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徐奇渊
xuqiyuan@hotmail.com

杨盼盼
pamelapanda@126.com

Emerging Asia Currencies Anchor to Emerging Currency Baskets?

The Role of Renminbi as an Anchor Currency in Southeast Asia

Abstract: With the time varying parameter regression based on the State Space model, the empirical research in this paper finds that since the global financial crisis, the East Asian economies currencies have moved towards basket-peg. Nevertheless, whether there is a convergence among the selection of currency anchors in the baskets still remains doubtful. We have also reach other two conclusions:(1) the US dollar still plays a dominant role in the basket, and renminbi's influence increases just a little; (2) quite opposite to the conventional wisdom, the global financial crisis enhances the role of US dollar and euro and undermines the role of renminbi and Yen within this area.

Key Words: East Asian, exchange rate, anchor

1. Introduction

After South East Asian Financial Crisis, eclipsing or partly eclipsing role of US dollar within this region attracted a lot of attention from both academia and politician. The literature on the Asian currencies exchange rate regime arrangement has grown very large over the last 15 years. According to the different choices, there are at least three major proposals: free floating, pegging to a single currency and pegging towards a basket anchor.

Eichengreen (1999) and Summers (2000) proposed that Asian economies should choose free floating exchange rate regime. Their argument is based on the theoretical fundamental of Obstfeld and Rogoff (1995). They thhougt open economies should abandon intermediate exchange rate regime. Hence, they should either let exchange rate to be totally fixed or floating. Compared with fixed exchange rate regime, floating exchange rate regime would solve the problem of Trilemma better. So that the free flow of capital and a higher independency of central bank would promote the potential growth of Asian economies.

The simplicity attracted a lot of supporters for floating exchange rate but its uncertainty also provided a lot of opponents. Cooper (1999) and others proposed that floating exchange rate would lead to over-fluctuated exchange rate. This did harm to developing economies in East Asia. Uncertainty of exchange rate would suppress the growth of international trade and direct investment. And it would also lead to instability of domestic financial market. Even if developing economies abandoned fixed exchange rate regime and moving towards floating, they still did a lot of intervention in the foreign exchange market. These historical similarities were observed by Calvo and Reinhart (2000). And they named this phenomenon as “fear of floating”. And the major reason for this phenomenon was because: in practice, central banks in developing economies did not like to maintain the free floating of exchange rate, rather they would like to chase for the policy reputation through market intervention.

There are also scholars in support of fixed exchange rate regime in East Asia area. Mckinnon (2000) recommended that Asia currencies should peg against US Dollar. A

nominal currency anchor would be able to stabilize the value of the currency in order to reduce the original sin (Hausmann, 1999). And it would stabilize the domestic inflation and interest rates level as well. With similar reason, Japanese scholars also proposed that East Asian currencies should peg against Japanese yen (Kwan, 1998).

Compared with The two extreme situations above, pegging against the currency basket is a more realistic choice for East Asian economies. Compared with pegging against a single currency, it will reduce the fluctuation of real effective exchange rate. Due to the trade diversity, taking any single currency as anchor would face certain degrees of sacrifice. According to the research of Ito, Ogawa and Sasaki (1999) and Rajan (2002), a designed currency basket for all in East Asian economies based on optimization of the welfare loss function would minimize cost due to the fluctuation of exchange rate. Further they proposed that all East Asian economies should peg against the same currency basket. This would stabilize the bilateral exchange rate within East Asian economies and basket peg would help to stabilize the real effective exchange rate in order to stabilize external trade for all these economies. It would also help to release asymmetric influence of external shock on the competitiveness of Asian economies and help to stabilize the relative price. .

The proposals we quote above have been published for nearly 15 years. During this time period, East Asia economies have developed their exchange arrangement widely. A review of the current currency arrangement in major East Asian economies will provide a very insightful examination of different proposals provided by researchers. Before the East Asian Financial crisis, most of the economies tended to peg against US Dollar. And after crisis, they moved to a more flexible exchange rate arrangement. Further, there are two recent factors that cannot be omitted: the ascending role of China and Renminbi and global financial crisis. Consequently it is necessary to re-exam the status quo of currency arrangement in this area.

Based on the exchange arrangement report by IMF in 2012, we would be able to observe the de facto exchange rate arrangements of major East Asian economies. We are focusing on 9 economies including: ASEAN 6, Korea, Hong Kong and Taiwan.

Despite of Hong Kong, there are no other economies chooses hard peg. When examining soft peg, there is no economy choosing the conventional peg. This is a very important signal: there are no major Asian economies choosing to peg against one single currency or a fixed basket of currency. This is quite different from the proposal, none of these economies would like to go back to peg against one single currency. They don't even have a fixed basket. Vietnam chooses stabilized arrangement. The flexibility of that arrangement is higher than traditional peg. Singapore and Malaysia yield to the other managed arrangement, which means their exchange rate regime is in general managed, but the way of managing is unclear. These economies are in the intermediate exchange rate regime. Even if Indonesia, Korea, Philippines and Thailand fall into the classification of floating exchange rate regime, none of them are in the free floating classification. This means those economies' currencies still face intervention from time to time.

Based on the IMF de facto exchange arrangements, we can observe that after East Asian Financial Crisis, the real situation for most East Asian economies is that they are going middle rather than going extreme. The authorities still have incentives to do market interventions. Nominal anchor cannot be observed directly, but the target should be there. It is hard to find a single currency as an anchor. It is even harder to figure out one single currency basket. The composition of the currency basket changes from time to time and from country to country. We bare in mind this time-variant and country-specific characteristic in mind. We set out to include time-varying composition of currency basket for the major Asian economies. The rest of the paper is arranged as: part 2 provides literature review on currency basket analysis; part 3 provides methodologies of this paper, we use different methods to make comparisons; part 4 explains the major findings of the paper and draws conclusions.

2. Literature review

There are a lot of literatures in the field of analyzing the currency basket. It originated from a very famous paper done by Frankel and Wei (1994), which had become the

bench mark paper when discussing currency basket issue. In their paper, they were discussing whether there was a yen bloc or dollar bloc in East Asian Area. There was no doubt why people were interested in adding Yen into basket at that time. Japan was the dominant economy in East Asia, and had close trade ties with Asian economies. To stabilize trade, Asian economies had strong incentives to peg against Yen. With the similar incentive in mind, Renminbi was widely considered in 21st century. China is facing a quite similar situation like Japan did in 1990s. China has become the second largest economy in the world and the largest in Asian area. China has also exerted very large influence on regional trade and has become the largest trade partners for many economies in Asia area. Furthermore, a different background compared with 1990s occurred: most Asian economies tended to abandon peg against US Dollar, which made it possible for them to think about alternative currency arrangement.

The basic method calculating currency basket was developed by Frankel and Wei (1994), which regressed daily variation of one currency's exchange rate against other currencies considered, such as US dollar, yen, British pounds or euro. This method has been extended to add renminbi to include the influence of China within this region. Researchers would be able to consider the coefficients for each basket candidate currency and then analyze the composition of the currency basket.

There are several extensions of the original method, especially when adding China into basket discussion. Before the exchange rate regime reform on July 21st 2005, renminbi was pegged against US dollar. After that, renminbi exchange rate was managed floating. When US dollar and renminbi are both in the right hand side of the regression equation, we need to pay special attention to the problem of multicollinearity. The currency basket also changed a lot during past decade, it is necessary to address the evolution of the currency basket. Several extensions have been made to in order to take into account those features.

The first way is trying to keep the time when renminbi (seemingly) floated against US dollar and abandon the time when renminbi pegged against USD. In Subramanian and Kessler (2013) paper, they chose two sample periods: the first period was July 2005 to

August 2008, and the second was July 2010 to July 2013. And they were trying to compare the role of renminbi in these two periods by using the regression equation we list above. In this paper, they found out astonishing role of renminbi and they called this "ascend in US backyard".

The second method was proposed by Chen, Peng and Shu (2009). They followed a two-step method. Firstly they regressed renminbi against other reference currencies such as US dollar, euro and yen. And then they would be able to get the residuals of the regression. Then they used the residuals to replace renminbi in the equation above, and ran the regression again. The intuition of this method is trying to understand the renminbi coefficient as the sensitivity of other currencies to fluctuations in renminbi's autonomous component.

The third method is the principal components approach proposed by Spencer (2013). This approach generally picked up the currencies that would be able to constitute the so-called renminbi bloc using method 1. And then pooled all the currencies data together. By using principal components approach, they calculated the principal components of these currencies. By comparing the variation of principal components and the candidate currencies i.e. US dollar, yen and renminbi, they would be able to figure out whether those currencies pegged against US dollar, yen or renminbi. Spencer concluded that Asian currencies were still better described as a 'dollar bloc' than a 'yuan bloc'. But in this method, the correspondence between a principal component and a reference currency was selected to some extent subjectively.

The fourth method is trying to add market intervention into the equation. The basic idea of this method is trying to exclude the influence of central bank intervention. Frankel and Wei (2007) proposed this method. They added the percentage change of foreign reserves of one country in the regression equation. Actually as mentioned by Subramanian and Kessler (2013) it was also more difficult to estimate equation with currency intervention, since not all emerging-market countries report reserves on a daily basis. More comments will be introduced in the third part of this paper.

The bench mark regression (Frankel and Wei, 1994) runs through the OLS method,

which means the coefficient estimation is an average in the sample period. And the composition keeps the same through all the sample period. But with the global economy substantial variations in last decade, we cannot accept the hypothesis that structures of the basket anchors for Asian currency haven't been changed in a given period.

In order to deal with the time-varying problem, the pioneer literatures (Ogawa and Sakane, 2006; Sun, 2010; Subramanian and Kessler, 2013) decomposed the long term sample into several stages, and then employed the bench mark regression. But the sub samples were always selected based on a priori judgment with each author's knowledge respectively. There was a hypothesis that the basket composition remained the same within the sub sample period. But if the sample period was too long, we could hardly accept this hypothesis. What is the most important is that we don't know whether the sub sample period is short enough to catch the time-varying character, such kind of methodology consequently got into trouble.

In this paper, we expand the bench mark regression to a time-varying parameter model. Based on the state space form (Harvey, 1989; Hamilton, 1994), the estimation equation could be described by a combination of measurement equation and state equation. And then the coefficients could be estimated by Kalman filter. As a result, we could describe the evolution of the basket composition of each currency.

In part 3, the methodology and the data source would be described. And then we turn to the regression based on the state space model and get the time varying estimations.

3. Methodology

3.1 The bench mark regression

In order to analyze the Asian currencies de facto basket anchors, we adapt the method developed by Frankel and Wei (1994, 2007) as a bench mark. Firstly the reference currencies are selected as explanatory variable, and then each of the currency to be explained is regressed by OLS estimation. The outcome of the coefficients recovers the

composition of the basket. The following equation runs for each currency:

$$d\ln(\frac{Y_{i,t}}{CHF_t}) = c + w_{i,1} * d\ln(\frac{EUR_t}{CHF_t}) + w_{i,2} * d\ln(\frac{JPY_t}{CHF_t}) + w_{i,3} * d\ln(\frac{CNY_t}{CHF_t}) + w_{i,4} * d\ln(\frac{USD_t}{CHF_t}) + \varepsilon_{i,t}$$

Y_i is the one of the Asian currencies. Four of the potential reference currencies lie on the other side. All of these exchange rates are expressed by Swiss Franc (CHF). And the coefficient for each of the reference currencies is corresponding to the share in Y_i's basket. The constant *c* indicates the trend of currency Y_i deviating from the basket.

It's worth mention that each of the economies suffered different magnitudes of shocks. In order to control this effect, Frankel and Wei (2008) introduced the variable ΔEMP to describe the Exchange Market Pressure:

(2)

With $$\Delta EMP_{i,t} = \Delta \log reserve_{i,t} + \Delta \log(\frac{X_{i,t}}{CHF_t})$$

The *ΔEMP* stands for the changes of exchange market pressure. It captures the fact that changes in the demand for a currency can be reflected in changes in either its prices or quantities depending upon the reaction of the monetary authorities. The more they absorb it in quantities via exchange market intervention, the less the impact on prices. Indeed, the coefficient ρ can simply be interpreted as the de facto degree of exchange rate flexibility with ρ =1 denoting high flexibility and ρ =0 denoting a perfectly fixed exchange rate regime.

But in this paper, we tend to omit this market intervention. According to the same consideration as in Subramanian and Kessler (2013) as we have mentioned in the literature review, we are mainly interested in the level of the co-movements between currencies regardless of whether they are due to administrative intervention or to market pressure. In both cases, a high coefficient for a given basket currency shows that its exchange rate matters for the left-hand-side currency. Hence we estimate equation (1) rather than equation (2).

3.2 The time varying parameter estimation based on state space model

The bench mark regression runs through the OLS method, which means the coefficient estimation is an average in the sample period. And the currency basket composition keeps the same through the sample period. In this paper, we expand the bench mark regression to a time-varying parameter model in order to capture the changing basket composition. Based on the state space form (Harvey, 1989; Hamilton, 1994), the estimation equation could be described by a compact form:

Measurement equation:

$$d\ln(\frac{Y_{i,t}}{CHF_t}) = c + w(t)_{i,1} * d\ln(\frac{EUR_t}{CHF_t}) + w(t)_{i,2} * d\ln(\frac{JPY_t}{CHF_t}) + w(t)_{i,3} * d\ln(\frac{CNY_t}{CHF_t}) + w(t)_{i,4} * d\ln(\frac{USD_t}{CHF_t}) + \varepsilon(t)_i \quad (3)$$

state equation：

$$w(t)_{i,1} = \lambda w(t-1)_{i,1} + \upsilon(t)_{i,1} \quad (4.1)$$

$$w(t)_{i,2} = \lambda w(t-1)_{i,2} + \upsilon(t)_{i,2} \quad (4.2)$$

$$w(t)_{i,3} = \lambda w(t-1)_{i,3} + \upsilon(t)_{i,3} \quad (4.3)$$

$$w(t)_{i,4} = \lambda w(t-1)_{i,4} + \upsilon(t)_{i,4} \quad (4.4)$$

With $$(\varepsilon_t, \upsilon_t)' : \ N\left(\begin{pmatrix}0\\0\end{pmatrix}\begin{pmatrix}\sigma^2 & 0\\0 & R\end{pmatrix}\right) \quad (5)$$

In the measurement equation:

$w(t)_{i,j}$ is estimated coefficients for each of the reference currency. It should be noticed that this vector is time varying. The estimation could reveal the evolution of the basket composition. In the state equation, there is an assumption that the w_t subjects to an AR(1) model;

ε_t and υ_t are respectively the random disturbance terms for the measurement equation and the corresponding state equation. Equation (5) shows that ε_t and υ_t are mutually independent, and they are subjected to a normal distribution, in which their mean values are zero, the variances are both σ^2 and the covariance matrix are

R.

There are still one problems with the estimation. In case of China, there is a particular problem because of the de facto peg of the CNY to the US dollar. So that there is probably multicollinearity between the time series of USD and renminbi. In order to solve the problem, we follow the method employed by Chen, Peng and Shu (2009), Balasubramaniam, Patnaik, and Shah (2011), Fratzscher and Mehl (2011). They firstly regressed CNY by the potential reference currencies, and then removed the reference currencies components from CNY. In this paper, the reference currencies for CNY include USD, EUR and JPY.

$$d\ln(\frac{CNY_t}{CHF_t}) = c + \theta_{i,1} * d\ln(\frac{EUR_t}{CHF_t}) + \theta_{i,2} * d\ln(\frac{JPY_t}{CHF_t}) + \theta_{i,3} * d\ln(\frac{USD_t}{CHF_t}) + \omega_{i,t} \quad (6)$$

At last the residual $\omega_{i,t}$ could be used as a proxy for the autonomous renminbi component and we put it back into the equation (3), in which $d\ln(\frac{\dot{C}NY_t}{CHF_t}) = \omega_{i,t}$

3.3 Data

Economies in the sample: There are nine economies observed in this paper: Hong Kong SAR and Taiwan in great China, Korea and other six ASEAN economies: Indonesia, Malaysia, Phillies, Singapore, Thailand and Vietnam.

For the reference currencies, as shown above, euro, yen, yuan and dollar are considered. And the time series of yuan are processed by equation (6).

The sample period stems from the July 21, 2005 to Oct. 20, 2013. The starting point is known as the historic event for the exchange rate regime reforms in China. On that day, China yuan gave up the strictly pegging to US dollar.

All the time series are daily data from CEIC database.

3.4 The estimation of time varying parameter and the outcome

We use the Kalman filter to estimate the time varying coefficients. Instead of the direct use of AR(1) estimation for the state equation, we take the recursive method. Because

the AR(1) estimation could not avoid the problem to assign the initial value, and different initial value would probably lead to various conclusions. In this way, we at last get the final estimation for all the time varying coefficients. In each of the state space model for the nine groups, the residual time series are identified to be stationary by the ADF test. This confirms the robust of the regressions. All the results are shown in Figure 1.

4 Conclusions

According to the results shown in figure 1 and 2, the basket composition of the major East Asian currencies are more stable after global financial crisis, that is to say, the time varying parameters after the global financial crisis are much more stable than ever have been. The US dollar still keeps a lion share in all of East Asian currencies basket anchor. The share of US dollar ranges roughly from 60% to 100%.

4.1 Towards a more stable basket?

Our result in Figure 1 and 2 generally shows different trends before and after the global financial crisis. That is, the East Asian currencies' anchor compositions after the crisis are much more stable than before.

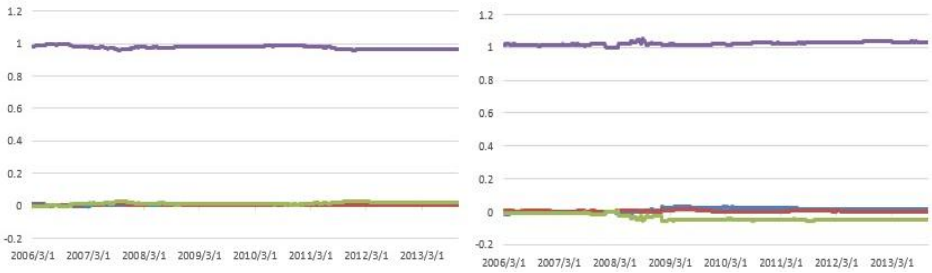
Figure 1 reveals that, before and during the global financial crisis, the time varying coefficient lines are volatile, but after that, almost all of the lines are flat and stable. It reflects the different currencies moving toward a stable basket anchor at least respectively. In order to see it clearly, we calculate the standard deviations for the daily coefficient time series for these four reference currencies in the year of 2006, 2008 and 2013 respectively(Figure2). It shows that the volatility of the reference currencies' shares is large in 2006 and 2008, while it becomes almost zero in 2013. Hong Kong and Vietnam are excluded in this analysis, because of the de facto peg to US dollar.

Further, is there a trend for the different currencies converging to one currency basket? The fact is quite complicated. In Figure 3, we calculate the standard deviation for the

average of reference currency (euro, dollar, yen and renminbi respectively) coefficient across the seven economies (except Hong Kong and Vietnam) in the year of 2006, 2008 and 2013.

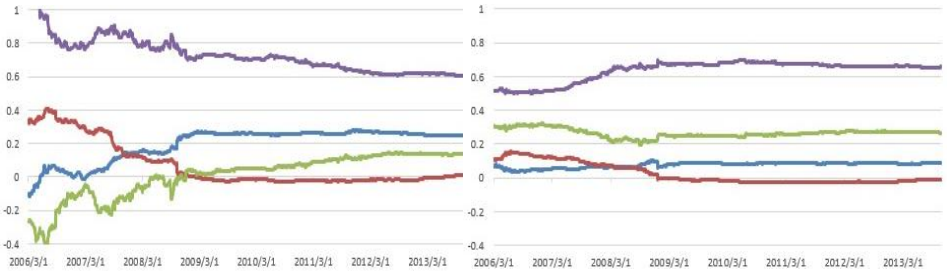
Figure1 The time varying basket composition of the reference currencies for East Asian economies

(a) Hong Kong dollar (b) Vietnamese dong

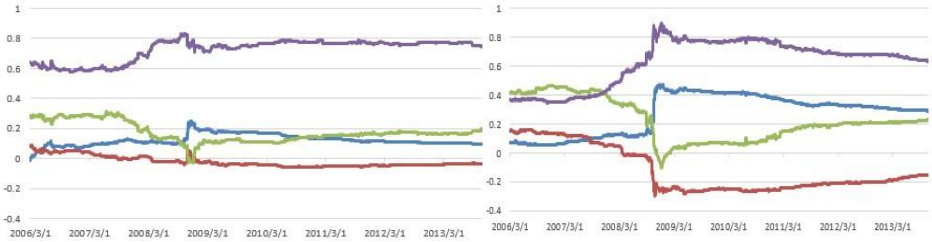


(c) Malaysian Ringgit (d) Philippines Peso

(e) Sigpore dollar (f) New Taiwan dollar



(g)Indonesian Rupiah (h)Korean Won



(i)Thai Baht

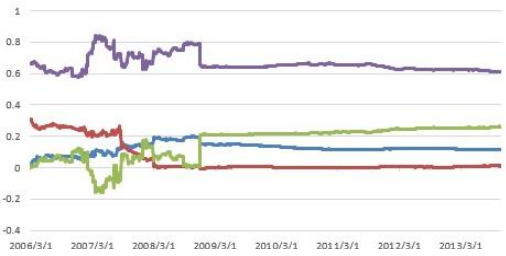
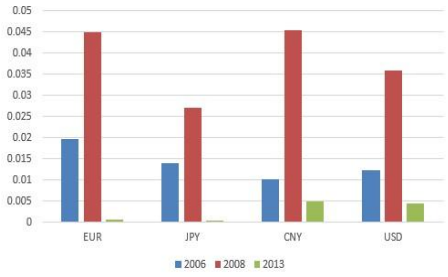
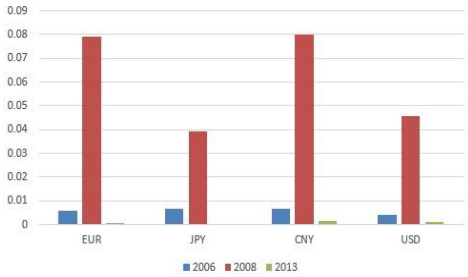


Figure 2 More and more stable anchor composition: the standard deviation for time varying parameter of the reference currency in 2006, 2008 and 2013

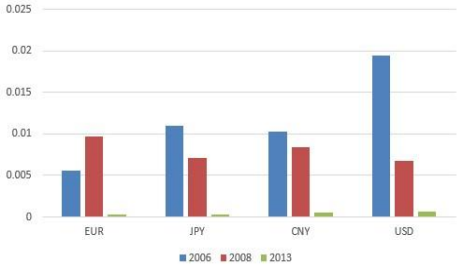
(a)Indonesian Rupiah



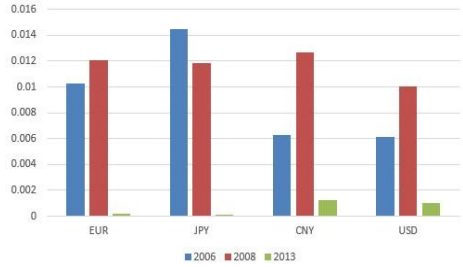
(b)Korean Won



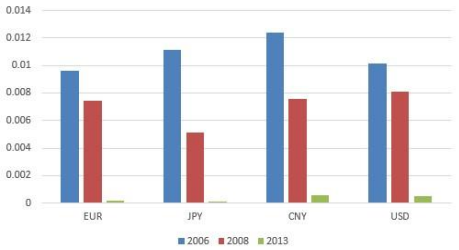
(c) Malaysian Ringgit



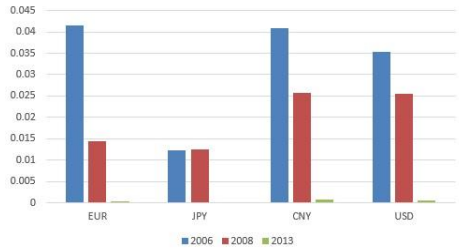
(d) New Taiwan dollar



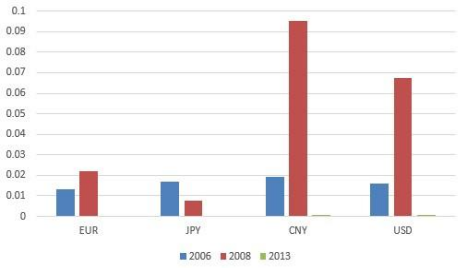
(e) Philippines Peso



(f) Sigpore dollar

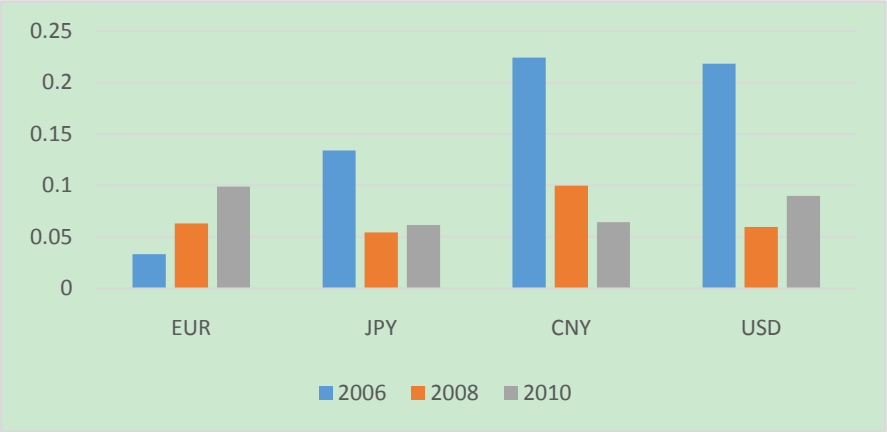


(g)Thai Baht



Note: We calculate the daily parameter's standard deviation for these four reference currencies in the year of 2006, 2008 and 2013 respectively. These figures show that the volatility of the reference currencies' shares are large before or during the crisis, while it becomes almost zero in 2013. Hong Kong and Vietnam's currencies are excluded, because of the de facto peg to US dollar.

Figure 3 The convergence index of the anchor composition in 2006, 2008 and 2013



Note: Hong Kong and Vietnam are excluded, because of the de facto peg to US dollar. For each of the seven Asian currencies, there is a time varying coefficient for each reference currency. For example, as to euro, we calculate the average of the coefficient time series in the year of 2006, 2008 and 2013 respectively. And we can get the **standard deviations** for the average of euro coefficient across the seven economies. In the same way, we get all the stand deviations for other reference currencies

It is illustrated that in figure 3, from a view of long term, compared the case in 2013 with 2006, there is a trend for the convergence. The standard deviation of US dollar's parameter among the East Asian currencies has decreased significantly. It is the same happening to Japanese yen and Chinese yuan. This is in general a convergence for the currency basket.

But from a view of relatively short run, compared the case in 2013 with 2008, the external component in the basket anchor, such as US dollar and Euro, has a trend of divergence. At the same time, the internal component of the anchor, such as Japanese yen and Chinese yuan, there is a weak trend of convergence.

Table.1 China has become a more important trade partner in regional trade

Thailand	**Malaysia**
2005： The US, Japan, EU	2005： The US, Singapore, EU
2012： China, Japan, The US	2012： China, Singapore, EU
Philippines	**Singapore**
2005： The US, Japan, EU	2005： Malaysia, EU, The US
2012： Japan, The US, China	2012： Malaysia, Hong Kong, China

4.2 Ascending renminbi, eclipsing Dollar?

By examining the currency baskets one by one, there was a very significant trade-off between US dollar and renminbi. Where there is a declining of US dollar, there is an ascending of renminbi. 4 currencies out of 9 show this tendency, including Malaysia ringgit, Philippine peso Singapore dollar and Thailand baht. The declining proportion for US dollar ranges from 10% to 40%. And the increasing level of renminbi is around 10% to 30%. The ascending role of renminbi in the basket of these four economies is closely related with the closer trade relationship. China has become a more important trade partner for all these economies (Table 1). In 2005, China was not Top3 trade partners for all these 4 economies, but now China has been among the Top 3 trade partners for all of them. But US dollar's shares in baskets of Indonesian rupiah, Korea won and New Taiwan dollar have risen steadily. And in these three economies, China's role is declining. This is specifically the case for Korea. In 2005, the role of renminbi in Korean Won was even higher than the US Dollar. But now is much less than before. The proportion of US dollar has increased around 20% in these currencies. For renminbi, it declines at most to 20%. US dollar also maintains 100% of dominance in the basket of Hong Kong dollar and Vietnam dong, while renminbi is not in the basket.

In aggregated weights, we do observe a slightly increasing role of renminbi in currency baskets of major East Asian economies and a declining role of US dollar. In 2005, the

average level of renminbi was 13% and now is 17%. And US Dollar used to occupy a role of 78% and now it declines to 75%. This is not a very significant change.

Renminbi has played a rising role when compared with yen and euro in the currency basket. Renminbi has maintained second place in the basket of Malaysia ringgit, Philippines peso and New Taiwan dollar from 2005 till now. Renminbi also played second place in Indonesia rupee in 2005 and now, though there were some fluctuations in between. Renminbi has exceeded yen and euro in the currency basket of Thailand baht. In the currency basket of Singapore dollar, renminbi has exceeded yen, but is still behind euro. The only declining is in the basket of Korea won. It was No.1, but now falls behind the US dollar and euro.

In sum, among 9 currencies, renminbi ranks 2nd place in all but Korea won and Singapore dollar. From a general average comparison, renminbi and yen enjoyed a similar status in 2005, both occupying 11%-13% of currency basket and there was little role of euro. But now, there is a rapid increasing of euro in this region, for about 11%. And it seems to be no place for yen.

Our time-varying estimation shows that the US dollar still dominates in East Asian currencies basket, although there is some declining trend in recent years. Renminbi's influence continuously increases and it is now the second important currency anchor for most economies in East Asia. Euro increases influences within this area while yen is the truly diminishing anchor.

4.3 The role of International Financial Crisis

There are many assertions that the role of US dollar has been weakened due to the global financial crises. In theory, reserve currency diversification is necessary. But according to our estimation, the declining power of dollar did not happen after the crisis, rather, US dollar gained more power. The declining trend we talked in part 3 mainly came from the period before the global financial crisis.

If we take a look at the currency baskets for all the major Asian currencies, we would be able to figure out that almost all the currencies have increased the US dollar weights

in their currency basket after the global financial crisis. Hong Kong and Vietnam maintained 100% weights of US Dollars throughout the crisis. Except Singapore, all other emerging ASEAN economies and Korea and Taiwan increased their weight on US dollars in 2008-2009.

Actually if we compared the US dollar weight before the global financial crisis (2005-2007), it was declining rapidly. As we have mentioned before in 2005, US dollars accounted for 78% of the currency basket. But before the crisis this proportion had already declined to 70%. But then there was a sharp rise of US dollars proportion during the financial crisis. So actually after the financial crises the role of US Dollars has strengthened for more than 5%.

The similar situation applied for euro. During 2008-2009, the currency basket for euro increased for almost all the currencies, except Hong Kong, Vietnam and Philippines. Due to the double ascending of US dollar and euro, Yen's role was eroded a lot.

The negative effect also influenced renminbi. After the break out of global financial crisis, the role of renminbi as an anchor declined among almost all the currencies. But quite different from Yen, after that temporary shock, the weight of renminbi recovered and regained its growth momentum. Renminbi has shown a growing trend ever since 2011.

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联系邮箱：iwep100732#163.com