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Stability of East Asian Currencies under the Global Financial Crisis

Junko Shimizu
School of Commerce, Senshu University
and
Eiji Ogawa
Graduate School of Commerce and Management, Hitotsubashi University

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Hitotsubashi University
2-1 Naka, Kunitachi, Tokyo, 186-8601 Japan

Stability of East Asian Currencies under the Global Financial Crisis*

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Junko Shimizu ‡ (Senshu University)
Eiji Ogawa † (Hitotsubashi University)

Abstract

In this paper, we investigate movements of nominal effective exchange rates (hereafter, NEER) of East Asian currencies and the Asian Monetary Unit (AMU), which is a weighted average of East Asian currencies, in the course of the global financial crisis. We found that the NEERs were more stable for countries that adopted a currency basket system even in the global financial crisis time. Comparisons between NEERs and a combination of AMU and AMU Deviation Indicators, which show intra-regional exchange rates among the East Asian currencies, shows that there are strong relationships between them before and after the global financial crisis. Accordingly, monitoring both the AMU and the AMU Deviation Indicators is effective to stabilize NEER of East Asian currencies. In this respect, the AMU Deviation Indicators as well as the AMU will play a very important role for surveillance over stability of intra-regional exchange rates.

Keyword: *de-facto* US dollar peg system, currency basket system, effective exchange rate, global financial crisis, East Asian currencies

JEL Classification: F31, F36

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‡ Associate Professor of School of Commerce, Senshu University, E-mail: jsimizu@isc.senshu-u.ac.jp

† Professor of Graduate School of Commerce and Management, Hitotsubashi University. E-mail: ogawa.eiji@srv.cc.hit-u.ac.jp

1. Introduction

The global financial crisis which started in the United States in summer of 2007 has given great impacts on Asian economies as well as the US domestic economy. It also is raising the possibility that production networks, which have been growing in East Asia, will undergo large-scale restructuring in the future. Large currency fluctuations, not only against the US dollar but also against other neighboring country currencies within the region, are undesirable for Asian countries. For determining the economic impact of exchange rate fluctuations on intra-regional trade, the transition to a system that stabilizes intra-regional exchange rates within Asia while allowing those values to fluctuate against the US dollar and the euro is essential.

In this paper, we investigate movements of nominal exchange rates, nominal effective exchange rates (hereafter, NEER) of East Asian countries, and the Asian Monetary Unit (AMU) , which is a weighted average of Asian currencies proposed by Ogawa and Shimizu (2005), in the course of latest global financial crisis. Especially we analyze differences of the above three kinds of exchange rate data in order to figure out what kind of currency regime is desirable to stabilize NEER for each of East Asian currencies in the global financial crisis time.

In addition, we investigate relationships among NEER and AMU and AMU Deviation Indicators for each of East Asian countries, which were studied by Ogawa and Shimizu (2005). The AMU is a 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 as measurements for surveillance under the

Chiang Mai Initiative and coordinated exchange rate policies among East Asian countries. If movements of the AMU Deviation Indicators for each of East Asian currencies are strongly related to its NEER, monitoring the indicators and keeping them within a certain band is considered to be an effective exchange rate policy in the region. Ogawa and Shimizu (2006) have already investigated relationship among the NEER and the AMU and the AMU Deviation Indicators. In this paper, we extend the sample period into one which include the global financial crisis period to conduct the same analysis for possible changes in the relationship among the NEER and the AMU and the AMU Deviation Indicators.

The rest of the paper is organized as follows. Section 2 overviews the previous researches of desirable currency regime in East Asian countries. Section 3 investigates Asian currencies movements under the global financial crisis. Section 4 focuses on volatilities of the NEER for each of East Asian currencies to compare relationships between their weights of effective exchange rate on East Asian countries and their currency regimes. Section 5 investigates relationship between NEER, and AMU and AMU deviation indicators for each of East Asian currencies. Section 6 discusses how to use the AMU Deviation Indicators to promote regional exchange rate coordination. Section 7 summarizes our results and concludes.

2. What is a desirable currency regime in East Asia

Although the Asian currency crisis in 1997 gave us an important lesson that *de facto* dollar peg was dangerous for East Asian countries, the monetary authorities of East Asian countries tended to choose a *de facto* dollar peg system rather than a

currency basket peg system. As McKinnon (2000) and Ogawa (2002, 2008) pointed out, linkages of East Asian countries to the US dollar have stayed at high level even after the Chinese currency regime reform in July 2005.[1] Ogawa (2008) showed empirical results that the monetary authority of China continues to stabilize the Chinese yuan against the US dollar despite its announcements of adopting a managed floating exchange rate system with reference to a currency basket while some linkages of home currency with a currency basket are found in some of East Asian countries. Such a coordination failure in exchange rate policies among the authorities of East Asian countries might increase volatility and misalignments of intra-regional exchange rates among East Asian currencies.

With the growing dependency of intra-regional trade in East Asian countries, a currency system to reduce exchange rate risks in international trade and investments within the region would be indispensable. One idea is to create a common currency basket, on which the monetary authorities of East Asian countries will base to achieve a joint currency basket system. Ogawa and Shimizu (2005) proposed an Asian Monetary Unit (AMU) as a weighted average of thirteen East Asian currencies (ASEAN + 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 in order that the monetary authorities of the East Asian countries should make regional coordination in exchange rate policies so as not to deviate each of the East Asian currencies from the common currency basket or the AMU. In this way, the countries will be able to achieve stability of intra-regional exchange rates among the East Asian currencies

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

with jointly floating against the outside currencies which include the US dollar and the euro.

Some East Asian countries, such as Singapore, China and Malaysia (from July 2005) are cited as a country that actually adopts a currency system near the BBC rule.[2] As an indicative proposal, Ogawa and Shimizu (2007) propose a step-by-step approach from individual currency basket system to a common currency basket system in East Asia. Ma and McCauley (2008) also discuss that intra-Asian exchange rate stability might build on similar national policies of managing currencies against their own respective baskets.

On the other hand, McKinnon (2005) proposes so-called the "East Asian dollar standard", that East Asian countries should coordinate their policies to keep their exchange rates stable against the US dollar. He explains that collective macroeconomic consequences of all East Asian governments' opting individually to peg to the US dollar. According to McKinnon's view, East Asian countries should coordinate their policies to keep their exchange rates stable against the US dollar. McKinnon and Schnabl (2009) also suggest that China should rigidly maintain the nominal peg of the Chinese yuan to the US dollar for reasons of monetary and financial stability.

In normal period, most of the Asian currencies are strongly correlated with the US dollar and, in other words, are stable vis-à-vis the US dollar. However, these currencies comparatively fluctuated vis-à-vis the euro and the Japanese yen. Accordingly, their effective exchange rates are not stable. As Bank of Thailand

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

clearly explains on their website, 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".

After the Lehman shock in September 15, 2008, a number of Asian currencies depreciated sharply vis-à-vis the US dollar, with the Japanese yen and the Chinese yuan being a notable exception. The monetary authorities of East Asian countries have recognized that the stability against the US dollar is not enough for their economy any more. Now, all of the monetary authorities should reconsider which is more desirable for the region to stabilize their exchange rates against the US dollar or a currency basket. Moreover, they should consider that it is desirable for the East Asian economy to make a progress to coordinate their exchange rate policies.

3. Exchange rate movements under the global financial crisis

At first, we check 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 with 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 vis-à-vis the US dollar in this period due to their strong relationship with the US dollar. It is like *de facto* the dollar peg

conducted by the monetary authority of China. The Singapore dollar and the Malaysia ringgit also have not depreciated largely against the US dollar due to their keeping a currency basket system. The South Korean won has had 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 Lehman Brothers' demise.

Next, we compare the volatilities of AMU, which is a 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 daily nominal exchange rates by year. All of the exchange rates are downloaded from Datastream while the AMU is available from the website of 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 AMU is the second stable relative to each of the East Asian currencies. Most of the East Asian currencies are more fluctuated against the US dollar than the AMU except for the Chinese yuan.

Figure 3 shows the volatilities of nominal exchange rates vis-à-vis the euro. As a whole, 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. Fluctuation of the Malaysian ringgit also is relatively lower compared with other East Asian currencies. Figure 4 shows the volatilities of

[3] Daily data of the AMU and the AMU deviation indicators are freely available at the website of RIETI (http://www.rieti.go.jp/).

nominal exchange rates vis-à-vis the Japanese yen. In this case, the AMU is the lowest relative with the East Asian currencies while The Chinese yuan is the second lowest.

As a whole, we can summarize the above results as follows. Volatilities of exchange rates of East Asian currencies vis-à-vis the three major currencies increased sharply in 2008. However, there are comparatively smaller fluctuations in currency basket-targeted currencies (the Singapore dollar and the Malaysian ringgit) especially vis-à-vis the euro and the Japanese yen. On one hand, the volatilities of AMU were lower than most of the East Asian currencies.

4. NEER of East Asian currencies

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

Why NEER of some East Asian currencies are fluctuating so volatile in the period of the global financial crisis? In order to answer this question, we have better check weights on trade-counter countries in their effective exchange rates at first.

Figure 6 shows weights of effective exchange rate for the East Asian currencies in 2005-2007 according to the BIS statistics.[4] As Ma and McCauley (2008) pointed out, we find that patterns of the weights in effective exchange rates are similar among 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 + ASEAN currencies + the Taiwanese dollar) are between 47.1% in Japan and 68.63% in Taiwan. Weight on the East Asian currencies is the smallest in China (40.7%) among them because a weight on its home currency is not included. 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 (+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 in 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 rate might be stable for the East Asian currencies if their intra-regional bilateral exchange rates are stable each other.

We investigate relationships between the weights on East Asian currencies in their effective exchange rates and volatilities of NEER for each of the East Asian currencies For the purpose, we plot a scatter diagram with the size of volatilities of NEER (monthly) in vertical axis and the effective exchange rate weights on East

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

Asian currencies in horizontal axis. Volatility of NEER is calculated as a standard deviation of monthly NEER data. We divide the sample period into two subsample periods which include a normal period from January 2000 to December 2006 and the global financial crisis period from January 2007 to March 2009.

Figure 7 shows the results. In the normal period, we can find no clear relationship between the weights on the East Asian currencies in the NEERs and the volatilities of NEERs. In the global financial crisis period, the volatilities of NEERs is smaller than 5 % when the weights on the East Asian currencies in NEERs are above around 60% except for the Indonesia rupiah. And the volatilities of NEERs are above around 7% when the weights on the East Asian currencies in NEERs are smaller than 55%. It implies that the weights on the East Asian currencies in NEER is higher, the volatilities of the NEERs becomes lower. In other words, NEERs of East Asian currencies with high weights on the US dollar and the euro were relatively volatile than those of the others.

Next, we investigate how the currency regime affects the volatilities of NEER. It is often said that the currency regimes varies among the East Asian countries. We compare the volatilities of NEER in the normal period with those in the global financial crisis period to investigate their relationships with the currency regimes. Table 1 shows current exchange rate policy in East Asian countries. Only the monetary authority of Hong Kong adopts the hard peg system, "currency board". Five Countries adopt a managed floating exchange rate system while three countries adopt 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 conduct 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:

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

where $\dot{e}_{i/Sfr}$ is rates of change in daily exchange rate of currency i in terms of the Swiss franc, which is a numeraire currency.[6] $\dot{e}_{USD/Sfr}$ is rates of change in daily exchange rate of the US dollar in terms of the Swiss franc. $\dot{e}_{Euro/Sfr}$ is rates of change in daily exchange rate of the euro in terms of the Swiss franc. $\dot{e}_{JPY/Sfr}$ is rates of change in 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 the coefficients a_1, a_2, a_3 are significantly estimated and they are positive, then it means that currency i pegs to a basket of three major currencies. If only the coefficients 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. We analyze nine East Asian currencies, which are five ASEAN currencies plus the Chinese yuan, the South Korean won, the Hong Kong dollar and the New Taiwan dollar. The sample period is from Jan 2007 to the end of May, 2009. We estimate the above equation by 6 month, so totally five sub-sample periods are analyzed. All daily exchange rates are from

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

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

Datastream.

Table 2 shows the results. We found that the Chinese yuan has still pegged to the US dollar even after they announced their exchange rate reform in July 2005. Their coefficients of the US dollar are 98 percent in whole sample period except for the second sub-sample period (July 2007 to December 2007) and their size of adjusted R-squared also is very high. These results indicate that the Chinese yuan has continued their strong linkage with the US dollar even under the global financial crisis. All other East Asian currencies, except for the Indonesian rupiah and the South Korean won, also have a strong linkage with the US dollar. Their US dollar coefficients are above 80 percent under the global financial crisis. On the other hand, the Singapore dollar has pegged to a currency basket with the US dollar and euro in whole sample period. Except for the Chinese yuan and the Hong Kong dollar, the other East Asian currencies peg to a currency basket with the US dollar and the euro in most sub-sample periods. Some of the Japanese yen's coefficients are significantly estimated, however, most of them are negative.

From the above results, we can find out how *de facto* currency regime affect on the volatilities of NEER. Figure 8 show the scatter diagram which indicates the relationship between de facto currency regime and the volatilities of NEER. The vertical axis indicates the size of volatilities of NEER (monthly) while the horizontal axis indicates de facto currency regime ordering 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 order the rest of East Asian currencies by the size of US dollar' coefficients estimated in the above results.

In the normal time (January 2000 to December 2006), volatility of NEER of the

Singapore dollar was the lowest. Volatilities of NEER of the US dollar pegging countries, such as Hong Kong, China, and Taiwan, were higher than Singapore. Volatilities of NEER of the free floating countries were higher than the other countries. In the global financial crisis period (Jan 2007 to March 2009), volatilities of NEER of the Japanese yen, the South Korean won (free floating countries) and the Chinese yuan increased. It is striking that volatility of NEER of the Singapore dollar did not change. Additionally, the volatilities of NEER of the Malaysian ringgit, the Thai baht and the New Taiwan dollar decreased. It implies that the currency basket system could keep the NEER stable or even lower even in the global financial crisis period.

Combining the above results about volatilities of NEERs together, we found that NEER of the country, whose effective exchange rate's weights on the East Asian currencies are high (Taiwan and Hong Kong) and who executes a currency basket system (Singapore, Malaysia, Thailand and Taiwan), are stable in the global financial crisis period. The 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 make their NEER stable.

5. The relationship between Effective Exchange rates, and the AMU and the AMU deviation indicators

Ogawa and Shimizu (2005) proposed to create an Asian Monetary Unit (AMU) as a weighted average of East Asian currencies and calculate AMU Deviation

Indicators, which 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) investigate the relationship between NEER of AMU composite currencies and the AMU and the 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 to find strong relationships between the AMU Deviation Indicators and the effective exchange rates except for some currencies.[7]

In this paper, we extend the sample period to one including the global financial crisis period to conduct the same empirical analysis. We regress monthly percentage change of NEER on monthly percentage change of the AMU and monthly difference of its AMU Deviation for each of the East Asian currencies to investigate how the movement of the AMU and each AMU Deviation Indicator explain movement in NEER for each of the East Asian currencies.[8] We estimate the following regression equation:

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

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

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

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

Table 3 shows the analytical results. Both the coefficient on the AMU and the AMU Deviation Indicators are significant and positive. The adjusted R-squared also are high in both sub-sample periods. Even in the global financial crisis period, the coefficients on the AMU and the AMU Deviation Indicators are significant and positive. In China, Indonesia, Japan and South Korea, the coefficients on the AMU Deviation Indicators are higher in the global financial crisis period than the normal period. These results imply that a coordinated exchange rate policy by monitoring the AMU and the AMU Deviation Indicators is effective to stabilize NEER of the East Asian currencies.

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

How will we promote coordinated exchange rate policies by using the AMU and the AMU deviation indicators? Ogawa and Shimizu (2007) propose a step-by-step approach toward a regional monetary coordination as follows:

- 1st step
  - Policy dialogue about exchange rates and exchange rate policies
  - Surveillance by using the AMU and the AMU Deviation Indicators at Economic Review and Policy Dialogue
- 2nd step

- Managed floating exchange rate system with reference of an individual currency basket
- Plus surveillance by using the AMU Deviation Indicators

We have recognized that policy dialogue concerning especially about coordinated exchange rate policies among East Asian countries should be needed in order to make regional policy coordination. Under the current circumstances, however, it is so difficult to start even the first step because the governments of East Asian countries have little policy consensus regarding the coordinated exchange rate policies. Do we really need any policy consensus? Some East Asian countries have already adopted an individual currency basket system as presented in the previous section. In addition, we found that the NEER of these currencies are stable even in the global financial crisis time. As Ma and McCauley (2008) pointed out that 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 adopts the policy to keep its own effective exchange rate stable.

For example, we can show a coordinated exchange rate policy by using the AMU Deviation Indicator. Figure 9 shows the movement of the AMU Deviation Indicators from January 2000 to March 2009. If we decide a fluctuation band of the AMU Deviation Indicators +/-15%, which is the same as currency band of the Exchange Rate Mechanism (ERM) under the European Monetary System (EMS) after 1992 and the ERM II except for the Denmark crone, we found that all of the East Asian currencies except for the Philippine peso and the Lao kip were within the +/-15% band from 2000 to middle of 2005. It means that 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 upper band of 15% while at the same time the AMU Deviation Indicator of Japanese yen has declined below zero. The AMU Deviation Indicators of the Thai baht and the Singapore dollar also followed the South Korean won.

What motivated those currencies to deviate from benchmark level? It is found that yen carry trades between the Japanese yen and those appreciating currencies destabilized the AMU Deviation Indicators (Ogawa and Yoshimi (2009)). These phenomena suggest that coordinated monetary policies also should be considered with coordinated exchange rate policies. Table 4 shows the latest policy interest rate and money market rate (3 month) in East Asian countries. There are still large differences between the lowest country (Japan) and the highest country (Indonesia). However, the differences of 3month rates are becoming narrow due to the latest global financial crisis. Accordingly, it is a good chance to discuss issues on coordinated monetary policies as well as the coordinated exchange rate policies.

7. Conclusion

In this paper, we investigate the movement of nominal exchange rates, NEER of East Asian currencies, and the AMU in the global financial crisis time. We found that the volatilities of 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 AMU were mostly lower than the East

Asian currencies. Regarding the movement in NEER, we found that NEER of most of the East Asian currencies have started to fluctuate up and down since 2007. Since September 2008, NEER of the Japanese yen and the Chinese yuan have increased sharply while NEER of the South Korean won has depreciated dramatically. The relationship between NEER volatilities and weights on the East Asia currencies in effective exchange rate suggested us that the weights on the East Asian currencies is higher, the volatilities of NEER becomes lower. Also we found that a currency basket system could stabilize NEER even in the global financial crisis time.

The analysis on the relationship between NEER and the AMU and the AMU Deviation Indicator showed the strong relationships between NEER of East Asian currencies and the AMU and the AMU Deviation Indicators. Their relationships mostly do not change in the global financial crisis time. Accordingly, monitoring both the AMU and the AMU Deviation Indicators is effective to stabilize NEER of East Asian currencies.

At the moment, individual basket system is desirable for Asian countries. Because weights in NEER are mostly similar among East Asian currencies, a similar policy of stabilizing home currency against their NEER can materialize the coordinated exchange rate policy without any strong consensus for a while. In the future, however, coordinated monetary policies also should 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, they have begun experiencing significant

subprime mortgage fallout with their 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 a large effect on foreign exchange rates. Under these circumstances, it is necessary to keep a close eye on foreign exchange rate movements. And what must 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

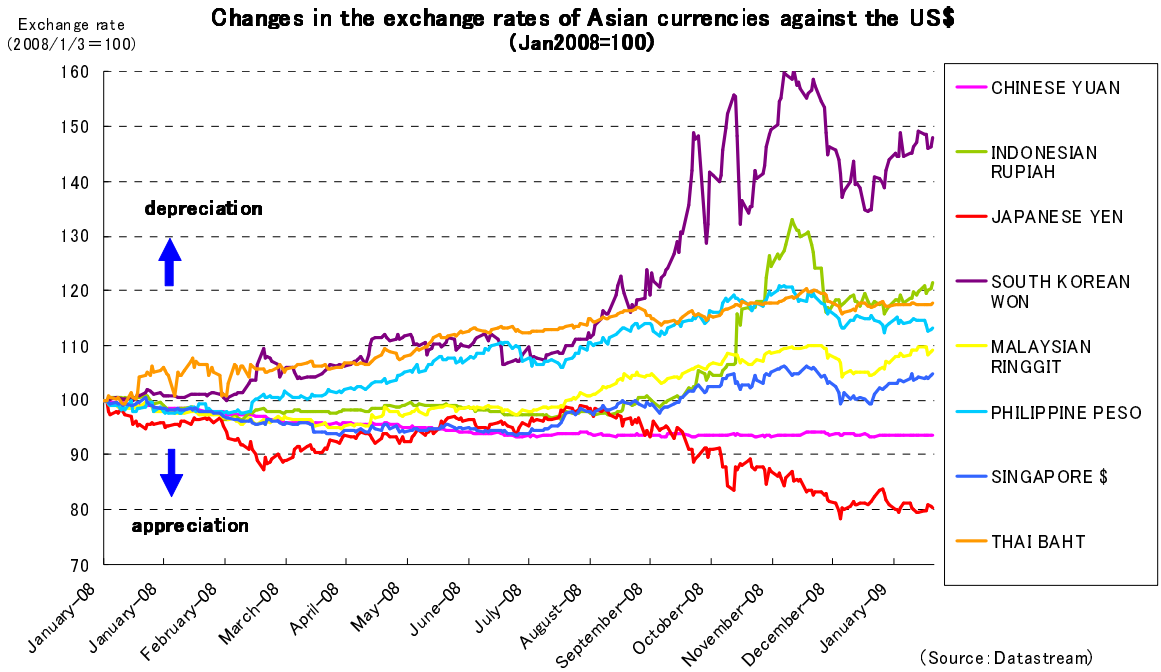
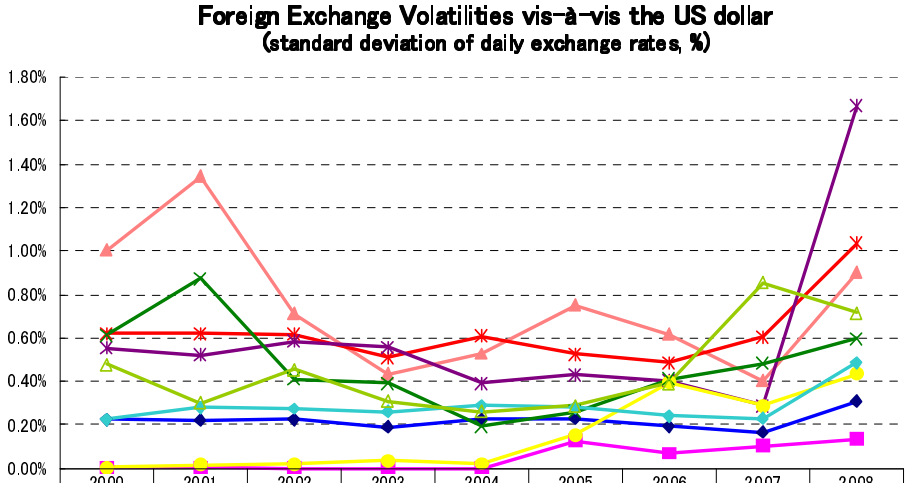


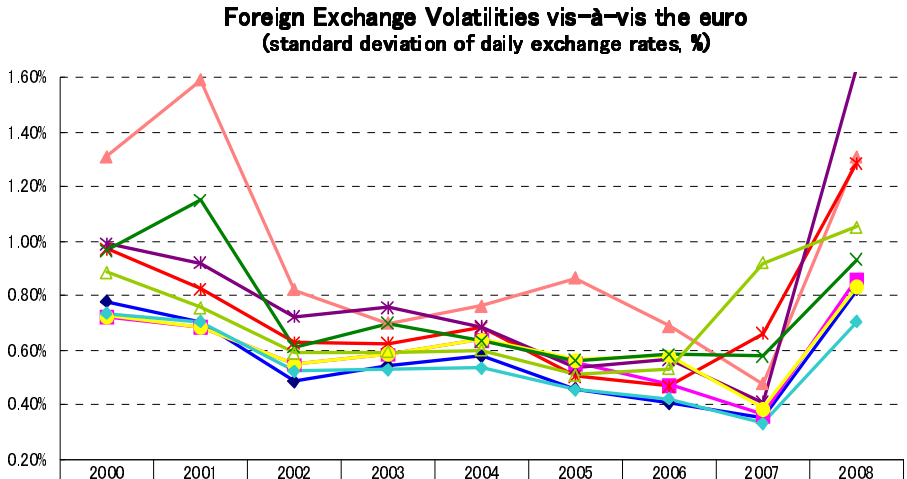
Figure 2. Foreign Exchange Volatilities vis-à-vis the US dollar



	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%

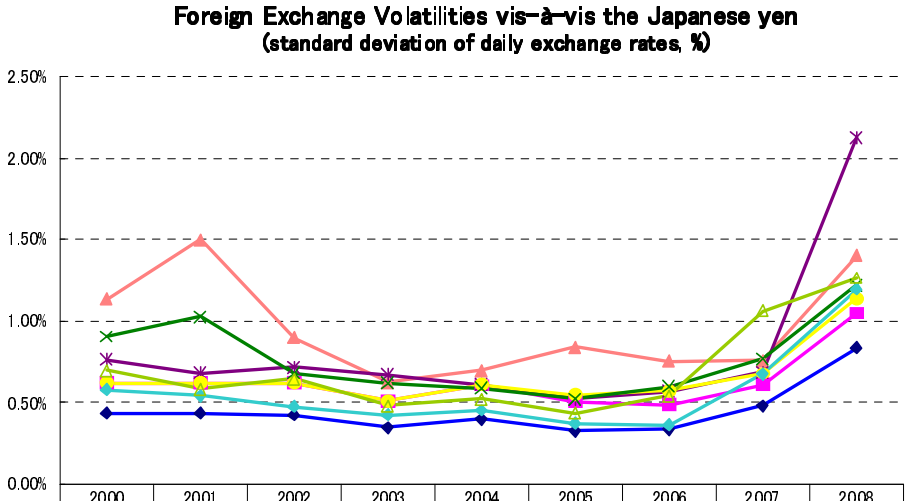
(Author's calculation. All exchange rates are from Datastream)

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%

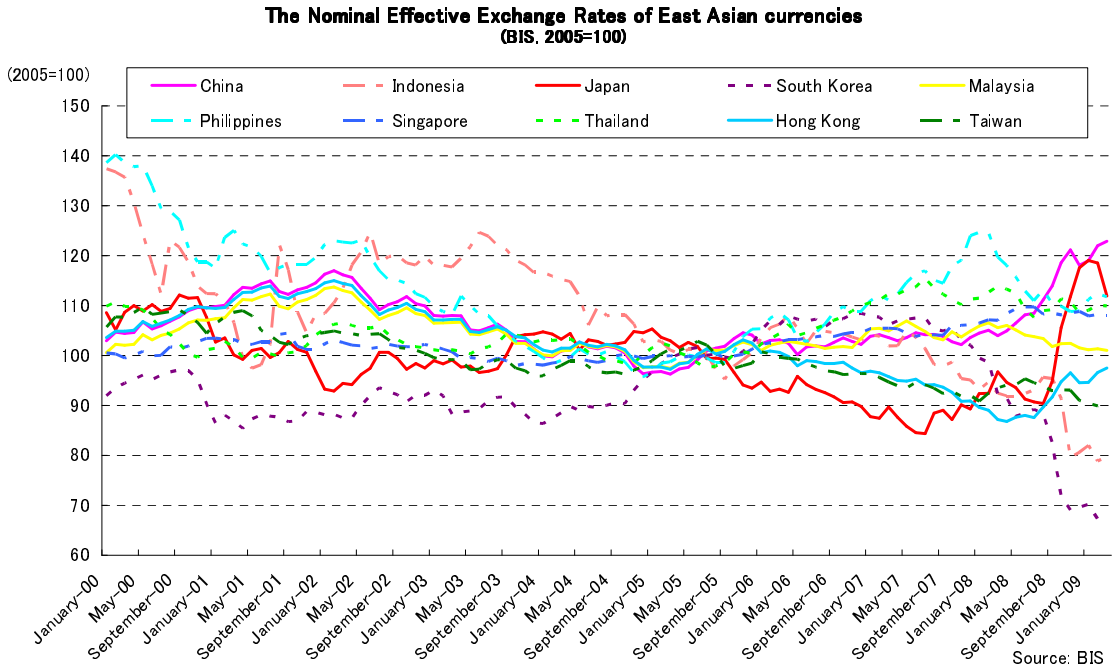
Figure 4. Foreign Exchange Volatilities vis-à-vis the Japanese yen



	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%

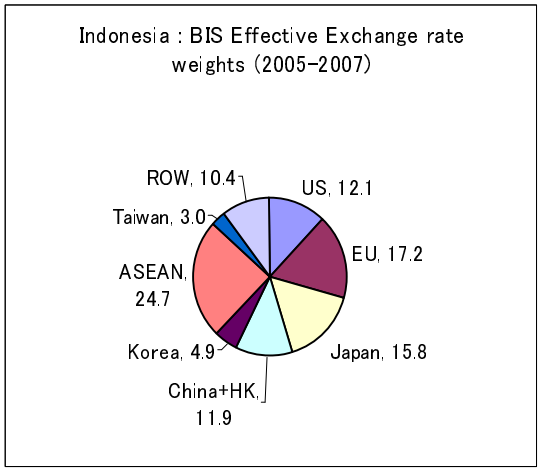
(Author's calculation. All exchange rates are from Datastream)

Figure 5. NEER of East Asian currencies



(Source: BIS)

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



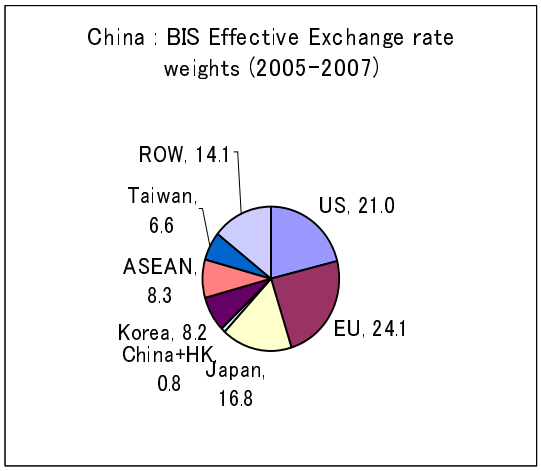
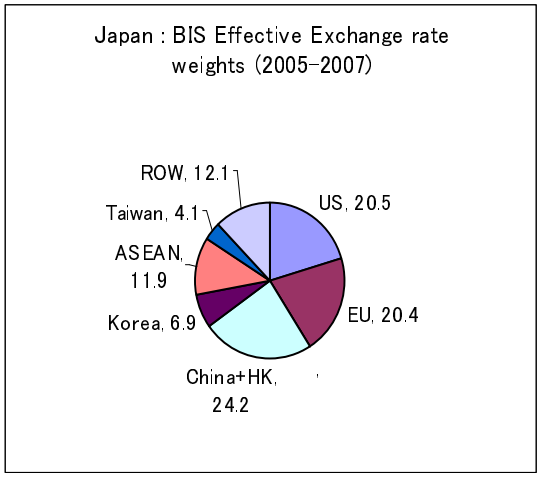
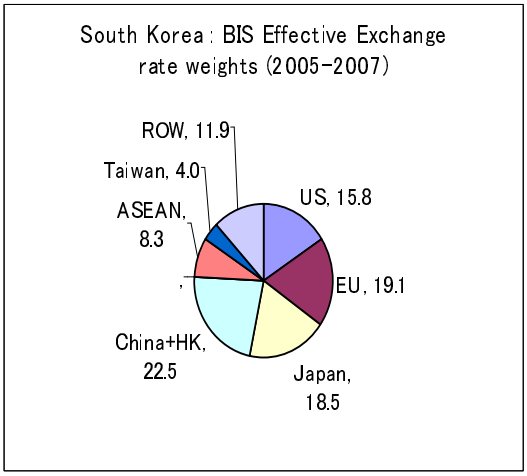
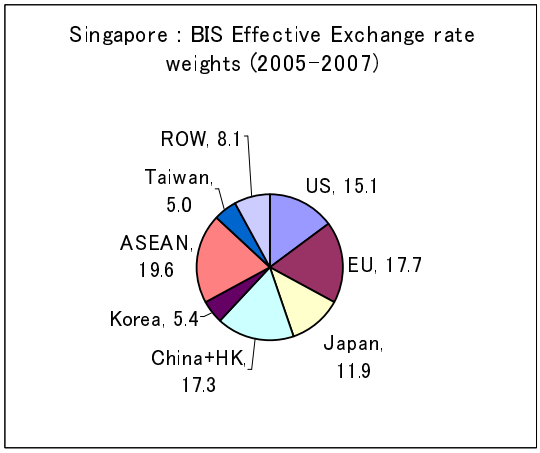
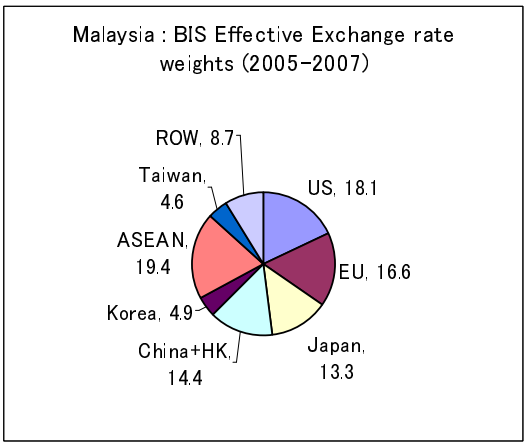


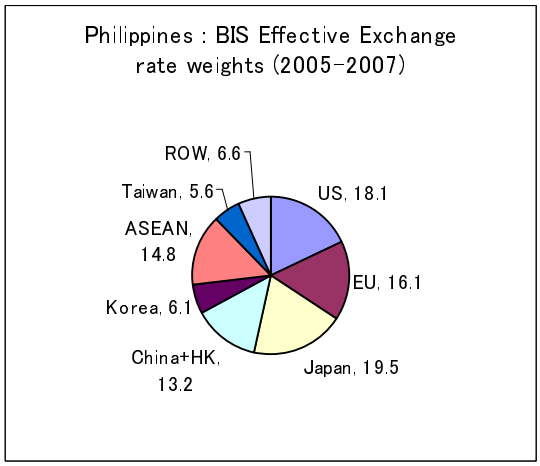
Figure 6 (continued)











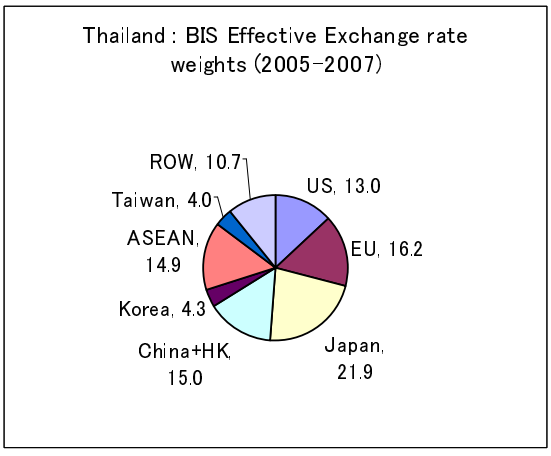
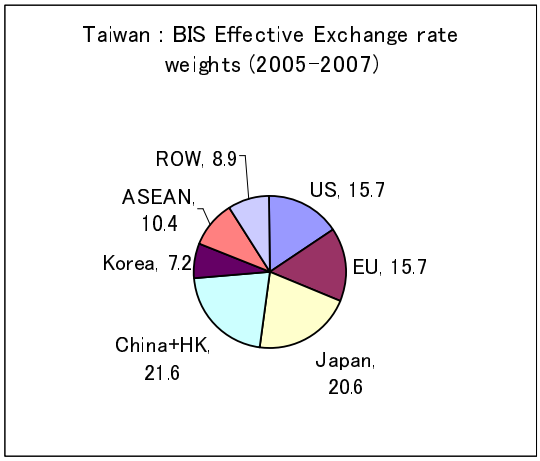
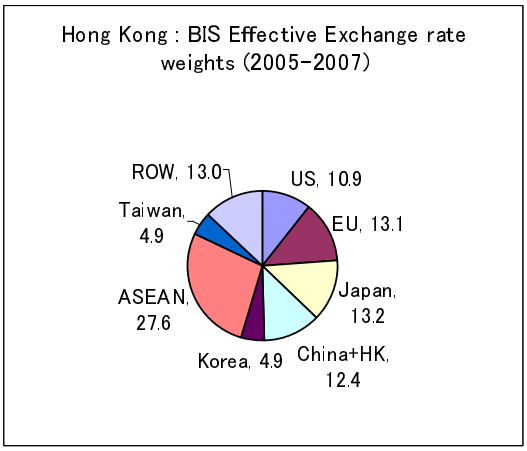


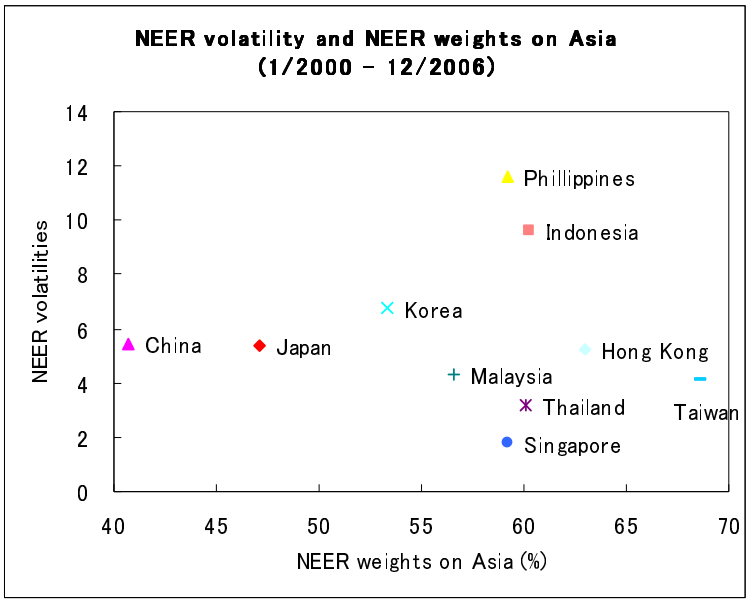
Figure 6 (continued)

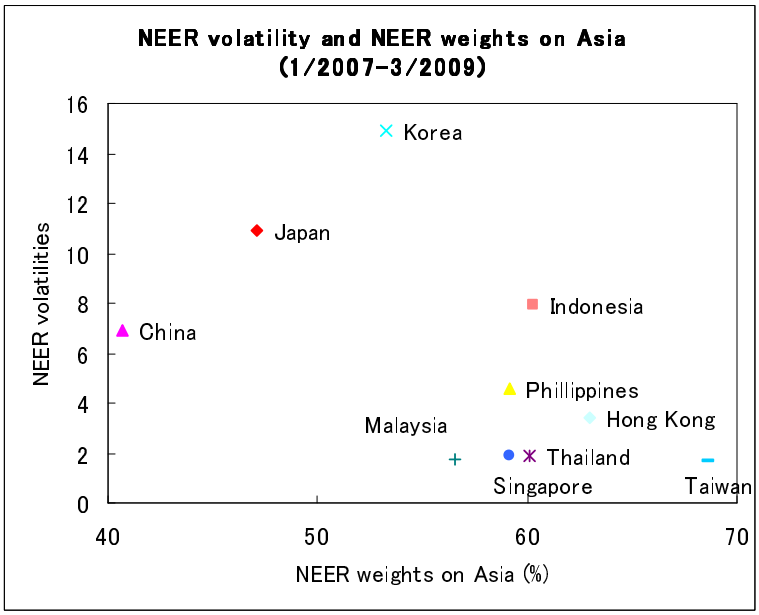




(Source: BIS)

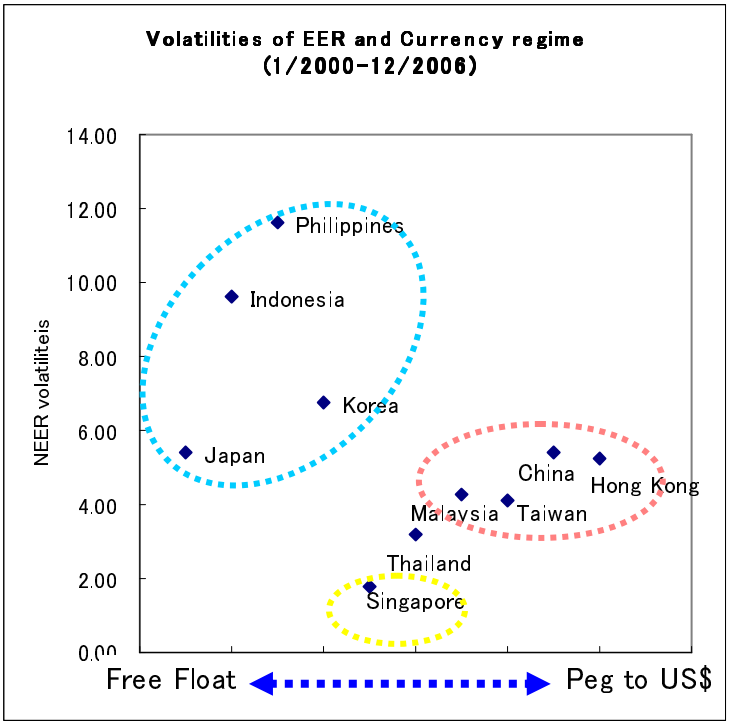
Figure 7. NEER Volatilities and NEER weights on Asia

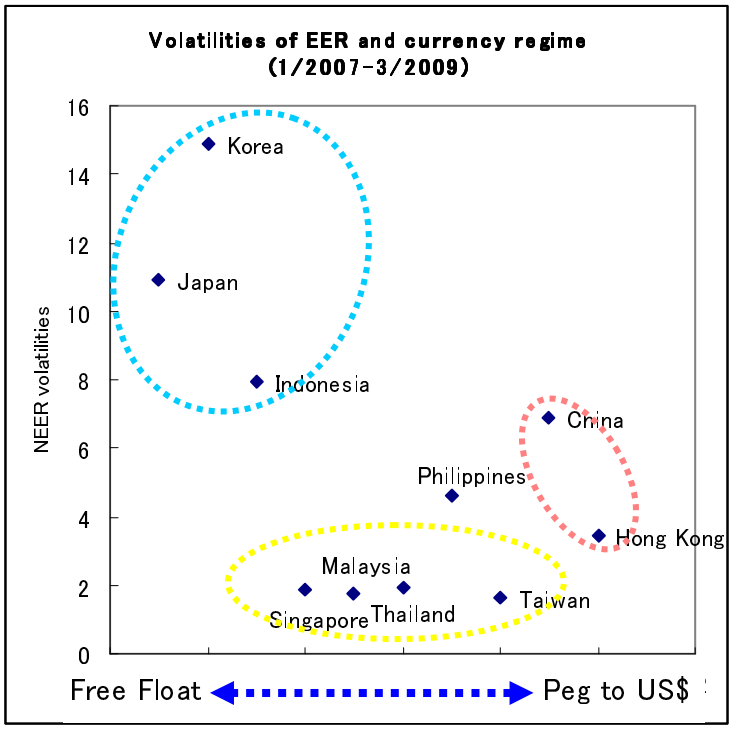




(Author's calculation)

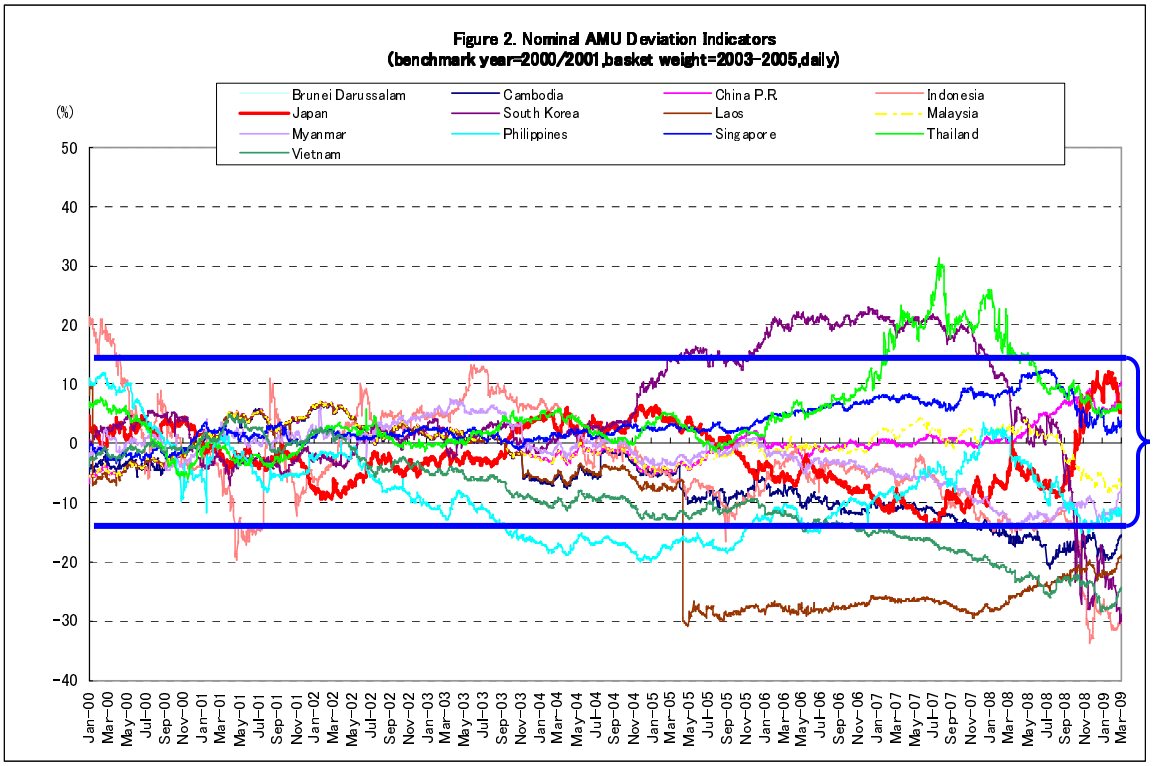
Figure 8. NEER Volatilities and de-facto Currency Regime





(Author's calculation)

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's 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 NEER and the AMU & the AMUDI

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		

Sample period 1/2007-3/2009 obsevations 27

	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.