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Towards an Expanded Role for Asian Currencies: Issues and Prospects

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Abstract

Notwithstanding incumbency advantages and network effects enjoyed by the United States (US) dollar, considerations about the stability of its value have led Asian countries to fear they are holding their foreign exchange reserves in a depreciating currency. At the same time, it pays for the regional countries to adjust their reserve currency composition to match the point of reference of their exchange rate policy. This paper examines empirically which regional currency or currencies seem to matter for exchange rate determination in Asia beyond the very short term. To this end, we employ country-specific Vector Autoregressive (VAR) models to compare the relative impact which fluctuations in the Asian Currency Unit (ACU), yuan, and yen separately have on movements of Asian currencies. Contrary to recent evidence based on daily data, we found monthly exchange rates variations in the region are more heavily influenced by the cumulative effect of key Asian currencies than by the yuan or the yen individually within the sample period we used. To the extent that exchange rates in the region shift over time from benchmarking the US dollar towards a broad range of Asian currencies, Asian central banks will find it more attractive to cross-hold Asian bonds. This calls for the development of deep private markets in such assets, as well as institutional prerequisites for internationalizing key regional currencies.

JEL Classification: F31, F33

Contents

1. Introduction 3

2. A Yuan Bloc in the Making? 4

2.1 Frankel-Wei Regressions 5
2.2 VAR Analysis 9
2.3 A Longer Sample Period 16

3. Sequencing Financial Liberalization 20

4. Policy Implications 24

References 25

1. INTRODUCTION

The chronic payments deficit and huge foreign debt of the United States (US) have led some to believe that the global position of the US dollar may be weakening. Without effective policy reforms to reverse these deficits, the widespread faith in the US dollar's value could be eroded. The US dollar, having long been the pre-eminent international currency, accounts for roughly 60% of the world's foreign exchange reserves. Fear of sizable capital losses on these reserves has prompted calls for the diversification of the currency denomination of official foreign exchange reserves. The aim is to reduce individual countries' exposure to externalities of US economic policies. In particular, emphasis has been placed on cross-holdings of Asian bonds by the central banks in the region. For instance, the central bank of the People's Republic of China (henceforth PRC) has started to purchase the government bonds of Japan and the Republic of Korea (henceforth Korea), while the central bank of Malaysia has recently been buying yuan denominated interbank bonds for its reserves.

Meanwhile, the Asian economies are gaining in importance in terms of their contribution to global growth. Most notably, the PRC has become the second largest economy and the largest exporter in the world. As is well known, it also holds the world's largest foreign reserves, to the tune of US$2.65bn, the bulk of which is being held in US dollars. The PRC's growing economic dominance has led to studies on the prospect of its currency—the yuan—attaining global status (see, inter alia, Dobson and Masson, 2009 and Huang, 2010). Indeed, various measures have been taken by the Chinese authorities to internationalize the yuan. Due to the interrelationships between different international uses of a currency[1], a currency that is widely used internationally as a medium of exchange and a unit of account would stand a better chance of becoming a global reserve currency.

Since the middle of the last decade, Hong Kong, China banks have offered offshore yuan accounts while yuan denominated bonds (termed Panda bonds) were issued by multilateral agencies like the Asian Development Bank and International Finance Corporation. Efforts aimed at broadening the use of the yuan have been accelerated of late including a program that allows companies to settle cross-border trades in yuan, as well as easing restrictions to allow offshore banks to transfer yuan among themselves to facilitate the issuance of yuan denominated financial products. Of particular significance are liberalization measures that allow offshore banks and central banks to invest in the PRC's interbank bond market. Foreign firms would certainly be more amenable to accepting payments in yuan now that the barriers to invest the currency are eradicated.

Several other Asian economies, including Japan and Korea, also welcome the internationalization of their currencies. In fact, the Japanese authorities between the mid-1980s and early 2000s took steps to promote the role of the yen in the international monetary system by lifting restrictions on cross border capital flows as well as embarking on a financial big bang, whereby yen-denominated markets and instruments were developed (Takagi, 2009). More recently, Korea also started to embark on currency internationalization—keen to avoid complications that arise with currency hedging such as those faced by its shipbuilding firms, as well as to reduce exposure to currency mismatches (Kim and Suh, 2009). Even Singapore, which uses the exchange rate as its

[1] See Chinn and Frankel (2005) on the public and private uses related to the three key functions played by international currencies, namely, as store of value, medium of exchange, and unit of account.

benchmark monetary policy instrument, has progressively liberalized its non-internationalization policy to facilitate the development of its domestic capital markets (Chow, 2008).

Shaped by competitive forces, currencies in the global economy are distributed in a hierarchical manner in the form of a Currency Pyramid (Cohen, 2004) with only very few currencies dominant at the top. This reflects scale economies in the use of an international currency. In other words, the choice of an international currency is largely determined by whether it has an extensive transaction network. Consequently, countries that are large in absolute size and well integrated into the world markets are favoured. In this regard, the yuan has considerable potential to become an international currency, with the PRC being the world's second largest economy and having extensive trade ties in just about every corner of the globe. Even if the yuan fails to rival the dollar[2], it could still achieve an appeal in the region. Nonetheless, as an alternative to promoting an individual regional currency like the yuan, some have advocated the use of a basket of regional currencies called the Asian currency unit (ACU) as a single supranational currency for the region (Kawai, 2008 and Lee, 2010).

This paper has two objectives. First, since choices of reserve currencies depend partly on the currencies against which countries manage their exchange rate, we examine empirically which regional currency or currencies seem to matter for exchange rate determination in Asia. In particular, we investigate whether exchange rates in Asia are more heavily influenced by an individual regional currency such as the yuan or the yen, or a wider range of Asian currencies. This relates to recent empirical evidence which shows, using daily exchange rates series, that the yuan is well on its way to becoming a prominent regional currency (Ito, 2010). Our study reviews the evidence with the use of monthly data to characterize exchange rate policy in the region beyond the very short term. To this end, we use country-specific VAR models to compare the relative impact which fluctuations in the ACU, yuan, and yen separately have on movements of Asian currencies. Our choice of using the ACU to represent a broad range of regional currencies is, of course, arbitrary and the results are not so much about the role of the ACU per se. Rather, they provide information on the cumulative effect of the key regional currencies including the yuan and the yen on exchange rate fluctuations in Asia. Our second objective is to discuss financial stability issues related to the sequencing of financial liberalization as Asian authorities embark on the internationalization of their currencies, focusing particularly on the case of the PRC.

This paper proceeds as follows. The next section presents empirical findings on the relative influence of the ACU, the yuan, and the yen on the Asian currencies. Section 3 discusses current account liberalization entailed by the internationalization of the yuan and the impact on financial stability. Section 4 concludes with a summary of policy implications.

2. A YUAN BLOC IN THE MAKING?

Portfolio theory suggests that it is advantageous for a country to hold reserves in the currencies relative to which its exchange rate is benchmarked, as these are the currencies that will have greater stability in terms of domestic purchasing power. (Papaioannou, Portes, and Siourounis, 2006). Indeed, historical observations have long

[2] The stickiness of monetary preferences confers on the US dollar a natural advantage of incumbency. This points to a gradual decline in the dollar's dominance rather than its sudden fall from favor.

revealed a strong correlation between a country's choice of reserve currencies and the currencies to which its exchange rate is pegged. For instance, the shares of the deutsche mark in the official foreign exchange holdings in the European Community countries rose between 1980 and 1989 as members of the European Monetary System (EMS) tied their currencies to the German currency (Tavlas, 1991). Similarly, the increased use of the euro as a currency peg enhanced the role of the euro as an international reserve currency (Papaioannou and Portes, 2008). In the same way, the Asian countries will likely be overweight on their anchor currency. The reserve currency composition of countries in the region will thus become more diversified and tilted towards a dominant regional currency or currencies against which they manage their exchange rates.

This raises the question of which regional currency or currencies do the Asian central banks pay more attention to when deliberating on exchange rate policy decisions? As an alternative to having a single dominant regional currency such as the yuan or the yen, Kawai (2008) amongst others have advocated that over the longer term a basket of regional currencies called the Asian Currency Unit (ACU) could be used as the region's supranational currency. In particular, the Japanese Research Institute of Economy, Trade and Industry (RIETI) proposed an ACU that is a weighted average of the currencies of the ASEAN+3 countries[3] using weights that reflect the relative size and trade share of their economies (Ogawa and Shimizu, 2006). Proponents argue that an ACU could provide a framework for specifying exchange rate objectives as part of any formal effort to coordinate exchange rate policies.

Empirical investigations into the relative influence of the yuan vis-a-vis other regional currencies are hampered by the PRC's fixed exchange rate system, which renders the yuan variations as practically indistinguishable from US dollar movements most of the time. However, the PRC abandoned its peg to the US dollar and announced a shift in its exchange rate regime to a basket peg in May 2005. And then in October 2008, the yuan was re-pegged to the US dollar at 6.83 yuan per dollar in response to the outbreak of the global financial crisis. This opens a window—albeit a very narrow one—to uncover the relative impact of various currencies on exchange rate movements in the region. Henceforth, we carry out our empirical analysis spanning the period July 2005 to September 2008, when the yuan was somewhat decoupled from the US dollar.

2.1 Frankel-Wei Regressions

Frankel and Wei (1994) developed and popularized a method for estimating the implicit weights assigned to major currencies in a currency basket. In particular, they employed the following regression:

$$\Delta e_t^i = \gamma + \delta_{USD}\Delta e_t^{USD} + \delta_{EUR}\Delta e_t^{EUR} + \delta_{YEN}\Delta e_t^{YEN} + \varepsilon_t \qquad (1)$$

where the e terms denote the value of each currency in terms of the Swiss franc which is the numeraire of choice, and the first difference of the exchange rate is given by $\Delta e_t = e_t - e_{t-1}$. The superscripts *i, USD, EUR* and *YEN* denote an Asian currency, the US dollar, German mark, and Japanese yen respectively. Given the way the exchange

[3] The ASEAN+3 comprises the ten ASEAN countries plus the PRC, Korea, and Japan. Some have considered wider currency baskets such as those consisting of the currencies of Hong Kong, China and Taipei,China in addition to the ASEAN+3 currencies, while others considered narrower baskets, particularly in the context of currency convertibility.

rate is defined, an increase in e denotes a depreciation of that currency against the Swiss franc. In this regression, the δ coefficients are considered to represent the weights of the respective currencies in the basket. Each δ coefficient measures the combined effect of the respective major international currency's direct impact on the Asian currency and its indirect impact through the regional currencies.

To examine the influence of yuan movements on exchanges rates in the region, Chen, Peng, and Shu (2009) applied this methodology by running the following augmented Frankel-Wei regression on daily data from nine Asian countries:[4]

$$\Delta e_t^i = \gamma + \delta_{USD}\Delta e_t^{USD} + \delta_{EUR}\Delta e_t^{EUR} + \delta_{YEN}\Delta e_t^{YEN} + \delta_{RMB}\Delta e_t^{RMB} + \varepsilon_t \qquad (2)$$

Despite the switch in the Chinese exchange rate regime, the correlation coefficient between the yuan and the US dollar movements in the sample period is very high, exceeding 0.9. Hence, to take into consideration the high correlation between the two currency movements, the additional term Δe_t^{RMB} refers to yuan fluctuations that are independent of US dollar movements as captured by the residuals from an auxillary regression of the yuan variations against the US dollar variations. The authors found that movements of the yuan have a significant impact on the exchange rate fluctuations of regional currencies. The results also indicate an increase in significance compared with the period prior to the exchange rate regime switch in the PRC, and that the increase came at the expense of a marked decline in the influence of the yen on regional currencies.

We observe that this and many related empirical studies use high frequency data such as daily nominal exchange rate series in the analysis. While this is understandable in view of the shortness of the sample period, such analysis may not adequately describe exchange rate policy beyond the very short run. Besides, official intervention operations in foreign exchange markets are typically carried out with the US dollar, which could affect the results of the analysis involving high frequency data. As opposed to daily data that might better identify micro-structural relationships, monthly data are more appropriate for identifying economic relationships. Hence, we perform our analysis on monthly data.[5] Another point of departure from previous studies concerns the use of the Swiss franc as "numeraire". Since the numeraire is an independent currency for gauging exchange rate variation, use of the Swiss franc is not appropriate due to its high correlation with the euro. We follow Frankel and Wei (2008) in using the Special Drawing Right (SDR)[6] as numeraire because, as explained in that paper, the SDR can capture the size of deviations from the reference point better than the Swiss franc.

The exchange rate variable used in our analysis is expressed as the amount of domestic currency that can be bought by one unit of SDR. It follows that an increase in the variable signals a depreciation of the currency. Figure 1 depicts the plots of the log

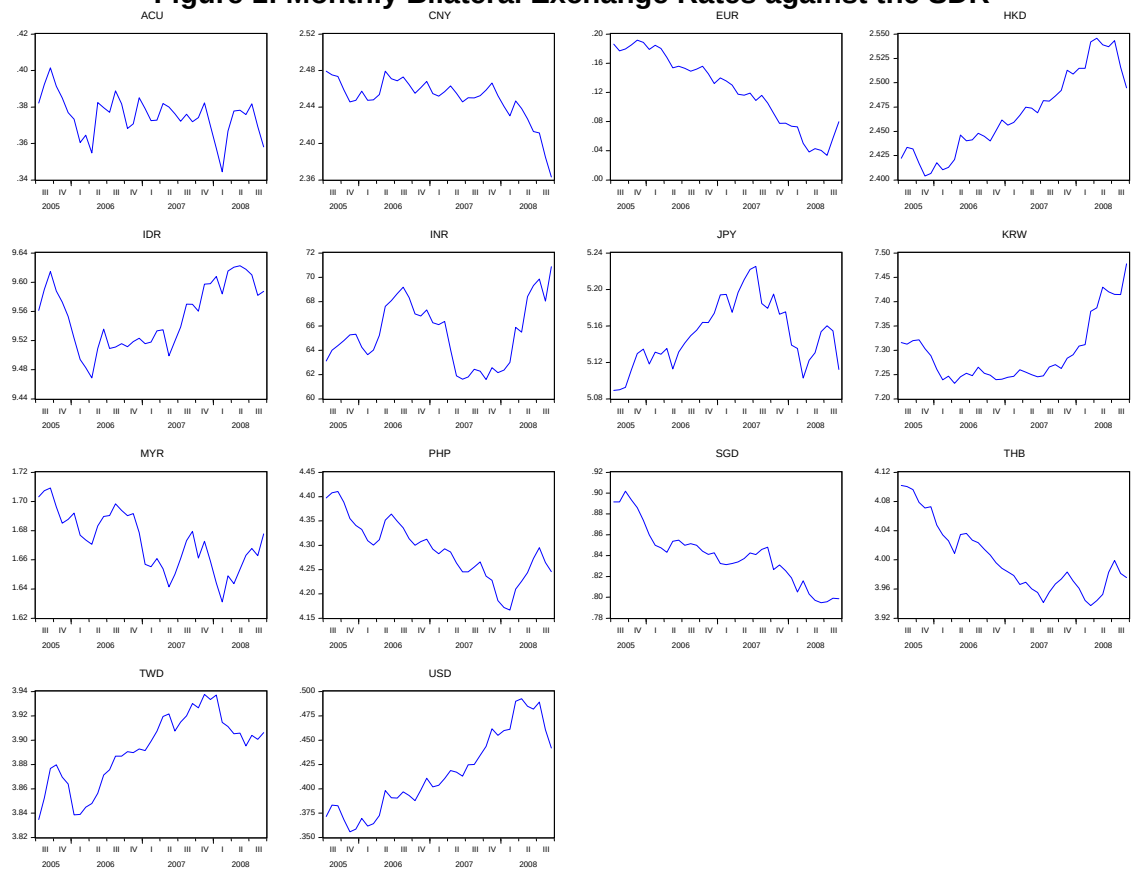
[4] In this and some other studies, the German mark was replaced by its successor the euro which is the European Union's single currency.

[5] Besides, if the relationship between two exchange rate series is very strong—as in the case of the Hong Kong, China dollar and the US dollar—it will be picked up by the analysis, no matter which data frequency is used. Conversely, if the relationship does not show when lower frequency data is used, this implies that the two exchange rate variables may not have a very tight relationship.

[6] This refers to the Special Drawing Right whose value is based on a basket of the US dollar, the euro, the British pound, and the yen.

transformation of monthly exchange rates for the ACU, the yuan (CNY), the euro (€), the Hong Kong, China dollar (HK$), the Indonesian rupiah (Rp), the Indian rupee (Re), the Japanese yen (¥), the Korean won (W), the Malaysian ringgit (RM), the Philippine peso (P), the Singapore dollar (SG$), the Thai Baht (B), and the NT dollar (NT$). It is clear from Figure 1 that the pressure on some of the regional currencies, namely the yuan, the peso, the Singapore dollar and the baht was generally positive in the sample period. The Hong Kong, China dollar and the NT dollar, by contrast, exhibited a general depreciation path while the remaining Asian currencies did not show clear appreciating or depreciating trends over the same time period.

Figure 1: Monthly Bilateral Exchange Rates against the SDR



Source: CEIC database

To assess the impact of the yuan on regional currencies beyond the very short term we repeat the above Frankel-Wei regression analysis on monthly data from the following nine Asian economies: Hong Kong, China; Indonesia; India; Korea; Malaysia; the Philippines; Singapore; Thailand; and Taipei,China, respectively. Hence, the e terms in equation (2) (and in our subsequent analyses) denote the value of each currency in terms of the SDR, except for the Δe_t^{RMB} term which is the residual term obtained from the corresponding auxillary regression using the new variables. The regression results are tabulated in Table 1 below.

Table 1: Estimates from Augmented Frankel-Wei Regressions (2005m7 to 2008m9)

	constant	δ_{USD}	δ_{EUR}	δ_{YEN}	δ_{RMB}	R^2
Hong Kong, China dollar	0.000	1.025***	0.057	0.022	-0.059	0.98
Indonesian rupiah	0.002	1.683*	1.212	-0.135	-0.657	0.33
Indian rupee	0.004	1.210	1.110	-0.238	-0.440	0.26
Korean won	0.005	-0.219	-0.099	-0.657***	-0.795	0.36
Malaysian ringgit	0.00	1.08**	1.03*	-0.08	0.20	0.37
Philippine peso	-0.005	1.165	0.217	-0.007	-0.360	0.34
Singapore dollar	-0.001	0.786**	0.820*	0.007	0.069	0.25
Thai baht	-0.003	0.776	0.595	0.177	-0.335	0.08
NT dollar	0.003	0.561	0.536	0.070	0.183	0.05

Note: ***, **, * denotes coefficients are statistical significant at 1%, 5%, and 10%, respectively.

Source: Computed by author through regression analysis

Two features stand out clearly in Table 1. First, with the exception of Hong Kong, China, the coefficient of determination is low for all the Asian economies suggesting that the fluctuations of the regional currencies on a monthly basis are not adequately explained by the augmented regression model. Second, in stark contrast to the results from daily data, the Δe_t^{RMB} term is not statistically significant in any of the country-specific regression equations. This implies that, beyond the very short term, movements of the yuan that are independent of US dollar movements do not play a significant role in regional exchange rate determination in the sample period. Similarly, over this same period, fluctuations in the yen do not exert a significant positive impact on regional currency movements.

In light of the growing importance of intra-regional trade as well as the real specter of competitive devaluation within the region, it is an imperative for the Asian central banks to explicitly consider regional currencies when determining exchange rate policies. Nonetheless, they could be taking into account regional competitive pressure by benchmarking their currencies relative to a range of regional competitor currencies rather than the yuan or the yen alone. In this regard, we use the ACU to represent a broad range of regional currencies and investigate empirically if movements in this currency basket significantly affect the fluctuations of Asian currencies[7]. Since the correlation coefficient between movements in the ACU and the US dollar is also quite

[7] In related research, Chow, Kim, and Sun (2007) constructed a regional competitor currency for individual East Asian countries by using trade weights of their top four regional trading partners.

high, at 0.72, we run an auxiliary regression of the former against the latter. The residual term from the regression denoted by Δe_t^{ACU} is used to capture ACU fluctuations that are independent of US dollar movements.

Nevertheless, there could be a problem with the direct application of the augmented Frankel-Wei regression by simply replacing the additional term Δe_t^{RMB} by Δe_t^{ACU} as a regressor in equation (2). If the movements in the ACU (that are independent of the US dollar variations) themselves are influenced by fluctuations in the Asian currencies, the Δe_t^{ACU} term will no longer be an exogenous variable, in which case, ordinary least squares estimation will produce biased and inconsistent estimates and there is a need to disentangle the simultaneity bias in the regression equation. We carry out the Hausman specification test to ascertain the endogeneity or otherwise of the Δe_t^{ACU} term. These tests are also performed on the Δe_t^{RMB} term for the sake of comparison. The test results indicate that at the 10% significance level the Δe_t^{RMB} term is an exogenous regressor in all cases, while the Δe_t^{ACU} term is an endogenous variable for all countries except for Hong Kong, China (as expected), Indonesia (marginally insignificant) and Thailand[8]. These results are not in the least surprising given the ACU is a currency basket that comprises regional components currencies.

2.2 VAR Analysis

To allow for mutual interactions of the variables, we propose using the following country-specific Vector Autoregressive (VAR) model to estimate the relationships among the exchange rates series:

$$\Delta e_t = \beta_0 + \sum_{k=1}^{p} \beta_k(L)\Delta e_{t-k} + \varepsilon_t \tag{3}$$

where $\Delta e_t = (\Delta e_t^{US}, \Delta e_t^{EUR}, \Delta e_t^{ACU}, \Delta e_t^{i})'$; $\beta_k(L)$ is a 4×4 matrix of lag polynomials, and β_0 is a vector of constants. We employ a VAR model in differences instead of in levels due to the nonstationarity of the exchange rate series. Without exception, unit root test results show that all the exchange rate data series are found to be integrated of order one. Thus, we model the first differences of the exchange rate series as in equation (3). While the use of a VAR model overcomes the simultaneity bias problem, it is difficult to recover the δ coefficients in equation (2), which represent the weights of the respective currencies in the basket. Alternatively, we can assess the relative influence of their innovations by deriving the impulse response functions that trace dynamic effects of innovations in foreign currencies on the domestic currency.

[8] The p-values of the Hausman test for the presence of simultaneity concerning the Δe_t^{ACU} term are 0.68, 0.12, 0.08, 0.02, 0.00, 0.08, 0.05, 0.16, and 0.03 for Hong Kong, China; Indonesia; India; Korea; Malaysia; the Philippines; Singapore; Thailand; and Taipei,China, respectively. The corresponding values for the Δe_t^{RMB} term are 0.22, 0.13, 0.57, 0.13, 0.94, 0.57, 0.61, 0.14, and 0.66, respectively.

We estimate country-specific VAR models using monthly data from each of the eight Asian countries9 over the period when the yuan was on a soft peg. Constrained by very limited degrees of freedom, a common lag length one is used for all countries. Nevertheless, the underlying dynamics of the system has been adequately captured since application of autocorrelation LM tests reveal that the serial correlations in the residuals have been eliminated for each model. We apply the Cholesky decomposition—which recovers the underlying structural shocks by recursive orthogonalization—by adopting the following causal ordering of the variables $(\Delta e_t^{USD}, \Delta e_t^{EUR}, \Delta e_t^{ACU}, \Delta e_t^{i})$ to reflect their level of exogeneity. The implicit assumption here is that the US dollar shocks are contemporaneously exogenous to the euro shocks that are exogenous the regional shocks which in turn are exogenous to the home currency shocks.10

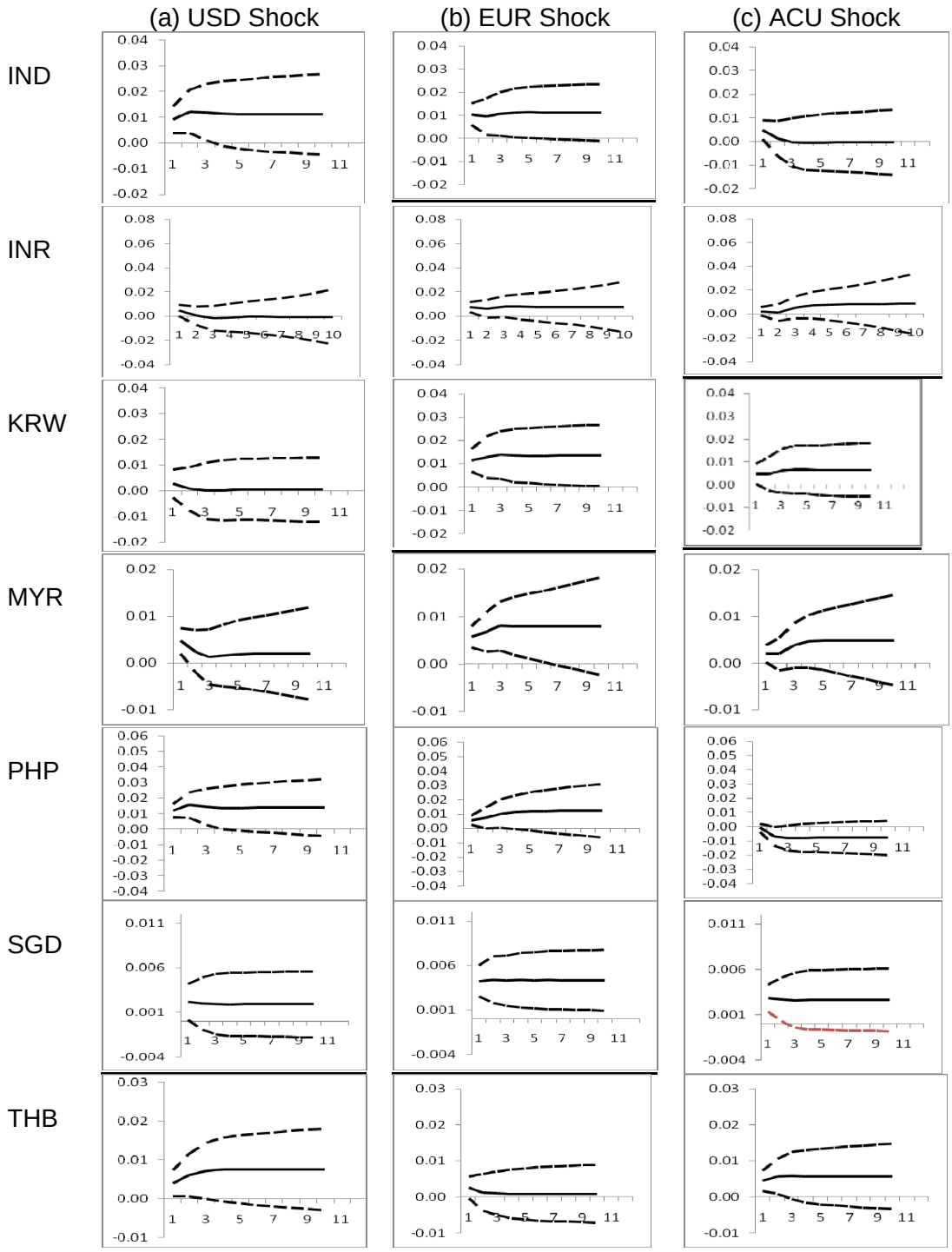
How does the influence of ACU movements on the regional currencies compare with the impact exerted by fluctuations in the yuan or the yen? Although we could run augmented Frankel-Wei regressions to assess individually the significance of these two currencies, the results will not be comparable to the findings for the ACU which are derived from a VAR framework. Hence, for comparability, we estimate two additional sets of country-specific VAR models: one with the yuan as the regional currency term, i.e., replacing Δe_t^{ACU} with Δe_t^{RMB} in equation (3); and another with the yen as the regional currency term, i.e., replacing Δe_t^{ACU} with Δe_t^{JPY} in equation (3). To conserve degrees of freedom, we ran the VAR models with only one regional variable at a time, i.e., either Δe_t^{ACU}, Δe_t^{RMB} or Δe_t^{JPY} is included in the system of variables to avoid higher dimensional VAR models.

Panels a to c in Figure 2 depict the responses of the home currency to a one standard deviation shock in the US dollar, the euro, and the ACU, while the panels in Figures 3 and 4 display the corresponding impulse responses when the regional currency is replaced by the yuan and the yen, respectively. The impulse responses are plotted in levels and extend to ten months, by which time the impulses have stabilized. We bootstrap 1,000 replications of the VAR residuals to obtain robust standard errors for the impulse responses and construct 1.5 standard deviation bands, which are displayed in the figures.

[9] We omitted the case of Hong Kong, China since its currency board pegs the exchange rate to the US dollar.

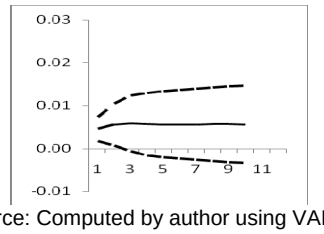
[10] For a robustness check, we repeat the analyses with generalized impulse response functions which do not depend on the causal ordering of the variables, the findings on the significance of the ACU shock on regional currencies movements turn out to be qualitatively similar. For parsimony, we do not present the results but they are available from the author on request.

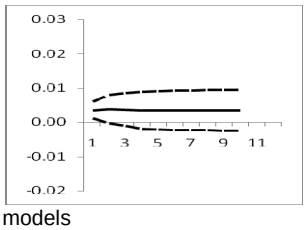
Figure 2: Home Currency Impulse Responses with an ACU Shock[11]

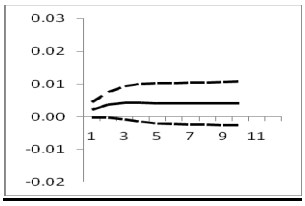


[11] In Figures 2 to 5, USD Shock, EUR Shock, ACU Shock, Yuan Shock and JPY Shock refers to a one standard deviation shock in the US dollar, the euro, and the ACU, the yuan, and the yen respectively.

TWD

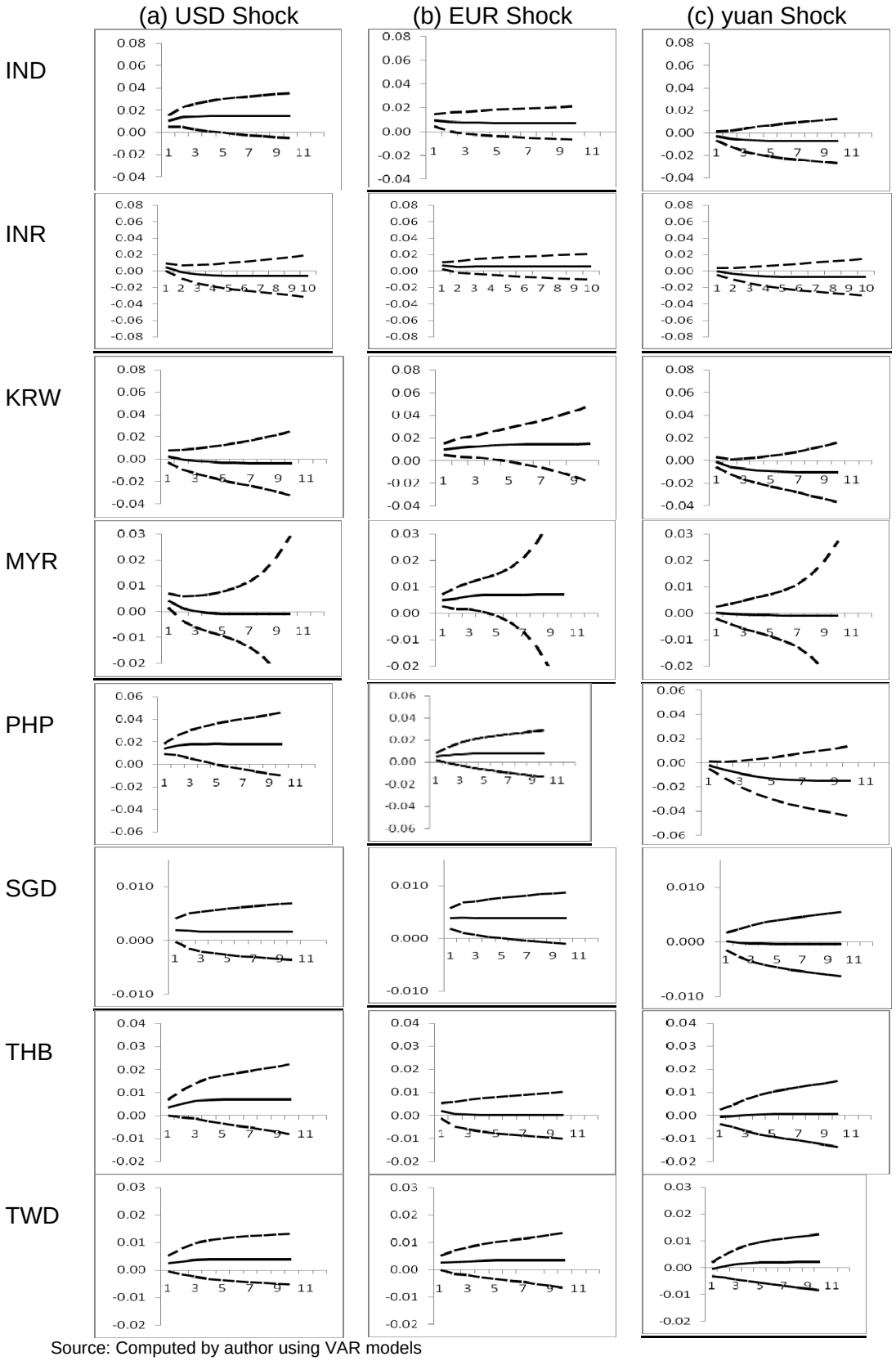






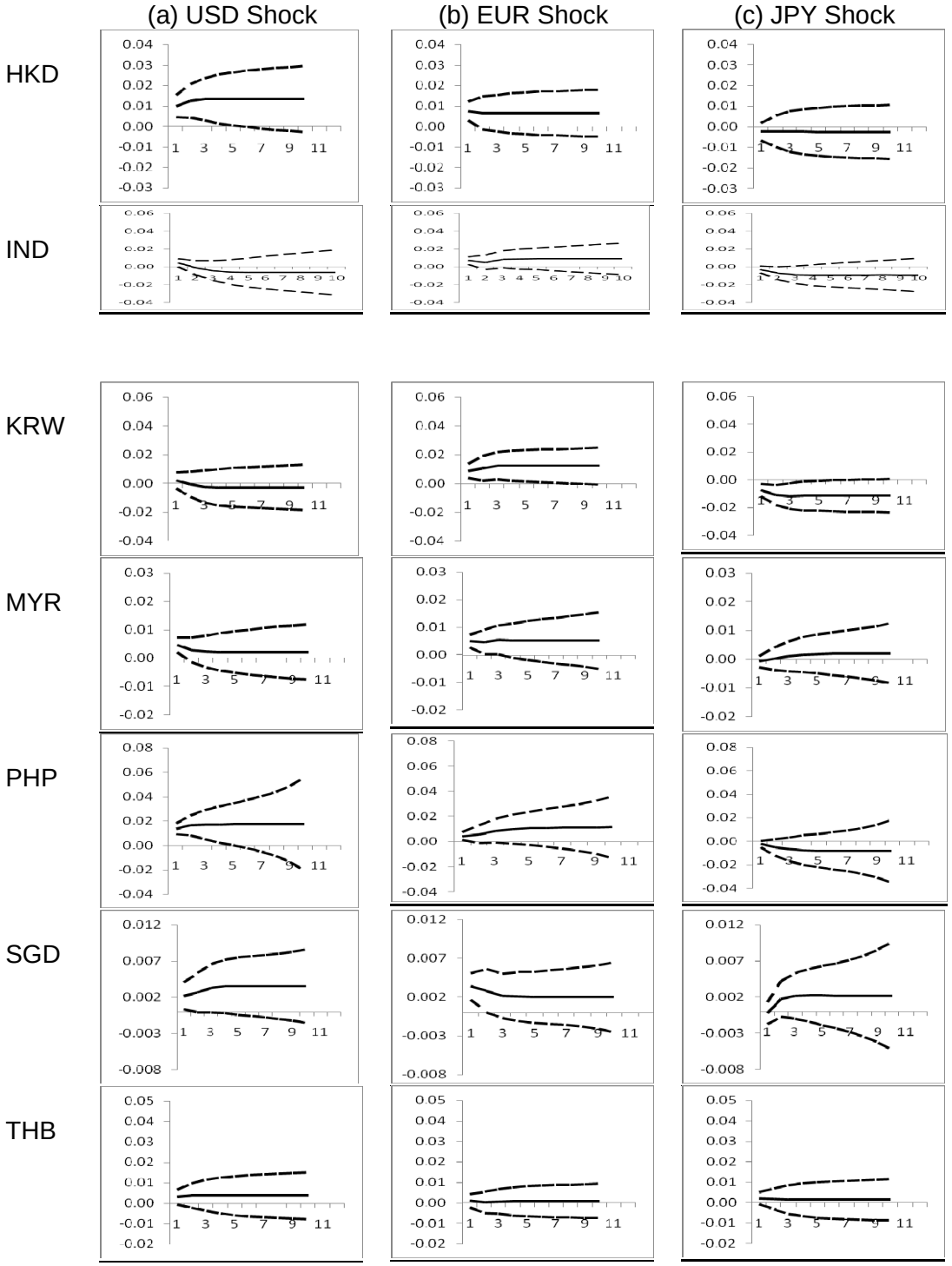
Source: Computed by author using VAR models

Figure 3: Home Currency Impulse Responses with a Yuan Shock

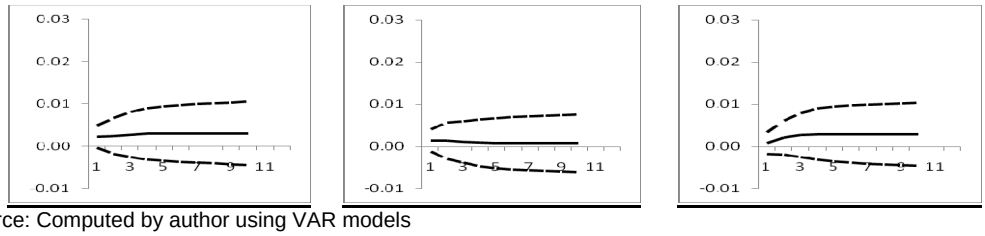


Source: Computed by author using VAR models

Figure 4: Home Currency Impulse Responses with a Yen Shock



NTD



Source: Computed by author using VAR models

Admittedly, the impulse responses to all three types of regional shocks are mostly insignificant beyond the first few lags (see panel c of Figures 2 to 4). We attribute this to the very low degrees of freedom that resulted in big standard deviations and wide error bands. Nevertheless, it is discernible when comparing the plots in panel c across the three figures that the currencies of the Asian countries are more responsive, at least initially, towards innovations in the ACU than to innovations in the yuan or the yen. We see from Figure 2 that, a one standard deviation shock to ACU movements produces significant positive responses within the first month in as many as six Asian currencies, namely, the Indonesian rupiah, the Korean won, the Malaysian ringgit, the Singapore dollar, the Thai baht, and the NT dollar[12]. Only the Indian rupee and the Philippine peso were not significantly affected by the ACU shock. By contrast, Figure 3 shows that none of the eight Asian currencies reacted significantly to a standard deviation shock to the yuan. Nevertheless, as the yuan gains international status, the regional countries are likely to strengthen the tie between their currencies and yuan movements. Similarly, a one standard deviation shock to the yen did not produce positive significant responses from the Asian currencies, except for the Malaysian ringgit (see Figure 4)[13].

Taken together, these results suggest that in the short run the ACU shocks dominate the individual yuan and yen shocks in determining currency movements of the Asian economies over the sample period. What does an ACU shock represent? It can be interpreted as a common regional shock as opposed to a global shock or a country-specific shock. Asian countries are responsive to common regional shocks due to the regional competitive pressure from neighboring countries. As highlighted above, these findings are not really so much about the ACU as about the cumulative role of a broad range of regional currencies. The major components of the ACU are the yuan, the yen, the won, the Singapore dollar, the rupiah, the baht, and the ringgit, with approximate weights of 36%, 26%, 11%, 7%, 5%, 5%, and 5%, respectively. Hence, the relatively more influential role played by the ACU suggests that in regional exchange rate management, the monetary authorities may be benchmarking in relation to a wide range of Asian currencies, rather than an individual Asian currency. This finding concurs with Wyplosz (2010) and others who observed that, in practice, the Asian economies (apart from Hong Kong, China) mostly tie their currencies to a country-specific currency basket comprising intra-regional as well as extra-regional currencies.

Not surprisingly, the US dollar shock plays a significant role in determining movements in Asian currencies, except in the case of Korea (see Panel (a) of Figures 2 to 4). However, to the extent that exchange rates in the region shift over time from benchmarking the US dollar relative to the Asian currencies, Asian central banks will find

[12] For each of the five cases—Indonesian rupiah, Korean won, Malaysian ringgit, Singapore dollar, and Thai baht—one can argue that the inclusion of the Asian currency under consideration in the ACU basket caused the former to significantly respond to a shock to the latter. Apart from the Korean won that has a weight of 11% in the ACU, the confounding effect is likely to be small for the other four Asian currencies since they have small weights that are below 10%.

[13] We obtained significant negative responses in the case of the Korean won.

it more attractive to hold a diversified portfolio of reserves, including Asian currency denominated bonds. That is, the Asian currencies will tend to assume greater importance in the reserve portfolios of the countries in the region. Nonetheless, this does not imply that Asia should start creating ACU-denominated bonds to be held as foreign reserves in the Asian countries. Central banks are adverse to holding a synthetic currency basket like the ACU since it pays for them to hold reserves in units that are widely used in international transactions. Besides, the monetary authorities could readily hold a portfolio of bonds in different currencies, and this allows for greater flexibility than a one-size fits all currency basket.

In the words of Wyplosz (2010: 4): "The weakness of basket denominated bonds, which affected the ECU bonds, is that it requires numerous currency conversion costs. To overcome this disadvantage, the [ACU] should become a quasi-currency which would require a commitment of the monetary authorities. This would come close to the adoption of a common currency in Asia." As regards exchange rate arrangements, vital economic linkages between Asia and extra-regional countries means that benchmarking in relation to the ACU alone (which comprises only regional currencies) will not stabilize the effective exchange rates of the Asian economies. Besides, as shown by Park and Wyplosz (2004), there is practically very little difference between the use of country-specific baskets versus a common pan-Asian basket (that includes extra-regional currencies). Given the heterogeneity in terms of their economic size and structure as well as the huge disparity in the stage of economic development, it is doubtful that the region should proceed towards formal exchange rate coordination or a monetary union even in the medium term. As pointed out by Kawai (2008), another key impediment to the creation of a common Asian currency is the unwillingness of governments to lose national monetary independence, which they deem to be crucial for domestic economic management.

2.3 A Longer Sample Period

The observed "comovements" among regional currencies picked up by the VAR analysis could simply reflect the interaction between slightly more exchange rate flexibility and the particular shocks hitting the system in the sample period. To qualify our results, we repeat the VAR analysis on the eight countries over a longer sample period by starting earlier in February 2001 for which the ACU data series is available. We maintain the end date as September 2008 to avoid inclusion of the global financial crisis period. Since the yuan was pegged to the US dollar over a large part of this longer time period, we obviously cannot re-assess its impact on regional currency movements. However, we can re-examine the influence of the ACU and the yen in this less restricted sample period.

With a higher degree of freedom, we can now include both the ACU and the yen in the same VAR model to compare their relative impact on exchange rate fluctuations in the region. In other words, the endogenous set of variables in equation (3) becomes

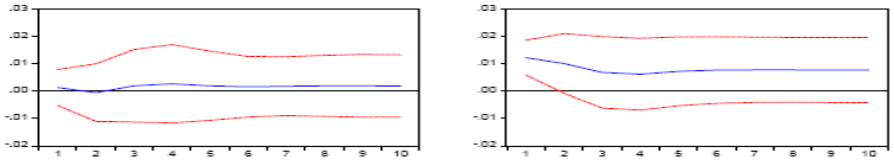
$\Delta e_t = (\Delta e_t^{US}, \Delta e_t^{EUR}, \Delta e_t^{JP}, \Delta e_t^{ACU}, \Delta e_t^{i})'$. Although the correlation coefficient between the movements of ACU and the US dollar stands at only 0.61 in the longer sample period, we extract the residual term from the auxiliary regression of the former against the latter for consistent representation of the ACU term Δe_t^{ACU}. Residual analysis reveals that we can use a common lag length two to adequately capture the underlying dynamics of the

VAR system for all countries. Applying Cholesky decomposition[14], the impulse responses of the home currency to a standard deviation shock in the US dollar, euro, yen, and ACU, along with their two standard deviation bands, are depicted in Figure 5 below.

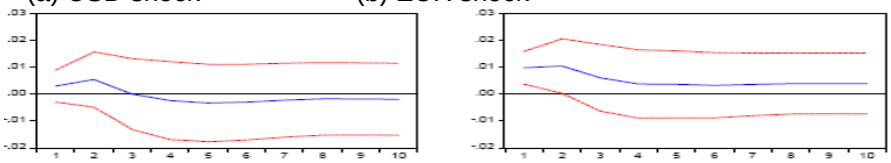
[14] A robustness check using generalized impulse response functions reveals that the findings on the significance of the ACU shock and the yen shocks on regional currencies movements are qualitatively similar, except in the case of Malaysia where the ringgit did not respond significantly to the ACU shock. This is to be expected as the currency was pegged to the US dollar—as was the case for the yuan—before July 2005. To conserve space, we do not present the results, but they are available from the author on request.

Figure 5: Home Currency Impulse Responses (2001m2 to 2008m9)

IDR

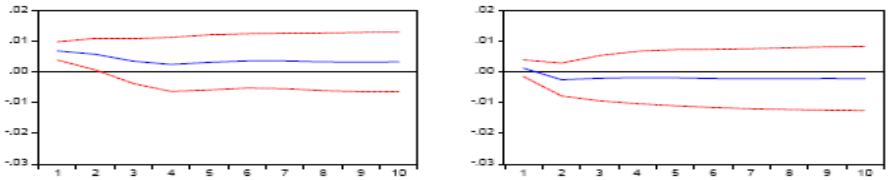


(a) USD shock (b) EUR shock

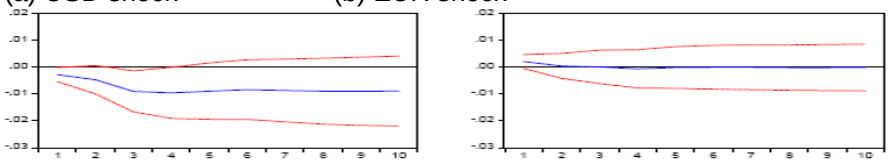


(c) JPY shock (d) ACU shock

INR

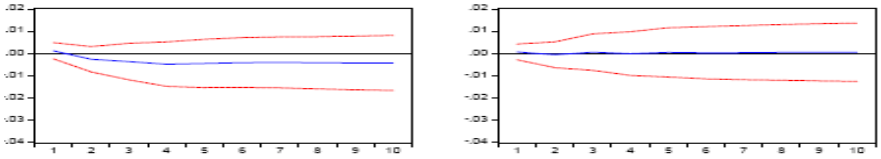


(a) USD shock (b) EUR shock

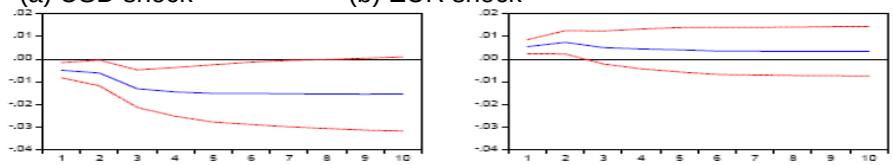


(c) JPY shock (d) ACU shock

KRW

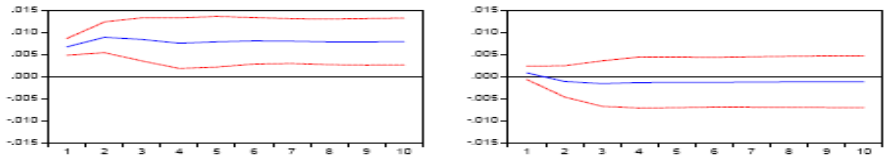


(a) USD shock (b) EUR shock

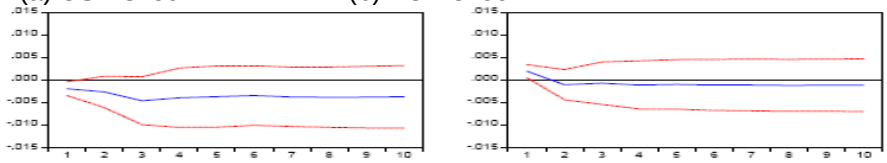


(c) JPY shock (d) ACU shock

MYR

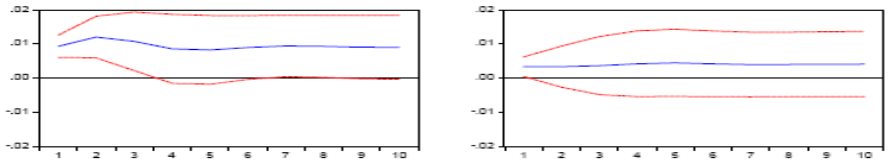


(a) USD shock (b) EUR shock

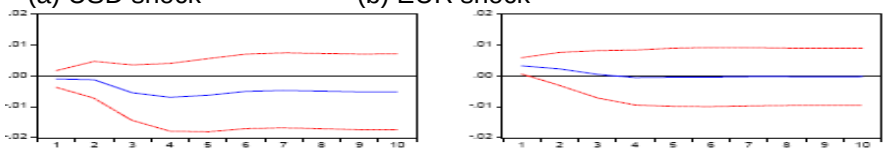


(c) JPY shock (d) ACU shock

PHP

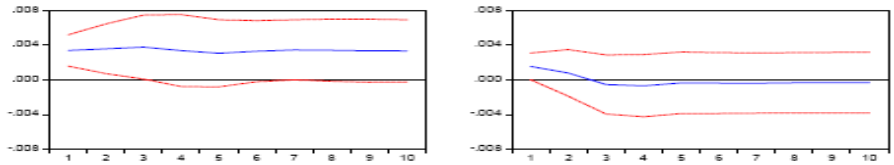


(a) USD shock (b) EUR shock

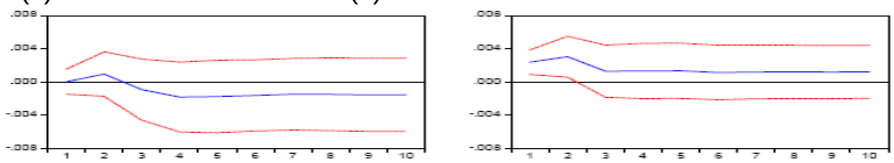


(c) JPY shock (d) ACU shock

SGD

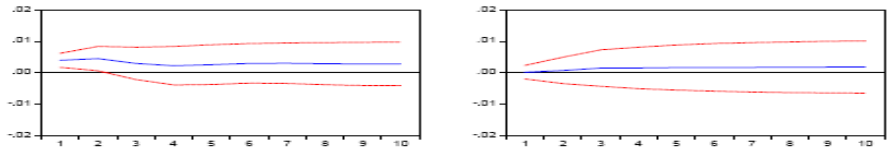


(a) USD shock (b) EUR shock

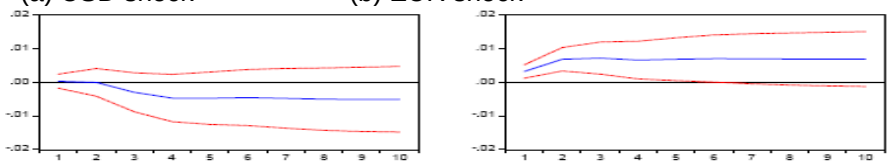


(c) JPY shock (d) ACU shock

THB

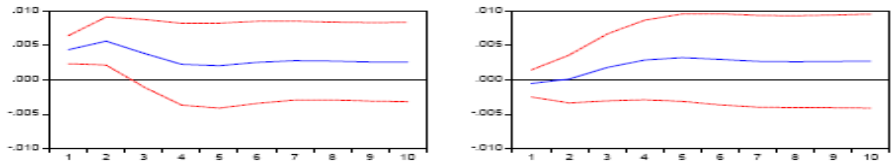


(a) USD shock (b) EUR shock

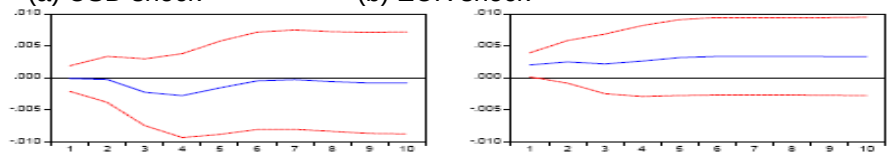


(c) JPY shock (d) ACU shock

NTD



(a) USD shock (b) EUR shock



(c) JPY shock (d) ACU shock

Source: Computed by author using VAR models

A visual inspection of panel (d) in Figure 5 reveals significant positive responses of the home currency to a one standard deviation ACU shock for all countries[15]. A one standard deviation shock to the yen did not produce significant positive responses in any of the countries (see panels (c) in Figure 5). Thus, the findings for the longer sample period are qualitatively very similar to those obtained above using a more restricted time period, and they suggest a relatively greater impact of the ACU relative to the impact of the yen only on regional exchange rate fluctuations. As above, the comovement in the currencies could partly be attributed to market forces at work in the past decade. Nonetheless, we think the findings do suggest that the central banks in Asia manage their exchange rates by benchmarking against a broad range of regional currencies as a reflection of diversified trade patterns. In this case, it pays for Asian countries to hold a portfolio of bonds in the key regional currencies—chiefly in yuan, yen, and won[16] and other regional currencies.

3. SEQUENCING FINANCIAL LIBERALIZATION

Since countries are more willing to hold reserves in units that are widely used in international transactions, the internationalization of the key regional currencies are called for[17]. However, currency internationalization entails currency convertibility. The full internationalization of a currency involves international borrowing and lending denominated in that currency, which is different from that used in either the jurisdiction of the borrower or the lender. This requires currency convertibility on both the current and capital accounts. Even partial internationalization that allows a borrower to denominate bond issues sold to foreigners in the borrower's currency where this currency is not used between third parties requires substantial freedom of capital account movements. This is because restrictions on currency convertibility constrain the scale and liquidity of international bond issues.

The Asian countries have, with very few exceptions, liberalized their current account. In particular, the PRC achieved current account convertibility by the end of 1996. In contrast, restrictions on capital account transactions are still in place for some countries, particularly for the PRC. The Asian countries have a wide range of experiences with capital account openness. On one extreme, we have Hong Kong, China; Japan; and Singapore as the region's most financially open countries. On the other, we have the PRC and India still imposing heavy restrictions on capital flows despite liberalization measures adopted in these countries. The rest of the Asian countries do impose varying degrees of restrictions on capital account transactions[18].

As far as the onshore markets are concerned, most Asian countries keep varying extent of regulatory controls in place. A description of the exchange controls for the Asian currencies can be found on Asian Development Bank's Asian Bonds Online website (http://asianbondsonline.adb.org). Such restrictions on the internationalization of regional

[15] As in the restricted sample period, we repeated the VAR analysis replacing the ACU basket with a regional composite index that is independent of US dollar movements and does not include the Asian currencies under consideration, namely the rupiah, the won, the ringgit, the peso, the Singapore dollar, or the baht. The results turn out to be qualitatively unchanged.

[16] These three component currencies have weights of at least 10% in the ACU basket.

[17] The Japanese yen is of course already an international currency.

[18] Of late, new capital control measures have been put in place by various Asian economies to curb the huge influx of capital due to the use of quantitative easing by the US as a tool of monetary policy.

currencies are imposed mostly to deter currency speculation. While Non-Deliverable Forwards (NDF) transactions in the offshore markets are active and can be used to cover foreign exchange forward risk, they are not sufficient to ensure deep and liquid markets. Should currency internationalization be desired, capital account liberalization measures would have to be taken. These include the liberalization of cross border transfer of funds and the lifting of restrictions on third party use of the currency in contracts and settlements of trade in goods and assets, as well as easing restrictions on assets denominated in the currency in private or official portfolios.

However, the desirability of capital account liberalization is not altogether clear in light of the disruptive swings in short term capital flows, with the attendant problems of sudden stops and financial instability. There is considerable theoretical and empirical evidence to suggest that financial integration of emerging markets has led to a higher incidence of crises (Gourinchas and Jeanne, 2005). Indeed, so devastating were the banking and currency crises in emerging markets in the 1980s and 1990s, that some economists openly questioned whether the capital account needed to be opened at all (Rodrik, 1998). Basically, capital account liberalization heightens the speed and magnitude of international spillovers and potentially increases the vulnerability of individual countries to external financial shocks. The ebb and flow in foreign capital choke credit supply and create liquidity bubbles in turn, destabilizing domestic banks and contributing to macroeconomic volatility.

The capacity with which a country can absorb such external financial shocks depends on country-specific factors including a robust financial system, strong regulatory institutions, a credible commitment to a sound monetary policy regime, and an exchange rate policy aligned with underlying fundamentals. In particular, a country should ensure a certain level of health and efficiency of its domestic financial system before embarking on capital account liberalization since sufficiently developed domestic financial sectors are necessary to absorb and allocate capital inflows to their most efficient uses. Further, empirical studies show that the positive growth effects of financial market development and capital account liberalization tended to be larger for countries with a higher level of institutional development (Chinn and Ito, 2002). The core institutional infrastructure required for well-functioning of the financial markets include adequate and well-enforced contracts, insolvency procedures, adequate accounting rules, consistent auditing and disclosure practices, and an efficient payment system (Eichengreen, Mussa, IMF Staff Team, 1999). The 1997–98 Asian financial crisis underscores the dangers of liberalization before the establishment of a sound, well-supervised financial system and the importance of minimizing the risks endemic to the "Open-Economy Trilemma"[19].

While deeper capital account liberalization requires mature domestic financial markets, it is unrealistic to expect that the domestic financial sector can ever fully mature without exposure to global financial markets and capital flows. In particular, institutional reforms are most likely to occur after rather than before the internationalization of financial services which opens the domestic sector to foreign financial institutions (Kaminsky and Schmukler, 2003). This is partly because established firms tend to oppose institutional changes for fear of increased competition and in order to safeguard their interest. Importantly, the commercial presence of foreign service providers normally increases the pressure to strengthen supervisory and regulatory framework. This can occur through many channels, such as providing a model of best practices, reducing information gaps,

[19] The "Open-Economy Trilemma" refers to the idea that monetary policy can only achieve fully two of the following three dimensions: monetary policy independence, fixed exchange rates, and open capital accounts.

improving transparency, and skill and technology transfer. (Kono and Schuknecht, 1998).

Similarly, domestic financial sectors will need increased exchange rate flexibility to help with risk management and price stability before they can fully develop[20]. Eichengreen and Hatase (2005) argue that allowing a sharp revaluation of the yuan and then limiting its fluctuations is not advisable as such a move could have a substantial negative impact on demand and growth. Compared with Japan in the 1970s, Eichengreen and Hatase, 2005: 33) point out that "the narrower profit margins of firms in the Chinese export sector, the more limited capacity of Chinese banks to cope with the financial consequences of a change in currency values, and the larger share of exports in Chinese GDP (which means that a smaller revaluation is needed to eliminate a current account surplus of any absolute size)—similarly point to the advisability of the Chinese authorities' decision to start with a relatively small change in the prevailing exchange rate". However, as in the case of Japan, domestic financial sector development in the PRC need not be complete before exchange rates are made flexible. Rather, increasing the flexibility of the yuan while the PRC continues with its domestic financial reforms are in the PRC's best interest (Prasad, Rumbaugh, and Wang, 2005). In any case, as more yuan are held outside the PRC, the central bank would have less scope to influence money supply and monetary conditions[21].

In summary, all three dimensions of liberalization, namely domestic financial sector development, exchange rate flexibility, and capital openness, do not necessarily follow sequentially but need to be determined together as a single holistic set of interrelated policy decisions (Chow, Kriz, Mariano, and Tan, 2007). Selective liberalization of the capital account[22] and a limited degree of exchange rate flexibility can take place while the domestic financial sector is developing. As the domestic financial sector deepens, increased exchange rate flexibility and an increasingly liberalized capital account will not only be possible but optimal. Pursuing all three dimensions of a liberalization program simultaneously requires that policymakers develop a broader and more internally-consistent set of policy prescriptions to manage plans for liberalization.

So far, the PRC has adopted a prudent and gradual approach to capital account liberalization. From 1994 until mid-2005, the yuan was pegged to the US dollar at a fixed rate of yuan8.28 to US$1. Citing underdeveloped domestic financial markets and legal institutions, the Chinese central bank argued unambiguously that its banking system was not ready to handle a flexible yuan. While the yuan remained fixed to the US dollar, the PRC did not completely restrict capital flows. The PRC has been the recipient of considerable foreign direct investment capital flows and other types of capital flows that have leaked in through the considerable presence of foreign branch operations and outsourcing operations. In May 2005, the Chinese central bank announced that the yuan be pegged to a basket of currencies and allowed to float within a tight band. Meanwhile, domestic financial sector reforms and a measured pace for relaxation of capital controls

[20] Although the need for careful sequencing applies equally to all Asian countries, we focus our discussion on the PRC given the yuan's potential of becoming a consequential international currency.

[21] In the past, various countries such as Germany and Japan (prior to the 1990s) resisted the international use of their domestic currencies precisely because of the perceived costs in terms of the increased sensitivity of domestic financial conditions to external factors. Furthermore, in a multiple reserve currency system, shifts in composition between two reserve currencies can result in instability in their bilateral exchange rates.

[22] See Williamson and Mahar (1998) for a breakdown of different capital flows and their roles in the liberalization programs.

continued. At present, according to Huang (2010: 10), "restrictions on capital transactions remain mainly in three areas: direct investment (mainly outward investment), debt financing (both ways) and portfolio flows (especially stock market investment)"[23].

The PRC has recently accelerated its removal of capital controls in the pursuit of currency internationalization. Even though the direction is clear, the pace may not be appropriate. Since the domestic financial sector is still lacking in terms of openness and efficiency, a more measured pace may be called for to avoid destabilizing the economy. Dobson and Masson (2009) provide a description of the current state of development of the domestic financial system, highlighting its lack of breadth and under-development of the corporate debt market. In addition, the authors highlighted the need to deregulate the Chinese banking system with regard to bank autonomy and allowing their lending decisions to be guided by commercial motives. Going forward, there is a need to enforce factors that expand the breath and depth of the financial markets such as increasing the availability of sophisticated financial instruments and the range of private financial intermediaries and dealers. To this end, deregulation of the financial markets is necessary since tight regulation of the financial sector inhibits financial innovation.

As mentioned above, the establishment of robust institutions supporting the financial markets—such as prudential regulation and supervision framework, and corporate governance structure—is a pre-requisite to successful liberalization. As the PRC develops its financial and capital markets, it is critical to take into account the hierarchy of the different markets in terms of the complexity of risks in each market as well as the inter-linkages among them. It is, thus, necessary to enhance the supervisory and regulatory capacity as more risks are injected in the financial system. Moreover, the stability of a securitized financial system entails a government authority with the capacity to provide liquidity-management and backstopping functions, akin to the role played by the Federal Reserve System (Fed) in responding to financial distress in US markets (Eichengreen, 1998). In addition, the establishment of an independent central bank that conducts credible and stability-orientated monetary policy is essential for the yuan to achieve global currency status. After all, the attractiveness of a currency in international transactions depends on its ability to maintain purchasing power, which means the central bank must be able to deliver low inflation.

There is of course no guarantee that when institutional reforms are in place, private sector interest in using a particular currency internationally will follow. A case in point is the yen. The Japanese authorities after 2003 practically ceased internationalization efforts when they realized there was weak demand for the yen's international use. Nevertheless, efforts at currency internationalization—as in the case of Japan—will spur the development of the PRC's financial sector to create a highly deregulated financial system, acting as a financial counterpart to the internationalization of the real economy. Looking ahead, the anticipated appreciation of the yuan will attract foreign investors to yuan-denominated claims and at the same time discourage foreigners from issuing debt denominated in yuan. Paradoxically, foreign demand for yuan-denominated assets will no doubt increase the demand for the PRC's currency, which will put further pressure on the yuan to appreciate, the very outcome that the PRC has worked hard to avoid.

[23] The effect of restrictions placed on portfolio flows is negated by the Qualifying Foreign Institutional Investor (QFII) scheme and the Qualifying Domestic Institutional Investor (QDII) scheme. See also Gao and Yu (2008) for detailed information on the various existing controls placed on capital and money markets in the PRC.

4. POLICY IMPLICATIONS

Notwithstanding the incumbency advantages and network effects enjoyed by the US dollar, considerations regarding the stability of its value have led Asian countries to fear they are holding their foreign exchange reserves in a depreciating currency. At the same time, it pays for the regional countries to adjust their reserve currency composition to match the point of reference of their exchange rate policy. Deeper regional integration in trade and investment as well as intense competition between Asian economies underscore the need for monetary authorities in Asia to explicitly consider regional currencies when managing exchange rates. In this paper, we have demonstrated, through the use of VAR models, that on a monthly basis the short term movements of the Asian currencies appear to be benchmarked against a broad range of regional currencies. Contrary to recent empirical evidence that point to a rise in the dominance of the yuan as a regional currency, an analysis of lower frequency data reveal that exchange rates fluctuations in Asia are more heavily influenced by the range of component currencies as captured in the ACU than by the yuan or the yen individually over the sample period from July 2005 to September 2008.

Going forward, if the erosion of the US dollar's appeal persists and the Asian economies operate their managed float against a basket with higher weights on regional currencies, these currencies will assume greater importance in their reserve portfolios. To be sure, we are not advocating ACU-denominated assets to be held as reserves, since Asian countries will not find the ACU attractive unless there are deep private markets in such assets. Rather, the central banks in the region will find it more attractive to hold a portfolio of bonds in the key regional currencies, chiefly in yuan, yen, and won.

In this regard, fresh emphasis should be placed on the development of government bond markets to facilitate the cross-holdings of Asian currency denominated bonds by the central banks in the region. Since countries are more willing to hold reserves in units that are widely used in international transactions, the internationalization of these currencies are called for.

As various Asian countries embark on currency internationalization, the trilemma dictates that consideration has to be given to the impact of requisite capital account convertibility on domestic financial stability. All three dimensions of liberalization—domestic financial sector development, exchange rate flexibility and capital account openness—have to be pursued simultaneously, requiring policymakers to develop a broad and internally-consistent set of policy prescriptions. Focusing on the case of the PRC, the pace for capital account liberalization has to take into account the extent of domestic financial sector development. Increasing the depth and breadth of domestic financial markets, as well as building the institutions that support them are necessary measures to increase the PRC's resilience to shocks arising from volatile cross-border capital flows.

Strengthening prudential regulation and supervisory capacity is crucial since more complex risks are being injected into the financial system as the PRC increases the sophistication of its financial and capital markets. The stability of its financial system also entails a government authority with the capacity to provide liquidity-management and backstopping functions particularly in periods of financial distress. In other words, policymakers need to press on with the development of institutional prerequisites for lifting Asian currencies to an international status.

REFERENCES

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.

Chow, H.K. 2008. Managing Capital Flows: The Case of Singapore. ADB Institute Discussion Paper No. 86. Tokyo: ADBI

Chow, H.K., Y. Kim, and W. Sun. 2007. Characterizing Exchange Rate Policy in East Asia: A Reconsideration. *Journal of Asian Economics* 18: 448–465.

Chow, H.K., P. Kriz, R.S. Mariano, and A.H.H. Tan. 2007. Financial Liberalization and Monetary Policy Cooperation in East Asia. SMU Economics and Statistics Working Paper Series No. 03-2007.

Cohen, B.J. 2004. *The Future of Money.* Princeton, NJ: Princeton University Press.

Chinn, M., and S. Frankel 2005. Will the Euro Eventually Surpass the Dollar as Leading International Reserve Currency? NBER Working Paper No. 11510.

Chinn, M., and H. Ito 2002. Capital Account Liberalization, Institutions and Financial Development. NBER Working Paper No. 8967.

Chinn, M. and H. Ito. 2008. A New Measure of Financial Openness. *Journal of Comparative Policy Analysis* 10(3): 309–322.

Dobson, W., and P.R. Masson. 2009. Will the Renminbi Become a World Currency? *China Economic Review* 20(1): 124–135.

Eichengreen, B. 1998. The Euro as a Reserve Currency. *Journal of the Japanese and International Economies* 12: 483–506.

Eichengreen, B., and M. Hatase. 2005. Can a Rapidly Growing Export-Orientated Economy Smoothly Exit an Exchange Rate Peg? Lessons for China from Japan's High-Growth Era. NBER Working Paper No. 11625.

Eichengreen, B., M. Mussa, and IMF Staff Team. 1999. Liberalizing Capital Movements. *Economic Issues*, Washington, DC: IMF

Frankel, J., and S. Wei. 1994. Yen Bloc or Dollar Bloc: Exchange Rate Policies of the East Asian Economies. In *Macroeconomic Linkages*, edited by T. Ito and A. Krueger. Chicago, IL: University of Chicago Press.

Frankel, J., and S. Wei. 2008. Estimation of De Facto Exchange Rate Regimes: Synthesis of the Techniques for Inferring Flexibility and Basket Weights. NBER Working Paper No. 14016.

Gao, H., and Y. Yu. 2009. Internationalization of the Renminbi. Paper presented at the BoK-BIS Seminar on Currency Internationalization: Lessons from the International Fincial Crisis and Prospects for the Future in Asia and the Pacific. 19-20 March 2009, Seoul.

Gourinchas, P., and O. Jeanne. 2006. The Elusive Gains from International Financial Integration. *Review of Economic Studies* 73(3): 715–741.

Huang, Y. 2010. Renminbi Policy and the Global Currency System. Paper presented at the ADB project meeting on The Global Reserve System: An Asian Perspective. 16–18 March 2010, Tokyo.

Ito, T. 2010. China as Number One: How About the Renminbi? *Asian Economic Policy Review* 5(2): 249–276.

Kaminsky, G., and S. Schmukler. 2003. Short Run Pain, Long Run Gain: The Effects of Financial Liberalization. NBER Working Paper No. 9787.

Kawai, M. 2008. The Role of Asian Currencies in the International Monetary System. Paper presented at 2008 Macro Research Conference on The Global Monetary and Financial System and its Governance, 11–12 November 2008, Tokyo.

Kim, K., and Y.K. Suh. 2009. Dealing with the Benefits and Costs of Internationalization the Korean Won. Paper presented at the BoK-BIS Seminar on Currency Internationalization: Lessons from the International Financial Crisis and Prospects for the Future in Asia and the Pacific, 19–20 March 2009, Seoul.

Kono, M., and L. Schuknecht. 1998. Financial Services Trade, Capital Flows and Financial Stability. WTO Staff Working Paper ERAD-98-12.

Lee, J.W. 2010. Will the Renminbi Emerge as an International Reserve Currency. Paper presented at the ADB-CCER workshop on China towards an Upper Middle-Income Country: Challenges and Policy Options, 31 May–1 June 2010, Beijing.

Papaioannou, E., and R. Portes. 2008. The International Role of the Euro: A Status Report. Economic Papers 317. Brussels: European Commission.

Papaioannou, E., R. Portes, and G. Siourounis. 2006. Optimal Currency Shares in International Reserves: The Impact of the Euro and the Prospects for the Dollar. *Journal of the Japanese and International Economies* 20: 508–547.

Park, Y.C., and C. Wyplosz. 2004. Exchange Rate Arrangements in East Asia: Do they Matter? In *Monetary and Exchange Rate Arrangements in East Asia*, edited by Y.H. Oh, D.R. Yoon, and T.D. Willet. Seoul: Korea Institute for International Economic Policy.

Prasad, E., T. Rumbaugh, and Q. Wang. 2005. Putting the Cart Before the Horse? Capital Account Liberalization and Exchange Rate Flexibility in China. IMF Policy Discussion Paper 05/1.

Rodrik, D. 1998. Who Needs Capital-Account Convertibility? *Essays in International Finance* 207: 55–65.

Takagi, S. 2009. Internationalizing the Yen, 1984–2003: Unfinished Agenda or Mission Impossible? Paper presented at the BoK-BIS Seminar on Currency Internationalization: Lessons from the International Financial Crisis and Prospects for the Future in Asia and the Pacific, 19–20 March 2009, Seoul.

Tavlas, G.S. 1991. On the International Use of Currencies: The Case of the Deutsche Mark. *Princeton Essays in International Finance* 181.

Williamson, J., and M. Mahar. 1998. A Survey of Financial Liberalization. *Princeton Essays in International Finance* 211.