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East Asian Currencies after 7/21/2005

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After the Asian financial crisis of 1997–98, Asian currencies have undergone several idiosyncratic phases in terms of exchange rate management. This paper found that, after the renminbi's shift to a more flexible exchange rate system in July 2005, East Asian currencies intensified their interdependence on each other until March 2008 when Bear Stearns collapsed. The renminbi (RMB) as well as the ringgit and the Singapore dollar, occupied a comparatively heavy weight in the exchange rate management in this region. Amid the ongoing financial crisis, East Asian currencies seem to have fallen into disorder again. A standstill may be inevitable in preparing a common basket system in this region.

1. Introduction

Since the onset of the Asian financial crisis (1997–98) the fundamental causes and preemptive measures have been discussed eagerly among academic researchers and policymakers. In particular, the dollar peg system, which had been adopted by many countries in this region, was cited as one of the principal causes that led to the crisis. Ito, Ogawa, and Sasaki (1998) argued that, considering the tripartite trade

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partners of East Asian countries,¹ adopting a basket currency system in this region could minimize the possibility of inviting another crisis.

After the two large-scale crises in the 1990s, the Exchange Rate Mechanism (ERM) crisis (1992–93) and the Mexican meltdown (1994–95), the dominant argument about the exchange rate regime was that the stable exchange rate regimes should be either hard peg or free floating, and it was estimated that the intermediate exchange rate regimes would decrease in number.² In fact, the traditional fixed exchange systems evolved into more high-guarded hard peg systems. However, the bipolar view began to be openly criticized after the currency board, one of the seemingly hard pegs, collapsed in Argentina in 2001–2.³

Another momentum for the resurrection of intermediate exchange rate regimes is progress in research about the *de facto* exchange rate regime in the academic field. Calvo and Reinhart (2002) found that quite a few monetary authorities in the developing world were inclined to manage exchange rates deliberately in spite of having declared their adoption of a floating rate system. This discrepancy between *de facto* and *de jure* exchange rate systems was called the “fear of floating” syndrome, which proved to prevail extensively across the world.

Reflecting these discussions in the academic field, some institutions have started researching the possibility of introducing a basket currency in this region. Among them, the faculty fellows of the Research Institute of Economy, Trade and Industry (RIETI) led by Professors Takatoshi Ito and Eiji Ogawa, started unveiling the deviation indicators among the virtual Asian Monetary Unit (AMU) on its website.⁴

Apart from the normative argument for a desirable exchange rate regime in East Asia, another academic interest lies in how Asian countries *de facto* manage exchange rate regimes and specifically whether Asian currencies are ready to make a common basket currency.

McKinnon (2000) and Ogawa (2002) found that, in the

period immediately after the crisis, Asian currencies resurrected the dollar peg that had been adopted by many Asian economies before the crisis. When Ito and Orii (2006) examined the exchange rate regime for the following period, they found that the Asian currencies formed several groups in operating exchange rate regimes. Korea, Singapore, and Thailand resumed the basket management that had been temporarily attempted before the crisis, and China, Hong Kong SAR, and Malaysia strictly maintained the dollar peg. Indonesia and the Philippines, meanwhile, still stuck to unstable exchange rate management.

After this period, we witnessed a remarkable event in international finance. On July 21, 2005, China suddenly announced that it had switched to a more flexible exchange rate regime “with reference to a basket of currencies.”⁵ The central parity of the RMB was revaluated by 2.1% from 8.2765 to 7.81 to the dollar. But the daily allowance of fluctuation remained as $\pm 0.3\%$.⁶ On the same day, Malaysia followed China. The ringgit shifted to a managed floating system with reference to a basket of currencies weighted by trade partners.

This paper updates the traditional analysis on the exchange rates in East Asia. It will in part extend the work of Ito and Orii (2006) but also will apply a renovated analytical framework to examine the basket weights and the degree of flexibility simultaneously. It specifically concentrates our interest on what the RMB surprise on 7/21/2005 brought to the exchange rate order in East Asia.

The remainder of this paper is structured as follows: the next section summarizes the recent taxonomy of the exchange rate regime focusing on Asian countries and retro-spects the exchange rate movement of Asian currencies in recent years. Section 3 overviews the analytical framework to be applied in this paper. Section 4 presents the empirical outcome with the latest framework regressing on major world currencies and exchange market pressure (EMP) simultaneously. Section 5 extends the basic framework with involving

neighboring currencies in the regressions and applying daily data on the “classical” regression without the EMP term. The final section concludes.

2. Evolution of Exchange Rates in East Asia

2.1 Taxonomy of the exchange rate regime in East Asia

Even though the bipolar view collapsed in this decade, the taxonomy of the exchange rate regime in the last decade survives. For example, Tavlas, Dellas, and Stockman (2008) aggregate the exchange rate regime classifications into the following six categories: (i) free floating, (ii) managed floating, (iii) soft pegs, (iv) currency boards, (v) dollarization (or euroization) and (vi) monetary union.

The *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*) of the International Monetary Fund (IMF) provides annually a description of the foreign exchange arrangements. It classifies the exchange arrangements into eight categories with the monetary framework for each country. Table 1 rearranges the exchange arrangements with the broader categories of hard pegs, intermediates, managed floating, and free floating.

East Asian countries employed a variety of exchange rate arrangements as of April 2008. Let us pick out 14 currencies that are adopted in the RIETI’s AMU units (consisting of 13 currencies) plus the Hong Kong dollar. Two hard peg currencies, the Hong Kong dollar and the Brunei dollar, stick to the currency board, one of the hard peg arrangements. Two countries adopt the intermediate arrangements: Vietnam (conventional peg to the dollar) and China (crawling peg to the dollar) Soft peg countries are the largest in number: seven belonging to the Association of Southeast Asian Nations (ASEAN) Of them, three countries continue to adopt the US dollar as the exchange rate anchor, while Singapore maintains a basket peg. Malaysia, which declared a

Table 1 De facto classification of exchange arrangements (End of April 2008)

Broader categories	Exchange rate arrangements in IMF(2008) (Number of countries worldwide)	East Asian currencies (Monetary policy framework)
Hard pegs	Exchange arrangement with no separate legal tender(10)	None
	Currency board arrangement(13)	Hong Kong SAR(USD) Brunei Darussalam(Other)
	Other conventional pegged arrangement (68)	Vietnam(USD)
Intermediate arrangements	Pegged exchange rate within horizontal bands(3)	None
	Crawling peg(8)	China(USD)
	Crawling band(2)	None
	Managed floating with no predetermined path for the exchange rate(44)	Cambodia(USD) Indonesia(Inflation targeting) Lao P.D.R.(USD) Malaysia(Other) Myanmar(USD) Singapore(Composite) Thailand(Other)
	Independently floating(40)	Japan(Other) Korea(Inflation targeting) The Philippines(Inflation targeting)
Free floating		

shift to basket management on the same day as China, and Thailand are reported to “have no explicitly stated nominal anchor, but rather monitor various indicators in conducting monetary policy.”

Three currencies are classified as free floating: the yen, the won and the peso. The latter two currencies adopt inflation targeting as a monetary framework. It should be noted that 34 of the 43 currencies in the world reportedly adopting inflation targeting belong to the independently floating system.

In East Asia, the two corner solutions of hard pegs or free floating are adopted by a limited number of countries. Small-scale economies with stable current account surpluses, Hong Kong SAR and Brunei, manage to maintain currency board agreement. Meanwhile, Korea and the Philippines employ inflation targeting to maintain free floating. Table 1 shows that many ASEAN countries operate managed floating, while most of the emerging and developing countries worldwide adopt intermediate arrangements along with managed floating.

What cannot be obtained from Table 1 is the interrelationship among East Asian currencies. The remainder of this paper is dedicated to approaching this problem.

2.2 East Asian exchange rates since 2000

Figure 1 displays the evolution of the exchange rates of the major East Asian currencies vis-à-vis the US dollar from 2000. The graph is depicted by standardizing the exchange rate level at the end of January 2000 as one. Monthly data from the IMF’s *International Financial Statistics (IFS)* CD-ROM are employed. The lower levels correspond to the appreciation of local currencies, while the upper areas refer to the depreciation compared with the January 2000 exchange rate levels, respectively.

Until the end of 2001, most of these currencies depreciated against the dollar. However, they showed a reversal to appreciation in 2002, with the exception of the peso, and

that continued until 2005. During this period, the RMB and the ringgit maintained the dollar peg.

The won maintained the yen peg until the end of 2004.⁸ After abandoning the yen peg, the won began to appreciate. However, in 2008 increasing current account deficits forced the won to depreciate. This turning point coincides with the collapse of Bear Stearns, one of the biggest securities companies in the United States.

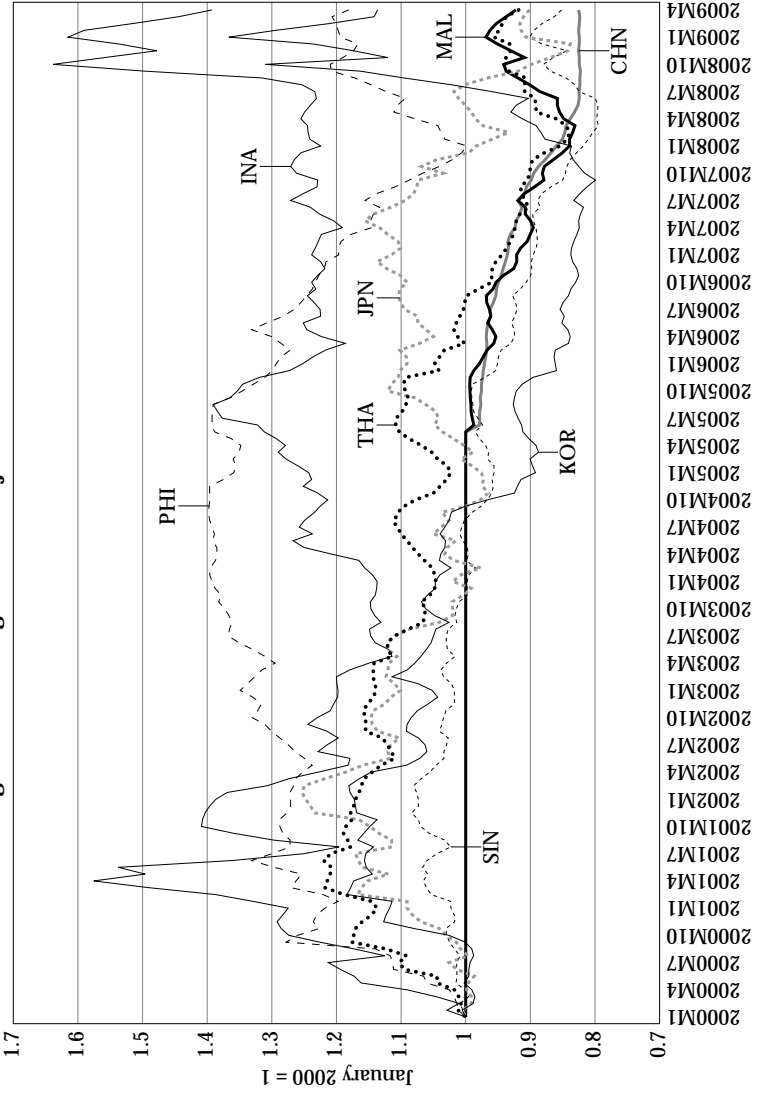
After the announcement on July 21, 2005, the RMB began appreciating against the dollar, and the ringgit followed suit immediately. The RMB continued appreciation until it reached the level of RMB 6.8 to the dollar. It has remained at approximately the same level since this turning point.

After the RMB and the ringgit shifted to a more flexible exchange rate regime, some of the other Asian currencies accompanied their appreciation. Figure 1 demonstrates that the Singapore dollar and the Thai baht attended the RMB and the ringgit. Even the Philippine peso, which had depreciated by 35% over the previous five years, reversed to appreciate against the dollar. The Indonesian rupiah is an exception; it has remained at the depreciated level since the middle of 2004.

Apparently, another turning point can be found in early 2008, when many currencies started to depreciate against the dollar. The won took the lead, followed by ASEAN currencies: the peso, the baht, the ringgit, the Singapore dollar, and the rupiah.

This paper examines the evolution of East Asian exchange rates by applying these two milestones: July 2005 and March 2008. One of the main interests rests upon whether the RMB's shift to a more flexible exchange rate regime has exerted any significant effect on the exchange rate behaviors of East Asian countries.

Figure 1 Exchange rates of major Asian currencies



3. Framework of Empirical Analysis

3.1 Methodology

The IMF's classification of exchange arrangements overviewed in Section 2.1 demonstrates that a variety of exchange arrangements are adopted in East Asia, ranging from hard pegs to free floating. The US dollar is no longer a unique anchor. Basket peg and inflation targeting are also employed as monetary policy frameworks in other countries.

One of the methods mainly adopted has been Frankel and Wei (1993, 1994). However, when considering the recent evolution in the exchange rate regime as mentioned above, it may be appropriate to apply a more augmented regression framework.

In this paper, I adopt the regressing methodology developed by Frankel and Wei (2008) and Frankel (2009b). They aim at examining the degree of basket weights and flexibility simultaneously by combining exchange market pressure (EMP) term in the regression. It may be appropriate to follow them because this region contains some currencies classified as independent floating.

The basic regression form is expressed as follows:

$$\Delta e_{i/k,t} = \alpha_i + \sum_{h=1}^n \beta_h \Delta e_{h/k,t} + \gamma_i \Delta EMP_{i,t} + \epsilon_{i,t} \quad (1)$$

$$\text{where } \Delta EMP_{i,t} = \Delta e_{i/k,t} + \Delta RES_{i,t}$$

Here, $e_{i/k,t}$ refers to country i 's logarithmic exchange rate vis-à-vis the numeraire currency k . Changes in the nominal exchange rates at the time t compared with the previous time $t-1$ ($\Delta e_{i/k,t}$) are regressed on the constant (α_i), changes in the fluctuations in basket currencies vis-à-vis the numeraire ($\Delta e_{h/k,t}$) and the EMP terms (ΔEMP). $\epsilon_{i,t}$ is the error term. Changes in the EMP at the time of t consist of the linear combination of changes in the exchange rates and in the international reserves minus gold (ΔRES)⁹

The US dollar, the yen, and the euro are adopted as key currencies supposed to compose a currency basket. The Swiss franc (CHF) is employed as the numeraire currency as in Frankel and Wei (1994) and Ito and Orii (2006) while the Special Drawing Right of the IMF (SDR) is applied as in Frankel and Wei (2008) and Frankel (2009b) in parallel.

3.2 Data

Monthly data are employed here as in Frankel and Wei (2008) and Frankel (2009b) because reserves data are not available on a daily basis. The end of the period data are applied for both the exchange rates and foreign reserves.¹⁰ Both data are obtained from the IMF's *International Financial Statistics* (IFS) CD-ROM.

4. Regression Results

4.1 First period (2000.1–2005.6)

The Korean won is significantly influenced by the yen (Table 2) This coincides with our observations in the former section (Figure 1) but it should be noted that this higher significance in the yen disappears when the numeraire is replaced from the Swiss franc to the SDR (Table 3) It is also noteworthy that the won maintained higher flexibility with the EMP coefficient significant at the 1% level throughout the period to March 2009.

The dollar peg of China and Malaysia can be confirmed with the higher significance in the dollar coefficient and extremely high R-squared scores. This is proven in both numeraire cases.

In the meantime, the Singapore dollar and the Thai baht reveal a basket management moderately, as was pointed out in Ito and Orii (2006) and other economists' research. The regression here proves a high significance in the basket weights of the yen and the euro, while that of the dollar is

not confirmed as significant. Perhaps, in this period, when the dollar appreciated against the yen and the euro, these Asian currencies followed the yen and the dollar by sacrificing the extent of dollar weights. This is partly reflected in the steady and significant coefficient of the EMP.

The remaining two ASEAN currencies, the Indonesian rupiah and the Philippine peso, provide more unstable results in terms of exchange rate management than the Singapore dollar and the baht. The rupiah was the most volatile currency in this period, as was observed in Figure 1, which is also reflected in the regression results. The peso discloses both dependence on the dollar and a certain degree of flexibility with comparatively lower R-squared scores.

4.2 Second period (2005.9–2008.3)

The won seems to raise the degree of free floating, as was shown by the estimated EMP coefficient. The fact that the won abandoned the link to the yen is reflected in the regression results, in which the yen no longer occupies significant weight.

The regression results confirm the official statement that the RMB and the ringgit shifted to “a more flexible exchange rate regime,” but the weights of the dollar still remain dominant. This is consistent with the findings of Frankel (2009b)

The Singapore dollar and the baht lowered the degree of basket management among the major world currencies. The weight of the yen, in particular, loses significance compared with the former period.

Of the remaining two ASEAN currencies, the rupiah and the peso barely seem to have modified their exchange rate policy compared with the former period. Indonesia keeps a discrete policy style, while the Philippines maintains a constant weight in the dollar.

4.3 Third period (2008.4–2009.3)

In the latest period, each country struggles in exchange rate management. The collapse of Bear Stearns in March 2008

Table 2 Results of basic regressions (with the CHF as numeraire)

(1) 2000.1–2005.6

	Korea	China	Indonesia
Constant	- 0.0108 (0.002) ***	0.0000 (0.)	- 0.0015 (0.003)
USD	0.0497 (0.094)	0.9995 (0.001) ***	- 0.2561 (0.123) **
JPY	0.2146 (0.078) ***	0.0002 (0.)	0.2580 (0.111)
EUR	0.0742 (0.166)	0.0011 (0.001)	0.3680 (0.283)
EMP	0.6793 (0.085) ***	0.0003 (0.001)	0.8075 (0.062) ***
Ad R-sq	0.856	0.992	0.797
Observations	66	66	66

(2) 2005.9–2008.3

	Korea	China	Indonesia
Constant	- 0.0058 (0.001) ***	- 0.0072 (0.002) ***	- 0.0050 (0.004)
USD	- 0.3261 (0.121) **	0.8594 (0.093) ***	0.5739 (0.31) *
JPY	- 0.0215 (0.082)	0.0146 (0.043)	- 0.2112 (0.247)
EUR	0.5490 (0.214) **	- 0.2176 (0.112) *	0.4948 (0.648)
EMP	1.0593 (0.085) ***	0.1203 (0.072)	0.2430 (0.098) **
Ad R-sq	0.943	0.971	0.578
Observations	31	31	31

(3) 2008.4–2009.3

	Korea	China	Indonesia
Constant	0.0139 (0.009)	- 0.0033 (0.002)	- 0.0040 (0.009)
USD	- 0.1070 (0.304)	0.9355 (0.126) ***	- 0.4892 (0.344)
JPY	- 0.2595 (0.26)	- 0.0299 (0.04)	- 0.1272 (0.241)
EUR	0.4471 (0.342)	0.0113 (0.059)	1.0744 (0.342) **
EMP	0.8072 (0.148) ***	0.0646 (0.102)	0.9406 (0.241) ***
Ad R-sq	0.727	0.993	0.656
Observations	12	12	12

Notes: 1. Standard errors are in parentheses.

2. ***, **, and * refer to significance at the 1%, 5%, and 10% levels, respectively.

opened a new stage of the ongoing world financial crisis. Many currencies in this region began depreciating.

The won abandoned the systematic management of exchange rates after it initiated a substantial depreciation against the dollar from early 2008. Meanwhile, the flexibility term represented by the EMP continues to be significant.

The RMB, one of the two former dollar-pegging curren-

Malaysia	The Philippines	Singapore	Thailand
0.0000 (0.)	0.0036 (0.002)	- 0.0019 (0.001) *	- 0.0010 (0.001)
1.0000 (0.) ***	0.5829 (0.109) ***	0.1742 (0.089) *	0.0702 (0.094)
0.0000 (0.)	0.0879 (0.094)	0.2606 (0.037) ***	0.3102 (0.055) ***
0.0000 (0.)	0.1243 (0.24)	0.2295 (0.094) **	0.4187 (0.14) ***
0.0000 (0.)	0.2217 (0.069) ***	0.3716 (0.071) ***	0.4047 (0.069) ***
1.000	0.653	0.917	0.841
66	66	66	66

Malaysia	The Philippines	Singapore	Thailand
- 0.0039 (0.002)	- 0.0141 (0.003) ***	- 0.0059 (0.002) ***	- 0.0104 (0.003) ***
0.8309 (0.183) ***	0.6895 (0.232) ***	- 0.0459 (0.282)	0.3200 (0.183) *
0.0091 (0.136)	0.0162 (0.185)	0.0665 (0.091)	0.0316 (0.14)
0.2829 (0.348)	0.1658 (0.464)	0.5031 (0.236) **	0.1006 (0.357)
- 0.0037 (0.087)	0.3114 (0.086) ***	0.5051 (0.204) **	0.2770 (0.089) ***
0.761	0.767	0.832	0.678
31	31	31	31

Malaysia	The Philippines	Singapore	Thailand
0.0096 (0.005) *	- 0.0024 (0.007)	- 0.0003 (0.002)	0.0049 (0.006)
0.5675 (0.137) ***	- 0.0275 (0.326)	- 0.4637 (0.221) *	0.4399 (0.264)
- 0.0312 (0.158)	0.1774 (0.137)	0.1942 (0.065) **	0.2127 (0.126)
0.3890 (0.157) **	0.3031 (0.192)	0.5030 (0.086) ***	0.2700 (0.172)
0.1854 (0.16)	0.8639 (0.374) *	0.8226 (0.174) ***	0.2100 (0.216)
0.894	0.902	0.969	0.920
12	12	12	12

cies, still maintains significance in the dollar weight, while the weights in the yen and the euro fail to be significant. Meanwhile, the ringgit obtains significance in the euro weight instead of losing the dollar weight moderately.¹¹

The Singapore dollar recovers a more stable basket management, although the weight in the US dollar remains negative compared with the former period. The Thai baht, on the

Table 3 Results of basic regressions (with the SDR as numeraire)

(1) 2000.1–2005.6

	Korea	China	Indonesia
Constant	- 0.0106 (0.002) ***	0.0000 (0.)	0.0003 (0.003)
USD	- 0.7392 (0.251) ***	1.0004 (0.002) ***	- 1.0329 (0.461) **
JPY	- 0.0276 (0.111)	0.0003 (0.001)	- 0.0289 (0.195)
EUR	- 0.4262 (0.202) **	0.0006 (0.001)	- 0.4289 (0.373)
EMP	0.6690 (0.078) ***	0.0002 (0.001)	0.8087 (0.062) ***
Ad R-sq	0.685	0.999	0.717
Observations	66	66	66

(2) 2005.9–2008.3

	Korea	China	Indonesia
Constant	- 0.0063 (0.001) ***	- 0.0061 (0.002) **	- 0.0050 (0.004)
USD	- 0.4686 (0.39)	1.2969 (0.226) ***	0.6964 (1.146)
JPY	- 0.1300 (0.101)	0.1626 (0.048) ***	- 0.2199 (0.279)
EUR	0.0968 (0.418)	0.4656 (0.204) **	0.4997 (1.182)
EMP	1.0621 (0.091) ***	0.0969 (0.071)	0.2427 (0.098) **
Ad R-sq	0.868	0.873	0.253
Observations	31	31	31

(3) 2008.4–2009.3

	Korea	China	Indonesia
Constant	0.0072 (0.008)	- 0.0038 (0.002) *	- 0.0112 (0.008)
USD	- 1.3710 (0.756)	0.8108 (0.152) ***	- 1.8915 (0.705) **
JPY	- 0.6206 (0.303) *	- 0.0637 (0.048)	- 0.6869 (0.253) **
EUR	- 0.5416 (0.638)	- 0.0979 (0.112)	- 0.5244 (0.551)
EMP	0.8685 (0.12) ***	0.0403 (0.097)	0.8593 (0.17) ***
Ad R-sq	0.880	0.958	0.801
Observations	12	12	12

Notes: 1. Standard errors are in parentheses.

2. ***, **, and * refer to significance at the 1%, 5%, and 10% levels, respectively.

other hand, loses significance in both three of the basket currencies and the flexibility term (EMP)

The rupiah is still short of any clear strategy in exchange rate management. Meanwhile, the peso loses significant weight in the dollar for the first time throughout the examined periods.

Judging from the goodness of fit, as is demonstrated in the

Malaysia	The Philippines	Singapore	Thailand
0.0000 (0.)	0.0036 (0.002)	- 0.0020 (0.001) **	- 0.0010 (0.001)
1.0000 (0.) ***	0.7081 (0.397) *	0.0198 (0.183)	- 0.3066 (0.249)
0.0000 (0.)	0.1312 (0.165)	0.2062 (0.063) ***	0.1654 (0.094) *
0.0000 (0.)	0.2101 (0.321)	0.0812 (0.122)	- 0.0535 (0.183)
0.0000 (0.)	0.2169 (0.071) ***	0.3839 (0.072) ***	0.4352 (0.07) ***
1.000	0.238	0.917	0.444
66	66	66	66

Malaysia	The Philippines	Singapore	Thailand
- 0.0042 (0.002) *	- 0.0141 (0.003) ***	- 0.0061 (0.002) ***	- 0.0100 (0.003) ***
0.6390 (0.626)	0.8872 (0.825)	- 0.4092 (0.457)	0.7688 (0.642)
- 0.0633 (0.157)	- 0.0095 (0.201)	- 0.0192 (0.101)	0.2102 (0.167)
- 0.0510 (0.64)	0.1382 (0.837)	0.0463 (0.442)	0.9030 (0.682)
- 0.0014 (0.086)	0.3031 (0.084) ***	0.4744 (0.202) **	0.2925 (0.092) ***
0.214	0.518	0.832	0.228
31	31	31	31

Malaysia	The Philippines	Singapore	Thailand
0.0087 (0.005)	- 0.0096 (0.008)	0.0007 (0.002)	0.0043 (0.006)
0.4758 (0.511)	- 1.0524 (0.62)	- 0.2416 (0.253)	0.3455 (0.461)
- 0.0807 (0.302)	- 0.2169 (0.174)	0.2093 (0.072) *	0.1318 (0.186)
0.2076 (0.476)	- 0.8158 (0.416) *	0.5714 (0.152) ***	0.0526 (0.438)
0.1619 (0.187)	1.0227 (0.361) **	0.7685 (0.148) ***	0.2122 (0.259)
- 0.008	0.438	0.766	0.327
12	12	12	12

R-squared scores, regressions employing the Swiss franc as numeraire demonstrate a higher goodness of fit than the case adopting the SDR as numeraire.

Table 4 Results of extended regressions

A. 2005.9–2008.3 with the CHF as numeraire

	Korea	China	Indonesia
Constant	-0.0057 (0.002) **	-0.0048 (0.002) ***	-0.0007 (0.006)
USD	0.2535 (0.462)	0.7427 (0.095) ***	0.6879 (1.059)
JPY	-0.0008 (0.087)	0.0332 (0.036)	-0.0814 (0.199)
EUR	0.4050 (0.242)	-0.1060 (0.099)	-0.2981 (0.577)
KOR		-0.1047 (0.046) **	0.1024 (0.283)
CHN	-0.6897 (0.481)		-1.3315 (1.167)
INA	0.0240 (0.094)	-0.0503 (0.04)	
MAL	0.0474 (0.192)	0.1684 (0.073) **	0.8629 (0.404) **
PHI	0.0496 (0.105)	0.0979 (0.038) **	0.2947 (0.242)
SIN	0.0214 (0.259)	-0.1333 (0.112)	-0.1565 (0.62)
THA	0.2270 (0.135)	0.1351 (0.057) **	0.5955 (0.295) *
EMP	0.8804 (0.129) ***	0.1023 (0.064)	0.1096 (0.089)
Ad R-sq	0.945	0.983	0.763
Observations	31	31	31

B. 2005.9–2008.3 with the SDR as numeraire

	Korea	China	Indonesia
Constant	-0.0066 (0.002) ***	-0.0041 (0.002) **	-0.0007 (0.005)
USD	0.4423 (0.725)	0.9836 (0.196) ***	2.0036 (1.55)
JPY	-0.0465 (0.121)	0.1098 (0.043) **	0.2102 (0.259)
EUR	0.2020 (0.457)	0.2571 (0.172)	1.0415 (0.978)
KOR		-0.1044 (0.045) **	0.1087 (0.273)
CHN	-0.8497 (0.499)		-1.6253 (1.152)
INA	0.0157 (0.099)	-0.0565 (0.039)	
MAL	0.0879 (0.195)	0.1587 (0.072) **	0.8626 (0.386) **
PHI	0.0487 (0.107)	0.0967 (0.037) **	0.2872 (0.235)
SIN	0.0177 (0.269)	-0.0896 (0.113)	-0.0329 (0.608)
THA	0.2211 (0.138)	0.1332 (0.056) **	0.5762 (0.285) *
EMP	0.8829 (0.133) ***	0.0866 (0.064)	0.1094 (0.086)
Ad R-sq	0.873	0.923	0.605
Observations	31	31	31

Notes: 1. Standard errors are in parentheses.

2. ***, **, and * refer to significance at the 1%, 5%, and 10% levels, respectively.

5. Extended Analyses

5.1 Extended regression with Asian currencies as regressors

In this section, regional Asian currencies will join the regressors

Malaysia	The Philippines	Singapore	Thailand
0.0027 (0.003)	- 0.0037 (0.004)	- 0.0026 (0.002)	- 0.0030 (0.002)
- 0.4053 (0.556)	- 1.8618 (0.746) **	- 0.2327 (0.564)	- 1.9846 (0.515) ***
- 0.0590 (0.101)	- 0.0531 (0.155)	0.0865 (0.07)	- 0.0354 (0.093)
0.1967 (0.271)	0.0656 (0.432)	0.2622 (0.222)	0.1378 (0.26)
- 0.0155 (0.139)	0.4969 (0.189) **	0.1122 (0.101)	0.1981 (0.125)
0.8064 (0.564)	2.2672 (0.769) ***	0.0498 (0.484)	2.0871 (0.517) ***
0.1869 (0.097) *	0.0450 (0.166)	0.0393 (0.081)	0.2537 (0.091) **
	- 0.3253 (0.348)	0.2712 (0.155) *	- 0.1712 (0.201)
0.0243 (0.119)		0.0119 (0.088)	- 0.3229 (0.106) ***
0.8266 (0.281) **	0.5381 (0.454)		0.4845 (0.262) *
- 0.2395 (0.154)	- 0.1695 (0.247)	0.1291 (0.114)	
- 0.0890 (0.073)	0.2681 (0.082) ***	0.2644 (0.19)	0.3208 (0.065) ***
0.891	0.851	0.908	0.876
31	31	31	31

Malaysia	The Philippines	Singapore	Thailand
0.0020 (0.002)	- 0.0046 (0.004)	- 0.0023 (0.002)	- 0.0031 (0.002)
- 0.5750 (0.913)	- 1.3614 (1.223)	- 0.8212 (0.748)	- 1.7301 (0.751) **
- 0.1565 (0.131)	- 0.0641 (0.208)	- 0.0003 (0.098)	0.0199 (0.126)
- 0.2411 (0.512)	0.0362 (0.777)	- 0.0989 (0.355)	0.3911 (0.472)
- 0.0012 (0.141)	0.5209 (0.189) **	0.1010 (0.098)	0.2017 (0.124)
0.8152 (0.615)	2.0208 (0.811) **	0.2630 (0.492)	2.0271 (0.518) ***
0.1957 (0.102) *	0.0277 (0.174)	0.0642 (0.081)	0.2428 (0.093) **
	- 0.2471 (0.341)	0.2160 (0.155)	- 0.1588 (0.199)
0.0150 (0.121)		0.0067 (0.086)	- 0.3243 (0.105) ***
0.7971 (0.309) **	0.5335 (0.464)		0.5096 (0.264) *
- 0.2558 (0.156)	- 0.1928 (0.246)	0.1156 (0.112)	
- 0.0812 (0.078)	0.2534 (0.079) ***	0.2982 (0.186)	0.3253 (0.065) ***
0.629	0.688	0.568	0.706
31	31	31	31

in order to examine any significant interrelationship among currencies in this region. Specifically, interest rests upon the RMB's influence on other currencies. The regression form (1) will not alter at all. In the case of the Korean won, for example, six other Asian currencies will join the right-hand side of the regression: the RMB, the rupiah, the ringgit, the peso, the Singapore dollar,

and the baht.

Let us concentrate on the second period (September 2005 to March 2008) because the co-movement between the RMB and other currencies is solely observed in this period, as shown in Figure 1. The same data are applied as in the former section.

The regression results are shown in Table 4. Table 4A is the case in which the Swiss franc is applied as the numeraire, and Table 4B is the result with the SDR as the numeraire.

In the case of the won, compared with the basic regression in the previous section, none of the newly joined regressors prove to be statistically significant. Furthermore, the dollar and the euro turn out to be insignificant although they were significant in the benchmark regression. The highly significant coefficient in the EMP term confirms that the won was independently floating by higher degrees in this period.

The largest number of significant variables is found in the case of the RMB. In addition to the dollar, which remains significant in the extended regression, four other currencies are found to be significant: the won,¹² the ringgit, the peso, and the baht. This is robust when the numeraire is replaced by the SDR.

Meanwhile, the ringgit finds fewer significant currencies: the rupiah and the Singapore dollar. Furthermore, the US dollar loses significance in this extended regression, while it is significant in the benchmark regression.¹³

The Singapore dollar discovers a neighboring currency, the ringgit, as significant at the 10% level. The Thai baht, on the other hand, discovers four Asian currencies as significant in addition to the dollar: the RMB, the rupiah, the peso, and the Singapore dollar. Among them, the influence of the RMB is the mightiest with the positive and largest coefficient.

The peso also finds the RMB as highly significant. Meanwhile, the rupiah observes significant variables not in the RMB but in the ringgit and the baht.

In sum, Table 4 clarifies that the RMB still depends on the US dollar by a higher degree even after it has shifted to a

more flexible system, and that most of the East Asian currencies are either associated with the RMB, like the peso and the baht, or more or less interrelated in the region. This suggests that the RMB has begun casting an undeniable effect on the ASEAN currencies.

5.2 “Classical” regression with daily data

All the regressions above employ monthly data due to the data availability problem of international reserves. The second extension here attempts to apply daily data in the regression by excluding the EMP term. The regression form will be simplified as follows:

$$\Delta e_{i/k,t} = \alpha_i + \sum_{h=1}^n \beta_h \Delta e_{h/k,t} + \epsilon_{i,t} \quad (2)$$

This is the same framework that the “classical” analyses, such as Frankel and Wei (1993, 1994) adopted. The data are drawn from the IMF’s exchange rate data website. However, the Philippine peso, which is not available in this dataset, is excluded. The Swiss franc is chosen as the numeraire. Only the second period (September 2005 to March 2008) is examined in order to identify the effects of the RMB and the inter-relationship among ASEAN currencies. Regression results are demonstrated in Table 5.

Compared with the results in Tables 2 to 4, daily data regressions here double or triple significant coefficients in number. The Korean won finds the RMB, the ringgit, and the baht as highly significant, while the RMB identifies the won and the Singapore dollar as such. The ringgit and the Singapore dollar find many positive and significant neighboring currencies. The rupiah is strongly connected with the Singapore dollar and the ringgit, though the goodness of fit is not procured enough. In the meantime, the baht is not so strongly connected with neighboring currencies, except for the won. Mutually close ties with positive and highly significant coefficients are discovered between the won and the RMB, the won and the baht, the RMB and the Singapore dol-

**Table 5 Results of extended regressions with daily data
(with the CHF as numeraire)**

(Regressions on the major and neighboring currencies)

	Korea	China	Indonesia
Constant	0.0000 (0.)	-0.0002 (0.) ***	0.0001 (0.)
USD	0.2430 (0.196)	0.8370 (0.027) ***	-0.1107 (0.211)
JPY	0.0085 (0.026)	0.0249 (0.005) ***	-0.0688 (0.027) **
EUR	0.1104 (0.051) **	0.0013 (0.011)	0.0119 (0.055)
KOR		0.0237 (0.008) ***	0.0621 (0.042)
CHN	0.5070 (0.178) ***		-0.0848 (0.193)
INA	0.0536 (0.036)	-0.0034 (0.008)	
MAL	0.1368 (0.072) *	0.0290 (0.016) *	0.5569 (0.075) ***
SIN	-0.2554 (0.086) ***	0.0801 (0.018) ***	0.6162 (0.09) ***
THA	0.1085 (0.041) ***	-0.0104 (0.009)	0.0319 (0.044)
Ad R-sq	0.705	0.980	0.688
Observations	673	673	673

Notes: 1. Standard errors are in parentheses.

2. ***, **, and * refer to significance at the 1%, 5%, and 10% levels, respectively.

lar, the rupiah and the ringgit, and the rupiah and the Singapore dollar, respectively.¹⁴

In sum, the daily data regression may be more effective in finding a significant relationship between currencies, while the degree of flexibility cannot be measured due to the data problems. At the time being, it is indispensable to employ both results simultaneously and synthetically.

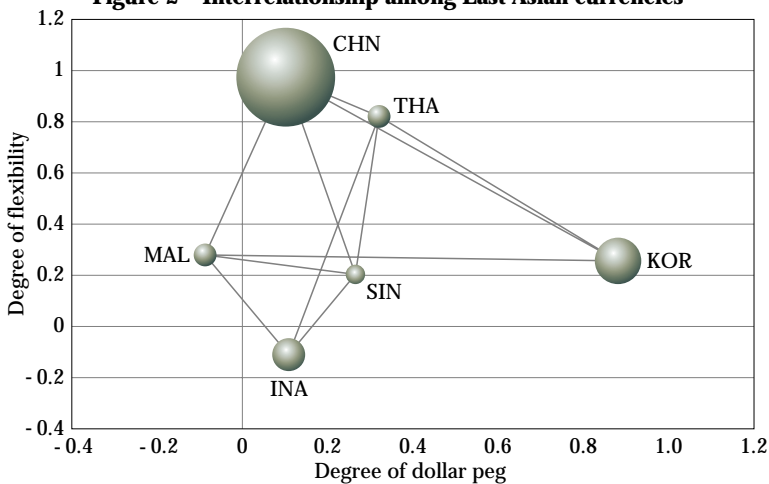
5.3 Interrelationship among the Asian currencies

It should be careful to make an interrelationship sketch among Asian currencies in terms of exchange rate management from the regression results. It is because, as mentioned before, to involve Asian currencies, some of which are still highly correlated with the US dollar, may cause serious multicollinearity problems.

While the analytical framework should be further elaborated, one idea is to pick up positive and mutually significant relationships among currencies from the regressions above and to attempt a correlation map. Based on this policy, a tentative interrelation map is depicted in Figure 2.¹⁵ The degrees

Malaysia	Singapore	Thailand
0.0000 (0.)	0.0000 (0.)	- 0.0004 (0.) ***
0.2784 (0.104) ***	0.1993 (0.088) **	0.8160 (0.183) ***
-0.0425 (0.014) ***	0.0442 (0.011) ***	0.0126 (0.024)
-0.0727 (0.027) ***	-0.0933 (0.023) ***	0.0771 (0.048)
0.0392 (0.021) *	-0.0515 (0.017) ***	0.0970 (0.037) ***
0.1771 (0.096) *	0.3450 (0.079) ***	-0.1991 (0.169)
0.1376 (0.019) ***	0.1073 (0.016) ***	0.0246 (0.034)
	0.3931 (0.029) ***	-0.0358 (0.069)
0.5577 (0.041) ***		0.1589 (0.081) *
-0.0115 (0.022)	0.0358 (0.018) *	
0.891	0.905	0.724
673	673	673

Figure 2 Interrelationship among East Asian currencies



of flexibility and dollar peg are taken as the horizontal and vertical axes, respectively. Both data are quoted from Tables 4

and 5. The size of a bubble corresponds to the country's nominal gross domestic product (GDP) in 2008 measured by the current US dollar. Linked currencies with solid lines indicate that the two countries share positive and statistically significant coefficients.

Many currencies in this region are interrelated irrespective of degrees of flexibility or dollar peg. On average, a currency is affected by approximately half of the neighboring currencies. The Singapore dollar and the RMB, in particular, influence (or are influenced by) most currencies in the region. The ringgit follows them. This suggests that the effect of the RMB, together with the Singapore dollar as a representative ASEAN currency, can no longer be neglected in considering the exchange rate movement in the region.

6. Conclusions

More than a decade has passed since the introduction of a common basket currency to East Asia was initially proposed. This paper focused on what impact the RMB's shift to a more flexible exchange rate system in July 2005 brought to the exchange rate management in East Asian countries. It was found that most currencies in this region increased their interdependence on regional currencies. To the RMB and the ringgit, the two former dollar peg currencies, neighboring currencies allocated important weights, while the RMB, by maintaining a dominant share in the dollar, did not seem to follow the basket management faithfully as it declared.

The situation has changed with the collapse of Bear Stearns in March 2008. East Asian currencies fell into disorder again by decreasing their interdependence in exchange rate management and resuming their depreciation against the dollar. It is yet to be seen how long this revisited disorder will continue. Promoting a common basket currency in this region will not be plain sailing.

* The author would like to thank Keiai University for granting financial aid for this research in 2006–7.

Notes

1. The US, Europe, and neighboring Asian countries are their main trade partners.
2. This so-called “bipolar view” was initially presented by Eichengreen (1993). Afterwards, Fischer (1999) predicted that the intermediate regimes would slowly decrease in number and the corner solutions of the hard peg and independently floating would be favorably adopted.
3. Recently, Frankel (2009a) labels the corners hypothesis as one of the “outs” in global money, along with G-7, currency manipulation, inflation targeting, and exorbitant privilege of the dollar.
4. The AMU involves 13 currencies in this region: the Japanese yen, the Korean won, the Chinese renminbi (RMB) and 10 ASEAN currencies (the Philippine peso, the Malaysian ringgit, the Thai baht, the Singapore dollar, the Indonesian rupiah, the Brunei dollar, the Vietnamese dong, the Cambodian riel, the Lao kip, and the Myanmar kyat). The recently defined AMU-wide zone includes, in addition to the above listed 13 currencies, the Australian dollar, the New Zealand dollar, and the Indian rupee.
5. Constituents of the reference basket were disclosed by the People’s Bank of China Governor Zhou Xiaochuan as 11 currencies, including the US dollar, the euro, the yen, the Korean won, the Singapore dollar, the British pound, the Malaysian ringgit, the Russian ruble, the Australian dollar, the Thai baht, and the Canadian dollar. However, the numerical weights among these currencies were not announced.
6. Afterwards, the daily allowance of fluctuations was widened to $\pm 0.5\%$ from May 21, 2007.
7. Monetary policy framework is disaggregated into four categories: (i) exchange rate anchors (115) (ii) monetary aggregate target (22) (iii) inflation-targeting framework (43) and (iv) other (12) frameworks. Arabic figures in parentheses refer to the number of countries adopting each framework. The US dollar (66) occupies the largest number in exchange rate anchors, followed by the euro (27) composite (15) and other currencies (7).
8. Approximately, 1 yen=10 won was estimated to be the targeted rate.
9. The exchange market pressure (EMP) was initially proposed by Girton and Roper (1977). Generally, it is defined by a linear combination of the changes in the exchange rates, foreign reserves, and short-term interest rate as $EMP_{i,t} = \Delta e_{i,t} + \Delta R_{i,t} + \Delta r_{i,t}$, while the short-term interest rate terms is often excluded. Identical weights ($= 1$) are applied here on the changes in the exchange rates and the reserves, while asymmetric weights can be employed in other cases. See Ito and Orii (2009) for details.
10. Data in the code AE.ZF. are used for national currencies per US dollar, AA.ZF. for national currencies per SDR, and 1..DZF for international reserves.
11. The R-squared is exceptionally low in the regression using the SDR as numeraire.
12. It should be noted that the coefficient is negative.
13. Instead, the RMB occupies the high and positive coefficient, although it is not found significant at the 10% level.
14. In the latest period (from April 2008 to March 2009) however, significant coefficients decrease in number substantially. Mutually close ties are found between the won and the baht, the RMB and the Singapore dollar, and the ringgit and the Singapore dollar. As was observed in the previous section, the won and the rupiah experienced rapid and substantial depreciations, which is reflected in the regression result with unexceptionally low levels of R-squared scores.

15. Negative coefficients are not adopted.

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