**The Renminbi and
Exchange Rate Regimes
in East Asia**

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In this report, "$" refers to US dollars, unless otherwise stated.

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Abstract

With the rise of the People's Republic of China (PRC) as the world's largest trading nation (measured by trade value) and second largest economic power (measured by GDP), its economic influence over the neighboring emerging economies in East Asia has also risen. The PRC introduced some exchange rate flexibility in July 2005, and in the wake of the global financial crisis has been pursuing a policy to internationalize its currency, the renminbi (RMB). Clearly the exchange rate policy of the PRC has significant implications for exchange rate regimes in emerging East Asia. This paper examines the behavior of the RMB exchange rate and the impact of RMB movements on those of other currencies in emerging East Asia during the period 2000–2014. We apply the Frankel–Wei regression model to identify changes in the RMB exchange rate regime over time and a modified version of the model, developed by the authors in their earlier paper, to estimate the RMB weight in an emerging East Asian economy's currency basket. We find that the US dollar continues to be the dominant anchor currency in the region, while the RMB has taken on increasing importance in the currency baskets of many East Asian economies in recent years. The paper also explores how monetary and currency cooperation—led by the PRC and Japan—can promote intra-East Asian exchange rate stability under the pressure of rising financial market openness in the PRC.

Contents

1. INTRODUCTION

The recent rise of the PRC as the world's largest trading nation (measured by trade value) and second largest economic power (measured by GDP) has been accompanied by the PRC's greater economic influence over emerging economies in East Asia.[1] The dependence of these economies on the PRC through trade and investment has risen over time.

The PRC used to peg its currency, the renminbi (RMB), tightly to the US dollar, but over the last 10 years it has engineered currency appreciation against the dollar by allowing a certain degree of exchange rate flexibility. The PRC shifted its exchange rate arrangement from a conventional US dollar peg to a crawling peg regime in July 2005. Although it temporarily restored a conventional US dollar peg regime in August 2008–May 2010, it once again shifted to a crawling-peg-like regime in June 2010. In general, the degree of exchange rate flexibility has increased over time.

In addition, the PRC has been pursuing a policy of internationalizing the RMB in the wake of the global financial crisis. The authorities started to allow firms to settle merchandise trade in RMB, foreigners to hold offshore RMB deposits, and foreigners to issue offshore RMB bonds. In addition, a series of bilateral currency swap arrangements have been concluded between the People's Bank of China (PBC) and foreign central banks to enable the latter to hold RMB and sell them to their importers who wish to pay for exports from the PRC in RMB.

Because of the rising economic importance of the PRC, its influence through expanding trade, and the RMB internationalization policy, the exchange rate policy of the PRC is likely to have significant implications for exchange rate regimes in emerging East Asian economies. Some experts (Eichengreen 2011) believe that the RMB will become a major international currency and rival—if not equal—the US dollar relatively soon. Indeed, the RMB is now the world's eighth most actively used settlement currency and the world's ninth most heavily traded currency in foreign exchange markets. Some authors (Henning [2012], and Subramanian and Kessler [2013]) argue that the RMB has already begun to play the role of an anchor currency at least in emerging Asia. Others argue, however, that the RMB still has a long way to go to become a global reserve and anchor currency that other countries' central banks may use to stabilize the values of their currencies.

The organization of the paper is as follows. Section 2 provides background information on the rising economic size of the PRC, the pace of RMB internationalization, and the capital account liberalization that is needed to support RMB internationalization. Section 3 discusses the evolution of the PRC's exchange rate regime and examines the behavior of the RMB exchange rate between 2000 and 2014 using the Frankel–Wei regression model. Section 4 investigates the impact of RMB movements on those of other currencies in emerging East Asia using the modified version of the Frankel–Wei regression model developed by Kawai and Pontines (2014). Section 5 explores the potential for regional monetary and currency cooperation to achieve intra-East Asian exchange rate stability. Section 6 concludes the paper.

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[1] In this paper East Asia includes the People's Republic of China (PRC), the Asian newly industrialized economies outside the Association of Southeast Asian Nations (Hong Kong, China; the Republic of Korea; and Taipei,China), Mongolia, and member states of the Association of Southeast Asian Nations (Brunei Darussalam; Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Philippines; Singapore; Thailand; and Viet Nam). It also includes India to make our study broader.

2. RISE OF THE PEOPLE'S REPUBLIC OF CHINA'S ECONOMY AND RENMINBI INTERNATIONALIZATION

2.1 Rise of the People's Republic of China's Economy and Trade

The rapid pace of economic growth over the past 30 years has made the PRC economy the world's second largest economy, measured by nominal GDP at market exchange rates. In 2010, it surpassed Japan in size. It is expected to become the world's largest economy, with a larger GDP than the US, in the early 2020s. The PRC's economic growth has important implications for exchange rate policies in other economies, particularly those in East Asia.

With the expansion of the PRC's economy, its trade has also increased rapidly. Figure 1 shows that it has become the world's largest export nation, accounting for 14% of global exports in 2013. Its imports have also risen and now account for 12% of the global total. The rising share of the PRC's exports in the global market suggests that its competitors may be concerned with their export competitiveness against the PRC and may wish to avoid the appreciation of their currencies against the RMB. The PRC's rising share of global imports also means that its expanding market is attractive for other economies as it provides an opportunity for economic growth. This suggests that these economies may wish to track the RMB closely.

Figure 1: Global Share of the People's Republic of China's Trade
(% of world total)
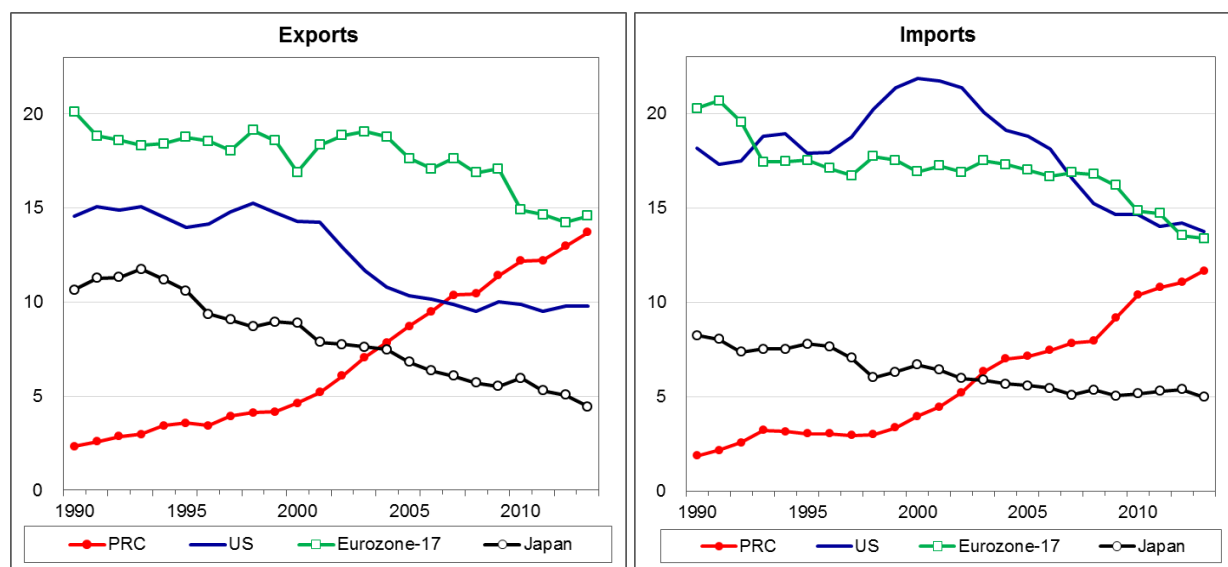
PRC = People's Republic of China, US = United States.

Note: Eurozone-17 exports and imports are net of intra-eurozone exports and imports, respectively.

Source: IMF, *Direction of Trade Statistics.*

Most emerging economies in East Asia have intensified their trade relationships with the PRC (Table 1). Mongolia and Hong Kong, China have particularly high export dependence on the PRC, and Taipei,China; Australia; the Republic of Korea; Lao People's Democratic Republic (PDR); and Myanmar have seen their export dependence rise in recent years. Hong Kong, China; Myanmar; Mongolia; Viet Nam; and Lao PDR have high import dependence on the PRC. It would not be surprising if most of these East Asian economies that have expanded trade with

the PRC start to pay greater attention to the movement of the RMB in their exchange rate policies.

Table 1: Asian Economies' Share of Trade with the People's Republic of China
(% of total trade)

	Exports to the PRC				Imports from the PRC			
	1990	2000	2010	2013	1990	2000	2010	2013
Australia	2.5	5.7	25.1	36.1	2.7	7.8	18.7	19.5
Bangladesh	1.5	0.2	1.2	1.7	3.4	7.4	16.8	21.9
Brunei Darussalam	0.1	1.8	7.0	0.8	2.7	1.2	12.9	22.1
Cambodia	0.4	2.1	1.2	3.7	5.9	7.9	24.2	22.0
Hong Kong, China	24.7	34.5	52.7	54.8	36.7	43.0	45.5	47.8
India	0.1	1.8	7.9	4.7	0.1	2.9	11.8	11.0
Indonesia	3.2	4.5	9.9	12.4	3.0	6.0	15.1	16.0
Japan	2.1	6.3	19.4	18.1	5.1	14.5	22.1	21.7
Republic of Korea	0.0	10.7	25.1	26.1	0.0	8.0	16.8	16.1
Lao PDR	9.1	1.5	23.3	25.1	10.7	5.5	14.7	26.1
Malaysia	2.1	3.1	12.5	14.1	1.9	3.9	12.6	17.0
Mongolia	11.4	49.8	81.6	90.0	21.5	17.8	41.7	37.8
Myanmar	8.1	5.7	13.5	24.5	20.6	18.0	38.5	40.0
New Zealand	1.0	3.0	11.2	20.8	1.2	6.2	16.0	17.5
Pakistan	1.2	2.7	7.4	11.0	4.6	5.0	17.4	22.5
Philippines	0.8	1.7	11.1	12.2	1.4	2.3	8.4	13.0
Singapore	1.5	3.9	10.4	11.8	3.4	5.3	10.8	11.7
Taipei,China	3.1	15.1	34.3	38.3	0.6	3.9	12.6	15.6
Thailand	1.2	4.1	11.1	11.9	3.3	5.5	13.2	15.0
Viet Nam	0.3	10.6	10.5	11.8	0.2	9.0	24.0	32.0

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: IMF, *Direction of Trade Statistics*.

2.2 Renminbi Internationalization

Since the outbreak of the global financial crisis, the PRC authorities have been making significant efforts to internationalize the RMB. The US dollar liquidity shortage caused by the crisis was considered to be a major deficiency of the existing international monetary system, and the PRC authorities believe that by creating another international currency the global system will be more balanced and stable.

Since July 2009, the internationalization of the RMB has been pursued in finely calibrated phases. The PRC authorities started to allow exporters and importers to use RMB to settle merchandise trade. They then allowed RMB receipts by foreign exporters to be parked in Hong Kong, China as deposits. Banks and firms there were permitted to mobilize those RMB funds by issuing "dim sum bonds" so that they could use the funds to invest in mainland PRC. Issuance of RMB bonds in the Hong Kong, China offshore market has expanded. Furthermore, a series of bilateral currency swap arrangements has been concluded between the People's Bank of China (PBC) and foreign central banks to enable these foreign banks to hold RMB and sell the currency to their importers who wish to pay PRC exporters in RMB.

There is no question that the pace of RMB internationalization will be accelerated by these policy efforts. The rising economic size of the PRC and its expanding trade volume will also help the process of RMB internationalization, particularly in East Asia. These observations have led

some experts (such as Eichengreen [2011] and Subramanian [2011]) to believe that the RMB, along with the euro, will become a major international currency rivaling the US dollar relatively soon. It is highly desirable for the PRC as the world's second largest economy to provide the RMB as an international currency not only for the PRC but also for global traders and investors.

An international currency plays several roles—as an invoicing currency for international trade, as a denomination currency for international investment, as a reference currency for other countries' exchange rate management, and as a foreign exchange reserve currency. The US dollar, the euro, the Japanese yen, and the UK pound sterling are major international currencies today, and the Swiss franc, the Australian dollar and the Canadian dollar are the next-tier international currencies, as summarized in Table 2. These currencies are traded most frequently in international foreign exchange markets and are often held as foreign exchange reserves by the world's central banks.

Table 2: Economies with International Currencies and the People's Republic of China

Economy (Currency)	Foreign Exchange Market Turnover (%), 2013	Foreign Exchange Reserves Held (%), 2013	World Payment Currency (%), Feb 2014	GDP in $ Trillion (global share, %), 2013	GDP per Capita ($), 2013
United States ($)	87.0	61.2	38.9	16,800 (22.7%)	53,101
Eurozone (€)	33.4	24.6	33.0	13,416 (17.2%)	38,073
Japan (¥)	23.0	3.9	2.5	4,901 (6.6%)	38,491
United Kingdom (£)	11.8	4.0	9.4	2,536 (3.4%)	39,567
Australia (A$)	8.6	1.6	1.8	1,505 (2.0%)	64,863
Switzerland (SwF)	5.2	0.2	1.5	651 (0.9%)	81,324
Canada (Can$)	4.6	1.7	1.8	1,825 (2.5%)	51,990
Mexico (Mex$)	2.5	--	0.3	1,259 (1.7%)	10,630
PRC (CNY)	2.2	--	1.4	9,181 (12.4%)	6,747
New Zealand (NZ$)	2.0	--	0.4	181 (0.2%)	40,481

GDP = gross domestic product.

Note: For foreign exchange market turnover data, the sum of the percentage shares of individual currencies totals 200% as two currencies are involved in each transaction. GDP is at current prices.

Sources: BIS, IMF, and SWIFT.

The table shows that the US dollar is used for 87% of currency trading in global foreign exchange markets, followed by the euro (33%), the Japanese yen (23%), and the UK pound sterling (12%). The US dollar is also the most preferred reserve currency, with 61% of the world's reserves being denominated in US dollars, followed by the euro (25%), and the pound sterling and the yen (4% each). Clearly, the US dollar is by far the most dominant international currency, followed by the euro and then by the Japanese yen and the pound sterling. The global presence of the RMB used to be very limited, but has been rapidly rising over the last few years. The RMB is the ninth most traded currency in the world's foreign exchange market and also the eighth most heavily used currency for payment.

The information presented in Table 2 suggests that economies that provide international currencies tend to have the following properties. First, they are the world's most advanced high-income countries, with the exception of Mexico; second, they have eliminated capital flow restrictions and achieved full currency convertibility; third, they have well-developed, liquid financial markets; and fourth, they have maintained social and political stability. Once a country acquires these properties, its currency tends to become an international currency. Acquiring these properties is an important way for the PRC to make the RMB a truly international currency.

It is important to note that for a currency to become a *major* international currency, large economic size is essential. For example, the currencies of Hong Kong, China; Singapore; and New Zealand have achieved international currency status, but they are not major or even second-tier international currencies because of their small economic size. Australia, Canada, and Switzerland cannot go beyond the second-tier international currency status for the same reason. In this regard, the PRC's GDP is already the second largest in the world and will likely catch up with US and eurozone in less than 10 years. In addition, the PRC's trade volume is now slightly larger than that of the US. The currency of a large economy tends to be used frequently for trade invoicing, investment denomination, reserve holding, and as an anchor for exchange rate stabilization if foreign investors and central banks find it easy and convenient to use the currency. This suggests that once the RMB achieves international currency status, it has the potential to become a major international currency like the US dollar, the euro, and the yen.

2.3 Capital Account Liberalization

Progress toward capital account liberalization is essential to the internationalization of a currency. Without adequate capital account liberalization, meaningful currency internationalization will not be achieved. The PRC has implemented a series of capital account liberalization measures since its adoption of economic reforms and opening in the late 1970s. Table 3 summarizes the state of capital account liberalization as reported by the PBC.

Table 3: State of Capital Account Liberalization in the People's Republic of China

Type of Cross-Border Transactions and Items Under Control	Not Convertible	Partially Convertible (highly restricted)	Basically Convertible (lightly restricted)	Fully Convertible	Total
Capital and money market transactions	2	10	4	0	16
Derivatives and other instruments transactions	2	2	0	0	4
Credit instruments transactions	0	1	5	0	6
Direct investments	0	1	1	0	2
Liquidation of direct investments	0	0	1	0	1
Real estate transactions	0	2	1	0	3
Individual capital transactions	0	6	2	0	8
Subtotal	4	22	14	0	40

Source: Statistics and Analysis Section, PBC (February 2012).

According to the table, 4 capital account items out of 40 are not convertible, 22 are partially convertible, and 14 are basically convertible. No item has achieved full convertibility. Credit instruments transactions and direct investments, which are essentially long-term capital flows, are the items that have been liberalized most, while capital and money market transactions, derivatives and other instruments transactions, real estate transactions, and individual capital transactions are the least liberalized items.

The degree of financial market openness can be measured by indexes that show the extent of *de jure* as well as *de facto* capital account openness. Figure 2 plots such indexes for the PRC and Japan as a reference. The index of *de jure* capital account openness was constructed by Chinn and Ito (2008), who put together information released by the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*. The index of *de facto* capital account openness has been developed by Ito and Kawai (2012), who use a country's external assets

(excluding foreign exchange reserves) and liabilities relative to a combination of the country's GDP and trade values.

Figure 2: Indexes of Capital Account Openness for the People's Republic of China and Japan
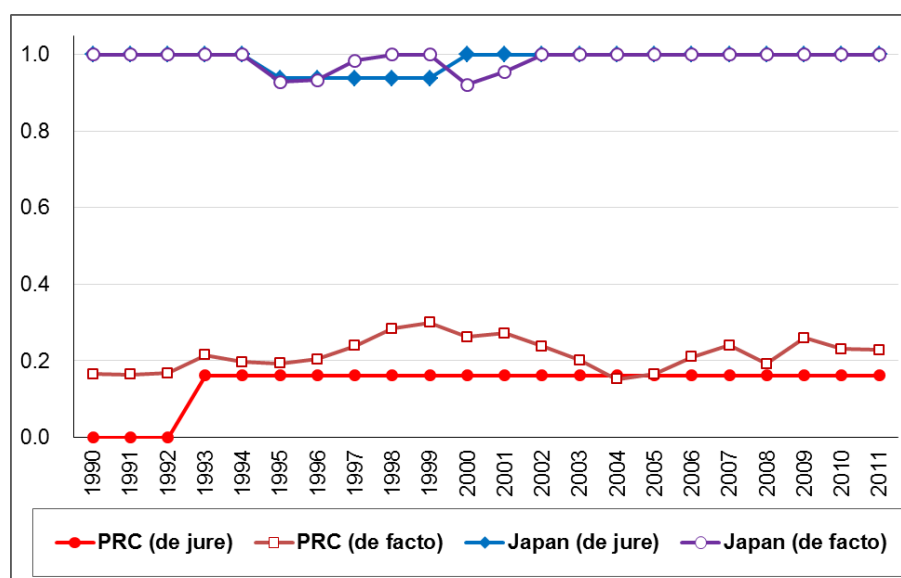
PRC = People's Republic of China.

Note: The capital account is fully open at a value of 1 and completely closed at a value of 0.

Sources: Chinn and Ito (2008) and website; Ito and Kawai (2012).

The figure shows that the PRC achieved a certain degree of capital account openness in the first half of the 1990s but has not made any progress since then according to the *de jure* index. Surprisingly, the *de facto* measure also suggests that the PRC has not made much progress on capital account liberalization in the 2000s, at least until 2011. In contrast, Japan had already achieved full capital account convertibility by 1990.[2] One of the reasons for the lack of progress on *de facto* capital account liberalization, despite the liberalization of various types of capital account restrictions as summarized in Table 3, is that the pace of regulatory liberalization has not been fast enough to catch up with the PRC's expanding GDP and trade volumes.

An internal document of the PBC highlighted a three-stage plan to push forward capital account liberalization, hinting that it may take 10 years for the PRC to achieve full capital account convertibility:

- 2012–2015: relaxing flows associated with foreign direct investments, both inbound and outbound;

- 2015–2017: relaxing credit flows related to genuine trade to support the internationalization of the RMB; and

- 2017–2022: strengthening the infrastructure of domestic financial systems; allowing inflows before outflows; and opening up real estate, equity, and bond markets for foreign capital investments.

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[2] Although not shown in the figure, the *de jure* and *de facto* indexes suggest that Japan achieved full capital account openness in 1983 and 1989, respectively. By 1970, Japan had achieved a level of *de jure* capital account openness that was far higher than the PRC's level in 2011. According to the *de facto* measure, the current level of the PRC's capital account openness is equivalent to Japan's in 1983.

PBC Governor Zhou Xiaochuan also stated that the basic (not full or free) convertibility of the capital account would be achieved by 2015. However, Figure 2 suggests that achieving a high degree of capital account liberalization within such a short time period would be a significant challenge.

3. EVOLUTION OF THE PEOPLE'S REPUBLIC OF CHINA'S EXCHANGE RATE REGIME

3.1 Exchange Rate Behavior

Until 1994, the PRC had a dual exchange rate system where the official exchange rate was set at a much higher level than the market rate. In early 1994 these rates were unified, with the official rate being devalued by about 30% from CNY5.8 per US dollar to CNY8.48 per US dollar (see Figure 3). Thereafter, the exchange rate appreciated slightly to CNY8.28 per US dollar and stayed there until July 2005. Although the PRC authorities defined the country's exchange rate regime as a managed float with 0.3% daily fluctuation band, it was in reality a fixed exchange rate regime against the US dollar. The regime was maintained rigidly during and after the Asian financial crisis of 1997–1998.

Figure 3: Renminbi–US Dollar Rate and the Renminbi's Real Effective Exchange Rate
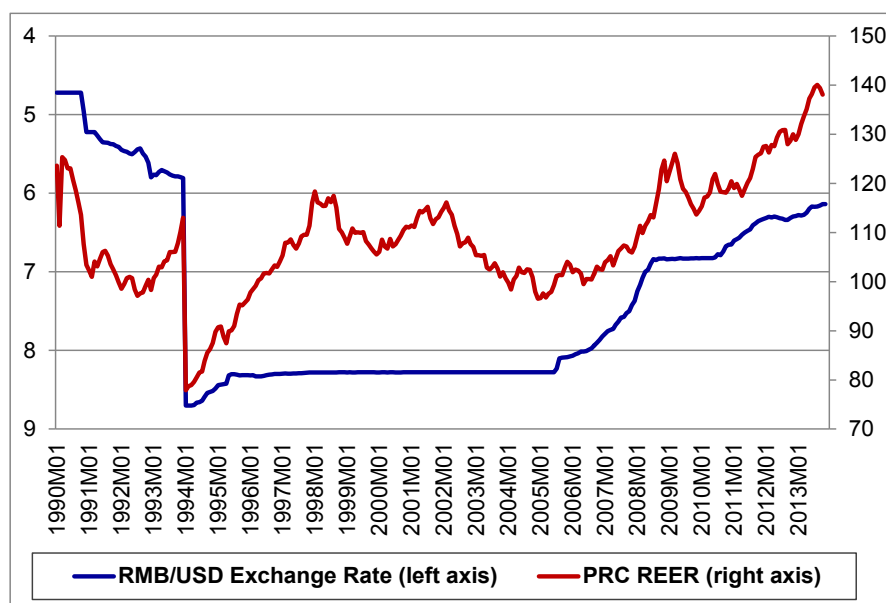
PRC = People's Republic of China, REER = real effective exchange rate, RMB = renminbi, USD = US dollar.

Note: An increase in the value means RMB appreciation.

Source: IMF, *International Financial Statistics*.

On 21 July 2005 the PRC authorities announced that they would revalue the RMB against the US dollar (by 2.1% from CNY8.28 to CNY8.11 per dollar) and move away from the long-standing US dollar peg system to a managed float system with an undisclosed currency basket as a reference. They also added that the daily exchange rate against the US dollar might

fluctuate within the previously set band of ±0.3% around the announced central parity, and ±1.5% against non-US dollar currencies.[3]

Starting in July 2005, the authorities allowed the RMB to appreciate gradually, partly to tighten monetary policy given the domestic economic overheating and partly to respond to the criticism by the US and IMF that the PRC had maintained an undervalued currency which led to rising current account surpluses and foreign exchange reserves. The pace of appreciation was slow and well-controlled but persistent until the summer of 2008. The nominal RMB against the US dollar appreciated by 17.5% and the RMB real effective rate by 15% between June 2005 and September 2008 when the RMB reached a peak before the world faced the grave consequences of the global financial crisis.

In the summer of 2008 the PRC authorities decelerated the pace of RMB appreciation and restored a US dollar peg system for the RMB before the Lehman shock sent global financial markets into deep turmoil. They were concerned about the erosion of the PRC's export competitiveness and decided to stabilize the RMB rate against the US dollar even before many of its export competitors in the region began to suffer from sharp depreciations of their currencies after the collapse of Lehman Brothers. The RMB exchange rate was set at CNY6.83 per US dollar until May 2010. In June 2010 the PRC abandoned the peg once again, allowing RMB appreciation against the US dollar to resume.

Figure 4 shows the PRC's balance of payments, i.e., the current account, the financial account, and reserve accumulation. The PRC ran a large current account surplus in the second half of the 2000s, reaching 10% of GDP in 2007, which rapidly shrank thereafter. The country's reserve accumulation was also notable given the surpluses in both the current account and the financial account. Its stock of foreign exchange reserves reached US$3.8 trillion at the end of 2013.

Figure 4: The People's Republic of China's Current Account, Financial Account, and Reserves
(% of GDP)
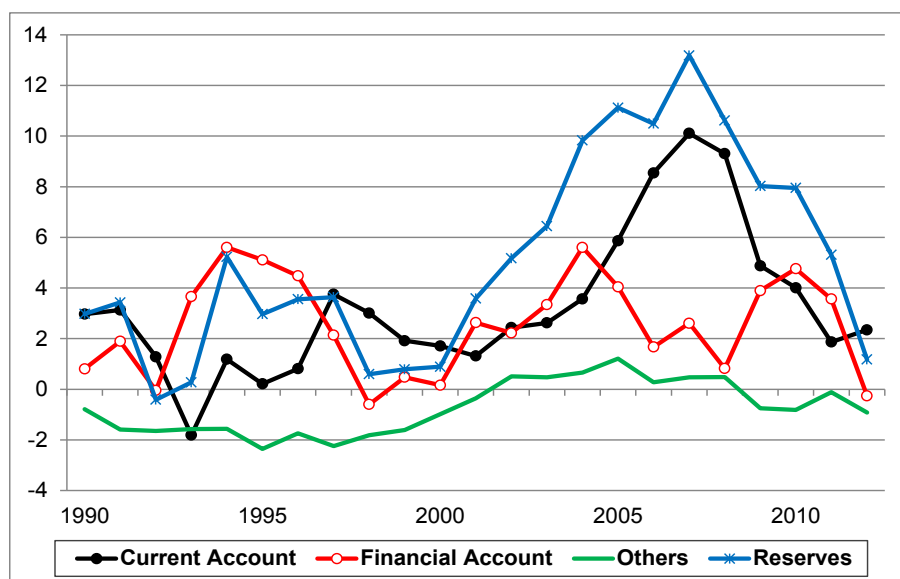
GDP = gross domestic product.

Source: IMF, *International Financial Statistics*.

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[3] On 25 September 2005, the daily fluctuation band with respect to non-US dollar currencies was widened from ±1.5% to ±3%.

3.2 International Monetary Fund Classification of the People's Republic of China's Exchange Rate Regimes

Table 4 summarizes the IMF's classification of exchange rate arrangements of East Asian economies from 2000 to 2013. East Asia exhibits a rich set of diverse foreign exchange rate regimes. As shown in the table, the spectrum ranges from the US dollar peg of Hong Kong, China's currency board system (and Brunei Darussalam's Singapore dollar peg under its own currency board system) at one end to the free floating Japanese yen at the other. In between, there are various types of intermediate regimes (other conventional fixed peg arrangements, stabilized arrangements, crawling peg regimes, crawl-like arrangements, other managed regimes, managed floating arrangements, and floating regimes), chosen by different economies.

The first row of the table reports changes in the PRC's exchange rate regime as defined by the IMF. As explained above, the PRC had a dollar peg system until July 2005, defined by the IMF as "other conventional fixed peg arrangement (US dollar)." The move to what the authorities called a managed float was recognized by the IMF as a move to a "crawling peg" only in August 2006 and was reported as such in the April 2007 issue of the *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). The reason for this delay was that the fluctuation in the RMB–US dollar exchange rate was less than the 2% range (for a 3-month period) used in the IMF's exchange rate classification system, so that initially the regime was classified as a conventional fixed peg exchange rate arrangement. The return to a US dollar peg in mid-2008 was immediately captured by the IMF, effective June 2008, as the RMB showed the characteristics of a stabilized arrangement. The table reports the change made in the April 2009 issue of AREAER to a "US dollar stabilized arrangement," which lasted briefly. The authorities then began allowing RMB appreciation in mid-2010. In the April 2011 issue of AREAER, the IMF reclassified the PRC's exchange rate arrangement, effective June 2010, to a "crawl-like arrangement" because the RMB had gradually appreciated against the US dollar, while the rate remained in a 2% crawling band. Previously, the RMB had been stable within a range of ±1% since mid-2008. This continues to be the PRC's current arrangement, according to the most recent IMF classification of exchange rate arrangements published in April 2013.

Table 4: International Monetary Fund's Classification of Exchange Rate Arrangements of East Asian Economies, 2000–2013

	Dec 2000	Dec 2001	Dec 2002	Dec 2003	Dec 2004	Apr 2006	Apr 2007	Apr 2008	Apr 2009	Apr 2010	Apr 2011	Apr 2012	Apr 2013
PRC	Other conventional fixed peg arrangement (USD)						Crawling peg (USD)		Stabilized arrangement (USD)		Crawl-like arrangement		
Japan	Independently floating								Free floating				
Rep. of Korea	Independently floating								Free floating	Floating			
Hong Kong, China	Currency board (USD)												
India	Managed floating								Floating				
Mongolia	Independently floating		Managed floating				Other conventional fixed peg arrangement (USD)		Floating				
Brunei Darussalam	Currency board (Singapore dollar)												
Cambodia	Managed floating (USD)								Floating	Stabilized arrangement (USD)			
Indonesia	Independently floating		Managed floating						Floating				Crawl-like arrangement
Lao PDR	Managed floating						Conventional pegged arrangement (USD)	Managed floating (USD)	Stabilized arrangement (USD)			Stabilized arrangement	
Malaysia	Other conventional fixed peg arrangement (USD)						Managed floating		Other managed arrangement				
Myanmar	Other conventional fixed peg arrangement (composite)	Managed floating						Managed floating (USD)	Other managed arrangement				
Philippines	Independently floating								Floating				
Singapore	Managed floating							Managed floating (composite)	Other managed arrangement (composite)	Crawl-like arrangement (composite)			
Thailand	Independently floating	Managed floating							Floating				
Viet Nam	Pegged exchange rate within horizontal bands	Managed floating					Other conventional fixed peg arrangement (USD)		Stabilized arrangement (USD)			Stabilized arrangement (composite)	Stabilized arrangement (USD)

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, USD = US dollar.

Notes:
1. Beginning in 2006, the IMF adopted new classifications based on *de facto* exchange rate arrangements which could be different from *de jure* arrangements.
2. "Managed floating" refers to managed floating with no pre-determined path for the exchange rate.

Sources: IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions* (for 2001–2013); and IMF, *International Financial Statistics* (for 2000).

3.3 Changes in the People's Republic of China's Observed Exchange Rate Regimes

Although the IMF classification of exchange rate arrangements is useful, the question remains as to how clear-cut these definitions are, especially in those periods when the observed exchange rates appear to have tight links with the US dollar. The way to ascertain this is to run the Frankel–Wei (1994) regression; that is, to regress changes in the value of the local currency, in this case the RMB against changes in the value of the US dollar, euro, yen, and the pound sterling that can exert a significant influence on the movements in the RMB. This has become the standard approach used to estimate the influence of important international currencies in the currency baskets of individual countries and thus identify "observed" exchange rate regimes. The equation to be estimated is expressed as:

$$\Delta \log \left(\frac{RMB}{NZD}\right) = \phi_0 + \phi_1 \Delta \log \left(\frac{USD}{NZD}\right) + \phi_2 \Delta \log \left(\frac{EURO}{NZD}\right) + \phi_3 \Delta \log \left(\frac{JPY}{NZD}\right) + \phi_4 \Delta \log \left(\frac{GBP}{NZD}\right) + u, \quad (1)$$

where $\Delta \log \left(\frac{k}{NZD}\right)$, k = *RMB, USD, EURO, JPY,* and *GBP*, is the logarithmic change in the exchange rate of currency k (the RMB, US dollar, euro, yen and pound sterling, respectively) per New Zealand dollar.[4] The exchange rates are taken in logs and transformed into first differences. The important international anchor (or reference) currencies are on the right-hand side of this equation and the estimated coefficients of these anchor or reference currencies are their implied weights in the currency basket for the RMB.[5]

We have run equation (1) across four non-overlapping sub-periods: the post-Asian financial crisis (AFC) period (3 January 2000–30 June 2005); the pre-Lehman period (21 July 2005–21 July 2008); the global financial crisis (GFC) period (1 August 2008–31 May 2010); and the post-GFC period (1 June 2010–31 March 2014). Table 5 presents the estimation results of the Frankel–Wei regressions for the PRC's observed exchange rate regimes. The results in the sub-periods that correspond to the PRC as having operated a conventional fixed peg arrangement (post-AFC period) as well as a US dollar stabilized arrangement (GFC period) are fully captured by the large and significant US dollar coefficients that are close to unity.[6] The results in the sub-periods when the PRC was classified as having operated a US dollar crawling peg and a crawl-like arrangement show lower weights on the US dollar (0.934 in the pre-Lehman period; 0.940 in the post-GFC period) than in the sub-periods of the RMB's US dollar

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[4] Here the New Zealand dollar is chosen as the numeraire currency. Previous studies have typically used either the Swiss franc or the special drawing rights (SDR) as the numeraire currency. However, there are problems with these numeraire currencies. The Swiss franc has been pegged to the euro since September 2011 and would be inappropriate to serve as a numeraire currency in the Frankel–Wei regression. The SDR on the other hand, comprise the same currencies that are included on the right-hand side of equation (1). The choice of the New Zealand dollar in our estimation is based on the fact that it is a freely floating currency of a small and open economy without capital and exchange controls, and one that we believe should not be accorded major importance or significant weight to the currency baskets of the Asian economies that we examine here.

[5] With the exception of Ogawa and Sakane (2006), we are not aware of any previous study that shows the RMB to depend on other East Asian currency in a systematic manner. The Ogawa and Sakane (2006) study included the Republic of Korea's won on the right-hand side of equation (1) above, but, in all of the regressions, the won came out to be statistically insignificant.

[6] In fact, in the post-AFC period during which the PRC was classified as having operated a conventional fixed peg arrangement, the estimated US dollar coefficient was equal to 1, and in the GFC period when the PRC was classified as having operated a US dollar stabilized arrangement, the estimated US dollar coefficient was close to 1, at 0.970.

peg or stabilization, although these estimated US dollar weights are still quite high in value. In addition, the fit, measured by R^2, is still good even in the periods of relative exchange rate flexibility. For example, R^2 was almost 1 during the initial period of a fixed exchange rate regime (post-AFC) and the second period of a peg (GFC period), and declined marginally to 0.979 and 0.985 in the periods of relative exchange rate flexibility (pre-Lehman and post-GFC periods). These findings seem to indicate that the PRC's exchange rate management behavior reflects its willingness, thus far, to allow RMB appreciation against the US dollar but not to let go of the US dollar as its major anchor currency. In the pre-Lehman period and the post-GFC period, the euro and the yen took on some importance in the PRC's exchange rate management.

Table 5: Changes in Observed Exchange Rate Regimes for the Renminbi

Estimation Period	US Dollar	Euro	Yen	Pound Sterling	R^2
Post-AFC period (3 January 2000–30 June 2005)	0.999*** [0.000]	0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]	0.999
Pre-Lehman period (21 July 2005–21 July 2008)	0.934*** [0.009]	0.044*** [0.013]	0.028*** [0.007]	-0.017 [0.013]	0.979
GFC period (1 August 2008–31 May 2010)	0.970*** [0.006]	0.023*** [0.008]	0.003 [0.004]	0.003 [0.005]	0.996
Post-GFC period (1 June 2010–31 March 2014)	0.940*** [0.008]	0.034*** [0.007]	0.011** [0.005]	0.002 [0.008]	0.985

AFC = Asian financial crisis, GFC = global financial crisis.

Notes:
1. The estimates for the baskets of the RMB are obtained from estimating equation (1).
2. *, **, and ***, indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The values in brackets are the estimated robust standard errors.

Source: Authors' computation.

How stable are the estimates presented in the table? One way to answer this is to carry out a series of "rolling" regressions of the Frankel–Wei type presented above. The way to implement such regressions is first to specify a window width of 260 daily trading observations (equivalent to a year) that begins on the first trading day of January 2000. This specified window width is then moved by estimating equation (1) at a step-size of one daily observation at a time and through the remaining observations that end on the last trading day of March 2014. In each of the rolling regressions using the specified window width of 260 days, we are able to arrive at a collection of point estimates of the coefficients (i.e., weights) of the currencies on the right-hand side of the equation, including the US dollar (blue), euro (red), yen (green), and pound sterling (black) as depicted in Figure 5. What is clear from the figure is that, while the US dollar weights accorded by the PRC have dipped slightly following the move to introduce some relative flexibility to the RMB in July 2005, these US dollar weights are still quite high in value and dominate those of the other international major currencies. However, the decision to introduce some flexibility to the RMB is associated with the rising weights of the euro and yen in the PRC's currency basket.

Figure 5: Estimated Weights of the US Dollar, Euro, Yen, and Pound Sterling in the People's Republic of China's Currency Basket
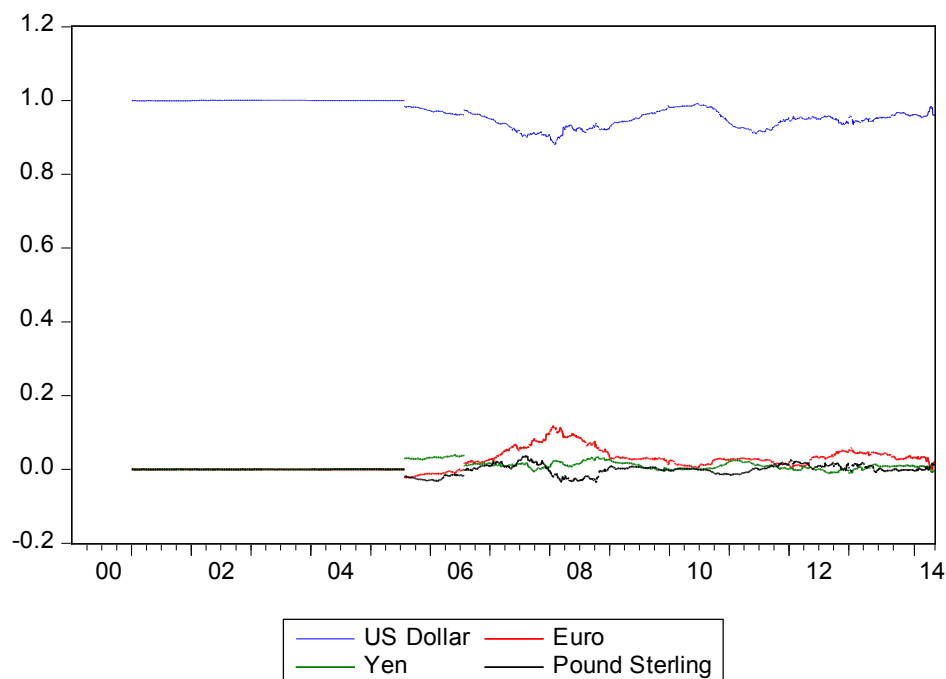
Source: Authors' calculations.

3.4 Factors behind a High Degree of Exchange Rate Stability in the People's Republic of China

An important question is why the PRC has maintained relatively high weights on the US dollar and a high degree of exchange rate stability even though it has allowed substantial RMB appreciation since mid-2005. One important factor is its tight capital controls as reported in Figure 2. Without significant capital account opening, the PRC authorities have been able to enjoy a high degree of monetary policy independence even under relatively stable exchange rate arrangements. This reflects the well-known "impossible trinity" or "trilemma" hypothesis in the choice of exchange rate regime for any economy. The hypothesis states that an economy may simultaneously choose any two, but not all, of three goals: exchange rate stability, capital account openness, and monetary policy independence.

Figure 6 depicts the Ito–Kawai (2012) index of monetary policy independence for the PRC and Japan as a reference. While the values of the index gyrate, the PRC appears to be enjoying an increasing degree of monetary policy independence (almost to the same extent as Japan). In the context of the trilemma hypothesis, Japan's choice has been to open its capital account fully and to allow free floating of the currency, thereby securing monetary policy independence. The PRC's trilemma choice has been to control its capital account tightly, to maintain stable exchange rates against the US dollar (although allowing measured RMB appreciation), and to secure high degrees of monetary policy independence. Essentially, the PRC authorities have been able to set the interest rate and stabilize the exchange rate under the tightly controlled capital account.

Figure 6: Indexes of Monetary Policy Independence for the People's Republic of China and Japan
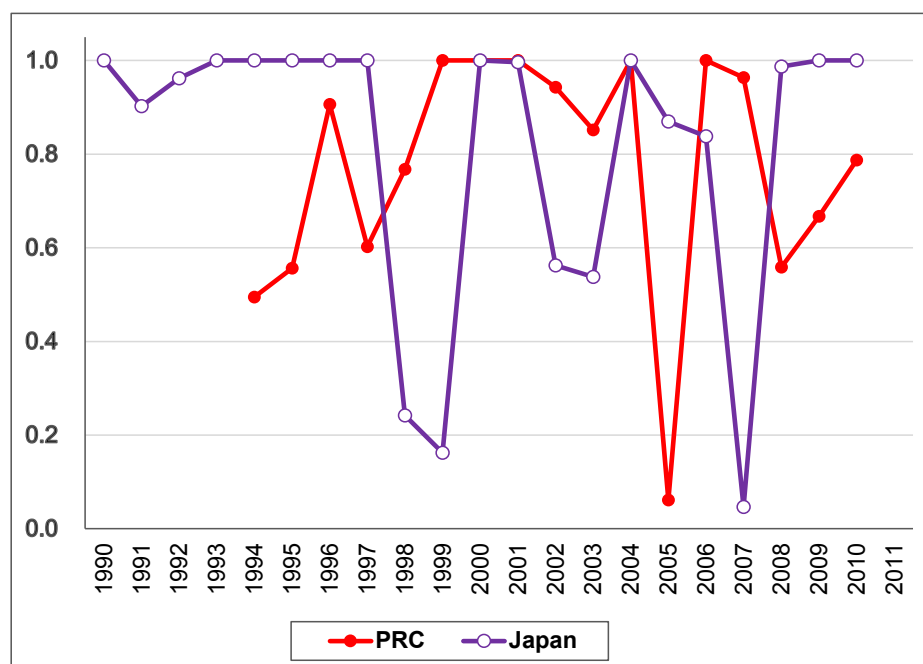
PRC = People's Republic of China.

Note: Value 1 represents complete monetary policy independence and value 0 means no monetary policy independence

Source: Ito and Kawai (2012).

This suggests, however, that with planned progressive capital account liberalization (to be achieved by 2015 or 2020), the PRC authorities will have to make the RMB exchange rate much more flexible if they wanted to maintain monetary policy independence. Thus the current policy of RMB internationalization, which would require significant capital account openness, calls for substantial exchange rate flexibility.

4. ROLE OF THE RENMINBI IN THE EXCHANGE RATE REGIMES OF EMERGING ASIAN ECONOMIES

4.1 Exchange Rate Behavior of East Asian Currencies

The exchange rate movements of East Asian currencies during the period 2000–2014 are plotted in nominal effective terms in Figure 7 and in real effective terms in Figure 8.[7]

Figure 7 shows that, at the beginning of the 2000s, apart from the Hong Kong dollar and RMB, most currencies fluctuated and often depreciated to varying extents. This nominal depreciation quickly reversed, however, in most currencies—a trend that continued until the onset of the global financial crisis. The RMB began its gradual appreciation in mid-2005 when the PRC exited from the US dollar peg and this trend continued after the global financial crisis. The Republic of Korea's won, the Japanese yen, and to a lesser extent the NT dollar, also

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[7] Nominal and real effective exchange rates are available only for the economies shown in Figures 7 and 8 among Asian economies from BIS, and are not readily available for Brunei Darussalam, Cambodia, Lao PDR, Mongolia, Myanmar, or Viet Nam.

experienced appreciating trends, though the won depreciated significantly during the global financial crisis of 2008–2009. The yen had already experienced a nominal depreciation just before the global financial crisis and was on a nominal trend appreciation at the time of the global financial crisis. This nominal yen appreciation lasted for a few more years and only started to reverse beginning in late 2012.

The Thai baht, Singapore dollar, Philippine peso, Indian rupee, and to a lesser extent the Indonesian rupiah, also experienced depreciation trends in the early 2000s. The Malaysian ringgit appreciated after the authorities decided to loosen its fixed peg to the US dollar (following the RMB's move to exit from its US dollar peg) and also depreciated in nominal terms in 2008 and 2009. Eventually, most ASEAN currencies recovered in nominal terms from the effects of the global financial crisis and have experienced relatively stable rates toward the end of the period of observation. The notable exceptions are the Indonesian rupiah and Indian rupee, which experienced substantial nominal depreciations in the wake of discussions of the possible beginning of tapering off of US quantitative easing monetary policy during May–September 2013.

Figure 7: Nominal Exchange Rate Movements
(nominal effective exchange rate, 2010=100)
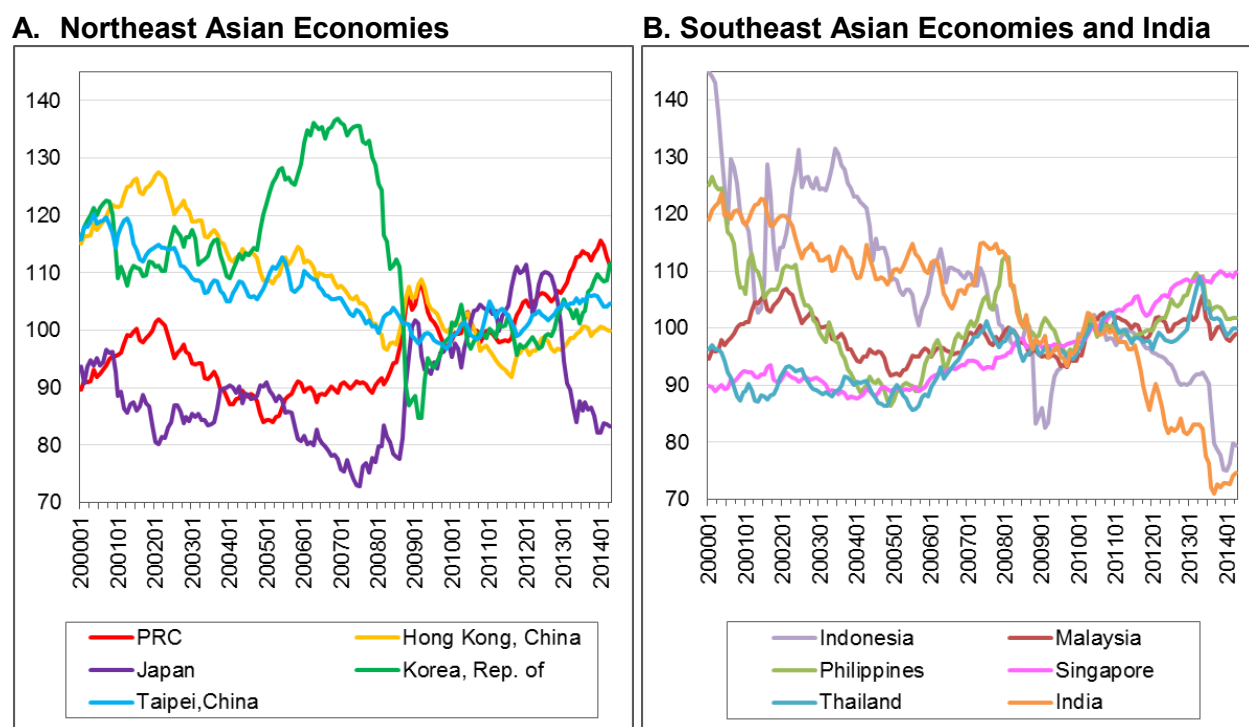
A. Northeast Asian Economies   **B. Southeast Asian Economies and India**

PRC = People's Republic of China.

Note: An increase denotes an appreciation, while a decrease denotes a depreciation.

Source: Bank for International Settlements.

Figure 8 depicts movements of real effective exchange rates (REERs), based on consumer price indexes, for East Asian currencies. The RMB began to appreciate in mid-2005 and has consistently trended this way since. Three currencies—the Hong Kong dollar, the NT dollar, and the Japanese yen—have experienced real depreciations to varying extents since the beginning of the 2000s. The yen experienced a real depreciation until the global financial crisis, sharply appreciated and remained strong during the 2008–2009 global financial crisis, and, in recent years, has again experienced a real depreciation. In contrast, the won, which had appreciated in

real terms since the beginning of the 2000s began to depreciate a year before the global financial crisis and remained steady in real terms.

The Indonesian rupiah, for the most part of the period of observation, experienced a real appreciation that was only briefly interrupted during the global financial crisis. In recent years, the rupiah has started to depreciate in real terms. The Philippine peso initially experienced a real depreciation, started to appreciate in real terms in late 2004, and has continued on this path since then. The Malaysian ringgit, Indian rupee, Thai baht, and Singapore dollar were relatively steady in their movements in real terms for the most part, although in recent years the Singapore dollar has experienced a moderate real appreciation and the Indian rupee a moderate real depreciation.

Figure 8: Real Exchange Rate Movements
(real effective exchange rate, 2010=100)
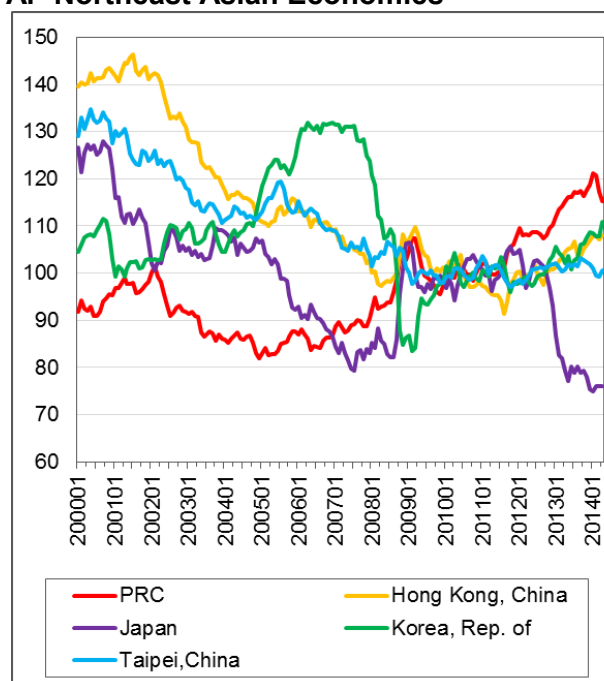
A. Northeast Asian Economies   **B. Southeast Asian Economies and India**
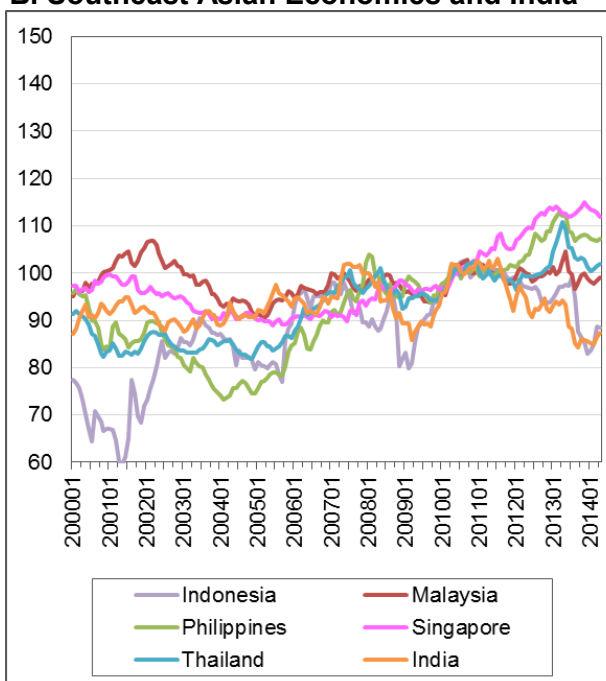
PRC = People's Republic of China.

Note: An increase denotes an appreciation, while a decrease denotes a depreciation.

Source of data: Bank for International Settlements.

Table 6 reports the correlation coefficients between pairs of currencies across the four non-overlapping sub-periods considered in the previous section: (i) post-AFC period (3 January 2000–30 June 2005), (ii) pre-Lehman period (21 July 2005–21 July 2008), (iii) GFC period (1 August 2008–31 May 2010), and (iv) post-GFC period (1 June 2010–31 March 2014). The correlation coefficients that are at least 0.70 in the table are shaded to show that they are high.

Table 6: Correlation Coefficients between Nominal Exchange Rates of Currencies

Post-AFC period: 3 January 2000–30 June 2005 (period of US dollar peg of the RMB)

	KRW	TWD	HKD	SGD	CAM	IDR	LAK	MYR	INR	MNT	PHP	THB	VND	USD	EUR	JPY	GBP	RMB
USD	0.853	0.957	0.999	0.931	0.947	0.634	0.907	1.000	0.978	0.834	0.845	0.901	0.998	1.000				
EUR	0.571	0.646	0.634	0.682	0.641	0.376	0.584	0.633	0.632	0.562	0.551	0.627	0.632	0.633	1.000			
JPY	0.765	0.765	0.743	0.822	0.680	0.528	0.648	0.741	0.740	0.585	0.689	0.793	0.740	0.641	0.586	1.000		
GBP	0.674	0.741	0.742	0.741	0.762	0.475	0.685	0.740	0.739	0.606	0.618	0.701	0.738	0.640	0.648	0.621	1.000	
RMB	0.853	0.957	0.999	0.931	0.947	0.634	0.907	1.000	0.978	0.833	0.845	0.901	0.998	1.000	0.633	0.641	0.640	1.000

Pre-Lehman period: 21 July 2005–21 July 2008 (period of relative flexibility of the RMB)

	KRW	TWD	HKD	SGD	CAM	IDR	LAK	MYR	INR	MNT	PHP	THB	VND	USD	EUR	JPY	GBP	RMB
USD	0.847	0.946	0.999	0.942	0.905	0.785	0.959	0.934	0.927	0.939	0.880	0.892	0.990	1.000				
EUR	0.736	0.808	0.804	0.859	0.728	0.679	0.740	0.787	0.774	0.746	0.724	0.770	0.790	0.699	1.000			
JPY	0.686	0.802	0.798	0.831	0.668	0.651	0.696	0.769	0.742	0.731	0.700	0.785	0.781	0.692	0.614	1.000		
GBP	0.740	0.803	0.812	0.837	0.733	0.689	0.771	0.790	0.784	0.769	0.735	0.767	0.797	0.608	0.670	0.645	1.000	
RMB	0.846	0.947	0.989	0.944	0.894	0.777	0.952	0.933	0.917	0.929	0.870	0.894	0.978	0.989	0.607	0.603	0.607	1.000

GFC period: 1 August 2008–31 May 2010 (return to US dollar-peg of the RMB)

	KRW	TWD	HKD	SGD	CAM	IDR	LAK	MYR	INR	MNT	PHP	THB	VND	USD	EUR	JPY	GBP	RMB
USD	0.476	0.973	1.000	0.958	0.240	0.778	0.978	0.940	0.895	0.884	0.940	0.984	0.970	1.000				
EUR	0.365	0.761	0.753	0.817	0.204	0.583	0.744	0.757	0.712	0.662	0.722	0.774	0.723	0.652	1.000			
JPY	0.334	0.859	0.886	0.877	0.203	0.647	0.853	0.822	0.779	0.780	0.810	0.892	0.864	0.685	0.646	1.000		
GBP	0.331	0.677	0.668	0.692	0.178	0.539	0.679	0.661	0.619	0.591	0.649	0.670	0.649	0.667	0.685	0.599	1.000	
RMB	0.471	0.974	0.998	0.960	0.242	0.780	0.977	0.943	0.897	0.882	0.938	0.984	0.967	0.998	0.659	0.688	0.670	1.000

Post-GFC period: 1 June 2010–31 March 2014 (period of relative flexibility of RMB)

	KRW	TWD	HKD	SGD	CAM	IDR	LAK	MYR	INR	MNT	PHP	THB	VND	USD	EUR	JPY	GBP	RMB
USD	0.779	0.962	0.999	0.897	0.955	0.748	0.928	0.872	0.707	0.892	0.905	0.922	0.949	1.000				
EUR	0.553	0.653	0.635	0.709	0.619	0.504	0.646	0.624	0.529	0.559	0.641	0.661	0.605	0.634	1.000			
JPY	0.581	0.741	0.763	0.733	0.728	0.579	0.703	0.644	0.508	0.688	0.674	0.730	0.731	0.665	0.538	1.000		
GBP	0.644	0.772	0.787	0.791	0.768	0.607	0.751	0.720	0.599	0.690	0.750	0.765	0.743	0.687	0.652	0.653	1.000	
RMB	0.780	0.962	0.992	0.898	0.953	0.741	0.924	0.876	0.707	0.882	0.905	0.923	0.940	0.992	0.640	0.665	0.685	1.000

AFC = Asian financial crisis; CAM = Cambodian riel; EUR = euro; GBP = pound sterling; GFC = global financial crisis; HKD = Hong Kong dollar; IDR = Indonesian rupiah; INR = Indian rupee; JPY = Japanese yen; KRW = Republic of Korea won; LAK = Lao PDR kip; MNT = Mongolian togrog; MYR = Malaysian ringgit; PHP = Philippine peso; RMB = renminbi; SGD = Singapore dollar; THB = Thailand baht; TWD = NT dollar; USD = US dollar; VND = Vietnamese dong.

Notes:
1. All exchange rates are the logarithmic first-difference of the currencies with respect to the New Zealand dollar.
2. The correlation coefficients that exceed 0.7 in value are shaded.

Source: Authors' computations.

Focusing first on the post-AFC period, when the RMB was pegged to the US dollar, one can see relatively high correlations between major international currencies (except the euro) and East Asian currencies (except the Indonesian rupiah). The RMB also exhibited high correlations with all East Asian currencies other than the rupiah and the yen, which may reflect the RMB's peg to the US dollar—with the correlation coefficient between the RMB and the US dollar being 1.0—and other East Asian authorities' preference to stabilize their currencies against the US dollar. Turning to the pre-Lehman period when the RMB steadily appreciated against the US dollar, correlations between Asian currencies and major international currencies became much tighter than in the previous sub-period. The correlation coefficient between the US dollar and the RMB for this sub-period declined slightly to 0.989, which was still high. The RMB continued to exhibit high correlations with other East Asian currencies, but these correlations tended to be lower than the US dollar's correlations with these currencies except the NT dollar, Singapore dollar, and Thai baht. This suggests the possibility that these currencies began to move more closely to the RMB than in the previous sub-period. Looking at the GFC period when the RMB resumed its US dollar peg, we observe that the strong correlations in the earlier sub-periods disappeared in a number of pairs of currencies. For instance, the pound sterling lost its strong correlations with other currencies and the correlations of the Cambodian riel also went below the threshold across almost all pairs of currencies. The currencies that exhibited stronger correlations with the RMB than with the US dollar were the NT dollar, Singapore dollar, riel, Indian rupee, ringgit, and rupiah. Finally, with regard to the correlation coefficients during the post-GFC period, when the RMB again steadily appreciated against the US dollar, we observe that the euro lost its strong correlation with most East Asian currencies. The East Asian currencies that exhibited higher correlations with the RMB than with the US dollar were the won, Singapore dollar, ringgit, and baht.

4.2 Evolution of International Monetary Fund-Defined Exchange Rate Regimes in East Asia

In Table 4 we presented the IMF's classification of exchange rate arrangements for East Asian economies in addition to the PRC for the period 2000–2013. In the table, we observe that after the 1997–1998 Asian financial crisis, almost all the crisis-affected economies, with the exception of Malaysia, were reported to have adopted different varieties of exchange rate flexibility. The Philippines and Republic of Korea adopted an independent float from 2000 to 2008, and then a floating regime from 2009 to 2013. Indonesia and Thailand were briefly in an independent float from 2000 to 2001, then both switched to a managed float regime from 2002 to 2008, and returned to introducing more flexibility by adopting a floating regime from 2009 to 2012. The only exception between the 2 countries is that Indonesia was recently reported to have adopted a crawl-like exchange rate arrangement. Malaysia implemented a conventional fixed peg arrangement in September 1998, and then followed the PRC's exit from its US dollar peg in July 2005 to adopt a managed float regime.

For other Asian economies not directly affected by the Asian financial crisis, their exchange rate arrangements cover a wide spectrum of regimes, including the currency board systems of Hong Kong, China and Brunei Darussalam, as well as the free floating regime adopted by Japan. Japan, perhaps the best example of a floating currency in the region, had been on an independent float from 2000 to 2008 and a free floating regime from 2009 to 2013.[8] Most countries not directly affected by the Asian financial crisis, such as Cambodia, India, Mongolia,

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[8] A major difference between an independent floating regime and a free floating regime is that the former may allow frequent currency market interventions while the latter does not.

Myanmar, and Singapore, switched back and forth for most of the 2000s to different forms of flexible exchange rate arrangements, e.g., an independent float and managed floating. The only two exceptions were Lao PDR and Viet Nam, which for most of the 2000s adopted stabilized arrangements with regard to the US dollar.

In addition to the relatively flexible exchange rate regimes in most economies in East Asia in the 2000s and 2010s, a significant buildup of foreign exchange reserves has been evident in the region. As Figure 9 shows, while this reserve buildup slowed somewhat for the majority of the East Asian economies during the 2008–2009 global financial crisis due to exchange rate depreciation pressures caused by reversals in capital inflows, the upward trend has nonetheless resumed in recent years. This trend suggests that there has been a high degree of exchange rate management in the region, which then points to the nature of the exchange rate regimes in the region being managed floating. In other words, exchange rate movements in most economies in the region should have otherwise displayed relatively greater flexibility in the absence, or lesser degree, of foreign exchange intervention.

Figure 9: Foreign Exchange Reserve Accumulation in East Asian Economies

Rep. of Korea

Reserves (left Axis: in billion US dollars)
Rep. of Korea won/US dollar (right axis)

Malaysia

Reserves (left Axis: in billion US dollars)
Malaysia ringgit/US dollar (right axis)

Philippines

Reserves (left Axis: in billion US dollars)
Philippine peso/US dollar (right axis)

Singapore

Reserves (left Axis: in billion US dollars)
Singapore dollar/US dollar (right axis)

Taipei,China

Reserves (left Axis: in billion US dollars)
NT Dollar/US dollar (right axis)

Thailand

Reserves (left Axis: in billion US Dollars)
Thai baht/US dollar (right Axis)

Source: IMF, *International Financial Statistics*.

The choice of exchange rate regime for any economy must be made in relation to the trilemma hypothesis. In this context, Table 7 reports indexes of capital account openness and monetary policy independence. According to the index of *de jure* capital account openness, some East Asian economies already have relatively open capital accounts, e.g., Hong Kong, China; Japan; and Singapore. For most economies (particularly Cambodia, the Republic of Korea, and Viet Nam), with the exception of Indonesia and Malaysia, the index has trended upward. The *de facto* index of capital account openness displays largely similar trends of rising openness for many economies. In contrast to the *de jure* measure, Malaysia's *de facto* index suggests rising openness over time. The index for monetary policy independence suggests a generally high degree of monetary policy independence for many economies, with the exception of Hong Kong, China, although it is difficult to find a clear trend over time for individual economies. In summary, as capital account openness has increased over time, most East Asian economies seem to have chosen greater exchange rate flexibility to retain a certain degree of monetary policy independence under the trilemma constraint.

Table 7: Indexes for Capital Account Openness and Monetary Policy Independence

	Capital Account Openness								Monetary Policy Independence		
	Chinn–Ito (de jure)				Ito–Kawai (de facto)						
	1990	2000	2010	2011	1990	2000	2010	2011	1990	2000	2010
PRC	0.00	0.16	0.16	0.16	0.17	0.26	0.23	0.23	--	1.00	0.79
Japan	1.00	1.00	1.00	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00
Rep. of Korea	0.41	0.41	0.59	0.65	0.04	0.20	0.29	--	1.00	1.00	1.00
Hong Kong, China	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.06	0.58	0.11
Taipei,China	--	--	--	--	--	--	--	--	1.00	0.00	1.00
India	0.16	0.16	0.16	0.16	0.29	0.18	0.25	0.19	1.00	0.54	1.00
Cambodia	--	0.00	0.71	0.71	--	0.34	0.39	0.40	--	--	--
Indonesia	1.00	0.69	0.69	0.41	0.32	0.40	0.30	0.25	1.00	1.00	1.00
Lao PDR	0.00	0.25	0.16	0.16	1.00	0.72	0.46	--	--	--	--
Malaysia	1.00	0.41	0.16	0.16	0.18	0.26	0.45	0.43	0.94	1.00	1.00
Philippines	0.16	0.45	0.16	0.16	0.34	0.29	0.26	0.25	1.00	1.00	0.56
Singapore	1.00	1.00	1.00	1.00	0.60	1.00	1.00	1.00	0.86	1.00	1.00
Thailand	0.41	0.41	0.16	0.16	0.11	0.25	0.27	0.25	1.00	1.00	1.00
Viet Nam	0.00	0.22	0.41	0.41	--	0.23	0.20	--	--	--	--

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Note: The *de jure* measure of capital account openness was constructed by Chinn and Ito (2008) and the *de facto* measure of capital account openness and the monetary policy independence index were developed by Ito and Kawai (2012).

Sources: Chinn and Ito (2008) and website; Ito and Kawai (2012).

4.3 Role of the Renminbi in East Asian Currency Baskets

Several recent studies have examined whether the RMB has started to figure in the currency baskets of individual economies, particularly in the East Asian region—e.g., Ho, Ma, and McCauley (2005); Balasubramaniam, Patnaik, and Shah (2011); Chow (2011); Fratzscher and Mehl (2011); Henning (2012); and Subramanian and Kessler (2013).

These studies also employed the Frankel–Wei model which was used in Section 3, except that this time the movement in the RMB is included on the right-hand side of the equation, which is expressed as:

$$\Delta \log\left(\frac{x}{CHF}\right) = \alpha_0 + \alpha_1 \Delta\log\left(\frac{USD}{CHF}\right) + \alpha_2\Delta\log\left(\frac{EURO}{CHF}\right) + \alpha_3\Delta\log\left(\frac{JPY}{CHF}\right) + \alpha_4\Delta\log\left(\frac{GBP}{CHF}\right) + \alpha_5\Delta\log\left(\frac{RMB}{CHF}\right) + u', \text{ (2)}$$

where $\Delta\log\left(\frac{k}{CHF}\right)$, $k = x$, *USD, EURO, JPY, GBP*, *RMB* is the logarithmic change in the exchange rate of currency k (a particular East Asian emerging currency x, US dollar, euro, Japanese yen, pound sterling, and RMB) per Swiss franc. As earlier mentioned, the exchange rates are taken as log first differences. The estimated coefficient on the RMB measures the importance of the RMB assigned to the currency basket of a particular Asian currency, x. The difficulty with this regression, as has been pointed out by previous studies, is that the correlation between changes in the US dollar and the RMB—particularly during the periods in which the PRC pursued an official US dollar peg—is remarkably high, i.e., multicollinearity is present.

Brief Literature Survey

The previous literature attempted to address the multicollinearity problem in three ways. The first was to estimate equation (2) above at the two known periods in which the PRC authorities allowed the RMB to exhibit some flexibility against the US dollar. For example, Henning (2012) estimated the Frankel–Wei regression with the RMB movements included on the right-hand side for the period 22 July 2005–2 July 2009 and also for the period 18 June 2010–30 December 2011. Subramanian and Kessler (2013) estimated the regression for the periods July 2005–August 2008 and July 2010–July 2013. Adopting this approach, Henning (2012) obtained results that led him to conclude that Malaysia, the Philippines, Singapore, and Thailand, had formed a loose but effective "RMB bloc" with the PRC, and that the Republic of Korea had participated since the global financial crisis. Subramanian and Kessler (2013) were more forthcoming in arriving at their conclusion that the RMB had become the dominant reference currency in East Asia, particularly for Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei,China; and Thailand, eclipsing the US dollar and the euro. Thus they argued that an RMB bloc had emerged in a number of East Asian economies.

The second way of addressing the multicollinearity problem was to express all the exchange rates in terms of the US dollar and place the RMB–US dollar rate on the right-hand side of the regression equation. This approach removed the US dollar movements from the right-hand side of equation (2), making the dollar the numeraire currency, and then used the movements in the RMB-US dollar rate as one of the right-hand side variables. This method was expected to resolve the multicollinearity problem. The US dollar weight was implied from the estimation of the modified Frankel–Wei regression. For instance, Ho, Ma, and McCauley (2005) employed this approach by using the movements in the RMB non-deliverable forward (NDF) rate per US dollar as the RMB variable on the right-hand side of the equation for the 2003 and 2004 data.[9] They found that the role of the RMB had been significant even in the first half of the 2000s, that several Asian currencies (the rupiah, won, and NT dollar) had already tracked the RMB, and that the importance of the RMB rose in three currencies between 2003 and 2004.

The third way of surmounting the multicollinearity problem was to first purge the US dollar component from the RMB movements and then incorporate the "independent" movements of the RMB in the Frankel–Wei model. This approach was suggested by several authors, including Balasubramaniam, Patnaik, and Shah (2011), and Fratzscher and Mehl (2011). In their study, Balasubramaniam, Patnaik, and Shah (2011) found that all the East Asian currencies they

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[9] In addition, Ho, Ma, and McCauley (2005) excluded the pound sterling from the right-hand side of the equation.

considered had attached importance to the US dollar, and that beginning in October 2005 two Asian currencies—the ringgit (until June 2007) and the NT dollar (until February 2011)—had attached importance to the RMB. But in June 2007, the ringgit stepped away from giving importance to the RMB. In October 2009, movements in the RMB started to matter for the Vietnamese dong. Thus, at the end of their period of observation, only two Asian currencies, the NT dollar and the dong, were found to have accorded importance to movements in the RMB.

In a recent study, Kawai and Pontines (2014) replicated these three approaches by conducting a series of "rolling" regressions of the Frankel–Wei model or its modifications and found that none of the three approaches above provided adequate solutions to the issue of multicollinearity.[10] With regard to the first approach, Kawai and Pontines (2014) obtained two important results: first, the US dollar weights moved in the opposite direction to the RMB weights, exhibiting highly negative correlations; and second, in almost all of the rolling regressions conducted, both the US dollar and RMB weights showed instability in the form of quite large or small coefficients. With regard to the second approach, they found unstable and very large or small values for both the implied US dollar weights and the RMB weights. The implied US dollar coefficients behaved as if they had a multicollinear relationship with the RMB coefficients, with highly negative correlations regardless of the period examined, i.e., the period when the RMB was pegged to the US dollar or the period when it was relatively flexible.[11] With regard to the third approach, they found that the US dollar weights had been more stable than the previous two approaches but the RMB weights had remained very volatile. That is, the estimated RMB weights exhibited unstable and very large or small values for almost the whole period of observation.

Kawai–Pontines (2014) Estimation Method

In their study, Kawai and Pontines (2014) presented a new method of estimating the US dollar and RMB weights in the Frankel–Wei regression model. A two-step regression was conducted and followed at first the strategy of removing the "dependent" components of the movements in the RMB from the movements of major international currencies, particularly the US dollar, and obtaining the residuals from the first-step regression, which was identical to equation (1). This was used to determine the weights accorded by the PRC authorities to the major international currencies in their currency basket.

Once the estimated residuals from the estimation, $\hat{u}$, were obtained, these residuals were used as a proxy for the actual RMB movements in equation (2) (except that the numeraire currency of equation [2] is now the New Zealand dollar), and these were subtracted from both sides of the equation under the condition that the sum of the estimated coefficients was unity. This yielded the following, modified version of Frankel–Wei regression for a particular East Asian emerging economy currency, x:

$$\Delta \log \left(\frac{x}{NZD}\right) - \hat{u} = \gamma_0 + \gamma_1 \left[\Delta \log \left(\frac{USD}{NZD}\right) - \hat{u}\right] + \gamma_2 \left[\Delta \log \left(\frac{EURO}{NZD}\right) - \hat{u}\right] + \gamma_3 \left[\Delta \log \left(\frac{JPY}{NZD}\right) - \hat{u}\right]$$
$$+ \gamma_4 \left[\Delta \log \left(\frac{GBP}{NZD}\right) - \hat{u}\right] + v \tag{3}$$

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[10] The rolling regression is carried out by first specifying a window width of 260 daily trading observations (equivalent to a year) that begins on 22 July 2005 (the day following the announcement by the People's Bank of China that it would allow relative flexibility in the RMB exchange rate against the US dollar). This specified window width is then moved by estimating the Frankel–Wei type regression at a step-size of one daily observation at a time and through the remaining observations. The last observation was on 31 March 2014.

[11] In addition, Kawai and Pontines (2014) found that results were very similar even if the RMB spot exchange rate was used instead of the RMB NDF rate.

Estimation of this modified Frankel–Wei regression equation (3) also yielded the implied RMB coefficient as: $\gamma_5 = 1 - \gamma_1 - \gamma_2 - \gamma_3 - \gamma_4$.[12]

Table 8 reports the estimation results for the four sub-periods that were earlier considered in previous sub-sections using the Kawai–Pontines estimation method. Several important observations can be made from the table.

First, throughout the whole period of observation, for all the emerging East Asian currencies considered, the US dollar reigned supreme as the major anchor currency in view of its weights in the currency baskets. In addition to the official US dollar peg of the Hong Kong dollar and the pre-July 2005 US dollar peg of the Malaysian ringgit, in all four sub-periods the US dollar was the most important anchor currency for all East Asian currencies, although the authorities in Indonesia; the Republic of Korea; Malaysia (after 2005); the Philippines; and Taipei,China have attached slightly less importance to the US dollar than previously. While the US dollar's role has declined in the case of the Indian rupee and Singapore dollar between the post-AFC period and the post-GFC period, its role has not been replaced by that of the RMB.

Second, the RMB was already important for five currencies (the won, Singapore dollar, rupiah, Indian rupee, and baht) in the post-AFC period, and the number of Asian currencies according importance to the RMB and the average magnitudes of the RMB weights have increased over time. All currencies—with the exception of the riel, kip, togrog, and dong—had assigned statistically significant weights to the RMB by the post-GFC period. The size of the estimated RMB coefficients have risen in the case of the won, NT dollar, Singapore dollar, rupiah, ringgit, Indian rupee, peso, and baht. For example, in the post-GFC period, India and the Republic of Korea assigned close to 30% weight to the RMB in their respective currency baskets. Singapore and Malaysia assigned more than 20%; and Indonesia, the Philippines, Taipei,China, and Thailand, more than 10%. However, these estimated weights are still smaller than those of the US dollar and do not suggest that the RMB has supplanted the US dollar in the currency baskets of these economies.

Third, the importance of the euro, yen, and pound sterling in the currency baskets of East Asian currencies has changed over time. The number of currencies that attach some importance to the euro has risen from two during the post-AFC period (the NT dollar and the Singapore dollar) to seven in the post-GFC period (the NT dollar, Singapore dollar, kip, ringgit, Indian rupee, peso, and baht). On the other hand, the importance of the Japanese yen and the pound sterling has dropped. In the case of the yen, the number of currencies that attached some importance to it declined from seven during the post-AFC period (the won, NT dollar, Singapore dollar, rupiah, Indian rupee, peso, and baht) to just one by the post-GFC period (the Singapore dollar). In the case of the pound sterling the number of currencies that attached some importance to it had come down from four (the won, NT dollar, Singapore dollar, and Indian rupee) in the post-AFC period to just one by the post-GFC period (the Singapore dollar). In a sense the weights of the RMB in East Asian currency baskets rose at the expense of the yen and pound sterling.

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[12] Kawai and Pontines (2014) demonstrated the superiority of their method over the previous approaches. First, conducting rolling regressions for equation (3), they found that their method produced much more stable and smoothly changing estimates of the US dollar and RMB weights than in previous approaches. Second, by obtaining the goodness-of-fit measured by the constructed R-squared values of the new method and the Balasubramaniam–Patnaik–Shah approach, the constructed R-squared values are larger under the new method than under the Balasubramaniam–Patnaik–Shah method. These suggest a superior estimation outcome to those of the other approaches mentioned above.

Table 8: Estimation Results Using the Kawai–Pontines Method, with Renminbi Spot Rate

	USD	EURO	JPY	GBP	RMB	R^2
Rep. of Korea won						
Post-AFC period	0.638***	-0.022	0.270***	0.065**	0.048***	0.768
	[0.030]	[0.021]	[0.021]	[0.025]	[0.017]	
Pre-Lehman period	0.686***	0.140**	-0.036	0.096	0.112***	0.730
	[0.055]	[0.067]	[0.055]	[0.070]	[0.023]	
GFC period	0.684***	0.086	-0.265***	0.030	0.465***	0.231
	[0.096]	[0.105]	[0.076]	[0.075]	[0.083]	
Post-GFC period	0.638***	0.085*	-0.034	0.026	0.284***	0.608
	[0.043]	[0.032]	[0.027]	[0.047]	[0.027]	
NT dollar						
Post-AFC period	0.810***	0.031**	0.094***	0.045***	0.016*	0.924
	[0.017]	[0.014]	[0.011]	[0.012]	[0.010]	
Pre-Lehman period	0.737***	0.076**	0.079***	0.042	0.064***	0.908
	[0.027]	[0.032]	[0.020]	[0.031]	[0.014]	
GFC period	0.837***	0.040	-0.028	0.041*	0.109***	0.909
	[0.027]	[0.033]	[0.022]	[0.024]	[0.021]	
Post-GFC period	0.832***	0.073***	0.004	-0.013	0.103***	0.929
	[0.019]	[0.017]	[0.012]	[0.022]	[0.014]	
Hong Kong dollar						
Post-AFC period	0.988***	0.000	0.004***	0.004***	0.001	0.998
	[0.002]	[0.000]	[0.001]	[0.001]	[0.001]	
Pre-Lehman period	0.980***	0.007	0.010***	0.001	0.000	0.998
	[0.002]	[0.005]	[0.002]	[0.004]	[0.001]	
GFC period	0.992***	0.005*	0.002	-0.001	0.001	0.999
	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	
Post-GFC period	0.985***	0.002	-0.003*	0.001	0.015***	0.999
	[0.003]	[0.002]	[0.002]	[0.003]	[0.002]	
Singapore dollar						
Post-AFC period	0.611***	0.082***	0.219***	0.036***	0.049***	0.911
	[0.017]	[0.011]	[0.012]	[0.013]	[0.009]	
Pre-Lehman period	0.562***	0.196***	0.078***	0.049*	0.113***	0.925
	[0.022]	[0.024]	[0.019]	[0.025]	[0.013]	
GFC period	0.597***	0.196***	0.022	0.029	0.156***	0.913
	[0.022]	[0.027]	[0.019]	[0.018]	[0.020]	
Post-GFC period	0.478***	0.159***	0.049***	0.073***	0.240***	0.842
	[0.027]	[0.026]	[0.016]	[0.027]	[0.020]	
Cambodian riel						
Post-AFC period	0.992***	0.011	-0.022	0.036	-0.017	0.897
	[0.015]	[0.015]	[0.017]	[0.026]	[0.017]	
Pre-Lehman period	0.964***	0.037	-0.015	0.005	0.007	0.822
	[0.035]	[0.080]	[0.027]	[0.065]	[0.020]	
GFC period	1.013***	0.032*	0.005	-0.044**	-0.007	0.977
	[0.014]	[0.019]	[0.012]	[0.017]	[0.011]	
Post-GFC period	0.973***	-0.002	-0.009	0.032*	0.006	0.914
	[0.017]	[0.023]	[0.010]	[0.018]	[0.013]	
Indonesian rupiah						
Post-AFC period	0.779***	-0.101	0.180***	0.028	0.113***	0.411
	[0.052]	[0.049]	[0.041]	[0.050]	[0.035]	
Pre-Lehman period	0.664***	0.087*	0.008	0.127**	0.113***	0.631
	[0.081]	[0.048]	[0.042]	[0.059]	[0.024]	
GFC period	0.866***	0.020	-0.163***	0.081	0.195***	0.569
	[0.067]	[0.085]	[0.053]	[0.056]	[0.053]	

Post-GFC period	0.791***	0.035	-0.005	0.033	0.146***	0.558
	[0.045]	[0.045]	[0.035]	[0.051]	[0.042]	
Lao PDR kip						
Post-AFC period	0.996***	-0.029	-0.003	0.038	-0.000	0.821
	[0.016]	[0.041]	[0.019]	[0.033]	[0.016]	
Pre-Lehman period	1.032***	-0.073*	0.004	0.008	0.027	0.920
	[0.023]	[0.043]	[0.015]	[0.026]	[0.021]	
GFC period	0.977***	0.061	-0.024	-0.003	-0.011	0.918
	[0.022]	[0.048]	[0.023]	[0.032]	[0.028]	
Post-GFC period	0.932***	0.119**	-0.028	-0.020	-0.002	0.867
	[0.035]	[0.036]	[0.026]	[0.039]	[0.015]	
Malaysian ringgit						
Post-AFC period	0.999***	0.000	0.000	-0.000	0.000	0.999
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
Pre-Lehman period	0.752***	0.068	0.021	0.042	0.114***	0.879
	[0.029]	[0.042]	[0.025]	[0.042]	[0.018]	
GFC period	0.764***	0.104**	-0.078***	0.034	0.176***	0.837
	[0.029]	[0.038]	[0.020]	[0.023]	[0.024]	
Post-GFC period	0.709***	0.110***	-0.049**	0.018	0.212***	0.771
	[0.034]	[0.026]	[0.022]	[0.033]	[0.020]	
Indian rupee						
Post-AFC period	0.915***	0.007	0.024***	0.028***	0.023***	0.956
	[0.016]	[0.008]	[0.008]	[0.010]	[0.006]	
Pre-Lehman period	0.804***	0.058*	-0.023	0.080**	0.079***	0.866
	[0.030]	[0.034]	[0.023]	[0.036]	[0.021]	
GFC period	0.746***	0.113*	-0.129**	0.045	0.225***	0.667
	[0.060]	[0.059]	[0.039]	[0.042]	[0.038]	
Post-GFC period	0.604***	0.132***	-0.072**	0.045	0.290***	0.519
	[0.042]	[0.044]	[0.038]	[0.058]	[0.030]	
Mongolian togrog						
Post-AFC period	1.026***	0.063	-0.025	-0.104	0.039	0.696
	[0.033]	[0.065]	[0.021]	[0.079]	[0.033]	
Pre-Lehman period	1.028***	-0.011	-0.018	0.012	-0.010	0.883
	[0.035]	[0.021]	[0.012]	[0.031]	[0.014]	
GFC period	1.024***	-0.071	-0.015	0.028	0.034	0.749
	[0.047]	[0.051]	[0.031]	[0.044]	[0.041]	
Post-GFC period	1.016***	0.001	0.019	-0.044	0.008	0.794
	[0.032]	[0.032]	[0.020]	[0.035]	[0.026]	
Philippine peso						
Post-AFC period	0.878***	0.012	0.144***	-0.055	0.019	0.723
	[0.024]	[0.018]	[0.039]	[0.039]	[0.013]	
Pre-Lehman period	0.801***	0.044	-0.021	0.059	0.115***	0.779
	[0.041]	[0.046]	[0.034]	[0.045]	[0.022]	
GFC period	0.849***	0.063	-0.117***	0.029	0.176***	0.804
	[0.044]	[0.045]	[0.031]	[0.031]	[0.031]	
Post-GFC period	0.760***	0.102***	-0.041**	0.036	0.143***	0.828
	[0.033]	[0.023]	[0.021]	[0.032]	[0.018]	
Thai baht						
Post-AFC period	0.652***	0.033*	0.231***	0.020	0.061***	0.847
	[0.023]	[0.018]	[0.018]	[0.022]	[0.015]	
Pre-Lehman period	0.681***	0.038	0.140***	0.057*	0.082***	0.815
	[0.035]	[0.041]	[0.025]	[0.032]	[0.023]	
GFC period	0.786***	0.077**	0.041***	0.018	0.078***	0.950
	[0.024]	[0.024]	[0.013]	[0.016]	[0.014]	
Post-GFC period	0.692***	0.110***	0.032*	0.022	0.145***	0.862

	[0.028]	[0.021]	[0.017]	[0.024]	[0.016]	
Vietnamese dong						
Post-AFC period	1.000***	-0.003	0.001	0.003	-0.002	0.996
	[0.002]	[0.002]	[0.001]	[0.003]	[0.001]	
Pre-Lehman period	1.014***	0.006	-0.005	-0.013*	-0.002	0.980
	[0.010]	[0.009]	[0.009]	[0.007]	[0.004]	
GFC period	0.987***	-0.034	-0.003	0.014	0.037	0.912
	[0.026]	[0.038]	[0.023]	[0.020]	[0.025]	
Post-GFC period	0.977***	0.015	0.015	-0.020	0.014	0.890
	[0.030]	[0.011]	[0.019]	[0.012]	[0.013]	

AFC = Asian financial crisis; GBP = pound sterling, GFC = global financial crisis; JPY = Japanese yen, RMB = renminbi, USD = US dollar.

Notes:

1. The estimates for the baskets of the currencies above are obtained from the following two-step regressions:

$$\Delta\log\left(\tfrac{RMB}{NZD}\right) = \phi_0 + \phi_1\Delta\log\left(\tfrac{USD}{NZD}\right) + \phi_2\Delta\log\left(\tfrac{EURO}{NZD}\right) + \phi_3\Delta\log\left(\tfrac{JPY}{NZD}\right) + \phi_4\Delta\log\left(\tfrac{GBP}{NZD}\right) + u,$$

$$\Delta\log\left(\tfrac{x}{NZD}\right) - \hat{u} = \gamma_0 + \gamma_1\left[\Delta\log\left(\tfrac{USD}{NZD}\right) - \hat{u}\right] + \gamma_2\left[\Delta\log\left(\tfrac{EURO}{NZD}\right) - \hat{u}\right] + \gamma_3\left[\Delta\log\left(\tfrac{JPY}{NZD}\right) - \hat{u}\right] + \gamma_4\left[\Delta\log\left(\tfrac{GBP}{NZD}\right) - \hat{u}\right] + v,$$

where $\hat{u} = \Delta\log\left(\tfrac{RMB}{NZD}\right) - [\hat{\phi}_0 + \hat{\phi}_1\Delta\log\left(\tfrac{USD}{NZD}\right) + \hat{\phi}_2\Delta\log\left(\tfrac{EURO}{NZD}\right) + \hat{\phi}_3\Delta\log\left(\tfrac{JPY}{NZD}\right) + \hat{\phi}_4\Delta\log\left(\tfrac{GBP}{NZD}\right)].$

2. Asterisks, *, **, ***, indicate statistical significance at the 10%, 5% and 1% levels, respectively. The values in brackets are the estimated robust standard errors.

Source: Authors' computation.

5. MONETARY AND CURRENCY COOPERATION IN EAST ASIA

There is no doubt that an increasingly integrated East Asia will need more stable intraregional exchange rates. The region has created closely knit supply chains where capital goods, industrial materials, parts and components, semi-finished goods, and final products are traded across borders. The ever closer economic integration in the region means each economy is increasingly affected by shocks and policies that originate from neighboring economies. At the same time, economies in the region compete among each other in markets within and outside the region, and therefore the potential of losing competitiveness against each other is treated with utmost sensitivity. Ultimately, the prospect of a beggar-thy-neighbor competitive depreciation strategy, which could be very costly to the region in terms of large and unnecessary reallocations of resources across the region, always looms large (Kawai and Takagi 2012). Despite the paramount importance of the achievement of intraregional exchange rate stability, there has been limited meaningful progress in moving toward a regional framework for exchange rate policy coordination.

In East Asia, there are potentially three ways in which intraregional exchange rate stability could be achieved:

- choosing a single currency, such as the US dollar, the RMB, or the yen, as the region's monetary anchor;

- selecting a currency basket that includes major international and/or regional currencies as the region's monetary anchor; and

- establishing a coordinated arrangement of choosing a mutually acceptable currency or currency basket as the region's common currency.

5.1 The US Dollar, Renminbi, or Yen as Anchor for East Asia?

The experience of the global financial crisis and Asia's diverse economic relationship with the major economies of the world suggest that the traditional practice of choosing the US dollar as the region's monetary anchor is no longer the best policy. Given that the East Asian economy will continue to grow and far exceed the US economy in size, the region cannot simply continue to depend on the monetary policy of the US Federal Reserve for its monetary and financial stability.

For the RMB to play an anchor currency role in East Asia, the PRC must create enabling environments for global investors to freely hold and utilize the RMB by fully liberalizing its capital account, dismantling exchange controls, and building deep and liquid financial markets. The RMB's international role will clearly rise over time supported by the PRC's strong growth performance, trade and investment expansion, and currency internationalization policy. Nonetheless, decades may have to pass before it becomes a fully convertible international currency that is equivalent to the US dollar, the euro, or the yen.[13] More to the point, it may take a long time for the PRC to establish a truly independent, credible central bank, put in place effective prudential and supervisory frameworks governing its financial systems, and implement rule of law through independent judicial systems.

The Japanese yen is a fully convertible international currency and fulfills all the conditions for becoming a regional anchor currency. Japan is Asia's second largest economy with massive amounts of savings. It has a fully open capital account, deep and liquid financial markets, systems for international clearance for yen financial instruments, transparent rules-based institutions and a strong tradition of rule of law coupled with independent judicial systems. Tokyo is one of the top five global financial centers. However, the yen has not yet achieved its full potential as the region's anchor currency. Because of Japan's two decades of economic stagnation, its large government debt, and its aging population, which places further constraints on the country's growth potential and fiscal capacity, Japan is economically struggling. However, if "Abenomics" is successful in revitalizing the economy, Japan may be able to enhance the international role of the yen significantly. Nevertheless, it will be hard for the yen to play an anchor currency role in East Asia on its own.

Furthermore, other East Asian economies, however robust their economic policies, are too small for their currencies to take on a meaningful leadership role as anchor currencies, although collectively they can be important. This makes it desirable—even necessary—to introduce a mechanism for intraregional currency stability based on a currency basket or a regionally coordinated framework, as no single East Asian currency is capable of playing a dominant monetary anchor role, at least in the near future.

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[13] For the RMB to be widely held and used in third countries, the PRC economy must become fully open with respect to trade, investment, and finance. It was the openness and liquidity of US financial markets after all that heightened the US dollar's international role and that made foreign investors willingly hold dollar-denominated assets. In addition, the US provided transparent, rules-based institutions that would protect private property and enable market participants to resolve any disputes based on laws. If the RMB is to play a significant role as an anchor currency, the PRC must fully liberalize its capital account and build deep, broad, and liquid financial markets. In addition, it needs to significantly improve the quality of domestic institutions. Practically speaking, this is not going to happen anytime soon. A precondition for capital account convertibility is that the country must complete its transition to a market economy and establish a sound and resilient financial sector. The PRC is still far from a free market economy, with extensive problems in its banking and shadow banking system and underdeveloped capital markets. At a minimum, completing this transition will require another 10–20 years, although some degree of capital account liberalization might be achieved by 2020.

5.2 A Case for Currency Basket Systems

As the RMB or yen alone cannot become the region's dominant anchor currency for the foreseeable future, a currency basket system is an attractive and viable direction to suggest for East Asian economies. Both the RMB and yen need to play prominent roles in the currency baskets of emerging Asian economies. Three options may be considered for the region's currency baskets:

- the IMF special drawing right (SDR) comprising the US dollar, euro, pound sterling, and yen;

- an SDR+ currency basket comprising the US dollar, euro, pound sterling, yen, and emerging East Asian currencies; or

- an Asian currency unit (ACU)—a basket of East Asian currencies, including the RMB, yen, won, baht, ringgit, and possibly other currencies.

The first two options would not require a substantial degree of policy coordination because they rely on external nominal anchors. The third option requires either a certain degree of currency cooperation or a few major country central banks pursuing a form of inflation targeting, together with soft exchange rate stabilization, in order to establish a regional nominal anchor. The first option is the simplest and the third option the most complex. One of the advantages of the second option is that, once it is introduced, moving to the third option at a later stage would be easy since it would require only reducing the weights of the dollar, euro, and pound sterling to zero.[14]

As implied from the evidence in Section 3.3 on the PRC's currency basket weights, at this point, the PRC appears to have chosen the first option, a type of an SDR basket system with a very large weight assigned to the US dollar. This choice is reasonable as the country does not have to adopt a freely flexible exchange rate regime in the presence of capital controls, and wishes to tightly manage the exchange rate. Until now, the US dollar-skewed SDR basket system has served the PRC well in maintaining a high degree of exchange rate stability while allowing gradual RMB appreciation against the US dollar—particularly given the need to rebalance the current account. However, to cope with the process toward greater capital account opening and RMB internationalization, it will be increasingly important for the PRC to shift to more loosely managed floating with a more balanced SDR basket system that assigns a much smaller weight to the US dollar.

As can also be observed from the results obtained in Section 4.3, the second option, the SDR+ currency basket system, appears to have been adopted by many emerging East Asian economies. A typical example is Singapore, which has been managing its exchange rate in an SDR+ basket framework, which includes the US dollar, euro, pound sterling, yen, and the RMB.[15] Other economies, including India; Indonesia; the Republic of Korea; Malaysia; the Philippines; Taipei,China; and Thailand, also assign weights to the US dollar, euro, and RMB to varying extents. By pursuing managed float exchange rate systems, these emerging economies can enhance the degrees of extra-regional exchange rate flexibility and intra-regional stability.

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[14] An SDR+ currency basket is also defined as a basket of the US dollar, the euro, the pound sterling, and an ACU (which is a currency basket of the yen and other Asian currencies). If the weights on the dollar, the euro, and the pound sterling become zero, the SDR+ basket becomes an ACU.

[15] It is often claimed that other regional currencies are also included in the currency basket for the Singapore dollar. The estimation results in Table 8 for Singapore did not include other regional currencies but they may be partly represented by the US dollar, euro, yen and RMB to the extent that these affect other regional currencies.

National monetary authorities can maintain policy independence by combining an appropriately defined inflation targeting policy and a basket-based managed floating policy (Kawai and Takagi 2005). One advantage of this approach is that it does not require significant economic and structural convergence among the economies.

The third option, the introduction of an ACU, would be useful in at least four ways (Kawai 2009). It would provide:

- a statistical indicator summarizing the collective movement of Asian currencies,

- an accounting unit for operations of regional financial cooperation mechanisms,

- a currency basket used by the market, and

- an official unit of account for exchange rate policy coordination.

Given that there is currently no consensus about whether the region should embark on exchange rate policy coordination, the creation of an ACU could support the ongoing process of market-driven economic integration in several ways.[16]

First, an ACU index could be used for intensive policy discussions on exchange rate policy as a part of regional economic and financial surveillance. By working in a gradual and calibrated fashion in which policy dialogue and surveillance take center stage, the end objective would be to cultivate a culture that views the exchange rate not merely as a national concern but also as a regional matter. An ACU index could be used as a benchmark, a tool to measure the value of East Asian currencies as a whole against external currencies—such as the US dollar and the euro—as well as to track the degree of divergence of each currency's value from the regional average set by the ACU.

Second, the ACU could be used for informal currency policy coordination in order to achieve both greater exchange rate flexibility vis-à-vis external currencies (particularly the US dollar) and improve exchange rate stability within East Asia. As mentioned earlier, most emerging East Asian economies have adopted a managed floating regime based on an SDR+ basket system. The PRC may reduce the US dollar's weight in its SDR basket system, while economies with sufficient rate flexibility (such as Japan and the Republic of Korea) may continue to allow their currencies to float. To achieve a degree of intraregional rate stability, greater convergence of exchange rate regimes would be desirable, starting with similar managed floating regimes based on an SDR or SDR+ basket and then moving to an ACU basket once sufficient economic and structural convergence has been achieved among the economies. With these developments, countries with floating currencies—such as Japan and the Republic of Korea— may also eventually move to ACU-based systems.

5.3 Financial Cooperation

Despite the importance of achieving intraregional exchange rate stability, there has been limited progress toward establishing a regional framework for exchange rate policy coordination. This represents a major disconnect in the area of monetary and financial cooperation, given that

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[16] The ASEAN+3 (the 10 ASEAN member states plus the PRC, Japan, and the Republic of Korea) and Hong Kong, China is a natural starting point for constructing an ACU because of the group's existing financial cooperation efforts. The ACU could be used as an index to monitor exchange market developments; as an accounting unit to denominate the operations of regional institutions; in the private sector to denominate Asian bond issues, bank deposits and loans, and trade invoicing; and as official units for currency market intervention. See papers included in Chung and Eichengreen (2009) as well as Pontines (2013).

several financial cooperation mechanisms have been developed in the region under the auspices of ASEAN+3 finance ministers (and central bank governors).

That said, the PRC, Japan, and other emerging East Asian economies can introduce a more coordinated approach to intraregional currency stability. A starting point could be to enlarge the use of local currencies for international trade invoicing and settlement, issuance of local currency bonds in counterparts' markets, mutual holding of sovereign debt as foreign exchange reserves, and activation of direct trading of currencies. Other efforts could include: collaboration of financial authorities and supervisors to monitor cross-border financial risks; intensive policy dialogue on exchange rate policies, including reducing large bilateral exchange rate volatility through the use of the ACU as discussed above; and convergence of exchange rate regimes toward managed floating arrangements within emerging East Asia.

At the same time, it is vital that the important strides toward financial cooperation achieved by the region in recent years are strengthened. This could include measures such as expanding substantially the size of financial resources available to individual countries under the Chiang Mai Initiative Multilateralization (CMIM); reducing the CMIM link with the IMF over time, ultimately to zero, by making the ASEAN+3 Macroeconomic Research Office (AMRO) and Economic Review and Policy Dialogue (ERPD) more effective; and providing sufficient resources and more solid funding and institutional arrangements for AMRO. It is important that CMIM and AMRO work with the IMF, as these East Asian financial safety nets may not be able to cope with a large-scale financial crisis in the region on their own, and the CMIM facility needs to be supplemented by IMF resources. In addition, the ASEAN+3 authorities may consider enlarging membership of CMIM and AMRO to include, for example, India, Australia, and New Zealand. Once these are achieved, a *de facto* Asian monetary fund will have been created.

Deepening Asian bond markets remains an important challenge so that the large accumulated savings in the region that are currently invested in major international markets in the US and Europe can then be re-invested in East Asia. For this purpose, it would be useful to strengthen the Asian Bond Markets Initiative (ABMI). In addition, a new Asian Bond Fund-3 could be launched to encourage corporate bond markets, possibly with the help of the Credit Guarantee and Investment Facility (CGIF), established by ASEAN+3 and the Asian Development Bank. Finally, more policy dialogue on Asian financial stability among the region's financial authorities would help to promote the stability of the regional financial system.

6. CONCLUSION

This paper has examined the evolution of exchange rate regimes in the PRC and other emerging East Asian economies, including India. It has shown that, since 2000, the PRC authorities and those of most East Asian currencies have increased their exchange rate flexibility against the US dollar (with a few exceptions, such as Hong Kong, China and Brunei Darussalam, which have kept their currency board systems). The RMB exited from a US dollar peg in July 2005 and has since appreciated against the US dollar. The Singapore dollar and the currencies of the founding member countries of ASEAN have also become more flexible and exhibited similar movements with each other over time.

To preserve monetary policy independence, policy makers need to make exchange rates more flexible as they open their financial markets. Greater exchange rate flexibility would serve as a cushion against shocks and events in the global and regional financial markets and allow greater policy independence for central banks.

The paper has demonstrated that since July 2005 the RMB has become more flexible in the sense that the US dollar's weight in the Frankel–Wei regression equation has become smaller

and the R^2 of the regression has declined. But these changes are still marginal for the RMB, reflecting a limited degree of capital account liberalization in the PRC. In a sense, a high degree of exchange rate flexibility has not been required to preserve monetary policy independence due to tight capital controls. Once the authorities attempt to pursue significant capital account liberalization to promote RMB internationalization, however, a high degree of exchange rate flexibility is clearly needed for the PBC to maintain policy independence.

Other East Asian currencies exhibit greater exchange rate flexibility, reflecting the underlying trend toward more open financial markets. In addition, with the growth of the PRC economy and its trade and the rising economic influence of the PRC on these economies, the role of the RMB in the exchange rate policies of East Asian emerging economies has become increasingly important. Based on Kawai and Pontines (2014), this paper has argued that the RMB weight in the modified Frankel–Wei regression model has risen for many East Asian economies. For example, in the post-global financial crisis period India and the Republic of Korea have assigned close to 30% to the RMB in their respective currency baskets; Malaysia and Singapore more than 20%; and Indonesia, the Philippines, Taipei,China, and Thailand, more than 10%. Although there is no RMB bloc yet—contrary to the arguments of some authors—the RMB has gained importance in the exchange rate policies of the region's emerging economies. This seems to have taken place at the expense of the yen and pound sterling. It remains to be seen whether this trend will lead to the emergence of the RMB as the most dominant anchor currency in East Asia and one of the global currencies in the future.

The paper then explored how greater regional monetary and currency coordination could help to achieve intra-East Asian exchange rate stability. Given that the RMB operates on an SDR basket system (comprising the US dollar, euro, pound sterling, and yen) and most other East Asian currencies on an SDR+ basket system (comprising the same currencies plus an emerging East Asian currency such as the RMB), achieving intra-regional exchange rate stability may not come easily. For a start, the PRC would have to reduce the weight of the US dollar in its dollar-dominant SDR basket system and increase exchange rate flexibility substantially if significant capital account liberalization is to be achieved. The paper suggests that a transition to greater convergence of exchange rate regimes would have to begin with similar managed floating regimes based on an SDR or SDR+ basket and then move to an ACU basket once sufficient economic and structural convergence has been achieved among the economies.

It goes without saying that the region's economic future is a matter of speculation. A stronger form of economic policy coordination such as the eventual establishment of a regional monetary union would depend on the required political support among the region's political leaders and their readiness to create the requisite range of institutions at every stage of the process. For instance, as the recent euro area crisis showed, institutions have to be stronger than previously thought for monetary unions to function properly.

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