Competing proposals for the Asian basket currency

Masaki Yamaguchi

(Department of Public Policy and Social Studies, Faculty of Literature and Social Sciences)

Abstract

This paper sets out to conduct a comparative study of competing proposals for the Asian basket currency based on objective criteria. One of the proposals is ACU: the basket currency which is composed of several Asian currencies. The other is DEY, which the yen, the dollar and the euro comprise. Statistical examinations by using unconditional volatility can not determine relative merits of competing proposals. Meanwhile results from fluctuation widths demonstrate a clear-cut advantage of ACU over DEY. This result implies much higher feasibility of a target zone mechanism applying ACU. Besides, this study clarifies an instability of DEY is attributed to the unprecedented global imbalance.

JEL *classification* : F15, F31, F33

Keywords : Basket currency, Target zone system

1 Introduction

A move toward the creation of the East Asian Community has accelerated. Only a few years ago this idea was something unthinkable. This Asian regional tide gathers a momentum toward the East Asian Community in both the plolitical and business world.[1] Most of political proposals for the East Asian Community refer to the need to create a regional basket currency, although those proposals rarely show a specific plan based on an objective computation. Furthermore a regional cooperation in the financial fields lags significantly behind an economic cooperation like free trade agreements.

The 10 ASEAN countries and Japan, China and South Korea agreed a network of bilateral currency swap arrangements to cope with currency crises in May 2000, in the so-called Chiangmai Initiative. This initiative is a sure and steady step towards a regional financial coordination, nevertheless this is a bilateral and a lower dimensional cooperation compared to a multilateral one like the euro. And also this coordination primarily intends to offer a last resort in the event of emergency situations. Asian countries do not ensure a means for stabilizing their currencies in peacetime so far.

Contrary to political proposals, some academic works have demonstrated specific blueprints of the basket currency. Ogawa and Kawasaki (2003) [8] have computed an artificial basket currency which is composed of the yen, the dollar and the euro. They investigated the possibility of the optimum currency area in the East Asia by applying this basket currency. This type of basket currency has been popular and

directly applicable to other literature. Ogawa and Shimizu (2004) [9] has applied an artificial basket currency to the *Asian Bond*[2] and studied risks and returns of the bond denominated in the basket currency by comparing those of the bond denominated in three major currencies. Tanaka (2004) [11] has broadened an application range of a basket currency. He named a basket currency DEY and examined the feasibility of a target zone scheme which uses DEY. All of these literature calculated a basket currency which includes three major currencies.

Meanwhile the other type of a basket currency exists. That is ACU (Asian Currency Unit) of which Asian currencies compose. Originally Kim (2003) [6] has designed ACU by applying the experience in EU: ECU (European Currency Unit). Later on, Yamaguchi (2003) [13] has applied ACU to the Asian Bond market and computed risks and returns of the bond denominated in ACU.

Two specific designs of a basket currency coexist, although very few of existing studies have weighed the positive and the negative involved in two competing proposals for the Asian basket currency. This is because most researchers estimate the possibility of ACU much lower than a basket currency which is composed of three major currencies due to the difficulty of a political coordination among relevant countries. This underestimation results in the exclusion of ACU from a candidate of a basket currency which should be examined specifically. However, the reason of the exclusion lacks a rationale allowing that a basket currency composed of three currencies also requires a political coordination. Hence, a comparative study of two proposals is a meaningful work and contributes to an adequate consideration towards a creation of common currency. Besides, results of the examination provide a basis for an argument concerning further financial cooperation in the East Asia.

The rest of the paper is organized as follows. The next section presents a general computation method of a basket currency and specific designs of DEY and ACU. Understanding comparative study in subsequent sections requires this preliminary work. Section 3 and section 4 discuss the objective criteria to examine basket currencies at the beginning of the respective section. We also explain the method of statistical measurements that we have used to analyze the nature of basket currencies. Subsequently, the statistical results are presented and we consider the implications of the results. Section 5 presents a summary and concluding remarks.

2 Blueprint for a basket currency

2.1 Computation method

Existing literature have used two major computation methods for a basket currency. They are a geometric mean and a harmonic mean. Assuming that a basket currency includes three major currencies (i.e., the yen, the euro and the dollar) as its components, employing a geometric mean gives the exchange rate

of home country X against a basket currency as follows.

$$CB_{g,X} = (E^{X/jpy})^{w_{jpy}}(E^{X/eur})^{w_{eur}}(E^{X/usd})^{w_{usd}} \tag{1}$$

where E is the exchange rate of home currency X against three major currencies and w is the weight in this basket. Ogawa and Kawasaki (2003) [8], Ogawa and Shimizu (2004) [9] and numerous literature have used this calculation method and computed artificial basket currencies.

Another one is a harmonic mean, which is commonly referred to as a standard basket. The experience in the European Union have examined this type of currency basket. The calculation using a standard basket gives the exchange rate of U.S. dollar against a basket currency as follows.[3]

$$CB_{h,usd} = u_{jpy}E^{usd/jpy} + u_{eur}E^{usd/eur} + u_{usd} \tag{2}$$

where u stands for a number of unit and uE provides a weight on this basket. Multiplying eq. (2) by the exchange rate of home currency X against U.S. dollar yields the exchange rate of home currency against a basket currency.

$$CB_{h,X} = u_{jpy}E^{X/jpy} + u_{eur}E^{X/eur} + u_{usd}E^{X/usd} \tag{3}$$

ACU and DEY use this standard basket. However, the difference in calculation method among existing studies does not matter and does not attract a serious controversy. The central issue here is components of a basket. Some informed persons express distaste for including the dollar and the euro in a basket currency. On the contrary, most of recent works in economics have computed an artificial basket currency which contains the yen, the dollar and the euro. Meanwhile, the studies using standard basket, which is composed of several East Asian currencies, have formed a small minority.

Including different parts in a basket currency definitely varies in performance, however existing studies rarely examine these two basket currencies at one time. Hence we work out a design for specific basket currencies and compare their performance based on unambiguous criteria.

2.2 Specific basket currency

We compute DEY in the beginning following Tanaka(2004) [11]. The computation requires basket weights of respective countries (or area). We apply ECU formula, in which the weight of each currency was determined according to a country's share of collective GNP and its share of intra-Community trade. For a simplicity of a calculation, using trade share decides basket weights of DEY for eight East Asian countries. It should be noted that we calculate trade share on the assumption that world trade are the sum of bilatelal trades with the Japan, the United States and the EU. Thus we define trade share as follows.

$$Share_i = \frac{Ex_i + Im_i}{trade_{jp} + trade_{us} + trade_{eu}} \tag{4}$$

whrere $Share_i$ is a trade share of the ith country[4], Ex_i is the export to the ith country and Im_i stands for the import from the ith country. Here we use the trade data in 1999, which are all from *Direction of Trade Statistics* (IMF). Once we obtain trade share, we can also compute the number of unit instantly. Table 4 shows the basket weight and the number of unit for respective countries.

Next to DEY, we calculate ACU, which includes nine East Asian currencies: Japanese yen, Chinese yuan, Korean won, Hong Kong dollar, Thai baht, Malaysian ringgit, Indonesian rupee, Philippine peso and Singapore dollar. Components of this basket currency demonstrate that ACU is the application of ECU to the East Asian region.

We employ a share of collective GDP based on purchasing power parity (PPP) for the calculation of the basket weight. The share of GDP converted by using U.S. dollar is also eligible for a basket weight, although the Japanaese yen account for almost 70% share of a currency basket. Thus yen/dollar exchange rate has a great impact on ACU. Taking into consideration of a large volatility of yen/dollar rate, applying GDP converted by U.S.dollar makes ACU a volatile unit of account. Furthermore, a bulge in basket weight is an obstacle for consensus-building on a common basket weight. This is because we use GDP based on PPP. Here we use the data in 1999, which are from *World Development Report* (World Bank). Table 5 demonstrates the calculation results: basket weight and the number of unit for relevant countries.

Computing basket currencies by using the number of unit results in Figure 1, which presents changes in ACU and DEY for reapective East Asian countries after 2000. Basket currencies have demonstrated clear-cut co-movement until mid-2002. This co-movement is common to all eight countries. In contrast, the increasing divergence between ACU and DEY has characterized the changes in the basket currency for a subsequent period.

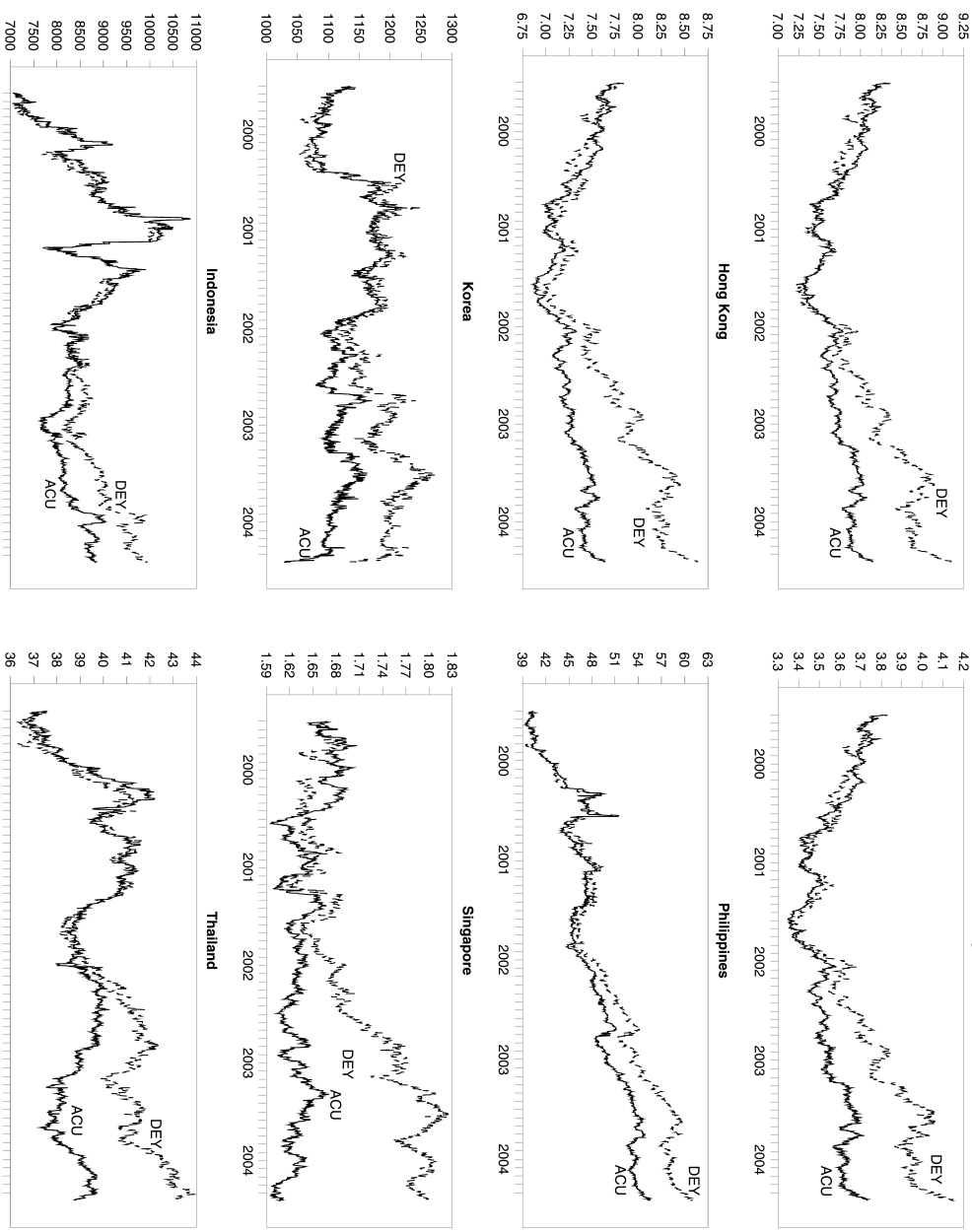
How can we evaluate the performance of both basket currencies? We will present objective criteia for comparison and estimate the feasibility of a basket currency in the next section.

3 Comparison of volatility

3.1 Theoretical background

Exchange rate uncertainty is the first candidate for a criterion to compare currency baskets. This is because some macroeconomic variables (i.e., investment and trade) allegedly suffer a negative effect from the exchange rate volatility. Above all, an impact on inter-regional trade has the first priority in the context of East Asian economy. Now East Asian countries work on free trade agreements to boost inter-

Figure 1 : ACU vs DEY



regional trade. Hence an empirical trial here requires a focus on exchange rate volatility.

According to theoretical and empirical studies, the volatility and the volume of trade have a negative causal relationship. Assuming the firms are risk averse, decisions of firms rely on the risk. This link results from the risk averseness that means the utility function of the firms are concave in profit. The risk makes returns and profit uncertain if the trade contract is factorized in a foreign currency and the open position is not completely covered by financial instruments. Consequently, the supply function shifts leading to a smaller volume of trade in equilibrium.

Furthermore, Hooper and Kohlhagen (1978) [5] have developed the classical equilibrium model in this research field that consider both export supply and import demand. They concluded that an increase in the exchange rate volatility reduces the trade no matter if the exporter or the importer bears the risk.

Empirical studies have verified the above-mentioned theory. Caporale and Doroodian (1994) [2] have found that exchange rate uncertainty has a negative and statistically significant affect on trade flow. Lee (1999) [7] also has examined the effect of exchange rate volatility and showed a weak negative relationship. Furthermore, Suaer and Bohara (2001) [10] have investigated the regional differences between developing and industrialized countries. Their estimation resulted in a negative relationship between the export and the exchange rate volatility for less-developed countries. Thus, these theoretical and empirical evidences justify using exhange rate volatility for criteria to study basket currencies .

3.2 Unconditional volatility

There is the issue of how to measure volatility. The literature offers a wide range of possible measures for uncertainty, which are more or less carefully justified. Among those candidates, two measurements dominate existing studies. They are standard deviation (or variance) and GARCH (or ARCH) measures. Recent works employ GARCH measures, nevertheless we will use standard deviation at the first onset to outline the volatility of ACU and DEY.

Table 1 shows summary statistics of daily return for ACU and DEY, which are written in differences of natural logarithms. Comparing standard deviation provides clear results. ACU has an advantage over DEY for all countries. Exchange rate managements of East Asian countries may explain this advantage. Many literatures have reported that East Asian countries tend to stabilize their currencies against the dollar after currency crises. Employing *de facto* dollar peg reduced the volatility of ACU. This is because ACU is composed of regional currencies' exchange rates against the dollar.

Statistical evidence presents a clear result, however the differences of standard deviation is less than one percent. We are not absolutely sure that such a minute figure has a different effect on macroeconomic variable significantly.

In addition, stylized facts about financial time series urge us to reconsider the assumption that the volatility is constant over time. Many financial time series exhibit periods of unusually large volatility followed by periods of relative tranquility. Observing financial time series demonstrates some characteristics that are commonly seen. First, there exist volatility clusters (i.e., volatility may be high for certain time periods and low for other periods). Second, volatility evolves over time in a continuous manner - that is, volatility jumps are rare. Third, volatility does not diverge to infinity - that is, volatility varies within some fixed range. In such circumstances, the assumption of a constant variance (homoskedasticity) is inappropriate.

Reviewing our basket currencies, Table 1 indicates the ARCH effect for all ACU and DEY series. Kurtosis demonstrates significant deviation from normal distribution: excess kurtosis. Besides, Jarque-Bella tests refute the null hypothesis of normality for ACU and DEY. Therefore, we can use GARCH model to draw actual picure of the volatility. In what follows, we will compare two currency baskets by estimating conditional variance.

Table 1 : Summary statistics : daily return for ACU and DEY

		Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
CNY	ACU	-9.85E-06	0.00186	-0.00512	5.8750	617.90
	DEY	5.09E-05	0.00286	0.07976	5.0985	331.08
HKD	ACU	-1.01E-05	0.00189	0.13846	6.9103	1148.70
	DEY	5.75E-05	0.00261	0.01563	4.6557	205.00
KRW	ACU	-5.45E-05	0.00487	-0.11765	7.7312	1677.37
	DEY	-1.06E-06	0.00553	-0.05172	7.1850	1310.01
IDR	ACU	0.000126	0.00778	-0.32463	15.7665	12214.61
	DEY	0.00019	0.00854	-0.24854	14.22496	9436.94
MYR	ACU	-1.01E-05	0.00232	-0.00999	6.2745	801.55
	DEY	4.71E-05	0.00285	-0.13852	5.26134	387.98
SNG	ACU	-2.01E-05	0.00195	0.29964	7.1210	1296.35
	DEY	4.30E-05	0.00245	0.30831	5.84690	634.25
THB	ACU	1.87E-05	0.00277	0.38460	7.8983	1837.78
	DEY	7.62E-05	0.00343	0.257259	5.959421	674.4619
PHP	ACU	0.00017	0.00458	-4.69129	96.54	660692.8
	DEY	0.00022	0.00502	-3.79324	75.8574	401090.5

Notes: Let CNY, HKD, KRW, IDR, MYR, SNG, THB and PHP be Chinese yuan, Hong Kong dollar, Korean won, Indonesian rupee, Malaysian ringgit, Singapore dollar, Thai baht and Philippine peso, respectively.

3.3 Conditional volatility

Engle (1982) [3] introduced the ARCH methodology which was later extended to incorporate a lagged dependant variable in the conditional variance (GARCH). This method is presumed to capture risk in each period more sensitively than simple rolling standard deviations, which give equal weight to correlated shocks and single large outliers. Numerous studies have used GARCH model to derive measures of uncertainty.

Suppose we assume that exchange rate uncertainty is generated by the first order autoregressive process that is specified as

$$R_t = \mu + \rho R_{t-1} + \varepsilon_t \tag{5}$$

where R_t is a daily return of a basket currency, μ and ρ are parameters to be estimated, ε_t is an error term that is distributed normally with mean zero and variance σ_t^2. The variance of the error term depends upon t, and the objective of the model is to characterize the way in which this variance changes over time.

As set out in Bollerslev (1986) [1], the variance is given by

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 \tag{6}$$

where σ_t^2 is the conditional variance of a basket currency, ε_{t-i}^2[5] for $i = 1,2...p$ denotes the squared residuals derived from equation (5), σ_{t-j}^2 for $j = 1,2,...q$ is the GARCH term representing the last period's forecast variance, ω, α_i for $i = 1,2...p$ and β_j for $j = 1,2...q$ are the parameters to be estimated.

The simplest specification in this class, and the one most widely used, is referred to as GARCH(1,1) model and is given by

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \tag{7}$$

This paper therefore employs equation (7) as the GARCH process to compare the conditional volatility of a basket currency.[6] Thus, the predicted values of σ_t^2 provides us with a measure of a basket currency's volatility against East Asian currencies.

The estimation[7] results in a high significance of the GARCH(1,1) model. Hence volatility is time-varying and shocks are persistent. Note that $\alpha_1 + \beta_1$ approximately equals 1, therefore the process is stationary. As a result, we conclude that both currency baskets follow GARCH process and the conditional variance can be chosen as the measure of exchange rate uncertainty.

Comprehensible comparison requires plotting the conditional variance for basket currencies. Figure 2 demonstrates the volatility of ACU and DEY over time. Drawing the volatility makes possible to follow

an exchange rate uncertainty, alothough the figure does not provide a clear-cut evidence which basket currency has an advantage over the other. We can not find a palpable difference between two currency baskets for Korea, Indonesia and Philippines. Other countries show some differences, nevertheless they are still small same as results of a previous subsection. Therefore statistical examinations on volatility can not demonstrate an advantage between currency baskets. Thus we require other criteria for a comparison.

4 Comparison of the deviation

4.1 Theoretical background

Many literature have focused on a design of a basket currency. Synthesizing variety of currencies can eliminate a malady of dollar peg, from which East Asian countries suffered in a currency crisis of 1990s. These countries have trade links with not only the United States but also the Japan and the Euro area. Hence including the euro and the yen stabilizes the global competitiveness.

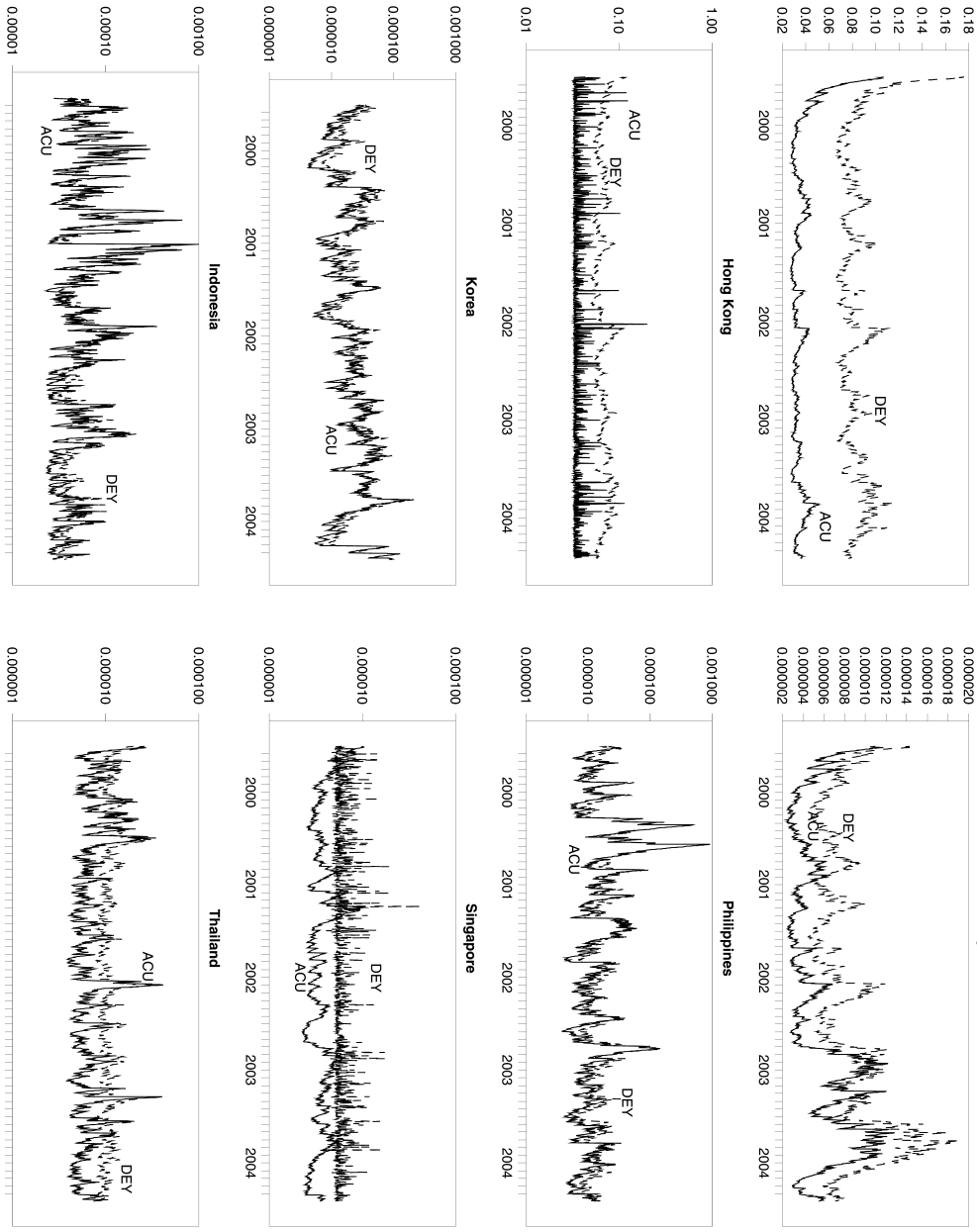
However, only setting up a basket currency can not stabilize exchange rates in East Asia. This is because the exchange rates have demonstrated a deviation from basket currencies without limitations (Figure 1). Preventing a large deviation requires the introduction of a target zone mechanism to a basket currency.

On the choice of the exchange rate regime for truly open markets, two major propositions are at war. Fischer (2001) [4] has supported both extremities of exchange rate regime; a genuine free float and an inpregnable linked exchange rate. In contrast, Williamson (2000) [12] has suggested BBC rule, which stands for band, basket and crawling. Exchange rate band or target zone is a major topic in the context of an intermediate exchange rate regime, nevertheless existing studies have rarely examined a target zone for a basket currency in East Asia.[8]

Furthermore a foregoing synthetic currency, ECU also have involved a target zone. The European Monetary System defined bands in which the bilateral exchange rates of the member countries could fluctuate. The bands of fluctuation were characterized by a set of adjustable bilateral central parities and margins that defined the bandwidth of permissible fluctuations. This set of parities was called a parity grid. The borders of the fluctuation bands were described by the upper intervention point and lower intervention point. Typically, the bandwidths were 2.25% to each side, with a wider margin for the Italian Lira. After a currency crisis in 1993, the bands were widened to 15% on each side, but in practice the fluctuations were kept within a narrow band.

We can point out two merits of a fluctuation band mentioned above. Firstly, the fluctuation band leaves a room for an independent monetary policy, and secondly, a wider fluctuation band avoids a one-way-bet currency speculation.[9] A conventional fixed exchange rate system can not offer these merits. Hence, the

Figure 2 : Volatility of ACU and DEY



mechanism design for future exchange rate system in East Asia needs an investigation into the feasibility of a target zone.

4.2 What explain the deviation?

Here we will use a deviation from a basket currency and compare merits of ACU and DEY. Smaller deviation means a good indicator to maintain a target zone by a deviation measure. This is that the basket currency, of which fluctuation is less volatile, is eligible for a candidate. Figure 1 demonstrates an advantage of ACU over DEY clearly. Changes of DEY from starting point exceeded 20% for China, Hong Kong, Malaysia and Philippines. Meanwhile ACU showed much smaller changes than DEY. Hence we can not doubt that using ACU enhances the feasibility of a target zone in East Asia.

What explain a different performance between basket currencies? Computing contributions of each component to total change enable us to elucidate the nature of basket currency, which is composed of three major currencies. We calculate contributions of a following equation,

$$\frac{E^{X\hat{}/CB}}{E^{X/CB}} = \sum \frac{E^{\hat{X}/i}}{E^{X/CB}} \tag{8}$$

where the hat (^) means a change of an exchange rate from starting point, $E^{X/CB}$ is an exchange rate of home currency X against a basket currency and $E^{X/i}$ is an exchange rate of home currency X against the i th currency. The sum of contributions of respective currencies (i.e., right-hand side) equals a total change of a basket currency. This computation clarifies an influence of each currency on a basket currency.

Table 2 shows calculated results for DEY. Large contributions of the euro characterizes this basket currency. The euro explains well over half of change in DEY excluding Korea, in which U.S. dollar is the largest factor to account for a fluctuation. In contrast, changes in ACU is smaller than DEY. Besides we can not find such a big contribution like the euro in DEY. Table 3 is computed contributions for ACU, which demonstrates that the Japanese yen and the Chinese yuan have relatively large impact on ACU,[10] although contributions are not as large as the euro. To sum up the matter, the euro is a factor inflating a fluctuation of DEY. Thus including the euro in a basket currency decreses the feasibility of a target zone compared to a basket currency which is composed of East Asian currencies.

This result reflects the global rebalancing problem. The most glaring sign of the imbalance is an unprecedented disparity between the world's current account deficits (United States) and surpluses (mainly East Asia and, to a lesser extent Europe). A huge current account deficit of the United States have posed an intensive downward pressure on its currency. A sharp appreciation of the euro against the dollar is two sides of the same coin. Hence, a controlled decline in the dollar remains in the best interest of

today's global economy.

The global rebalancing requires a fair burden of the imbalance adjustment, although we find very limited signs so far of burden-sharing among the key players in the world economy. Recent currency adjustments are not fair but rather asymmetry. The euro have underwent a sharp increase, in contrast, currency adjustments in East Asia have been smaller in spite of relatively large current account surpluses against the United States. This asymmetricity in burden-sharing is attributed to a difference in exchange rate policy in both region. Some politicians in EU mount worries about a strong euro, although European Central Bank have fundamentally no interest in an intervention in exchange rate market. On the contrary, the monetary authorities in East Asia, which follow dollar peg - either explicitly (i.e., China) or implicitly (i.e., Japan) have a great interest in the appreciation of exchange rates. Hence, stabilizing the exchange rate against the dollar resulted in smaller changes in ACU. To put it plainly, asymmetric responses to weakening dollar cause a larger deviation of DEY than ACU.

Mitigating a fluctuation of DEY requires the stability of the international monetary system, nevertheless we can not forecast such a rosy future. A candidate of the solution for the global imbalance is a new "Plaza Accord". That is a collective appreciation against the dollar by the EU and East Asian countries. However, we can not expect a coordination of exchange rate policy especially in East Asia. The explanation is that China is cautious about a parity adjustment in spite that China accounts for a key position in a coordination. In additon, no polititian demonstrates an initiative towards a collective solution for the global rebalancing. The international monetary system ran into a brick wall. And the intractable framework of the global money market can hardly improve.

Therefore, the euro will fluctuate as an adjusting valve for the global imbalance over time in the absence of the fairness with respect to the perceived burden of rebalancing. Meanwhile a coordination failure on the global imbalance among East Asian countries lower the feasibility of a target zone using DEY.

A basket currency which is composed of three currencies has often been used for a specific computation of a candidate for the Asian basket currency. However, we conclude that this type of a basket currency has limitations allowing for the current global imbalance and the target zone system. Our investigation elucidated empirically the limits of a basket currency which includes three major currencies .

Table 2 : Contribution to changes in DEY (%)

	Total	USD	JPY	EUR
China	23.74	-0.0009	8.86	14.88
Hong Kong	21.73	-0.12	5.56	16.29
Malaysia	23.31	0.08	9.19	14.03
Singapore	7.92	-5.18	3.10	9.99
Korea	-4.31	-9.62	0.55	4.75
Thailand	10.09	-4.09	4.72	9.47
Philippines	29.68	4.37	9.74	15.57
Indonesia	8.28	-4.51	3.59	9.20

Notes: Numerical round-off poses the differences between total change and the sum of contributions.

Table 3 : Contribution to changes in ACU (%)

	Total	JPY	CNY	KRW	HKD	THB	MYR	IDR	PHP	SGD
China	10.72	7.94	0	1.81	0	0.41	0	0.66	-0.22	0.12
Hong Kong	10.42	7.84	-0.14	1.79	0	0.4	-0.01	0.64	-0.23	0.12
Malaysia	10.97	8.03	0.11	1.83	0.01	0.42	0	0.67	-0.21	0.12
Singapore	-1.8	3.83	-5.58	0.8	-0.19	-0.03	-0.25	0.12	-0.51	0
Korea	-11.72	0.58	-9.99	0	-0.35	-0.38	-0.44	-0.31	-0.73	-0.1
Thailand	-0.91	4.12	-5.19	0.87	-0.18	0	-0.23	0.16	-0.49	0.01
Philippines	20.41	11.12	4.31	2.59	0.16	0.76	0.18	1.07	0	0.21
Indonesia	-4.54	2.94	-6.8	0.58	-0.23	-0.13	-0.3	0	-0.57	-0.03

5 Conclusion

This paper has computed specific basket currencies and compared competing proposals for the Asian basket currency based on objective criteria. Two type of currency basket have been proposed, although existing studies have rarely examined the positive and the negative of two proposals so far. This is the reason why we have conducted this comparative study. Thus this study, in other words intended to provide a basis for an argument concerning further financial cooperation in East Asia.

First, we presented a general computation method of a basket currency. This explanation clarified the difference of a calculation between ACU and DEY. Then, we demonstrated the performance of two basket currencies, nevertheless just looking at the movement of two basket currencies does not present any useful information for a comparison. Hence, we required objective criteria and statistical examinations for a tight scrutiny.

Secondly, we investigated two basket currencies by using a volatility of daily returns. This is because some macroeconomic variables allegedly suffer a negative effect from the exchange rate volatility. This

negative causal relationship implies that a basket currency with lesser volatility is eligible for the Asian basket currency. Unconditional volatility demonstrated an advantage of ACU over DEY for all relevant countries, although the differrences of volatility are so minute that we are not sure an advantage of ACU. Then we conducted examinations by applying conditional volatility. However estimated results could not show a clear-cut difference between two basket currencies.

Thirdly, we studied the deviation of basket currencies. Target zone system justified applying this criterion for a comparison. The result showed a clear advantage of ACU over DEY. Computing the contribution of the relevant currency to changes in a basket currency told that the advantage of ACU reflected the global rebalancing problem. The price mechanism in the exchange rate market can not solve this problem different from a theoretical assumption nor key players in the world market do not move towards the coordination *à la* Plaza Accord. Hence, a coordination failure make the euro fluctuate and lower the feasibility of a target zone using DEY. Stabilizing this type of a basket currency requires the resolution of the global imbalance, however the coordination towards a resolution is much harder than in the 1980s because the coordination involves not only developed countries but also developing countries.

A basket currency which three major currencies comprise has been popular, although this basket currency has its limit considering the global rebalancing problem and the target zone mechanism. That is a major contribution of this paper to an argument of the further financial cooperation in East Asia.

[1] For instance, the Japanese Government on December 21, 2004 made public its policy of promoting economic partnership agreements including free trade agreements, primarily with East Asian economies, based on its basic understanding that "efforts to build an East Asia community will contribute to the formation of a more beneficial international environment." Besides, Japan Association of Corporate Executive has suggested that Japan should lead a further regional cooperation of Asian economies, which play the role of an engine for the world economy.

[2] Japan is taking the initiative in fostering securities markets in the region, to make an effective use of a vast pool of savings which have been left unutilized, with borrowers turning to international capital markets to raise funds in foreign currencies. The Asian bond is assumed to be issued by Asian economic agents and in Asian financial markets, settled by Asian settlement mechanism, reviewed by Asian credit rating companies and hold by Asian investors.

[3] We assume that a basket currency includes three currencies for the simplicity of the explanation.

[4] i includes the Japan, the United States and the EU.

[5] ε_{t-i}^2 represents the ARCH term, which is a measure of information about volatility in the previous period. This specification illustrates clearly how current levels of volatility will be influenced by the past, and how periods of high or low exchange rate fluctuation will tend to persist.

[6] To ensure a well-defined process, all the parameters in the infinite order AR representation must be non-negative,

where it is assumed that the roots of polynominal lie outseide the unit circle. For GARCH (1,1) process this amounts to ensuring that both α_1 and β_1 are non-negative. It follows also that ε_t is covariance stationary if and only if $\alpha_1 + \beta_1 < 1$.

[7] See Table 6 and Table7.

[8] Tanaka (2004) is one of the very few works that have investigated a target zone in East Asia. He proposed the target band $\pm 10\%$ and studied the feasibility of a specific basket currency with target zone.

[9] An experience in EMS crisis in the early 1990s presents a historical evidence.

[10] This is because those two currencies have large weights of a basket currency. Hence it is natural that contribution of other currencies are small assuming their small weights in ACU.

Appendix

Table 4 : Weight and number of units for DEY

	Weight			Unit		
	JPY	USD	EUR	JPY	USD	EUR
China	0.3608	0.3353	0.3038	36.903	0.3354	0.3026
Korea	0.3138	0.4279	0.2582	32.097	0.4279	0.2572
Hong Kong	0.2356	0.4201	0.3441	24.102	0.4201	0.3428
Thailand	0.3704	0.3450	0.2844	37.886	0.3451	0.2833
Malaysia	0.3157	0.4028	0.2814	32.290	0.4028	0.2803
Indonesia	0.3919	0.2870	0.3209	40.085	0.2871	0.3196
Philippines	0.2900	0.4529	0.2569	29.665	0.4530	0.2559
Singapore	0.2711	0.4122	0.3166	27.729	0.4122	0.3153

Table 5 : Weight and number of units for ACU

	Weight	Unit
Japan	0.3238	33.120
China	0.4376	3.6235
Korea	0.072	83.048
Hong Kong	0.0153	0.1190
Thailand	0.0367	1.3774
Malaysia	0.0192	0.0731
Indonesia	0.0537	380.79
Philippines	0.0311	1.2566
Singapore	0.0092	0.0154

Table 6 : Estimates of GARCH model for ACU

	μ	AR(1)	ω	α	β
China	-9.73E-06	-0.02014	0.00061**	0.01126**	0.97020**
	(0.00433)	(0.02529)	(0.00011)	(0.00271)	(0.00409)
Hong Kong	-0.00126	-0.03820	0.03274**	0.09496**	—
	(0.00424)	(0.02669)	(0.00083)	(0.01265)	
Malaysia	-2.96E-05	-0.09323**	3.85E-08**	0.2786**	0.96452**
	(4.56E-05)	(0.024245)	(1.04E-08)	(0.00356)	(0.00433)
Singapore	-2.93E-05	-0.10642**	7.54E-08**	0.02518**	0.95415**
	(4.04E-05)	(0.02260)	(1.7E-08)	(0.00404)	(0.00704)
Korea	-5.21E-05	-0.23169**	3.09E-07**	0.08598**	0.90612**
	(6.99E-05)	(0.02355)	(5.16E-08)	(0.00642)	(0.00577)
Thailand	3.98E-05	-0.17927**	4.88E-07**	0.07951**	0.85429**
	(4.87E-05)	(0.02473)	(9.66E-08)	(0.00979)	(0.01948)
Philippines	0.00022**	-0.11740**	3.32E-07**	0.11216**	0.88396**
	(6.43E-05)	(0.01931)	(3.08E-08)	(0.00498)	(0.00407)
Indonesia	0.00026*	-0.15916**	4.59E-06**	0.15088**	0.79109**
	(0.00013)	(0.02876)	(2.17E-07)	(0.011421)	(0.00976)

Notes: The number in parentheses below coefficient is standard error. The asterisks *,**denote significant at 5% and 1% levels.

Table 7 : Estimates of GARCH model for DEY

	μ	AR(1)	ω	α	β
China	0.00604	-0.06079	0.00195**	0.01248**	0.96329**
	(0.006371)	(0.02380)	(0.00064)	(0.00375)	(0.00934)
Hong Kong	0.00623	—	0.00154**	0.01772**	0.959369**
	(0.00607)		(0.00062)	(0.00461)	(0.01204)
Malaysia	3.43E-05	-0.09428**	8.17E-08**	0.02334**	0.96620**
	(5.82E-05)	(0.02352)	(2.69E-08)	(0.00414)	(0.00625)
Singapore	6.02E-05	-0.14000**	5.17E-06**	0.13110**	—
	(4.77E-05)	(0.02638)	(1.57E-07)	(0.02334)	
Korea	-3.70E-05	-0.23021**	5.25E-07**	0.07845**	0.907198**
	(8.36E-05)	(0.02421)	(7.86E-08)	(0.00737)	(0.00758)
Thailand	8.51E-05	-0.15715**	7.29E-07**	0.04311**	0.89225**
	(6.73E-05)	(0.02332)	(2.33E-07)	(0.00805)	(0.02619)
Philippines	0.00028**	-0.13816**	5.35E-07**	0.10806**	0.88061**
	(7.16E-05)	(0.02157)	(6.11E-08)	(0.00672)	(0.00684)
Indonesia	0.00025*	-0.14563**	5.09E-06**	0.11321**	0.82441**
	(0.00159)	(0.02771)	(2.92E-07)	(0.0918)	(0.01004)

Notes: The number in parentheses below coefficient is standard error. The asterisks *,**denote significant at 5% and 1% levels.

References

[1] Bollerslev, T. (1986) "Generalized Autoregressive Conditional Heteroskedasticity", *Journal of Econometrics*, Vol. 31, No. 3, 307-327

[2] Caporale, T. and Doroodian, K. (1994) "Exchange rate variability and the flow of international trade", *Economic Letters*, Volume 46, Issue 1, 49-54

[3] Engle, R.F. (1982) "Autoregressive Conditional Heteroscedasticity with estimates of the variance of UK inflation", *Econometrica* Vol. 50, No. 4, 987-1008

[4] Fischer, S. (2001) "Exchange rate regimes: Is the bipolar view correct?" *Journal of Economic Perspective*, Vol. 15, No. 2, 3-24

[5] Hooper, P. and Kohlhagen, S.W. (1978) "The effect of exchange rate uncertainty on the price and volume of international trade", *Journal of International Economics*, Vol.8, 483-511

[6] Kim, M. (2003) "The stability of exchange rates by using currency basket in East Asia", *Sekai Keizai Hyoron*, Vol.47, No.1, in Japanese

[7] Lee, J. (1999) "The effect of exchange rate volatility on trade in durables", *Review of International Economics*, Vol.7, No.2, 189-201

[8] Ogawa, E. and Kawasaki, K. (2003) "Possibility of creating a common currency basket for East Asia", *JBICI Discussion Paper* No.5, Japan Bank for International Cooperation

[9] Ogawa, E. and Shimizu, J. (2004) "Bond issuers' trade-off for common currency basket denominated bonds in East Asia", *Journal of Asian Economics*, Volume 15, Issue 4,719-738

[10] Sauer, C. and Bohara, A.K. (2001) "Exchange rate volatility and exports: regional differences between developing and industrialized countries", *Review of International Economics*, Vol.9, No.1, 135-152

[11] Tanaka, S. (2004) "An empirical consideration of monetary cooperation in East Asia - In view of experiences with the European monetary cooperation", the paper presented at RIETI Policy Symposium"Resolving New Global and Regional Imbalances in an Era of Asian Integration", Jun. 17-18 2004, Tokyo, Japan

[12] Williamson, J. (2000) *Exchange rate regimes of emerging markets: Reviving the intermediate option*, Institute for International Economics, Washington, D.C.

[13] Yamaguchi, M. (2003) "The application of the East Asia currency basket to the Asian Bond market", *Sekai Keizai Hyoron*, Vol.47, No.8, in Japanese