0.49%	0.60%	1.04%
South Korea	0.55%	0.52%	0.59%	0.56%	0.39%	0.43%	0.40%	0.29%	1.67%
Malaysia	0.00%	0.01%	0.02%	0.03%	0.02%	0.15%	0.39%	0.29%	0.44%
Philippines	0.61%	0.87%	0.41%	0.39%	0.19%	0.26%	0.41%	0.48%	0.60%
Singapore	0.22%	0.28%	0.27%	0.26%	0.29%	0.28%	0.24%	0.23%	0.48%
Thailand	0.48%	0.30%	0.45%	0.31%	0.26%	0.29%	0.39%	0.85%	0.72%

Source: Datastream

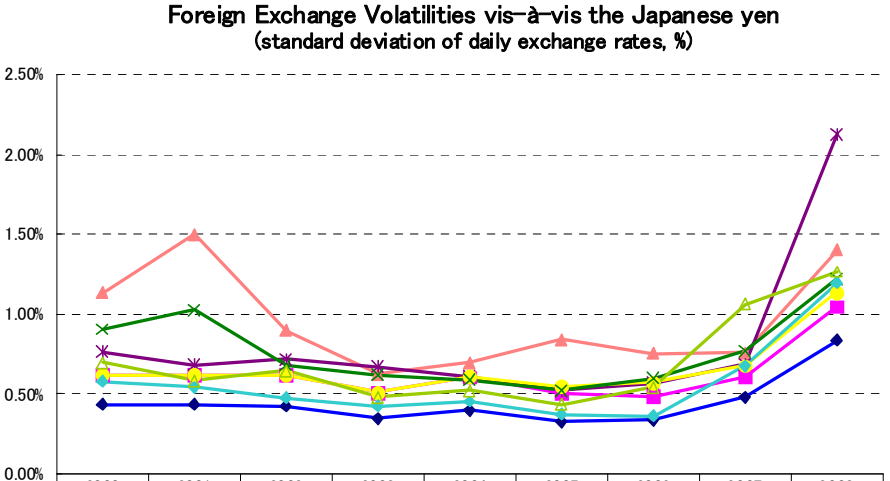
(Author's calculations.)

Figure 3. Foreign Exchange Volatilities vis-à-vis the euro



	2000	2001	2002	2003	2004	2005	2006	2007	2008
AMU	0.78%	0.70%	0.49%	0.54%	0.58%	0.46%	0.41%	0.35%	0.82%
China	0.72%	0.69%	0.55%	0.59%	0.64%	0.55%	0.47%	0.36%	0.86%
Indonesia	1.31%	1.59%	0.82%	0.70%	0.76%	0.86%	0.69%	0.48%	1.31%
Japan	0.97%	0.82%	0.63%	0.62%	0.68%	0.50%	0.47%	0.66%	1.29%
South Korea	0.99%	0.92%	0.72%	0.76%	0.68%	0.54%	0.56%	0.41%	1.64%
Malaysia	0.72%	0.69%	0.55%	0.59%	0.64%	0.56%	0.58%	0.39%	0.83%
Philippines	0.97%	1.15%	0.61%	0.70%	0.63%	0.56%	0.58%	0.58%	0.93%
Singapore	0.74%	0.70%	0.52%	0.53%	0.53%	0.46%	0.42%	0.33%	0.70%
Thailand	0.89%	0.76%	0.59%	0.59%	0.60%	0.51%	0.53%	0.92%	1.05%

Figure 4. Foreign Exchange Volatilities vis-à-vis the Japanese yen



	2000	2001	2002	2003	2004	2005	2006	2007	2008
AMU	0.43%	0.43%	0.42%	0.35%	0.40%	0.33%	0.34%	0.48%	0.84%
China	0.62%	0.62%	0.62%	0.51%	0.61%	0.51%	0.49%	0.61%	1.05%
Indonesia	1.13%	1.50%	0.90%	0.62%	0.70%	0.84%	0.75%	0.76%	1.40%
South Korea	0.76%	0.68%	0.72%	0.67%	0.61%	0.52%	0.57%	0.68%	2.13%
Malaysia	0.62%	0.62%	0.62%	0.51%	0.61%	0.55%	0.57%	0.68%	1.14%
Philippines	0.91%	1.02%	0.68%	0.62%	0.59%	0.52%	0.60%	0.77%	1.22%
Singapore	0.58%	0.54%	0.47%	0.43%	0.45%	0.37%	0.37%	0.68%	1.19%
Thailand	0.70%	0.58%	0.65%	0.48%	0.52%	0.44%	0.54%	1.06%	1.27%

Source : Datastream

(Author's calculations.)

Figure 5. The NEER of East Asian Currencies

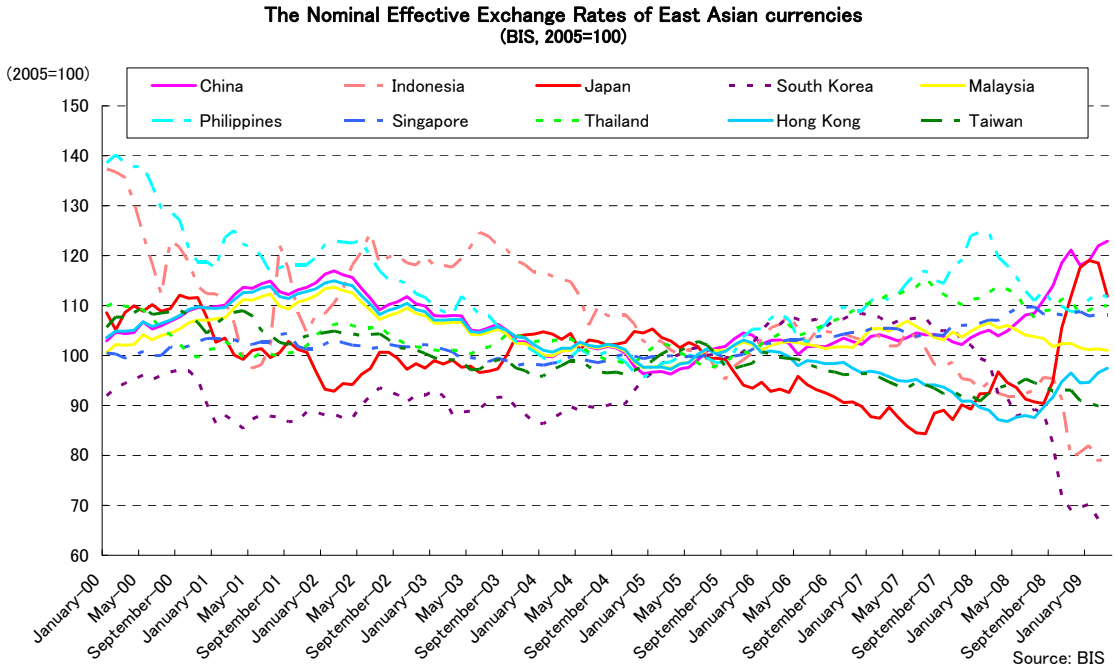
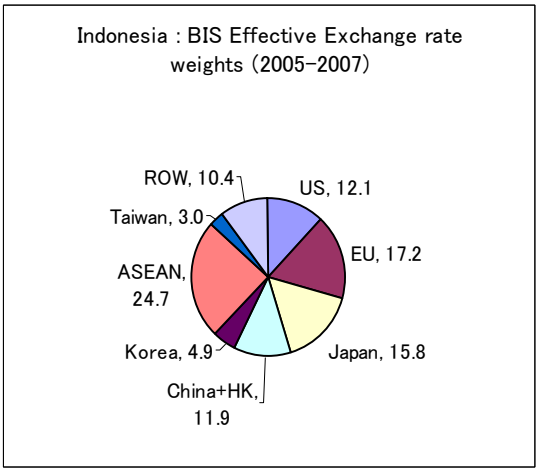


Figure 6. BIS Effective Exchange Rate Weights (2005-2007)



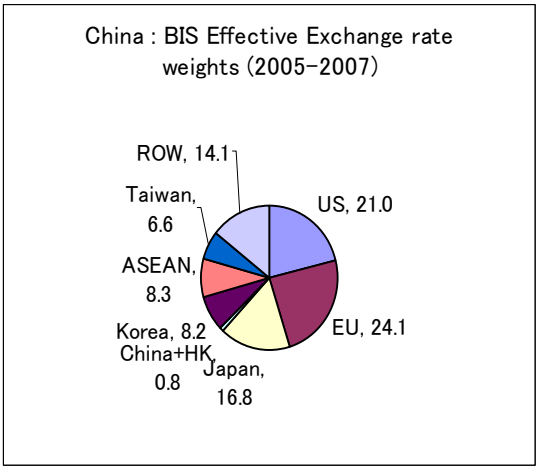
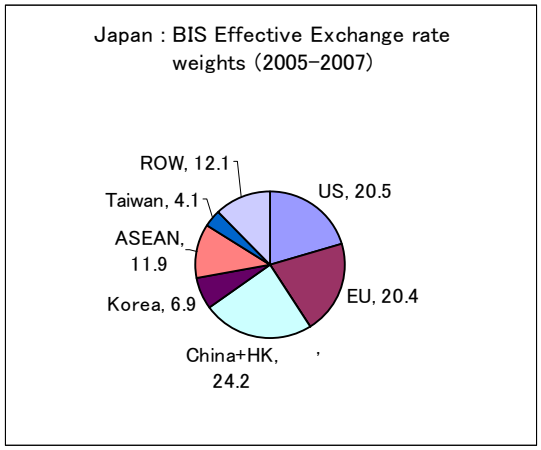
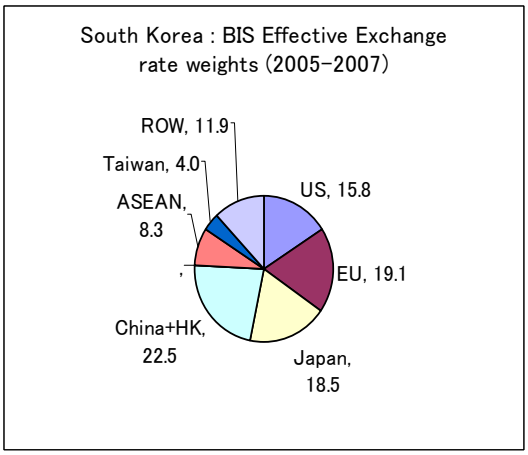
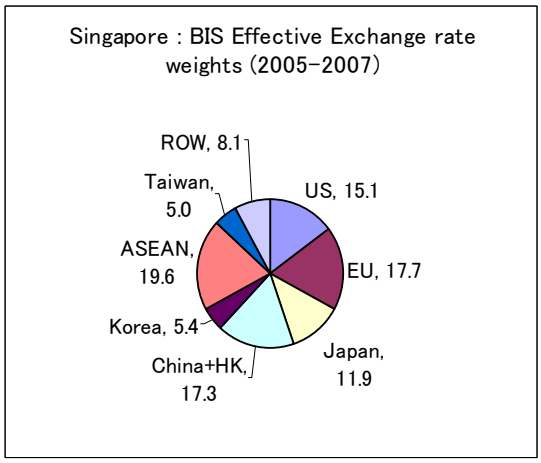
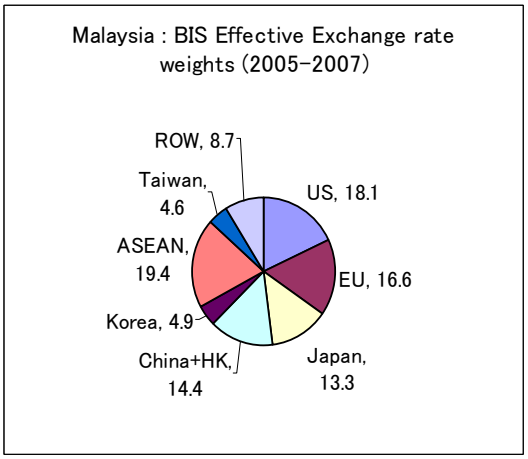


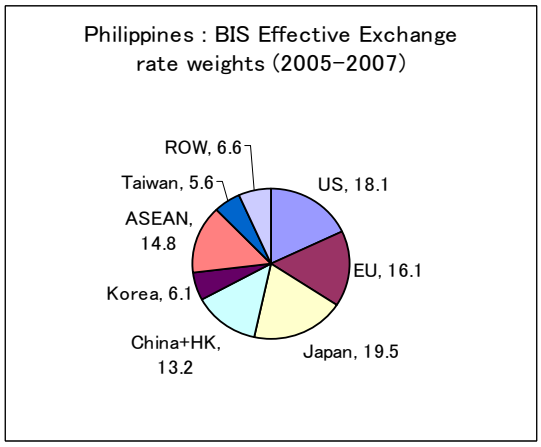
Figure 6 (continued)











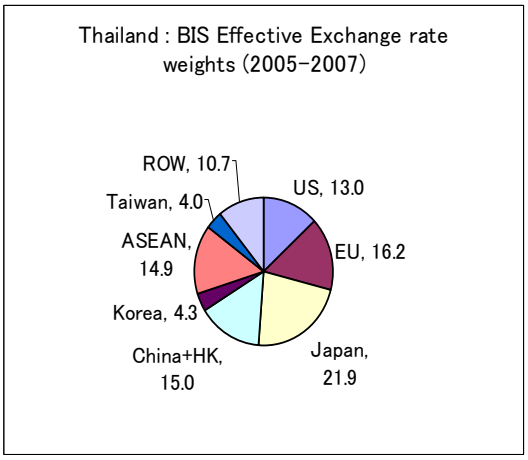
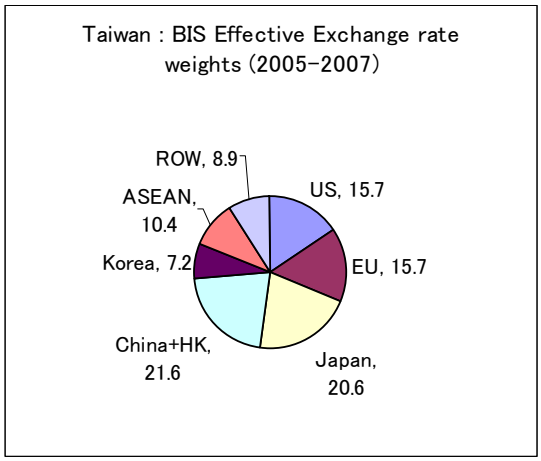
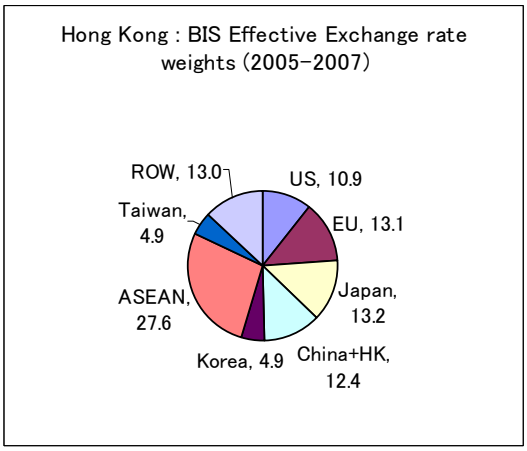


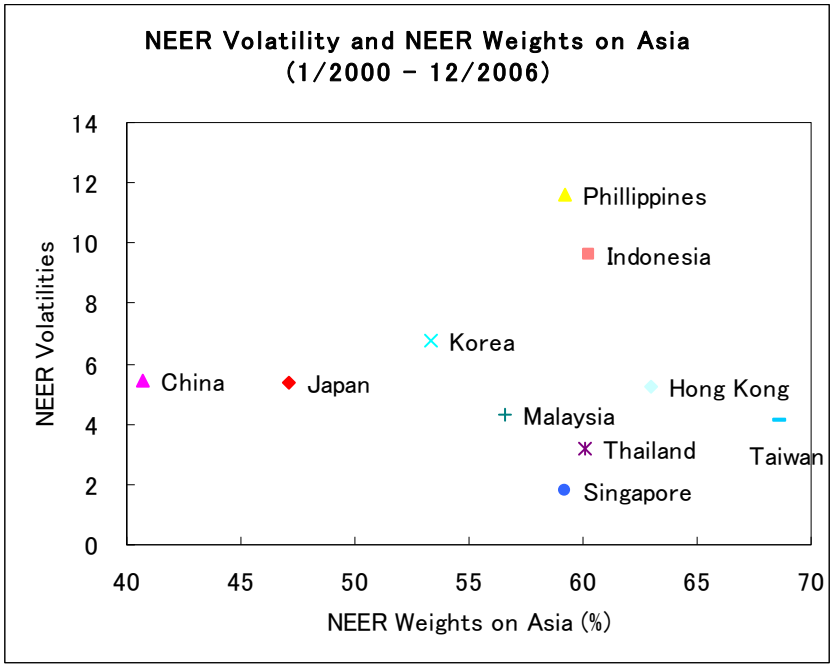
Figure 6 (continued)

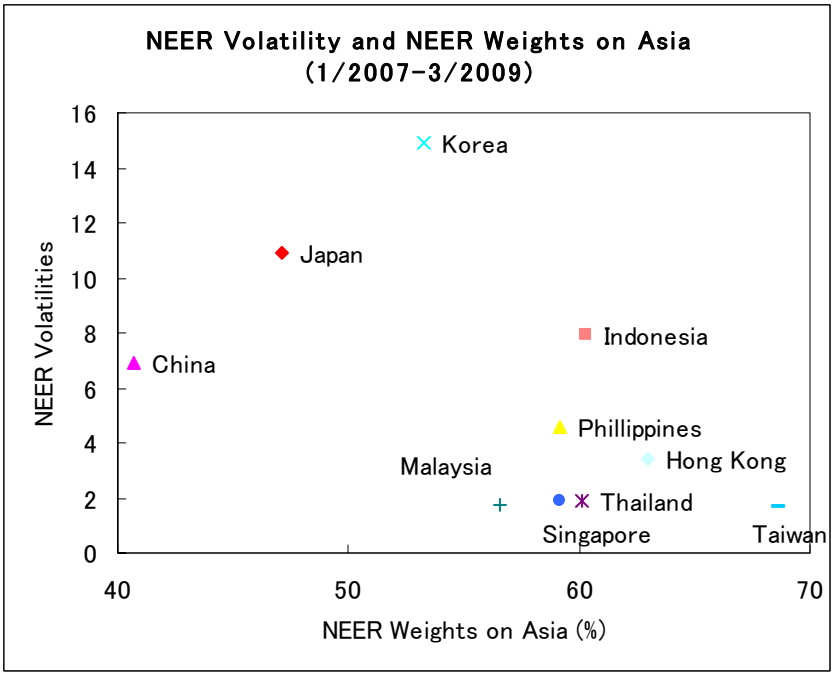




(Source: BIS)

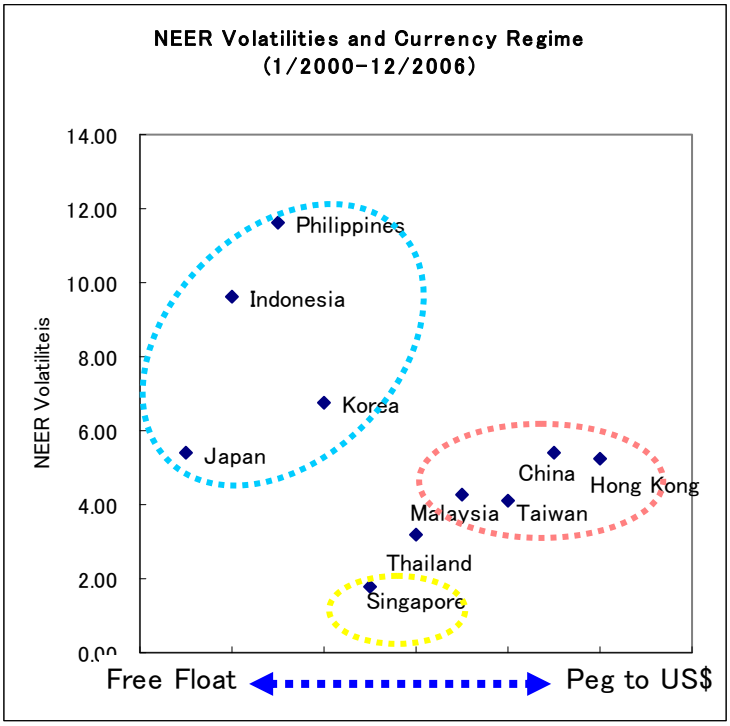
Figure 7. NEER Volatilities and NEER Weights in Asia

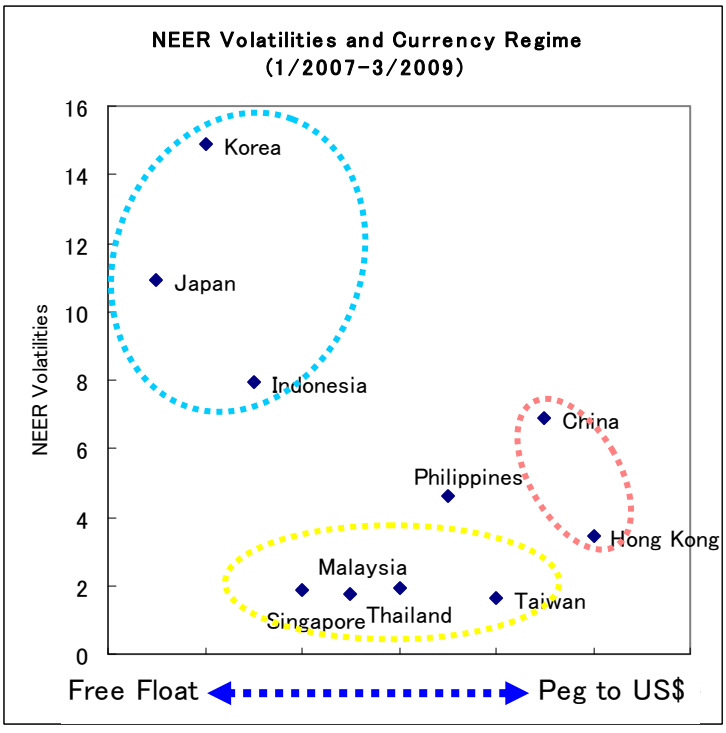




(Author's calculations)

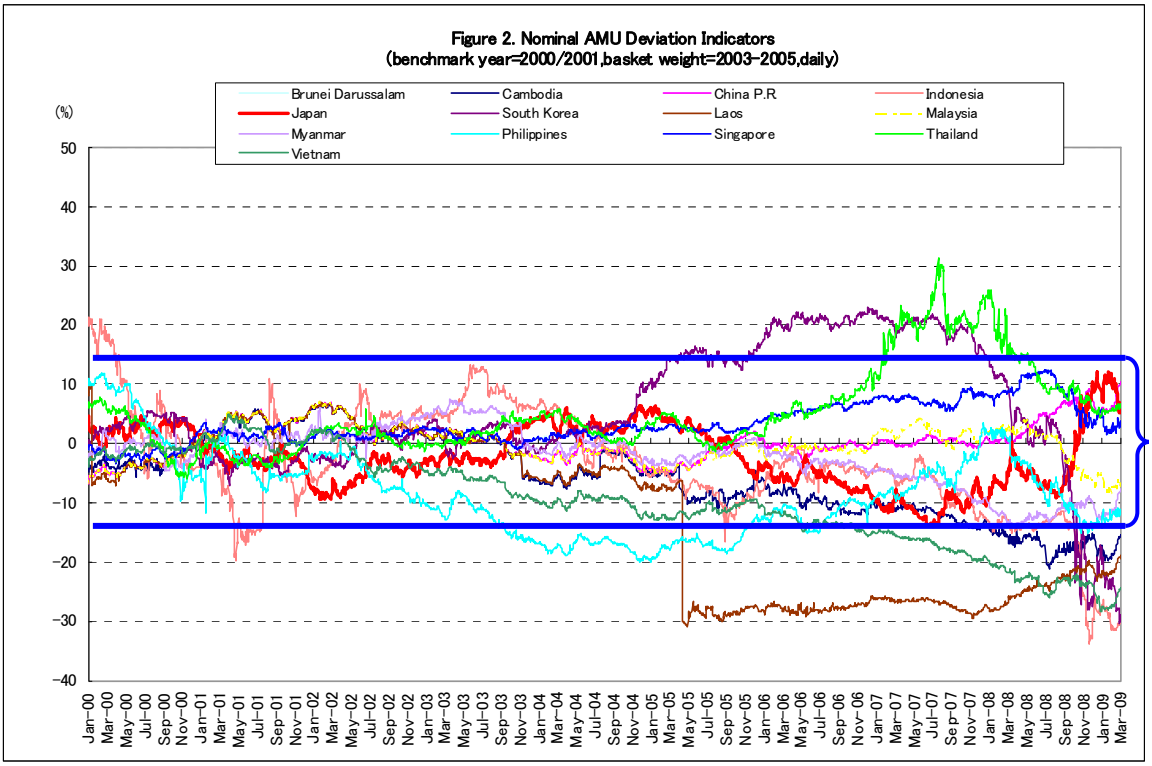
Figure 8. NEER Volatilities and the De-facto Currency Regime





(Author's calculations)

Figure 9. AMU Deviation Indicators (Jan 2000-Mar 2009)



(Source: RIETI)

Table 1. Exchange Rate Policy in East Asian Countries

	Exchange rate policy	Degree of fluctuation
Hong Kong	Currency Board	lowest
Taiwan	Managed Float (reference to a currency basket)	
China	Managed Float (reference to a currency basket)	
Malaysia	Managed Float (reference to a currency basket)	
Thailand	Managed Float	
South Korea	Managed Float	
Philippines	Free Float	
Indonesia	Free Float	
Japan	Free Float	highest

Source: Central Bank website

Table 2.

Country	China		Indonesia		Korea		Malaysia		Philippines		Singapore		Thailand		Hong Kong		Taiwan	
1/02/2007 to 6/29/2007																		
Variable	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.
C	−0.0195 ***	(0.0075)	0.0192	(0.0364)	0.0015	(0.0192)	−0.0077	(0.0204)	−0.0380	(0.0333)	0.0040	(0.0133)	−0.1024	(0.0741)	0.0037	(0.0030)	0.0074	(0.0160)
USD	0.9857 ***	(0.0267)	0.7650 ***	(0.1292)	0.7725 ***	(0.0680)	0.8647 ***	(0.0724)	0.8316 ***	(0.1182)	0.7660 ***	(0.0472)	1.1783 ***	(0.2629)	0.9935 ***	(0.0107)	0.8935 ***	(0.0567)
EURO	−0.0305	(0.0485)	0.6350 ***	(0.2343)	0.3468 ***	(0.1233)	0.4590 ***	(0.1312)	0.3162	(0.2142)	0.3246 ***	(0.0855)	−0.5599	(0.4765)	−0.0202	(0.0194)	0.0902	(0.1028)
JPY	−0.0213	(0.0179)	−0.1031	(0.0865)	−0.0454	(0.0455)	−0.0124	(0.0485)	−0.0401	(0.0791)	0.0651 ***	(0.0316)	0.2233	(0.1760)	−0.0091	(0.0072)	0.0113	(0.0379)
Adj. R2	0.9495		0.4258		0.6947		0.7322		0.4533		0.8381		0.2204		0.9918		0.7919	
7/02/2007 to 12/31/2007																		
Variable	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.
C	−0.0270 **	(0.0104)	0.0423	(0.0328)	0.0223	(0.0284)	−0.0104	(0.0249)	−0.0788	(0.0506)	−0.0347	(0.0195)	−0.0449	(0.0763)	−0.0014	(0.0044)	−0.0069	(0.0129)
USD	0.9231 ***	(0.0276)	0.7789 ***	(0.0875)	0.8256 ***	(0.0756)	0.6483 ***	(0.0663)	0.8602 ***	(0.1348)	0.7723 ***	(0.0520)	0.8448 ***	(0.2035)	0.9933 ***	(0.0116)	0.9515 ***	(0.0345)
EURO	0.0412	(0.0469)	0.5280 ***	(0.1486)	0.5694 ***	(0.1285)	0.7523 ***	(0.1126)	0.4425 *	(0.2290)	0.3629 ***	(0.0883)	0.0093	(0.3457)	0.0019	(0.0198)	0.0620	(0.0586)
JPY	−0.0013	(0.0165)	−0.0243	(0.0523)	0.0450	(0.0452)	0.0614	(0.0396)	−0.0138	(0.0805)	−0.1395 ***	(0.0310)	−0.2348 *	(0.1216)	0.0001	(0.0070)	−0.0177	(0.0206)
Adj. R2	0.9355		0.5984		0.7040		0.7223		0.4048		0.7772		0.1502		0.9893		0.9080	
1/01/2008 to 6/30/2008																		
Variable	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.
C	−0.0473 ***	(0.0107)	−0.0142	(0.0252)	0.0809	(0.0574)	−0.0106	(0.0471)	0.0524	(0.0651)	−0.0281	(0.0244)	0.0852	(0.0951)	0.0006	(0.0041)	−0.0480	(0.0260)
USD	0.9835 ***	(0.0205)	0.9455 ***	(0.0480)	1.0752 ***	(0.1093)	0.8688 ***	(0.0897)	0.9911 ***	(0.1241)	0.7705 ***	(0.0465)	0.9683 ***	(0.1811)	0.9864 ***	(0.0078)	0.9614 ***	(0.0496)
EURO	−0.0408	(0.0348)	0.1145	(0.0816)	0.3174 *	(0.1857)	0.1483	(0.1524)	0.0352	(0.2108)	0.2099 ***	(0.0789)	0.0103	(0.3077)	−0.0058	(0.0133)	0.0863 ***	(0.0842)
JPY	0.0166	(0.0180)	0.0357	(0.0422)	−0.1829 *	(0.0960)	0.1571 **	(0.0788)	0.2622 **	(0.1090)	−0.0800 *	(0.0408)	0.1919	(0.1591)	0.0102 *	(0.0069)	−0.0410	(0.0436)
Adj. R2	0.9760		0.8858		0.6555		0.6835		0.5914		0.8476		0.3700		0.9965		0.8738	
7/01/2008 to 12/31/2008																		
Variable	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.
C	−0.0078	(0.0123)	0.1389	(0.1081)	0.0167	(0.1839)	0.0230	(0.0384)	0.0125	(0.0488)	−0.0026	(0.0414)	0.0167	(0.0260)	−0.0041	(0.0035)	0.0413	(0.0284)
USD	0.9879 ***	(0.0152)	1.1242 ***	(0.1338)	0.5987 ***	(0.2276)	0.8573 ***	(0.0475)	0.8068 ***	(0.0604)	0.7524 ***	(0.0512)	0.8718 ***	(0.0322)	0.9914 ***	(0.0044)	0.8632 ***	(0.0352)
EURO	0.0325	(0.0204)	0.0360	(0.1793)	1.2976 ***	(0.3050)	0.2116 ***	(0.0637)	0.4580 ***	(0.0809)	0.3496 ***	(0.0687)	0.1447 ***	(0.0431)	0.0014	(0.0058)	0.1859 ***	(0.0471)
JPY	−0.0129	(0.0105)	0.0084	(0.0920)	−0.2048	(0.1566)	−0.0203	(0.0327)	0.0253	(0.0415)	−0.0834 **	(0.0352)	−0.0005	(0.0221)	0.0053 *	(0.0030)	−0.0133	(0.0242)
Adj. R2	0.9824		0.4866		0.2256		0.8244		0.7667		0.7614		0.9133		0.9986		0.8965	
1/01/2009 to 5/29/2009																		
Variable	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.	Coef.	Std.dev.
C	0.0007	(0.0034)	−0.0621	(0.0704)	0.0168	(0.1266)	0.0194	(0.0445)	0.0021	(0.0461)	0.0133	(0.0439)	−0.0110	(0.0242)	0.0001	(0.0014)	−0.0002	(0.0358)
USD	0.9831 ***	(0.0049)	0.8620 ***	(0.0999)	0.7491 ***	(0.1794)	0.8613 ***	(0.0631)	0.9788 ***	(0.0654)	0.8459 ***	(0.0622)	0.8294 ***	(0.0343)	0.9970 ***	(0.0020)	0.8619 ***	(0.0508)
EURO	0.0067	(0.0072)	0.0098	(0.1475)	0.4415 *	(0.2650)	0.2767 ***	(0.0931)	0.1673 *	(0.0966)	0.2152 **	(0.0919)	0.1339 ***	(0.0506)	−0.0009	(0.0030)	0.1896 **	(0.0750)
JPY	0.0011	(0.0040)	−0.0586	(0.0813)	−0.2806 *	(0.1462)	−0.1377 ***	(0.0514)	−0.1119 **	(0.0533)	−0.0542	(0.0507)	0.0145	(0.0279)	0.0021	(0.0017)	−0.0749 *	(0.0413)
Adj. R2	0.9987		0.5585		0.1980		0.7575		0.7905		0.7752		0.9235		0.9998		0.8375	

Author's calculation. Autuor's calculation. Significance level: *90%, **95%, ***99%.

Table 3. Relationship between the NEER, the AMU, and the AMU Deviation Indicators

Sample period 1/2000-12/2006 obsevations 83

	China		Indonesia		Japan		South Korea	
Variable	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error
C	-0.0324	(0.0260)	-0.0014	(0.0542)	-0.0242	(0.0231)	-0.0153	(0.0289)
DLOG(AMU)	0.6405 ***	(0.0366)	0.4326 ***	(0.0633)	0.5803 ***	(0.0304)	0.4445 ***	(0.0372)
D(AMUDI)	**1.4079** ***	(0.0338)	**1.0342** ***	(0.0172)	**1.1228** ***	(0.0201)	**0.9843** ***	(0.0249)
Adj. R2	0.9561		0.9788		0.9859		0.9725	

Sample period 1/2007-3/2009 obsevations 27

	China		Indonesia		Japan		South Korea	
Variable	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error
C	-0.0740	(0.1270)	0.0602	(0.1096)	0.0670	(0.1129)	0.0816	(0.0993)
DLOG(AMU)	1.1124 ***	(0.1710)	0.3362 **	(0.1508)	0.5017 **	(0.2169)	0.4192 ***	(0.1347)
D(AMUDI)	**1.5831** ***	(0.1357)	**1.1621** ***	(0.0398)	**1.2862** ***	(0.0643)	**1.0979** ***	(0.0324)
Adj. R2	0.8383		0.9722		0.9738		0.9813	

Autuor's calculation. Significance level: *90%, **95%, ***99%.

Sample period 1/2000-12/2006 obsevations 83

	Malaysia		Philippines		Singapore		Thailand	
Variable	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error
C	-0.0094	(0.0183)	0.0234	(0.0320)	-0.0089	(0.0207)	-0.0165	(0.0333)
DLOG(AMU)	0.4783 ***	(0.0252)	0.3258 ***	(0.0367)	0.4171 ***	(0.0257)	0.3127 ***	(0.0392)
D(AMUDI)	**1.1854** ***	(0.0237)	**1.1390** ***	(0.0224)	**0.9812** ***	(0.0337)	**0.9367** ***	(0.0317)
Adj. R2	0.9694		0.9694		0.9145		0.9151	

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	Malaysia		Philippines		Singapore		Thailand	
Variable	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error	Coef.	Std.error
C	0.0525	(0.0886)	0.0967	(0.0819)	0.1396 *	(0.0766)	-0.0427	(0.1949)
DLOG(AMU)	0.4774 ***	(0.1239)	0.3451 ***	(0.1102)	0.3402 ***	(0.1209)	0.4911 *	(0.2623)
D(AMUDI)	**0.7914** ***	(0.0836)	**1.0488** ***	(0.0469)	**0.5515** ***	(0.0796)	**0.2563** ***	(0.0769)
Adj. R2	0.7723		0.9507		0.6431		0.3133	

Autuor's calculation. Significance level: *90%, **95%, ***99%.

Table 4. Policy Rate and 3-month Market Rate

	Policy Rate		3 month Market Rate	
China	2.25 5.31	1year Deposit Rate 1year Lending Rate	1.207	SHIBOR
Indonesia	7.25	Bank Indonesia Rate	8.22	JIBOR
Japan	0.10	Target O/N call rate	0.567	TIBOR
South Korea	2.00	BOK Base Rate	2.41	KORIBOR
Malaysia	2.00	O/N Policy Rate	2.12	KLIBOR
Philippines	4.50 6.50	BSP O/N Borrowing Rate BSP O/N Lending Rate	3.688	PHIBOR
Singapore		n.a.	0.5	SIBOR
Thailand	1.25	1day Repurchase Rate	1.425	BKIBOR

Source: AsianBondOnlines (ADB), All data are as of May 2009.