

RMB as an Anchor Currency in ASEAN, China, Japan and Korea Region¹

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Abstract

The purpose of the paper is to explore (1) to what extent Yuan, or Renminbi (RMB) has become a reference currency in the East and Southeast Asian region, and (2) what are the major determinants that have led to the current status of Yuan. Built upon early works of Frankel and Wei (1994, 2007), we first present some empirical findings on the importance of RMB in determining the exchange rates of these countries. Our estimates show that the weight of RMB in the currency basket seems to be increasing, particularly since China started the exchange rate liberalization in July 2005. On the other hand, US dollar, while remaining the anchor currency in the region, has seemingly lost its dominating status. In a second stage we try to determine the economic factors that could have driven the increasing weights. Our findings suggest that closer trade and financial linkages are the major reason why the RMB is becoming more important, and that policies that encourage more outward investment and cross border usage of RMB might have also contributed to the rise in the weight.

JEL classifications: F31, F33

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I. Introduction

The recent global financial crisis has exposed the vulnerabilities of the US dollar denominated international monetary system, and brought back the policy debate of rebuilding the international financial architecture. The privilege of the reserve currency and the negative externalities it creates have done much harm to the global economy, and some argue that the role of the US dollar should be weakened so that the international monetary system would be more diversified and less dependent on the US policies, which were the origin of the current round of global financial crisis (Eichengreen 2011). One potential candidate that has emerged is the Chinese Renminbi (RMB), and the internationalization of the RMB has become an important topic for both China and the world. Apart from the need to reform the current international monetary system and financial architecture, the rising economic power of China, and more importantly the increasingly faster pace of liberalization in exchange rate and capital account in recent years have made many to believe that the RMB could have the potential to become a new reserve currency (Subramanian 2011, Prasad and Ye 2012).

Since the exchange rate reform in July 2005, more flexibility has been introduced to the RMB exchange rate, which has appreciated by more than 30 percent against the US dollar (Figure 1). The trading band against the US dollar was raised from 0.3 to 0.5 percent in May 2007, and further to 1.0 percent in April 2012². Besides US dollar, the direct trading with the Japanese yen started in June 2012, and in April 2013 it started with the Australian dollar. To partially address the dollar liquidity crunch during 2008-09, the RMB cross border settlement was initiated in 2009 in a few cities, but was soon expanded to the whole country and witnessed tremendous growth (Figure 2). In 2012, RMB cross border trade settlement reached 2.94 trillion

² During the April 2013 Spring Meetings of the International Monetary Fund, Deputy Governor Gang Yi indicated that the trading band would be widened again in the near future to make the exchange rate more market oriented.

(\$467 billion), and accounted for 8.4 percent of total trade settlement, a rise from 6.6 and 2.2 percent in 2011 and 2010 respectively. RMB settlement in direct investment reached RMB 284 billion (\$45 billion), more than doubled that of 2011. By the end of 2012 a total of 206 countries and regions have participated in the RMB cross border settlement, and RMB off-shore business now operates in Hong Kong, Taiwan, London and Singapore.

Channels for overseas participation in RMB cross border activities are widening too. In addition to trade and direct investment, overseas investors can obtain trade financing in RMB form domestic banks, issue RMB bonds overseas, or invest in interbank market bonds through overseas participating banks. The RMB holdings can then be invested in RMB bonds and other RMB products issued overseas, or through RQFII schemes into China.

The fast pace of the internationalization process of the RMB, together with the economic rise of China, has triggered the question of whether RMB could become an reserve currency, and even challenge the status of the existing such currencies such as the US dollar and the Euro. Although a multi-polar system might still be distant (Cheung, Ma and McCauley 2011), the RMB seems to be gaining importance in the international monetary system, and some argue that its international currency status could be imminent within the next one to two decades, if China could accelerate its reforms in the financial markets and capital account liberalization while maintaining reasonable growth momentum (Subramanian 2011, Prasad and Ye 2012).

While the global implications of RMB internationalization is an interesting topic, past studies have also identified significant impact of RMB in the East and Southeast Asian region (Fratzscher and Mehl 2011), and some even claim that a RMB bloc is already in shape (Subramanian and Kessler 2012). In this paper we try to assess the importance and potential of

RMB as a regional anchor in the ASEAN+3 region³, given the close economic ties between China and the members and the evidence of increasing exchange rate co-movements between the RMB and the other major currencies in this region. We are also interested in the major determinants that have led to the current status of RMB.

Trade integration between China and the rest in the region has accelerated during the past decade, growing by around four times (Table 1) in both exports and imports (more than six times for ASEAN). As of 2012 China's average export market share exceeded 10 percent for the ASEAN+3 members, and the average import market share reached more than 20 percent (Figure 3). Financial integration, while still at low levels, has gained momentum in recent years in that both direct investments and portfolio investments have experienced tremendous growth (Figures 4, 5, 6). Six countries in this region have signed RMB swap agreements with China, totaling RMB 1310 billion (Table 2). With further liberalization of the capital market and expansion of RMB cross border settlement, RMB has become more important in international transactions and a more serious player in exchange rate policies.

Major currencies in ASEAN+3 region have had a long history of following the US dollar. After the Asian financial crisis, some countries adopted more flexible exchange rate regimes, but empirical works have shown that US dollar was still the de facto anchor currency for many of them (Benassy-Quere, Coeure and Mignon, 2006). McKinnon and Schnabl (2004) used "dollar standard" to describe the return of US dollar peg in the regional exchange rate regime from 1999 to 2003. More recent works also verified the importance of the US dollar (Frankel and Wei, 2008, Frankel and Xie, 2010). In fact, according to the latest exchange rate arrangement classification reported by the International Monetary Fund (Table 3), among the fourteen

³ ASEAN+3 members include Brunei, Cambodia, China, Hong Kong SAR, Indonesia, Japan, Korea, Lao's PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

economies in the ASEAN+3 region, two officially use US dollar as exchange rate anchor (Cambodia and Hong Kong SAR), while three others adopt a de facto exchange rate anchor of US dollar (China, Lao PDR and Vietnam). And for other countries, although US dollar is not the nominal anchor, it remains an important currency in their de facto currency baskets (Frankel and Wei, 2008, Frankel and Xie, 2010).

Recently studies of the region's exchange rate regimes have started to assess RMB's influence on the currency baskets, in addition to the traditional anchors such as US dollar. Evidence seems to show that since China adopted a more flexible exchange rate in July 2005, RMB has become a more independent and increasingly important force in determining the region's exchange rates (Chen, Peng and Shu 2009, Henning 2012). Some authors even claim that RMB has become a reference currency and a RMB bloc is already formed in East Asia (Subramanian and Kessler, 2012).

Nominal exchange rate movements of the major ASEAN+3 currencies vis-à-vis the US dollar since July 2005 (Figures 7 and 8) seem to suggest that a number of them do follow to some extent the fluctuations of the RMB, especially during the two periods when the RMB exchange rate exhibited higher volatility and gained the most appreciation against the US dollar (July 2005 to June 2008 and July 2010 to end of the sample at March 2013). Correlations between RMB and other major ASEAN+3 currencies in the different sub periods (Table 4) also indicate that the co-movements of exchange rates tend to be higher when the RMB was floating more freely.

Our formal analysis of the impact of RMB is built upon early works of Frankel and Wei (1994, 2007), and use the weight of the RMB in a currency basket to infer the importance of the RMB in the exchange rate determination. Our regression estimates show that the weight of RMB

in the region's currency baskets seems to be increasing, particularly since China started the exchange rate liberalization in 2005. On the other hand, the US dollar, while remaining the anchor currency in the region, has lost its dominating status for at least a few currencies. Furthermore, empirical results also show that the expedition of the cross border use of RMB in 2009 might have further increased the weight of RMB in some currency baskets. Similar results are obtained when the currencies are denominated in the Swiss franc, other than in the SDR. Due to potential collinearity between USD and RMB, we also explore whether the RMB weight will change substantially if the effect of the USD on the movement of the RMB is excluded to get the pure RMB effect on regional currencies, and the results are consistent.

The underlying causes for the increasing importance of RMB in the region's currency baskets can be several. Increasing trade integration between China and these economies during the past decade or so is perhaps the most important factor (Subramanian and Kessler 2012). Annualized growth of exports and imports with China exceeded 20 percent for ASEAN economies, and more than 10 percent for Japan and Korea (Table 1). The need to stabilize the exchange rate with China may cause the central banks in this region to follow more closely the RMB movement. Another reason why many countries in this region have shifted to higher dependence on RMB in their exchange rate decisions could be the need to keep competitiveness on the export markets (Pontines and Siregar 2012). Trade competition on these markets may generate aversion to appreciate against RMB, as the role of RMB in the currency baskets increases.

In our efforts to search for the economic factors that could have driven the increasing weight of RMB in exchange rate determination, we explored the influences of trade and financial linkages, as well as business cycles. Our analysis shows that closer trade and financial linkages

as measured by bilateral trade and investment activities are indeed the major reason why the RMB is becoming more important. The business cycle factor is found to be insignificant. In addition to the economic factors, we notice that the deeper trade and financial integration is perhaps also a result of the more active policies pursued by the Chinese government, such as the push for the RMB to “go out” during the financial crisis and further liberalization of the capital account. We thus formally include a policy factor in our analysis and find that it has also contributed to the rise in the weight.

Despite the rapid rising of RMB and the broad attention it gets as the latest new candidate for the international monetary system, the internationalization of the RMB is still at an early stage. The international use of RMB is still limited by certain aspects, such as its weight in global trade and financial transactions, foreign exchange reserves and other measures. This contrasts with China’s share in global economy and trade. Wider cross border use of RMB will depend on further development of the capital markets and higher convertibility of the currency, and when that takes place RMB would presumably become a more important anchor currency in the ASEAN+3 region.

The increasing impact of the RMB on the region’s exchange rate determination also has policy implications for the ASEAN+3 members. While higher trade and financial integration is the major force behind the RMB’s rising importance, the deeper integration also means that the region might be increasingly subject to the spillover effects of China’s domestic macroeconomic policies and structural reforms. The exchange rate risk might be mitigated through more use of RMB in cross border trade settlement, but other risks could also arise with economic integration with China and closer policy coordination between countries are needed regarding risk management and control.

The rest of the paper is organized as follows. Section II explains the empirical estimation methodologies and data. Section III discusses the estimation results and robustness tests of the results. Section IV draws the potential policy implications for the RMB to act as the anchor currency. Section V concludes.

II. Data and Empirical Methodologies

This section focuses on the empirical methodologies for assessing RMB's role as an anchor currency for major ASEAN+3 economies, with outlines of the data sources and sample selection. We start from identifying the importance of RMB by estimating its weight as a reference currency in respective currency baskets, with an emphasis on its shift across different time periods. In a second stage we will try to determine the major contributors to the increasing importance of RMB.

II.1 Estimating the importance of RMB

Our estimation framework follows the spirits of early works of Frankel and Wei (1994, 2008). In order to determine the de facto exchange rate regime a country is following, one needs to infer the actual weights of the basket currencies, if the regime is believed to be a basket peg. This is because countries might prefer not to disclose the baskets or the weights, and could deviate from the de jure regime. If we assume a certain currency is determined by a currency basket, then regressing changes of exchange rate of this currency against those of candidate currencies in the basket would help recover the actual weights and importance of these candidate currencies in the exchange rate regime. The general model can be written as follows:

$$\Delta e_{t,t+s}^i = c + \sum_{j=1}^n w_j \Delta e_{t,t+s}^j + \varepsilon_t \quad (1)$$

where e_t^i is the log of the exchange rate of currency i at time t ; c is the constant term; w_j refers the weight of currency j in the currency basket; e_t^j is the log of exchange rate of currency j at

time t ; and ε_t indicates the iid residual. To get rid of likely non-stationarity we use the changes of exchange rates, hence $\Delta e_{t,t+s}^i$ indicates changes of exchange rate of currency i between time t and $t + s$. In this way, the constant term c can also be interpreted as a trend of appreciation or depreciation. The exchange rate is measured against a common currency or numeraire, and following the literature we will use special drawing rights (SDR). In a later stage, in order to test robustness of the results, we will also switch the numeraire to the Swiss franc (CHF).

Estimate of w_j , if significant, would suggest that currency j has an impact on the exchange rate movement of currency i . Higher w_j would mean larger impact of currency j 's movement on currency i . If we have captured the right reference currencies in a currency basket, the sum of the weights should be equal to 1, i.e. $\sum_{j=1}^n w_j = 1$.

The choice of reference currencies would affect our model specifications and our results. As a first step, we will include the major global currencies, US dollar (USD), Euro (EURO) and Japanese Yen (YEN), in the equation. Since our interest is to explore the impact of RMB, we would then add it to the equation to see if it has any significant power. Hence our model can be written more specifically as the following

$$\Delta e_{t,t+s}^i = c + w_{USD} \Delta e_{t,t+s}^{USD} + w_{EURO} \Delta e_{t,t+s}^{EURO} + w_{YEN} \Delta e_{t,t+s}^{YEN} + w_{RMB} \Delta e_{t,t+s}^{RMB} + \varepsilon_t \quad (2)$$

However, RMB is a known pegger to the USD before July 2005, and despite some liberalization after that, the flexibility of the exchange rate against USD can still be limited. In fact there seems to be periods when it reverted to the peg (Figure 1). In order to assess the individual impact of RMB on the respective currencies, in addition to run a regression on (2), we would also run a 2 stage regression where we first regress RMB exchange rate movements on USD exchange rate movements and use the residual, $\widehat{\Delta e_{t,t+s}^{RMB}}$ in this step as a proxy for RMB in equation (1). Thus our model can be more specifically written as:

$$\Delta e_{t,t+s}^i = c + w_{USD} \Delta e_{t,t+s}^{USD} + w_{EURO} \Delta e_{t,t+s}^{EURO} + w_{YEN} \Delta e_{t,t+s}^{YEN} + w_{RMB} \widehat{\Delta e_{t,t+s}^{RMB}} + \varepsilon_t \quad (3)$$

where $\widehat{\Delta e_{t,t+s}^{RMB}}$ is the residual of the following equation

$$\Delta e_{t,t+s}^{RMB} = \alpha + \beta \Delta e_{t,t+s}^{USD} + \delta_t \quad (4)$$

It is worth pointing out that in this modified model, the weight of RMB does not carry the same interpretation as the original one, as $\widehat{\Delta e_{t,t+s}^{RMB}}$ is not strictly the exchange rate movements of RMB. As a result the sum of the weights might not be equal to one either, even if we have included all the correct reference currencies in the basket.

Our data set includes daily exchange rate data for eight currencies in the ASEAN+3 region, over the period from January, 2002 to March, 2013. In addition to RMB, the other seven currencies include the Indonesian Rupiah (IDR), the Japanese yen (JPY), the Korean won (KRW), the Malaysian ringgit (MYR), the Philippine Peso (PHP), the Singapore dollar (SGD) and the Thai baht (THB). We exclude the countries whose de facto exchange rate arrangements are defined as either hard pegs or soft pegs by the International Monetary Fund⁴. We also exclude Myanmar due to data deficiency. We also pulled data for US dollar (USD), Euro (EURO), and Swiss franc (CHF).

During the sample period, the exchange rate policy of RMB has experienced substantial changes. Before July 2005, the RMB was more or less fixed to the US dollar. After that, the exchange rate has exhibited more flexibility, and has appreciated by more than 30 percent against the US dollar. The daily fluctuation of the spot exchange rate against the US dollar is still limited to 1 percent (0.5 percent before April 2012). Given the change of regime in July 2005, we would first divide our sample into pre-2005 and post-2005 eras. We are interested to see (1)

⁴ The hard peg refers to either no separate legal tender or currency board. Hong Kong SAR and Brunei Darussalam fall into this category. The soft peg refers to either conventional peg or stabilized arrangement. Cambodia, Lao PDR and Vietnam fall into this category.

whether the RMB acted as a reference currency for the major currencies in the region for these two periods, and (2) whether its weights in the respective currency baskets have changed. In addition, we would like to see whether the weights of the traditional anchor, the USD, have changed over these two periods and how did they compare with those of the RMB. To answer these questions, we are going to perform a series of hypothesis testing:

$$H_0 : w_{RMB}^{Pre-2005} = 0 \quad (H1)$$

$$H'_0 : w_{RMB}^{Post-2005} \geq 0 \quad (H2)$$

$$H''_0 : w_{USD}^{Post-2005} < w_{RMB}^{Post-2005} \quad (H3)$$

As the exchange rate fluctuations of RMB against the USD clearly showed different phases in the post-2005 period, we also divide our sample into more finite periods, following Hennig (2012) and Subramanian and Kessler (2012), to further examine the dynamics of weights during this period. We decide to have three sub-periods: July 2005 to June 2008, July 2008 to July 2010, and August 2010 to March 2013. The RMB/USD exchange rate exhibited higher volatility in the first and the third periods. Moreover, in addition to more exchange rate flexibility, the pace of RMB internationalization also quickened since 2009, with the expansion of cross border RMB settlement and further liberalization of the capital account. It is thus useful to see if these policy driven activities have had any impact on the exchange rate arrangement in the region.

II.2 Estimating the determinants of the weights

In this step, we try to explain the different factors that could affect the weights of the reference currencies, especially that of the RMB. The general model can be written as follows:

$$w_j = c + \sum_{k=1}^m \gamma_k X_k + \epsilon \quad (6)$$

where w_j is the weight of currency j , and X_k denotes factors that could determine the weight. The weight is obtained from the previous OLS regressions of the different currencies, and we would include the estimates from the post-2005 period for all the currencies into the cross sectional regression.

For the factors that can determine the weight, there could be several candidates. Trade integration is perhaps the most important, especially in our case, where the intra-regional trade has experienced explosive growth during the past decade, together with deeper vertical integration of the Asian supply chain. Another factor could be the financial integration with China. Although the capital account of China is still largely under control, and RMB is not fully convertible yet, there are increasing cross the border capital flows between China and the rest of the world, which may also exert some influence on the exchange rate determinations. The third group of factors could be some business cycle indicators, which may capture the level of co-movement of the economic cycles between China and the country, and can contribute to the weight of the RMB. In addition to the economic factors, we would also want to explore to what extent some policy factors may have affected the weights of the RMB.

In sum our specific model can then be written as:

$$w_{RMB} = c + \gamma_{Trade}Trade_{China} + \gamma_{Financial}Financial_{China} + \gamma_{Cycle}Cycle_{China} + \gamma_{policy}Policy + \epsilon \quad (7)$$

To better capture the trade integration with China, we include both the share of exports to China in total exports and that of imports from China in total imports into the equation. The data would come from the IMF's Direction of Trade Statistics, and we calculate the shares according to the different sample periods. However, given the different starting point in trade integration between China and the countries when RMB became more flexible, it might be more useful to use the change of the market shares rather than the level. To measure the financial integration, we would include here the share of cross border portfolio investments in China in

total portfolio for each country, based on the International Monetary Fund's CPIS database. Similar to the case of the trade, it might be more relevant to use the change of the share as a better indicator to capture the momentum of the financial integration, as the starting point of financial integration was different across the countries. For co-movement of the business cycle, we use the inflation correlations between China and the rest of the countries.

Apart from the economic indicators, we would like to include some policy factors as well. The change of the exchange rate regime is a major policy shift, but it is already captured by our division of sample periods. We would like to use some measures for the capital account liberalization, and the outward investment from China to these countries can serve as a proxy. During the period of 1999 to 2005, the average outward investment was 0.2 percent of GDP. From 2005 to 2012, it increased to 0.8 percent of GDP (Figure 5). Although the overall level is still low, the rapid increase is partly a result of the “going out” strategy that has accelerated after 2005. In our regression we would use China's outward investment stock in the countries adjusted by their respective nominal GDP as the variable to measure the overall impact of this policy driven factor.

III. Estimation Results

This section presents the estimation results following the methodologies outlined in the previous section. We start from the estimation of the weights of the currency baskets, and then proceed with the estimation of determinants of the weights. We will also discuss different extensions and robustness checks. Finally we will compare our results with those in the existing literature.

III.1 Estimation of the weights of the reference currencies

Tables 5.1 and 5.2 report the estimation results for equation (2). Two observations are worth noting. First of all, the significance of RMB appeared in six out of the seven currency baskets (with the exception of the Philippines peso) in the post-2005 sample, while it turned out to be insignificant unanimously in the pre-2005 sample. Secondly, the USD did not show significance in most of the currency baskets pre-2005 but is found to be a currency anchor for many of the currency baskets in the post-2005 sample, such as the Japanese yen, the Malaysian ringgit, the Singapore dollar, the Philippine peso, and the Thai baht. The movement of the Japanese yen and Euro had relatively smaller impact.

As mentioned in the previous section, in order to determine the impact of RMB, we need to deal with the potential multicollinearity problem of equation (2). This is done by running a regression based on equation (4), i.e. a regression of changes of RMB on that of the USD. The results in Table 6.1 show that the movements of RMB is indeed highly correlated to that of the USD. The whole sample estimate stands at 0.948, which means 1 percent of exchange rate movement between USD against the SDR will be associated with a 0.95 percent of movement between RMB against the SDR. Estimation results from the pre-2005 and post-2005 periods are even more revealing. From January 2002 to July 2005, the correlation of exchange rate movement between RMB and USD is perfect at 1, which reflects the fact that the RMB was basically pegged to the USD. After July 2005, the estimate dropped to 0.922, but the high value indicates that over 90 percent of the exchange rate change of RMB against the SDR can still be explained by that of the USD. This high correlation between RMB and USD exchange rate movements justifies the concern over multicollinearity, and gives us the reason to believe that it is necessary to run equation (3) by first removing the impact of USD from RMB.

Tables 6.2 to 6.3 report the results of the estimation of weights for equation (3), with the regressor of RMB the residual estimates from equation (4).

The results on the weights of the RMB are consistent with that of the previous regression. RMB is found to be a significant currency in six out the seven currencies in the post-2005 period, while it had no significance in the pre-2005 period. Moreover, the influence of RMB might have become more significant than other reference currencies for some Asian currencies. This can be seen from the larger values of the coefficients of the RMB (actually the residual RMB) for some currencies, such as the Japanese Yen, the Indonesian rupiah, the Malaysian ringgit and the Singapore dollar. The estimation results indicate that a 1 percent individual RMB exchange rate movement against the SDR (clear of the USD influence) is associated with a change of 0.94 percent for the Indonesian Rupiah, 0.89 percent for the Japanese Yen, 1.22 percent for the Malaysian ringgit, and 1.18 percent for the Singapore dollar. The magnitude of change associated with a 1 percent exchange rate change in the US dollar against the SDR for these currencies are all smaller, at 0.67 percent, -0.34 percent, 0.68 percent and 0.55 percent respectively.

The results on the USD however, are quite different from those obtained from regressions of equation (2). The estimates for the USD are found to be significant across all currencies and all sample periods. In the pre-2005 period, a 1 percent change of exchange rate movement of USD against the SDR will be associated with a change of around 1percent change for the Korean Won and the Malaysian ringgit, almost 0.8 percent for the Indonesian Rupiah, more than 0.6 percent the Thai Baht and more than 0.5 percent for the Singapore dollar. However, the impact of the USD seems to have weakened for some currencies in the post-2005 sample, such as the Indonesian rupiah, the Korean Won and the Malaysian ringgit. An exception is the Thai Baht,

where the correlation seems to have strengthened. The correlation between USD exchange rate movement against the SDR and that of the Singapore dollar has remained stable across the pre or post 2005 periods. The results mean that USD was and has remained a key anchor for the currencies in the region.

The changes of the weights of the US dollar in the currency baskets go hand in hand with the changes of weights of other reference currencies. Euro was only found to be a significant reference currency for the Japanese Yen in the pre-2005 period. This is not surprising as the flexibility of Yen is perhaps the highest among all currencies and Yen is a major international currency, while the other major Asian currencies basically followed the USD. In the post-2005 sample, however, Euro seems to have gained weights for the Thai baht and the Singapore dollar, in that it has become a significant reference currency in their respective baskets.

On the other hand, the role of Japanese Yen has also changed. Although its influence was smaller than that of the US dollar, the Yen was found to be a significant reference currency for the Indonesian rupiah, the Thai baht, and the Singapore dollar in the pre-2005 sample. In the post-2005 sample, the Yen seems to have dropped out of the basket of the Thai baht, and become a significant currency for the Malaysian ringgit. However, the correlations between the Japanese Yen and these currencies have been negative, and at relatively low levels, i.e. a 1 percent exchange rate movement of Yen against the SDR would be associated with a small change of the exchange rate movement in the opposite direction.

Table 7 reports the results of our hypothesis testing of equations H1 to H3. The results show that we cannot reject the null that the weight of RMB is zero for the pre-2005 period for all currencies (at 5 percent significance level), and we cannot reject the null that the weight in the post-2005 period is bigger than zero in six out of seven cases (with the exception of the

Philippines peso). For the comparison of the weights of USD and the RMB in the post-2005 period, the results show that we cannot reject the null that the weight of USD is smaller than that of the RMB in five out of the seven cases, with the exception of the Philippines peso and that of the Korean won.

Tables 8.1 to 8.3 report the estimation results using a different numeraire, the Swiss franc (CHF), instead of the SDR. Although the coefficients are somewhat different, the major findings are very similar. The significance of the RMB only appeared in the post-2005 sample, and in terms of the magnitude of influence, the individual RMB exchange rate movements seem to have dominated in some currencies.

Table 9.1 to 9.3 report the estimation results for the post-2005 period. Here we divide the sample further into three sub-periods, July 2005 to June 2008, June 2008 to July 2010, July 2010 to March 2013. The results show that the weights for RMB actually change between these sub-periods. The weights have been significant for the Indonesian Rupiah, the Malaysian ringgit and the Singapore dollar across the whole sample. In the case of Japan and Korea, it only mattered in the sub-period of July 2005 to June 2008, but not afterwards. The opposite is true for Thailand, where the RMB did not become a significant reference currency until after 2008. RMB is not a significant reference currency for the Philippines peso even in the latest sample period.

III.2 Estimation of the determinants for the weights

Table 10 reports the correlations of the variables included in the second stage regression based on equation (7) and Table 11 reports the estimation results. As discussed, we run the regression for weights of RMB obtained from the post-2005 period when higher flexibility and exchange rate volatility are observed.

Results show that trade integration is perhaps the most important factor associated with the increasing weights of RMB in the currency baskets of the countries. However, the relationship might be different through the export and import channels. A higher growth of exports to China would tend to increase the weight of RMB in the currency basket, but not a higher growth of imports. The results are significant across different specifications. A faster financial integration with China, as measured by the growth of the portfolio holding share in total overseas portfolio holdings, also contributes to the increase of the weight of RMB. The co-movement of economic cycles, as measured by the inflation correlations between China and the respective countries, does not seem to be a significant factor affecting the weight. The outward investments from China to these countries also turn out to be a factor associated with higher weight of RMB in the currency baskets. It seems that the “going out” policies pursued by the Chinese government did in a way affect the exchange rate determination of the major currencies in the region.

Our results are generally in line with the findings of other similar works, although the analysis is limited to the size of sample and the availability of data. For example Subramanian and Kessler (2012) found that there is a positive and significant relationship between the weights and the trade integration with China (measured as share of manufacturing trade with china over all manufacturing trade, and total trade of goods except oil) on a broader set of countries. Fratzscher and Mehl (2011) also found positive relationship with both exports and imports in some cases with a broad set of countries, although the exchange rate flexibility is found to be the major contributor. Our results are obtained from cross sectional data based on the seven currencies we study. While the small sample size could be an issue, the relationship between the weights and trade integration and financial integration seems to be strong and significant..

IV. Policy Implications

In the recent years, China's emergence as a key player in the global economy is a major factor underpinning the export performance and foreign direct investment flows in the Asian region. The wider use of RMB outside China since 2009 has fostered closer trade and financial linkages with ASEAN+3 economies. Our empirical results suggest that the dominating status of the US dollar has weakened and the weight of the RMB in the currency basket in ASEAN+3 currencies has been increasing.

There are several policy issues related to this evolution, namely, intra-regional exports at the background of China's rebalancing, reduction of trade transaction cost from a regional settlement system, risks associated to China's outward foreign direct investment in region and future evolution of RMB internationalization.

While regional production networks that are centered on China have promoted greater trade interdependence amongst countries in the region, China is also increasingly becoming a final destination for consumer goods, which has further encouraged intra-regional trade in final goods and services. Shown in the GDP figures of 2012, domestic consumption overtook investment in driving growth. So, amid the weak exports demand from Europe and the US and besides maintaining relative stable exchange rates against the RMB, the challenge to other ASEAN+3 economies is whether their exports could be diversified from commodity exports and component exports for processing in China to final consumption goods for the Chinese domestic markets.

Although the wider use of RMB outside China has reduced exchange rate risks and promoted more trade and financial integration, high bilateral transaction costs between non-US dollar currencies could hindered further integration between China and other ASEAN+3

economies. Relating to this, the ADB has advocated an expansion of the bilateral trade settlement systems, coupled with government bond settlement, into a regional settlement system (ADB 2007 and 2010, Rhee and Sumulong 2012). It is expected that the proposed regional settlement system will reduce significantly the transaction cost and promote further trade and financial integration. Given the existing efficient RMB settlement system in Hong Kong and the key role of the Chinese economy in the region, market force will most likely push RMB become an alternative currency of the region and reduce Asia's dependence on the US dollar.

On the financial integration, China's outward foreign direct investments (FDI) in the region have been relatively resilient despite periods of economic downturns. Chinese banks have been the main source of finance to these outward FDI projects. Amid the need of upgrading industrial production in China, more outward FDI projects are expected in the near term. As such, the policy issues are whether these banks have adequate risk management on the projects, as they have yet to reach international standards in risk management, and the Chinese regulators and supervisors have been fully aware of the risks posed to the banking system of China. In particular, the cross-border bank supervision between China and neighboring countries is still weak.

Finally, future evolution of RMB internationalization will mainly hinge on the continuous reforms of the Chinese financial sector because the RMB will not be widely used globally unless China could reform its financial sector to a stage that the country could open up its financial markets to overseas borrowers and lenders and relax most regulations of cross-border financial transactions (Gao and Yu 2011, Yu 2012). Given the current development stage of the Chinese financial sector, it might still need some years to accomplish this. So, it is still desirable for China to continue to pursue a path to become a regional currency in an orderly way.

V. Conclusion

This paper has presented the empirical evidence of the RMB's increasing role in determining the exchange rate movements in the ASEAN+3 region. After China adopted more flexible exchange rate policies since July 2005, and with the faster pace in liberalization of the capital account and strong push for RMB cross border use since the onset of the global financial crisis, the role of RMB as an international currency has been strengthened, and our analysis shows that RMB has become an anchor currency for at least some major currencies in the region, along with the US dollar, the traditional anchor.

The closer trade and financial integration between China and the region is found to be the major force behind the rise of the RMB. However, at least some of the financial integration is driven by strong policy push to liberalize the capital account and encourage the RMB to “go out”. To a lesser extent, the global financial crisis, which witnessed the weakness of the current US dollar dominated international monetary system, has also provided the chance for RMB to step in as the anchor currency in the East and Southeast Asian region.

Our findings are generally consistent with those of the other works. In addition to updating the existing literature with latest available data, the major contribution of our work lies in our analysis of the determinants of the weights, and our explicit inclusion of a policy related factor. Although the analysis is only suggestive, and limited by the sample size, the results are consistent with our assumptions and we hope it can generate more interest in further research on this topic.

With more open capital account and more flexible exchange rate, the RMB could rise further in the international monetary system, and China's macroeconomic policy could have stronger implications for the global economy. This paper only studies one aspect of the

international role of the RMB, i.e. the emerging role of an anchor currency, and focuses on the ASEAN+3 region. One natural extension of the research would be to study whether RMB can be the anchor to an optimal currency area in the region. Another extension would be to expand the sample and study the global implications of the RMB in a more comprehensive manner. This would involve assessment of the status of RMB as a reserve currency and its functions as medium of exchange, store of value and unit of account. We reserve these possible extensions for future research.

References

- Asian Development Bank (2007), Regional Technical Assistance 6338 Final Report: Minimizing Foreign Exchange Settlement Risk in the ASEAN+3 Region, August. Manila.
- Asian Development Bank (2010), ABMI Group of Experts Financial Report Part II: Evaluation of the Feasibility of Regional Settlement Intermediary Options for the ASEAN+3. June. Manila.
- Bénassy-Quéré, A., B. Coeuré, and V. Mignon, 2006. On the Identification of De Facto Currency Pegs, *Journal of the Japanese and International Economies*, Vol. 20 (March), pp. 112–27.
- Chen H., W. Peng and C. Shu (2009), “The Potential of the Renminbi as an International Currency,” *BIS Asian Research Program Research Papers*, February 2009.
- Cheung, Y-W., M. Guonan, and R. N. McCauley (2011), “Renminbising China’s Foreign Assets”, *Pacific Economic Review*, 16(1), 1-17.
- Eichengreen, Barry (2011). *Exorbitant Privilege: The Rise and Fall of the Dollar and the Future of the International Monetary System*. Oxford University Press, January 2011.
- Frankel, Jeffrey (2011), “Internationalization of the RMB and Historical Precedents,” *Journal of Economic Integration*, 2012, vol. 27, no. 3, pp.329-365. (Written for a workshop organized by the Council on Foreign Relations and the China Development Research Foundation).
- Frankel, Jeffrey, and Daniel Xie. 2010. Estimation of De Facto Flexibility Parameter and Basket Weights in Evolving Exchange Rate Regimes. Working Paper Series WP10-1. Washington, DC: Peterson Institute for International Economics.
- Frankel, Jeffrey, and Shang-Jin Wei. 2007. Assessing China’s Exchange Rate Regime. *Economic Policy* 22(51):575-614.
- Frankel, Jeffrey, and Shang-Jin Wei. 1994. Yen Bloc or Dollar Bloc? Exchange Rate Policies of the East Asian Economies. In *Macroeconomic Linkages: Savings, Exchange Rates and Capital Flows*, eds. Takatoshi Ito and Anne O. Krueger. Chicago: University of Chicago Press.
- Fratzscher, M and A Mehl (2011). China’s Dominance Hypothesis and the Emergence of a Tri-polar Global Currency System, *CEPR Discussion Paper*, No. 8671, November 2011.
- Gao, Haihong & Yongding Yu, 2011. "Internationalisation of the renminbi," BIS Papers chapters, in: Bank for International Settlements (ed.), *Currency internationalisation: lessons from the global financial crisis and prospects for the future in Asia and the Pacific*, volume 61, pages 105-124
- Girardin, Eric. 2011. A De Facto Asian-Currency Unit Bloc in East Asia: It Has Been There but We Did Not Look for It. *Working Paper Series* 11/262. Tokyo: Asian Development Bank Institute.
- Henning, C. Randall. 2012. “Choice and Coercion in East Asian Exchange Rate Regimes.” *Peterson Institute Working Paper*.
- Ito, Takatoshi. 2011. “The Internationalization of the RMB: Opportunities and Pitfalls.” *CGS/IIIG Working Paper*, Council of Foreign Relations, November.

Kawai, Masahiro. 2012. "Renminbi (RMB) Internationalization: Japan and China," Presentation given at the Renminbi Internationalization: Japan and the People's Republic of China event which was held in People's Bank of China, Beijing on 21 May 2012. <http://www.adbi.org/conf-seminarpapers/2012/05/29/5072.renminbi.internationalization.japan.prc/>

Ma, G. and R. McCauley (2010), "The Evolving Renminbi Regime and Implications for Asian Currency Stability," *BIS working paper*, No. 312, September 2010.

Mattoo, Aaditya, Prachi Mishra, and Arvind Subramanian. 2012. Spillover Effects of Exchange Rates: A Study of the Renminbi. IMF Working Paper 12/88. Washington, D.C.: International Monetary Fund.

McKinnon, R. and G. Schnabl, 2004. The East Asian Dollar Standard, Fear of Floating, and Original Sin, *Review of Development Economics*, 8(3), 331–360.

Park, Yung Chul and Chi-Young Song. 2011. "Renminbi Internationalization: Prospects and Implications for Economic Integration in East Asia." *Asian Economic Papers*. Vol. 10, No. 3, Pages 42-72

Prasad E., and L. Ye (2012). The Renminbi's Role in the Global Monetary System, Brookings Institution, Washington DC.

Pontines, V., and R. Siregar (2010): "Fear of Appreciation in East and Southeast Asia: The Role of the Chinese Renmibi", Working Paper.

Rhee, Changyong and Lea Sumulong (2012), "A Practical Approach to International Monetary System Reform: Building Settlement Infrastructure for Local Currency Internationalization", the ADB-CICG-HKIMR Conference on "The BRICs and Asia, Currency International, and International Monetary Reform", 10-11 December 2012, Hong Kong, China.

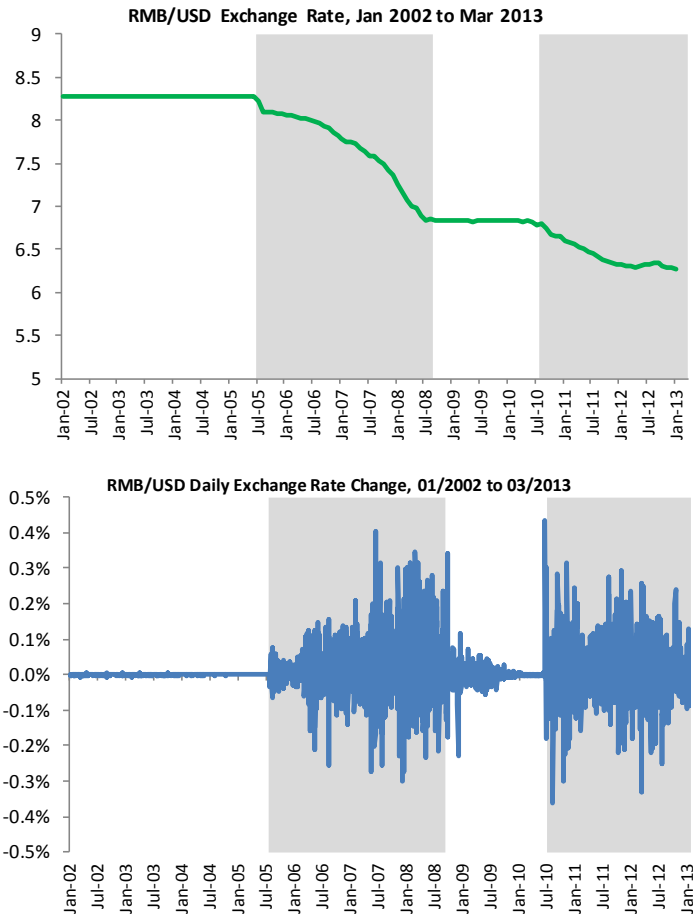
Subramanian, Arvind. 2011. Eclipse: Living in the Shadow of China's Economic Dominance. PIIE, Washington D.C.

Subramanian, A and M. Kessler (2012). The Renminbi Bloc is Here: Asia Down, Rest of the World to Go?. PIIE, Washington D.C.

Takagi, Shinji. 2011. "Internationalising the yen, 1984-2003: unfinished agenda or mission impossible?," BIS Papers chapters, in: Bank for International Settlements (ed.), Currency internationalisation: lessons from the global financial crisis and prospects for the future in Asia and the Pacific, volume 61, pages 75-92

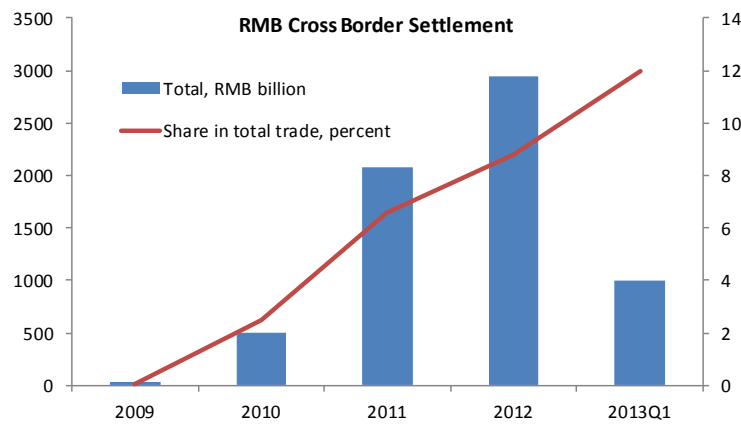
Yu, Yongding. 2012. "Revisiting the Internationalization of the renminbi." *ADBI Working Paper*, No 366. July.

Figure 1 RMB/USD Exchange Rate, Jan 2002 to Mar 2013



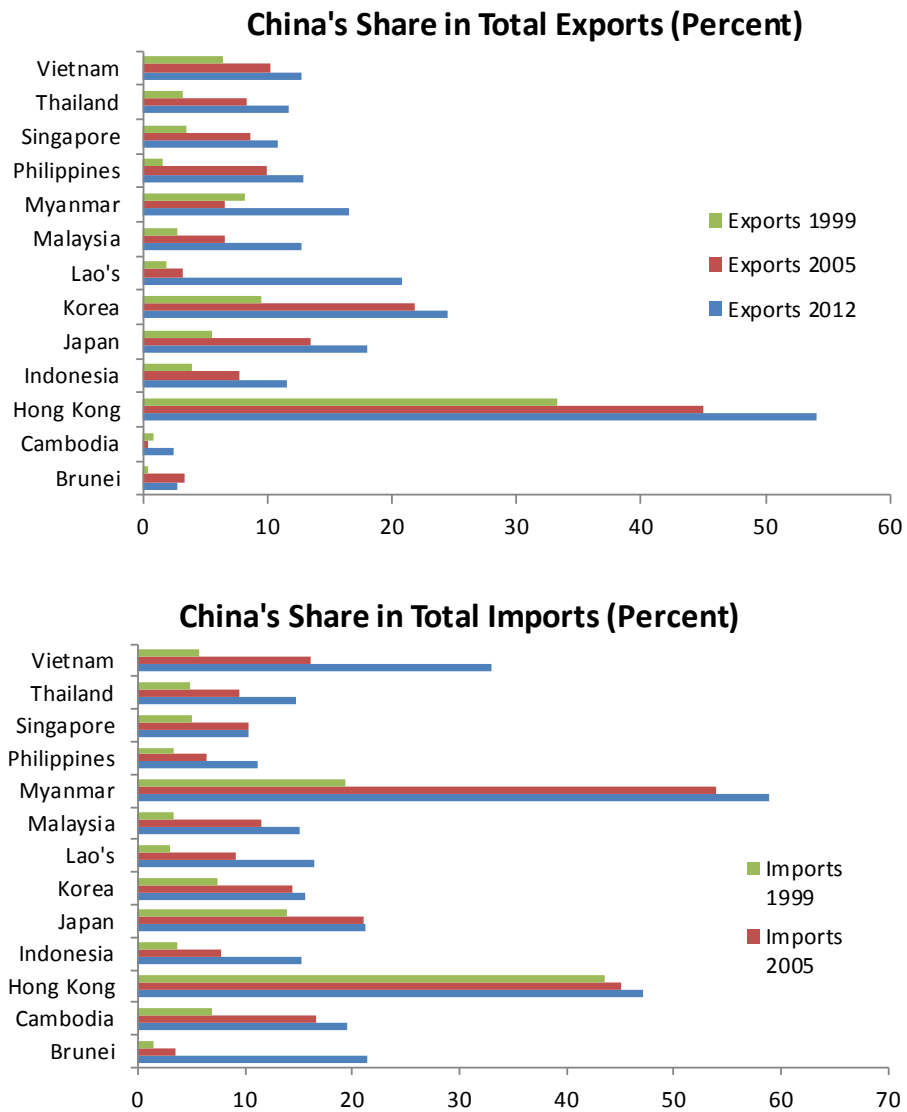
Sources: CEIC, International Monetary Fund, and author calculations

Figure 2 Renminbi Cross Border Settlement



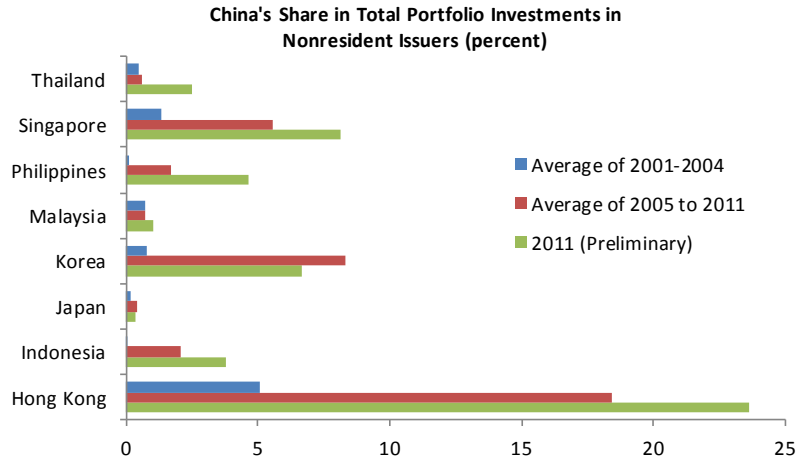
Sources: People's Bank of China, and author calculations.

Figure 3 China's Market Share in Trade in ASEAN+3 Economies



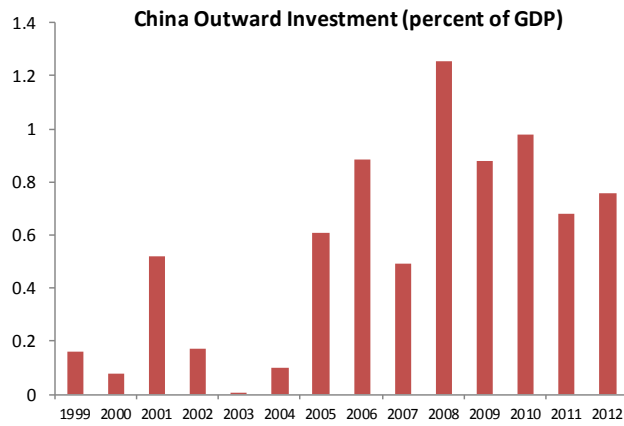
Sources: IMF Direction of Trade Statistics.

Figure 4 Portfolio Investments in China of Selected ASEAN+3 Economies



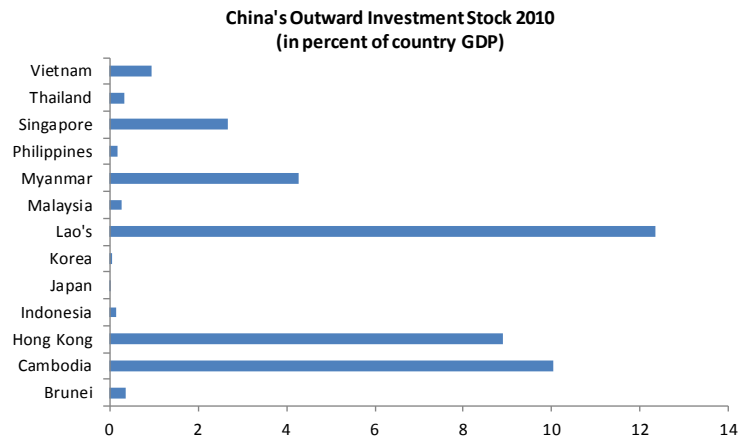
Sources: Coordinated Portfolio Investment Survey, IMF, and author calculations.

Figure 5 China's Outward Investments, 1999-2012



Sources: State Administration of Foreign Exchange, and author calculations.

Figure 6 China's Outward Investments in Selected ASEAN+3 Economies



Sources: 2010 Statistical Bulletin of China's Outward Foreign Direct Investment, and author calculation.

Figure 7 Nominal and Real Exchange Rate of Selected ASEAN+3 Currencies

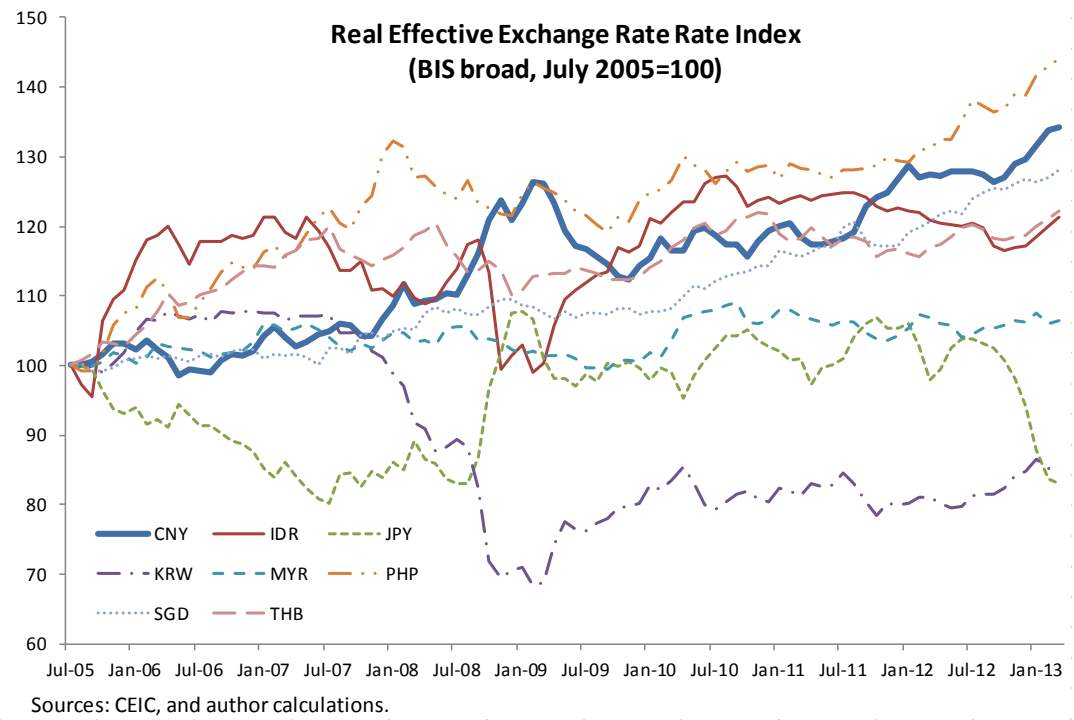
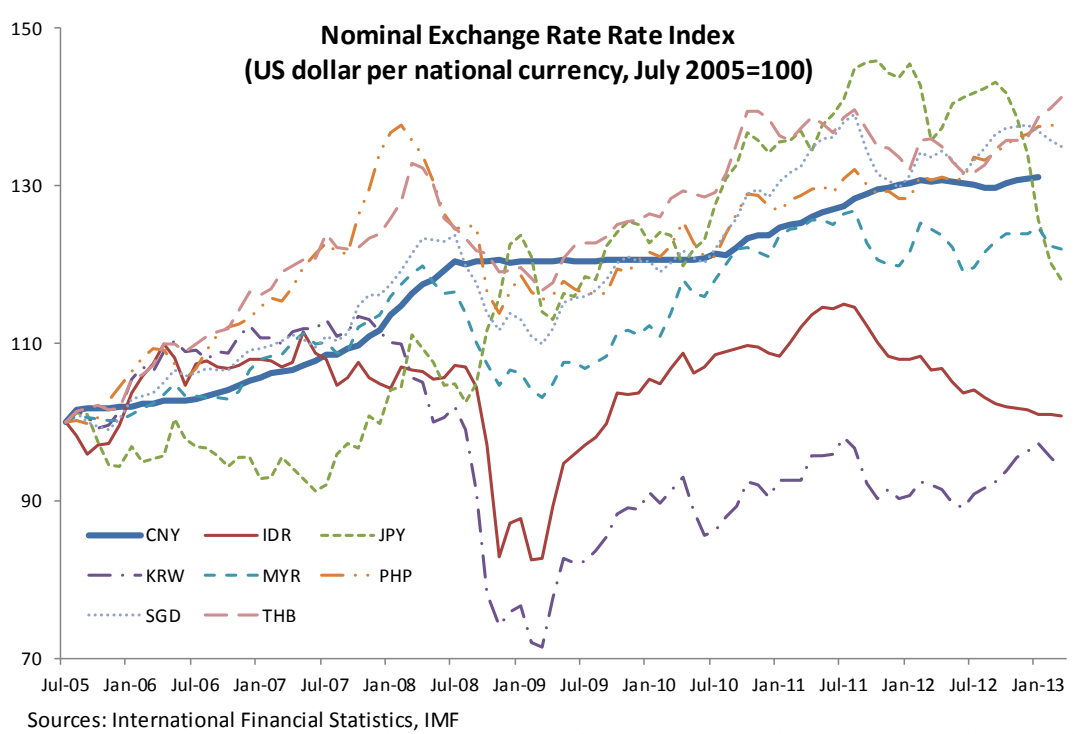
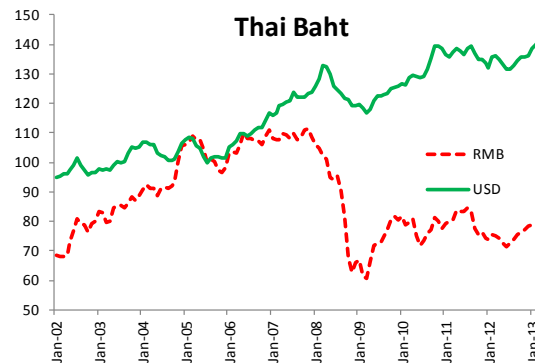
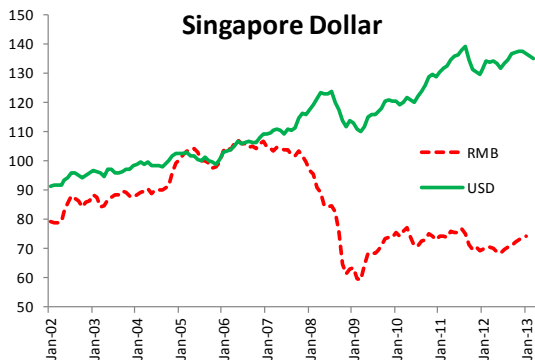
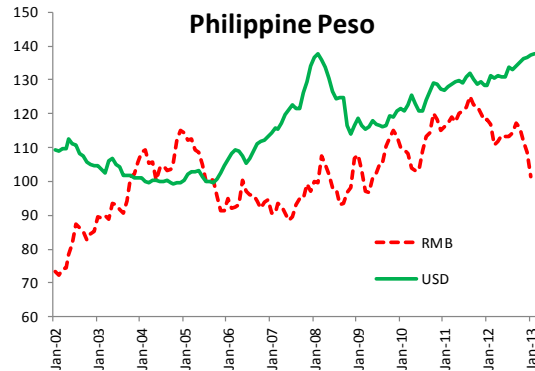
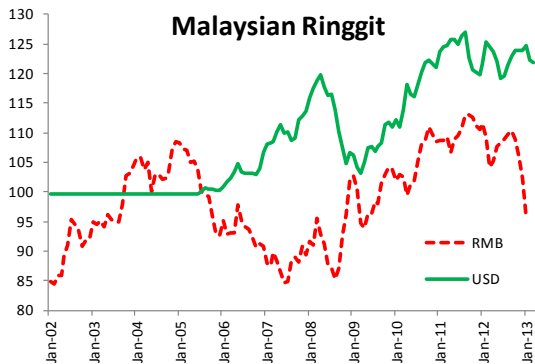
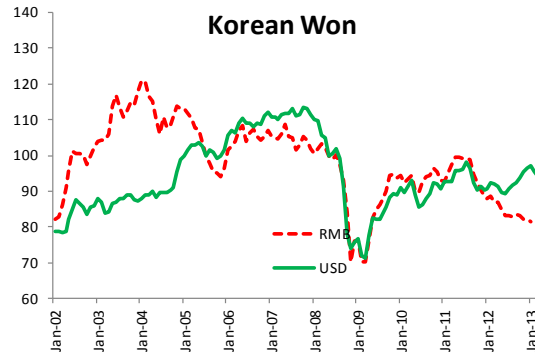
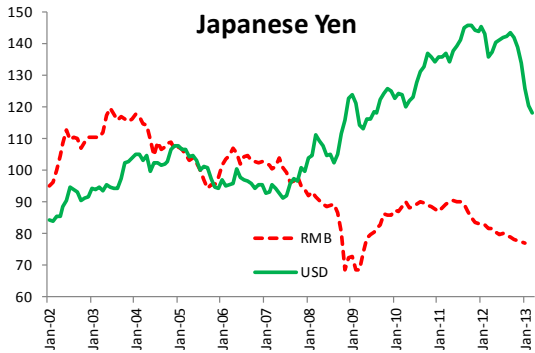
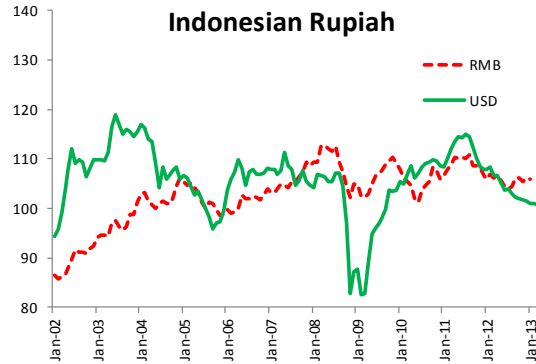
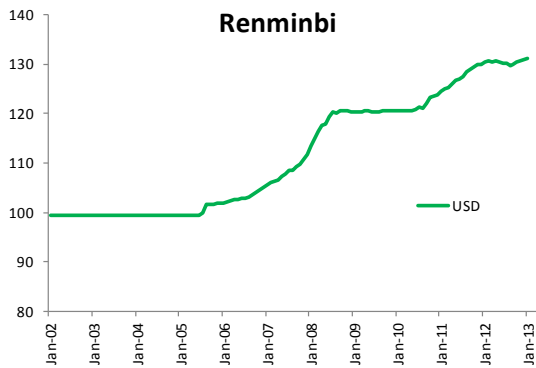


Figure 8 Bilateral Exchange Rate against USD and RMB of Selected ASEAN+3 Currencies



Sources: International Financial Statistics, and author calculations.

Table 1 Annualized Growth of Trade with China, 1999 to 2012 (percent)

	Imports from China	Exports to China
Overall	20.2	19.8
Japan	13.6	12.6
Korea	19.2	20.4
Hong Kong SAR	7.6	18.2
ASEAN	21.9	24.2
Brunei	27.5	31.3
Indonesia	19.8	25.6
Malaysia	23.9	26.8
Philippines	26.7	21.2
Singapore	16.2	18.5
Thailand	22.4	26.7
Vietnam	34.2	31.6

Sources: CEIC, and author calculations.

Table 2 Existing Swap Agreement with ASEAN+3 Memembs (RMB billion)

	Date	Size	Maturity
Hong Kong SAR	November 22, 2011	400	3 years
Korea	October 26, 2011	360	3 years
Malaysia	February 8, 2012	180	3 years
Singapore	March 7, 2013	300	3 years
Thailand	December 22, 2011	70	3 years
Total		1310	

Source: People's Bank of China.

Table 3 Exchange Rate Arrangements and Monetary Policy Framework

	De Facto Exchange Arrangement	Monetary Policy Framework	
		Exchange Rate Anchor	Other
Brunei	Currency board	Singapore dollar	
Cambodia	Stabilized arrangement	US dollar	
China	Crawllike arrangement		Monetary aggregate target
Hong Kong SAR	Currency board	US dollar	
Indonesia	Floating		Inflation targeting
Japan	Free floating		Other
Korea	Floating		Inflation targeting
Lao's PDR	Currency board		Other
Malaysia	Other managed arrangement		Other
Myanmar	Floating		
Philippines	Other managed arrangement		Inflation targeting
Singapore	Other managed arrangement	Composite	
Thailand	Floating		Inflation targeting
Vietnam	Stabilized arrangement	Composite	

Source: Annual Report on Exchange Arrangements and Exchange Restrictions, October 2012, IMF

Table 4 Correlations of Exchange Rate Movements

	1/2002-6/2005	6/2005-06/2008	07/2008-06/2010	06/2010-03/2013
Indonesian rupiah	0.27	0.41	0.16	0.60
Japanese yen	0.10	0.05	0.26	0.32
Korean won	0.67	0.51	0.34	0.57
Malaysian ringgit	1.00	0.54	0.48	0.40
Philippines peso				0.69
Singapore dollar	0.62	0.62	0.42	0.42
Taiwan dollar	0.66	0.52	0.87	0.60

Sources: IMF, and author calculations.

Table 5.1 Estimated Weights of Reference Currencies, January 2002 to July 2005

	IDR	JPY	KRW	MYR	SGD	THB
USD	-16.071 (0.75)	6.885 (0.49)	-2.881 (0.24)	0.958 (31.48)**	-8.922 (1.61)	-2.568 (0.52)
EUR	0.214 (1.69)	-0.533 (6.48)**	-0.012 (0.19)	-0.000 (1.73)	0.013 (0.39)	0.038 (1.08)
JPY	0.240 (3.33)**		0.044 (1.30)	-0.000 (0.30)	0.251 (15.01)**	0.234 (11.62)**
CNY	16.864 (0.79)	-7.132 (0.51)	3.886 (0.33)	0.042 (1.39)	9.464 (1.71)	3.191 (0.65)
Constant	-0.000 (0.58)	0.000 (0.42)	0.000 (1.44)	0.000 (0.07)	0.000 (0.14)	-0.000 (0.46)
R^2	0.13	0.08	0.42	1.00	0.56	0.56
N	597	736	625	721	690	609

Note: * P<0.05, ** P<0.01

Table 5.2 Estimated Weights of Reference Currencies, July 2005 to March 2013

	IDR	JPY	KRW	MYR	SGD	PHP	THB
USD	-0.196 (1.14)	-1.178 (6.34)**	0.417 (1.78)	-0.445 (3.37)**	-0.537 (4.79)**	0.956 (4.99)**	0.399 (3.38)**
EUR	-0.024 (0.37)	-0.796 (9.53)**	-0.150 (1.25)	0.057 (1.37)	0.073 (2.13)*	-0.047 (0.84)	-0.066 (2.18)*
JPY	-0.255 (4.86)**		-0.006 (0.09)	-0.130 (6.95)**	-0.064 (4.16)**	-0.026 (0.96)	-0.008 (0.56)
CNY	0.933 (5.15)**	0.888 (4.61)**	0.583 (2.41)*	1.221 (8.86)**	1.181 (10.54)**	0.105 (0.52)	0.444 (3.54)**
Constant	-0.000 (1.13)	-0.000 (0.12)	-0.000 (1.25)	-0.000 (1.28)	-0.000 (0.73)	0.000 (0.13)	0.000 (0.41)
R^2	0.09	0.15	0.17	0.29	0.26	0.52	0.48
N	1,430	1,576	1,466	1,427	1,500	415	1,307

Note: * P<0.05, ** P<0.01

Table 6.1 USD as Reference Currency for RMB (SDR based)

	Total	Pre-2005	Post-2005
USD	0.948 (217.82)**	1.000 (6869.2)**	0.922 (135.49)**
R^2	0.952	1.00	0.928
N	2531	832	1699

Note: * P<0.05, ** P<0.01

**Table 6.2 Estimated Weights of Reference Currencies, January 2002 to July 2005
(SDR based, RMB residual)**

	IDR	JPY	KRW	THB	MYR	SGD
USD	0.795 (5.88)**	-0.247 (2.83)**	1.006 (14.33)**	0.624 (14.66)**	1.000 (19,045.42)**	0.543 (15.37)**
EUR	0.214 (1.69)	-0.533 (6.48)**	-0.012 (0.19)	0.038 (1.08)	-0.000 (1.73)	0.013 (0.39)
JPY	0.240 (3.33)**		0.044 (1.30)	0.234 (11.62)**	-0.000 (0.30)	0.251 (15.01)**
RMB	16.864 (0.79)	-7.132 (0.51)	3.886 (0.33)	3.191 (0.65)	0.042 (1.39)	9.464 (1.71)
Constant	-0.000 (0.58)	0.000 (0.42)	0.000 (1.44)	-0.000 (0.46)	0.000 (0.07)	0.000 (0.14)
R^2	0.13	0.08	0.42	0.56	1.00	0.56
N	597	736	625	609	721	690

Note: * P<0.05, ** P<0.01

**Table 6.3 Estimated Weights of Reference Currencies, July 2005 to March 2013
(SDR based, RMB residual)**

	IDR	JPY	KRW	THB	MYR	SGD	PHP
USD	0.668 (6.39)**	-0.340 (3.24)**	0.948 (7.46)**	0.806 (22.15)**	0.684 (13.98)**	0.550 (13.35)**	1.051 (12.43)**
EUR	-0.011 (0.17)	-0.765 (9.00)**	-0.153 (1.24)	-0.068 (2.20)*	0.063 (1.49)	0.079 (2.23)*	-0.057 (0.94)
JPY	-0.262 (4.87)**		-0.006 (0.09)	-0.009 (0.55)	-0.132 (6.93)**	-0.071 (4.53)**	-0.041 (1.26)
RMB	0.936 (5.13)**	0.890 (4.63)**	0.579 (2.37)*	0.451 (3.55)**	1.215 (8.75)**	1.180 (10.42)**	0.100 (0.48)
Constant	-0.000 (1.16)	-0.000 (0.03)	-0.000 (1.05)	0.000 (0.26)	-0.000 (1.22)	-0.000 (0.69)	0.000 (0.37)
R^2	0.09	0.14	0.17	0.48	0.29	0.26	0.51
N	1,397	1,539	1,431	1,272	1,396	1,464	381

Note: * P<0.05, ** P<0.01

Table 7 Hypothesis Testing – P values

	IDR	JPY	KRW	MYR	SGD	PHP	THB
H1	0.431	0.610	0.742	0.165	0.0886		0.517
H2	0.999	0.000	0.992	1.000	1.0000	0.6976	0.9998
H3	0.928	1.000	0.069	0.9999	0.9999	0.00002	0.002

**Table 8.1 Estimated Weights of Reference Currencies, July 2005 to June 2008
(SDR based)**

	IDR	JPY	KRW	THB	MYR	SGD
USD	0.099 (0.40)	-2.177 (8.56)**	0.336 (1.35)	0.900 (4.26)**	-0.156 (0.94)	-0.171 (1.39)
EUR	0.165 (1.28)	-0.955 (7.65)**	-0.098 (0.84)	-0.153 (2.13)*	0.045 (0.65)	0.082 (1.55)
JPY	-0.158 (3.79)**		-0.022 (0.51)	-0.026 (0.71)	-0.118 (4.42)**	-0.009 (0.42)
CNY	0.847 (3.39)**	1.615 (5.85)**	0.717 (2.89)**	-0.079 (0.33)	0.943 (5.67)**	0.845 (6.88)**
Constant	-0.000 (1.66)	-0.000 (2.01)*	-0.000 (0.60)	0.000 (0.97)	-0.000 (1.06)	-0.000 (0.77)
R^2	0.15	0.18	0.31	0.35	0.35	0.34
N	561	634	554	477	558	605

Note: * P<0.05, ** P<0.01

**Table 8.2 Estimated Weights of Reference Currencies, June 2008 to June 2010
(SDR based)**

	IDR	JPY	KRW	THB	MYR	SGD
USD	-4.516 (2.36)*	-2.348 (1.70)	-5.133 (1.65)	-0.565 (1.21)	-1.487 (2.15)*	-2.906 (4.48)**
EUR	-0.041 (0.30)	-0.784 (4.73)**	-0.326 (1.24)	-0.102 (2.01)*	0.072 (1.03)	0.090 (1.65)
JPY	-0.429 (4.49)**		0.009 (0.07)	0.002 (0.10)	-0.160 (4.80)**	-0.125 (5.07)**
CNY	5.179 (2.62)**	2.204 (1.56)	6.107 (1.90)	1.524 (3.16)**	2.311 (3.25)**	3.603 (5.52)**
Constant	0.000 (0.09)	0.001 (1.30)	-0.001 (1.44)	-0.000 (0.42)	-0.000 (0.05)	0.000 (0.39)
R^2	0.08	0.15	0.14	0.78	0.33	0.33
N	352	381	370	324	360	365

Note: * P<0.05, ** P<0.01

**Table 8.3 Estimated Weights of Reference Currencies, June 2010 to March 2013
(SDR based)**

	IDR	JPY	KRW	THB	MYR	SGD	PHP
USD	-0.043 (0.24)	-0.155 (0.66)	1.136 (3.71)**	-0.072 (0.56)	-0.701 (3.26)**	-0.706 (3.57)**	0.956 (4.99)**
EUR	-0.039 (0.65)	-0.663 (6.06)**	-0.011 (0.12)	-0.020 (0.48)	0.055 (0.83)	0.066 (1.13)	-0.047 (0.84)
JPY	-0.014 (0.58)		-0.044 (0.87)	0.005 (0.21)	-0.069 (2.37)*	0.000 (0.01)	-0.026 (0.96)
CNY	0.965 (5.53)**	-0.048 (0.18)	-0.031 (0.09)	0.742 (5.65)**	1.448 (6.19)**	1.370 (6.72)**	0.105 (0.52)
Constant	-0.000 (0.89)	-0.000 (0.34)	0.000 (0.47)	0.000 (0.25)	-0.000 (0.86)	-0.000 (0.01)	0.000 (0.13)
R^2	0.38	0.16	0.27	0.37	0.23	0.23	0.52
N	517	562	543	507	510	531	415

Note: * P<0.05, ** P<0.01

Table 9.1 USD as Reference Currency for RMB (Swiss franc based)

	Total	Pre-2005	Post-2005
USD	0.948 (217.82)**	1.000 (6869.2)**	0.922 (135.49)**
R^2	0.952	1.00	0.928
N	2531	832	1699

Note: * P<0.05, ** P<0.01

Table 9.2 Estimated Weights of Reference Currencies, January 2002 to July 2005 (Swiss franc based, RMB residual)

	IDR	JPY	KRW	THB	MYR	SGD
USD	0.674 (6.08)**	0.677 (19.53)**	0.988 (31.26)**	0.659 (24.64)**		1.000 (33,606.66)**
EUR	0.174 (1.60)	0.069 (0.87)	-0.070 (1.13)	0.083 (2.18)*		-0.000 (1.13)
JPY	0.213 (3.18)**		0.038 (1.20)	0.243 (12.60)**		0.000 (0.82)
Residuals	11.751 (0.50)	-3.379 (0.19)	9.953 (0.80)	1.836 (0.36)		0.047 (1.34)
Constant	-0.000 (0.33)	0.000 (0.49)	0.000 (1.58)	0.000 (0.23)		0.000 (0.05)
R^2	0.46	0.46	0.78	0.90		1.00
N	534	649	553	537		634

Note: * P<0.05, ** P<0.01

Table 9.3 Estimated Weights of Reference Currencies, July 2005 to March 2013 (Swiss franc based, RMB residual)

	IDR	JPY	KRW	THB	MYR	SGD	PHP
USD	0.985 (16.34)* *	0.804 (20.10)**	1.066 (13.86)**	0.948 (49.37)**	0.898 (34.61)**	0.785 (40.88)**	1.075 (28.03)**
EUR	0.170 (2.82)**	-0.137 (2.25)*	-0.100 (1.42)	0.034 (2.06)*	0.186 (6.89)**	0.217 (9.11)**	-0.050 (1.75)
JPY	-0.242 (4.21)**		0.012 (0.19)	0.009 (0.64)	-0.116 (6.12)**	-0.050 (3.22)**	-0.047 (1.47)
Residuals	1.043 (5.49)**	1.208 (5.76)**	0.650 (2.48)*	0.533 (3.98)**	1.332 (9.23)**	1.270 (10.53)**	0.129 (0.62)
Constant	-0.000 (1.03)	-0.000 (0.22)	-0.000 (0.83)	0.000 (0.22)	-0.000 (0.94)	-0.000 (0.53)	0.000 (0.21)
R^2	0.38	0.45	0.51	0.87	0.80	0.82	0.89
N	1,336	1,458	1,362	1,204	1,324	1,385	368

Note: * P<0.05, ** P<0.01

Table 10 Pairwise Correlation of the Variables in Estimation of Determinants

	Weight	Export share growth	Import share growth	Portfolio holding share growth	Inflation correlation	China's outward investment
Weight	1.000					
Export share growth	0.365	1.000				
Import share growth	-0.666	0.276	1.000			
Portfolio holding share growth	0.173	0.025	0.217	1.000		
Inflation correlations	0.254	-0.100	-0.623	-0.838	1.000	
China's outward investment	0.441	-0.233	-0.376	-0.176	0.412	1.000

Table 11 Determinants of the Weights for RMB

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Export	0.867 (4.27)*				0.887 (4.81)*	0.905 (3.99)*	0.932 (5.87)**
Import	-0.989 (4.19)*				-1.086 (5.55)*	-1.247 (5.14)*	-0.861 (4.08)*
Portfolio investment		0.000 (0.96)			0.001 (8.67)**		
Inflation			0.385 (0.56)			-0.508 (1.67)	
FDI from China				0.190 (3.01)*			0.137 (4.06)*
Constant	0.735 (3.90)*	0.737 (3.78)*	0.559 (1.26)	0.664 (3.61)*	0.702 (3.30)*	1.078 (4.13)*	0.592 (5.60)*
R^2	0.77	0.03	0.06	0.19	0.89	0.84	0.85
N	7	7	7	7	7	7	7

Note: * P<0.05, ** P<0.01