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One Currency, Two Markets: The Renminbi's Growing Influence in Asia-Pacific*

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Abstract

This study presents evidence of the renminbi's growing influence in the Asia-Pacific region. The CNH market – the offshore renminbi foreign exchange market in Hong Kong SAR – is found to exert an effect on Asian currencies that is distinct from that of the onshore (CNY) market. Changes in the RMB/USD rates in both markets have a statistically and economically significant impact on changes in Asian currency rates against the US dollar, even after controlling for other major currency moves and the transmission of China's monetary policy to the region. The continuing growth of the offshore renminbi market suggests that the influence of the CNH market is rising, but how long the independent impact will last will likely depend on China's progress in liberalising its capital account. The findings also suggest that China's regional influence is increasingly transmitted through financial channels.

Keywords: Renminbi Internationalisation, Renminbi Impact, Offshore Markets

JEL Classification: F31, F42, G15

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1. Introduction

China has risen to become the second largest economy in the world. Its economic weight is particularly notable in Asia-Pacific, being the largest trading partner of most of the economies in the region. In more recent years, the country's financial markets and financial linkages with Asia and the rest of world have also been expanding rapidly. One reflection of such developments is the finding by the Bank for International Settlement's 2013 Triennial Central Bank Survey that the renminbi now ranks the ninth most traded currency in the world, and the most traded in Asia. This naturally raises the question of what role the renminbi plays and will play in the Asian-Pacific region. This question will inevitably become more important as China's weight in the global economy and financial system will likely rise further with its continuing robust growth and liberalisation of its financial systems. Yet, this issue, as the general topic of China's regional and global influence through financial linkages, has not yet been studied in much depth.

A major international currency can influence the behaviour of other currencies through actions taken by both the official and private sectors. For instance, as a component of currency baskets against which the exchange rate of local currencies is determined, movements in the international currency are more likely to prompt local authorities to take action to stabilise their own currencies. In addition, portfolio managers (both official and private), with an increased share of their portfolio in a new international currency, may be more likely to react at the margin to exchange rate movements in that currency by adjusting their holdings of related currencies. Growing trade links as well as domestic use of the international currency may also encourage authorities to stabilise the exchange rate of the domestic currency against the international currency (He and McCauley (2013)).

There are indications that the renminbi might have begun to play a growing role in influencing Asian currencies. A number of studies, eg Shu, Chow and Chan (2007), Fratzscher and Mehl (2011), Henning (2012) and Subramanian and Kessler (2012), find that, since China moved to a managed float regime in July 2005, the renminbi's impact on the Asian currencies has become increasingly significant. This may be owing to China's significant trade ties with other Asian economies and with the rest of the world. To China, Asian economies can be suppliers, partners and competitors in regional and global trade, and for many, these three roles are rolled into one. Thus, the influence of the renminbi may be a conscious decision on the part of Asian central banks to include the renminbi in the basket of currencies they track, with a view to maintaining competitiveness against China in global trade and to reducing volatility in their trade flows. These decisions can intertwine with the actions of international investors who might tie currency movements in Asia to those of the renminbi, resulting in market-driven co-movements between the renminbi and regional currencies.

The renminbi's regional influence has been strengthened by two important developments in China's exchange rate policy in recent years – greater exchange rate flexibility and renminbi

internationalisation. Increased fluctuations in the RMB/USD rate provide pricing signals, and help other central banks and market participants extract information about economic and market conditions in China. Increased external use of the renminbi has allowed the development of offshore renminbi markets. Historically, the development of offshore markets encourages the use of a currency outside the home country: He and McCauley (2010) posit that, without offshore markets, the US dollar would not have attained its dominant role as an international currency.

This study provides the first evidence of how the offshore markets for a currency provide an additional dimension when measuring the regional influence of that currency. As pointed out by He and McCauley (2010, 2013), there may be a spatial separation between onshore and offshore currencies. Central banks and portfolio managers may pay separate attention to offshore markets of an international currency for a number of reasons. For one, some of their assets are invested in offshore markets rather on onshore markets. In fact, the majority of the US dollar reserves held by central banks are held outside the United States (He and McCauley (2010)). In the case of the renminbi, central banks are known to have bought renminbi bonds issued by China's Ministry of Finance in Hong Kong SAR.[1] Second, the offshore market is less regulated than the onshore market, and thus may provide additional and distinct information that may be useful to both central banks and fund managers.

Deviations in the onshore and offshore markets can be particularly informative in the case of the renminbi. The onshore market, known as the CNY market, notwithstanding its increasing flexibility, remains constrained by the central bank's intervention and the stipulation of a daily trade band. By contrast, there is no presence of a central bank in the price formation process or in setting trading range limits in the offshore renminbi foreign exchange market, known as the CNH market. While the onshore and offshore currencies are essentially the same financial asset, the segmentation of the two markets can mean that price differentials can arise from different market conditions or the responses of different players in the two markets to the same set of fundamentals and policy announcements. In this paper, we attempt to capture the overall influence of movements in the renminbi by considering both the onshore and offshore exchange rate.

This study contributes to two strands of literature – renminbi internationalisation and China's global influence. First, the literature on the progress and process of renminbi internationalisation is both extensive and growing rapidly: eg Chen and Peng (2010), Gao (2010), He and McCauley (2010), Prasad and Ye (2011) and He (2014). Some studies have focused on China's onshore and offshore foreign exchange markets, mostly in the context of causality and deviations between the two, eg. Cheung and Rime (2013), Wu and Fei (2012) and Maziad and Kang (2012). Our study adds another dimension to this literature by looking at the role of the offshore market in the impact of the renminbi

[1] In the last several Ministry of Finance bond IPOs in Hong Kong SAR, a tranche is allocated to eligible central banks. See http://www.hkma.gov.hk/eng/key-information/press-releases/2012/20120614-6.shtml.

on Asian currencies. Second, China's global influence has been typically studied from the perspective of real linkages (eg IMF (2011), Mattoo, Mishra and Subramanian (2012)). Our study is among the first to examine how China's influence is transmitted through financial linkages including its exchange rate movements and monetary policy. Adapting the well established Frankel and Wei (1994) framework for the empirical analysis, this paper has undertaken more rigorous tests than the previous studies that have used this framework, addressing concerns over potential reverse causality from Asian currencies.

This paper is organised as follows. Section 2 introduces the institutional characteristics of the CNY and CNH markets that give rise to price signals of the CNH market which are distinct from those of the CNY markets. Section 3 reviews the literature on the renminbi's influence in Asia. Section 4 discusses the data and methodology of the empirical analysis. Section 5 presents evidence of the impact of the renminbi on other Asian currencies, an effect that is additional to that exerted by China's monetary policy shocks. The CNH and CNY markets each have separate influence on Asian currencies. The final section considers the policy implications.

2. Institutional Backgrounds

2.1 Renminbi Internationalisation

China has made substantial progress towards greater exchange rate flexibility in the past decade. In 1994, the multiple exchange rates for the renminbi were unified, and the yuan became fully convertible under the current account in 1996. A more significant move came when the People's Bank of China (PBoC) announced in July 2005 that China would implement a managed floating exchange rate system based on market supply and demand and in reference to a basket of currencies, instead of pegging to the US dollar. The daily trading band against the US dollar has been progressively widened since then, from ±0.3% to ±0.5% in May 2007 and then to ±1% in April 2010. In March 2014, this trading band was once again widened to ±2%. As the clearest indication yet of the future direction, Governor Zhou of the PBoC pledged in November 2013 that the central bank will [over time] largely withdraw from regular intervention in the market.

Another notable development in recent years is renminbi internationalisation. Chinese authorities have facilitated use of the renminbi outside mainland China since July 2009, moving quickly to remove restrictions on the use of the renminbi in current account transactions and gradually expand the scope for the use of the renminbi in capital account transactions. Cross-border renminbi settlement, now a major source of offshore renminbi liquidity, was introduced for trade on a trial basis in July 2009, and broadened over the course of the next three years to cover all current account transactions in China. Under the capital account, sources of offshore funds have been broadened, eg overseas direct investment in the renminbi by Chinese enterprises from 2011 and more recent rules to

make offshore lending easier for by mainland banks. The PBoC has also set up bilateral local currency swap facilities with overseas central banks and monetary authorities, with a view to supporting the international use of the renminbi and to providing a contingent source of liquidity. By 2013, 20 agreements for such facilities had been signed, with the total amount reaching RMB 1.6 trillion.

In the meantime, the use of offshore renminbi has been officially sanctioned for a wider variety of purposes and on a growing scale, such as in the onshore interbank bond market by offshore financial institutions, foreign direct investment by foreign firms, and the renminbi Qualified Foreign Institutional Investor (R-QFII) scheme (under which Hong Kong-based brokerage firms could offer renminbi investment products to non-Chinese residents that are invested in onshore bond and stock markets).

In addition to these new channels for cross-border renminbi flows, measures on the technical front have enhanced market development. In Hong Kong SAR, the spot fixing for the offshore renminbi exchange rate was launched in June 2011 by the Treasury Markets Association (TMA) – an industry association supported by the Hong Kong Monetary Authority (HKMA), and the interbank interest rate fixing for the renminbi (CNH HIBOR), the first offshore renminbi interest rate benchmark, was introduced in June 2013 and expected to facilitate the development of renminbi products such as syndicated loans and cross-currency swaps.

Vibrant offshore renminbi markets are taking shape as market forces respond quickly to official policies. For instance, renminbi deposits and CDs in Hong Kong SAR stood at more than RMB 1 trillion at end-2013, up from RMB 322 billion at end-2010. According to the Bank for International Settlements (BIS) international securities data, renminbi offshore bonds outstanding at end-2013 amounted to around RMB 490 billion, rising from around RMB 100 billion at end-2010. Since July 2010, Hong Kong SAR has produced a second set of spot and forward exchange rates for the renminbi – the CNH rates – for delivery of the renminbi against the US dollar outside Mainland China. A second set of renminbi yield curves has also been formed with the active bond issuance by China's Ministry of Finance and firms from both inside and outside China. Renminbi offshore centres have now also opened in London, Singapore and other locations.

2.2 Onshore and Offshore RMB Markets: A Comparison

The CNH market has a number of features in terms of its participant base and regulation that distinguish it from the onshore foreign exchange market, ie the CNY market.

The CNY market, with its comparatively long history and deep liquidity, remains highly regulated. Established in 1994, the CNY market developed forward and derivatives trading from 1997, and has seen rapid growth in recent years. According to the latest BIS Triennial Survey, its average daily turnover surged from USD 0.6 billion in 2004 to USD 20.0 billion in 2013 (Table 1). Among different

types of trading, spot contracts account for the majority of transactions, while forwards have a smaller share. The access to the wholesale market is restricted to domestic entities including banks, finance companies (subsidiaries of large SOEs), and subsidiaries of foreign banks. Importantly, foreign exchange transactions between banks and their customers must be backed by underlying real demand (eg current account transactions), and purely speculative trades are prohibited. The daily fixing, announced each morning at 9.30 am by China Foreign Exchange Trade System (CFEFS) in Shanghai, is based on quotations from a panel of banks. The PBoC has a presence in the market in order to maintain exchange rate stability, notwithstanding increased flexibility in the rate in recent years. The continuing constraints on exchange rate movements may have dampened the development of the onshore market. Despite its phenomenal growth, the CNY market is small in relation to China's economic links with the rest of the world. By comparison, for example, Japan's external trade is half the size of China's, yet the onshore trading of the Japanese yen is over eight times that of the onshore renminbi.

By contrast, the CNH market, short in history and growing exponentially, is a free market and has a more diversified range of products. Neither the PBoC nor the HKMA intervenes in the CNH market. Spot trading in the CNH market became active in August 2010 following the launch of cross-border renminbi trade settlement, and deliverable forwards and derivatives have been developed subsequently. As shown by the Triennial Survey, its daily turnover has grown to USD 7.3 billion in less than three years since its inception in late 2010 (Table 1).[2] This turnover is remarkable in view of the much smaller renminbi liquidity pool offshore than onshore. The CNH market is accessible by all entities outside Mainland China for purposes other than trade and personal use, eg investment, hedging, and so on.[3] Reportedly, corporates, banks, asset managers and even hedge funds, which traditionally use the NDF market, have increasingly switched to the CNH market as a result of this market's rapid improvement in liquidity. Bid-ask spreads have narrowed. The spot trading bid-ask spread has narrowed to the range of 20–40 pips, significantly lower than the volatile range of 30–300+ pips in late 2010 and much closer to the onshore spread. The greater latitude in the market may have facilitated rapid expansion and product proliferation. Notably, forwards account for a much larger share of the CNH market than in the onshore market.

The distinctive features of the CNY and CNH markets and continuing segmentation of the onshore and offshore renminbi markets in general (including money, bond and foreign exchange markets) have frequently caused the two exchange rates to diverge from each other. For example, even when both respond to the same set of economic news, eg on macroeconomic data and policy changes, the CNH rate may react more strongly as there are no trading limits or worries over central bank actions.

[2] The figures in the table refer to the renminbi trading in Hong Kong. The respective figures for offshore renminbi trading globally are USD 12.8 billion for spot and USD 7.1 billion for deliverable forwards.

[3] Renminbi foreign exchange transactions for trade settlement and personal use can be undertaken through the Bank of China (HK), a designated Clearing Bank by the PBoC for renminbi business in Hong Kong SAR, at rates close to onshore rates. However, there exists a conversion quota for personal transactions (ie RMB 20,000 per day per account).

At the same time, the offshore markets are more exposed to global factors. Arbitrage between the onshore and offshore markets does take place, and can help facilitate price convergence of the onshore and offshore markets (money market and foreign exchange market alike). Yet, given the still relatively narrow channels of cross-border flows and transaction costs, pricing in the CNY/CNH markets does still diverge.

Indeed, both the CNY and CNH rates have closely followed the same broad trend, appreciating by around 10% since September 2010 (Figure 1, left-hand panel). But the CNH rate has displayed greater volatility in daily movements, with a wider trading range and a bigger standard deviation (Figure 1, right-hand panel). Also, there have been two periods when the divergences of the CNY and CNH rates were particularly wide. At the very early stage of the CNH operations, the conversion quota for trade settlement-related renminbi transactions placed severe restrictions on liquidity in the offshore renminbi market. The quota ceiling was breached in October 2010 due to overwhelming offshore demand for the renminbi, leading to a much stronger CNH than the CNY. The reverse situation occurred in Q4 2011 against the global backdrop of a sharp increase in risk aversion globally as the European debt crisis deepened. The surge in demand for the US dollar led to a breach of the quota ceiling for renminbi conversion in Hong Kong SAR, and the CNH weakened much more than the CNY as a result. Since then, liquidity in the CNH market has improved significantly, with much lower bid-ask spreads and narrower deviations from the CNY market.

3. Literature Review

Literature on the rising significance of the renminbi on other currencies has grown in the last few years. Shu, Chow and Chan (2007) first note that the renminbi's impact in Asia became discernible after the exchange rate reform in July 2005 when China abandoned the fixed exchange rate and moved to a managed float regime. In the first two years following the reform, renminbi movements independent of the US dollar were followed by seven out of the nine Asian currencies studied. Studies using more recent periods show that such impact has grown stronger (Fratzscher and Mehl (2011), Henning (2012) and Subramanian and Kessler (2012)). For example, Fratzscher and Mehl (2011) describe the renminbi's significant presence in Asia as "China's dominance hypothesis", a parallel to the "German dominance hypothesis" which refers to the Deutsche mark's dominant role in Europe in the 1980s and 1990s. The renminbi is found to have become a key driver of emerging Asian currencies, particularly after the global financial crisis in 2008–09.

The rise of the renminbi may lead to shifts in major currencies' influence in the region. Before mid-2005, Asian central banks attached very high importance to tracking the US dollar, which is described by McKinnon and Schnabl (2004) and McKinnon (2005) as a "soft pegging to the dollar" regime. The past few years saw a decline in the influence of the US dollar and a rise in that of the renminbi. Examining four subperiods between 2000 and 2011, Henning (2012) identifies a broad declining trend

for the US dollar weights and a rising trend for the renminbi weights in the exchange rate regimes of eight East Asian currencies. In fact, the renminbi weight appeared to be higher than that of the US dollar from 2010 for a number of main Asian currencies. Subramanian and Kessler (2012) believe that the renminbi has become the dominant reference currency in seven out of 10 East Asian currencies for the period 2010–12, outweighing the significance of the US dollar and euro in the region. This finding is supported to some extent by Pontines and Siregar (2010).

Echoing Calvo and Reinhart's (2002) earlier finding of "fear of floating" among emerging markets, Pontines and Siregar (2010) suggest that East and Southeast Asian currencies demonstrate an asymmetrical response to depreciation and appreciation against the US dollar and renminbi. Most strikingly, the aversion to appreciation vis-à-vis the renminbi is even greater than to the US dollar in a number of cases. Nonetheless, most studies generally still point to the greater, albeit decreasing, influence of the US dollar, eg Fratzscher and Mehl (2011).

However, Asian currencies may also influence renminbi movements to a certain extent. Fratzscher and Mehl (2011) are not able to reject the null hypothesis that movements in the Asian currencies do not cause renminbi movements both for the period before or after the renminbi exchange rate reform, suggesting bi-directional causality between them. However, Subramanian and Kessler (2012) believe reverse causation is much weaker. When a reverse regression is run with the renminbi as the dependent variable and an Asian currency as the independent variable, Subramanian and Kessler (2012) find that the coefficient on the Asian currency is much smaller than that on the renminbi, when the renminbi is used to explain the same Asian currency. This provides some evidence that the causation is running less from Asian currencies to the renminbi than from the renminbi to Asian currencies.

There is also evidence that influence of the renminbi has gone beyond Asia. Fratzscher and Mehl (2011) find that currencies in other regions also respond to shocks in China's exchange rate policy. Advanced country currencies and emerging market economy currencies are influenced by perceived potential shifts in China's exchange rate policy. Having the widest country coverage of all studies, Balasubramaniam, Patnail and Shab (2011) show that 34 of 132 currencies in the world have been sensitive to movements in the renminbi, and thus suggest that the renminbi potentially has a significant role to play in global exchange rate arrangements. Subramanian and Kessler (2012) show that the renminbi's influence has been rising globally, particularly since the mid-2010. This rising influence is both reflected in the extensive margin – more currencies tracking the renminbi across the world – and the intensive margin – greater weights attached to renminbi movements. It is, in fact, the dominant currency in some cases, including for a number of key emerging market economies such as Chile and South Africa.

The renminbi's influence, particularly in Asia, arises from China's significant trade ties with the region and with the rest of the world. For many Asian economies, exports are an important source of growth

as in China, and these Asian economies' and China's export structure, in terms of products and export markets, resemble each other to a large extent (Branson and Healy (2005)). There are complex trade relationships between these economies and China. They can be suppliers for China's domestic demand. They can be in the same production chain as China, or exporting independently of China. An Asian economy often has all three types of relationship with China. This leads to a number of potential spillover channels for the renminbi exchange rate. Countries with a managed float may include the renminbi in the basket of currencies that they implicitly track with the aim of maintaining their competitiveness against China in global trade. The policy of tracking the renminbi may also be partly intended to stabilise demand from China. Currencies of the economies that are in the same product chain as China may respond to common shocks in the same way as the renminbi, resulting in market-driven co-movements.

The ongoing internationalisation of the renminbi may have further strengthened the co-movements between the renminbi and other Asian currencies. In particular, the volume of renminbi settlement has been expanding rapidly since the settlement scheme was introduced in July 2009, accounting in 2013 for about 12% of total trade between China and its trading partners. The increasing use of the renminbi in trade settlements may give Asian central banks greater motivation to seek exchange rate stability vis-à-vis the renminbi with a view to mitigating fluctuations in the trading environment of their domestic firms.

4. Methodology and Data

4.1 Benchmark Specification

To examine the role of the renminbi in the region, the basic model of this paper takes the following general form:

$$\Delta e_j = \alpha_0 + \sum_{i=1}^{k} \alpha_i \Delta e_i \qquad (1a)$$

In equation (1), e_j and 'e_i's are, respectively, the exchange rates of the Asian currency under study and those of currencies that might influence it. The main analysis of the study focuses on seven major Asian currencies – the Indonesian rupiah, Indian rupee, Korean won, Malaysian ringgit, Philippine peso, Singapore dollar and Thai baht (Figure 2). Estimation is carried out both for individual economies and for the group as a whole in panel regressions. Three other Asian-Pacific currencies – the Australian dollar, New Zealand dollar and Hong Kong dollar – are also included in a bigger panel for estimation (Figure 2). Hong Kong SAR has a currency board, and the Australian and New Zealand economies have less in common with the other Asian economies. For these reasons, the three currencies are only used for robustness checks.

This framework is similar to the Frankel and Wei model (1994), which has been widely adopted for detecting weights of currencies in a currency basket. However, our approach does not seek to include an exhaustive set of currencies to infer the composition of a basket. The key drivers of the major Asian currencies considered are the major currencies and the renminbi. All the currencies are measured against a common currency, which is the US dollar in this case, and thus the equation is estimated in the following form:

$$\Delta e_{Asiancurrency/Usd} = \alpha_0 + \alpha_1 \Delta e_{Eur/Usd} + \alpha_2 \Delta e_{Yen/Usd} + \alpha_3 \Delta e_{Rmb/Usd} \quad (1b)$$

The exchange rates are taken logs and transformed into first differences. For the estimation, daily data between September 2010 (when quotes for the CNH rates became regular) and September 2013, obtained from Bloomberg, are used.

In line with the studies using the approach, the OLS estimator is used. Conceivably, the renminbi exchange rate is also influenced by Asian currencies, and hence endogenous to the system. In view of the potential simultaneity issue, an instrumental variable estimation and other methods are used for robustness checks.

4.2 Controlling for Transmission of Monetary Policy

Exchange rate policy is one aspect of monetary policy in China. The renminbi tends to appreciate at a faster pace when there are stronger inflationary pressures, but to stay relatively stable when the Chinese economy is weak. For example, the renminbi appreciated rapidly in late 2007 and early 2008 as part of tightening monetary stance to contain inflation, but barely moved in 2008–09 against the background of weak economic growth at the height of the global financial crisis. Thus it is possible that the impact of the renminbi on Asian currencies, as identified through the framework above, may be reflecting that of China's monetary stance.

Changes in China's monetary policy may induce portfolio adjustment and thus affect Asian currencies. First, the monetary stance in China – the region's biggest economy – may be taken as an important gauge for the region, and its changes may indicate potential similar policy moves in other Asian countries. He and Liao (2012) show that, although they are becoming increasingly globalised, the Asian economies share a strong region-specific business cycle. This is clearly borne out by Asia's recent economic developments. In 2010 and early 2011 several Asian economies, China included, faced inflationary pressures, yet their growth weakened towards the end of 2011. Accordingly policy responses showed a high degree of synchronisation across the economies over the period. Policy synchronisation can lead to co-movements in exchange rates. In the case of a tightening, to the extent that China tightens monetary policy in response to domestic inflationary pressures, monetary

tightening might be expected by other Asian economies in similar circumstances. Thus, there can be immediate capital inflows, brought in by fixed income investors and funds for example, to the region in anticipation of higher interest rates, leading to a strengthening of Asian currencies against currencies outside the region.

Second, monetary tightening, if effective, may point to a weaker growth outlook in the region. Growth prospects will be dampened by slower expected growth in China and Asian economies' own slowdowns. This may lead to capital outflows from Asia, thus weakening the currencies. Such an effect will work in the reverse way in the case of a monetary loosening.

Thus an indicator of China's monetary stance will be included in the regression to see whether the renminbi independently influences Asian currencies after controlling for China's monetary policy. Inclusion of this variable is particularly important for isolating the "pure" exchange rate impact of the CNH rate on regional currencies. As a free floating rate, the CNH itself is likely to respond to China's monetary shocks, and thus its estimated coefficient may have embedded the influence of monetary stance should the latter be omitted from the regression.

In implementing monetary policy, the PBoC uses a range of different instruments including price-based tools (eg interest rates) and quantity-based tools (eg reserve requirements, open market operations and credit quotas). Many studies use individual instruments, such as monetary aggregates (eg Burdekin and Siklos (2008)), benchmark interest rates and credit quotas (Lin, Ju and Wei (2013)). However, the PBoC quite often uses a combination of tools, and its reliance on individual instruments may change over time (Xiong (2012)). Thus, no single instrument can adequately represent China's monetary stance. To overcome this problem, some studies follow an index-based approach: Shu and Ng (2010) and Xiong (2012) derive indices of monetary stance from readings of the PBoC's quarterly *Monetary Policy Implementation Report*, and the indicators He and Pauwels (2008) and Xiong (2012) compile are based on changes in a number of tools (eg benchmark interest rates, reserve requirement and net liquidity withdrawal). The methodology developed by He and Pauwels (2008) and Xiong (2012) is followed in this paper. A three-value index is compiled: +1 represents monetary tightening (indicated by a rise in benchmark interest rates or reserve requirement); 0 no change in monetary stance; and –1 monetary loosening (indicated by a fall in benchmark interest rates or reserve requirement).

5. Empirical Results

5.1 Benchmark Results

The CNY and CNH are both found to have a highly significant impact on Asian currencies no matter whether they enter the regressions individually or together. Table 2 reports the results of panel

regressions. Specification I corroborates findings in the strand of literature where the CNY rate has a significant impact on regional currencies (eg Shu, Chow and Chan (2007), Fratzscher and Mehl (2011), Henning (2012) and Subramanian and Kessler (2012)). Regional currencies often move in the same direction as CNY movements.

The same positive impact of the renminbi is found for the CNH rate no matter whether it enters the regression individually or together with the CNY variable. This finding is borne out both by panel regressions as well as regressions for individual countries (Table 2, Specification III, and Table 3). This means that the CNH market should be considered as transmitting signals distinct from those of the onshore market.

The impact of the CNY and CNH markets on regional currencies could be due to Asian banks' strategy of implicitly pegging their currencies to a basket in which the renminbi is included. It is also possible that international investors consider Asian currencies as having similar risk profiles. A stronger (weaker) renminbi will lead them to buy in (sell off) other Asian currencies, resulting in market-driven co-movement of the group.

Column III of Table 2 points to an impact of CNY (0.61) on Asian currencies, which is greater than that of the CNH (0.38). That is, if the CNY or CNH appreciates against the US dollar by 1 percentage point, Asian currencies would appreciate, on average, by 0.61 and 0.38 percentage points, respectively. This is consistent with the view that, as they emanate from a deeper market, moves of the CNY may be viewed as having more pricing power. It could also be that the policy signals from the CNY market are more valued by market participants.

At the country level, the renminbi has a significant impact on all the seven Asian economies in the panel analyses. With the exception of the Indonesian rupiah, the CNH has an independent influence on all the countries (Table 3). To look at the relative importance of the renminbi across the region, we examine the estimates from regressions with normalised variables (Table 4). After relative volatility is taken into account, the renminbi has the biggest impact (sum of the coefficients on the CNY and CNH) on the Malaysia ringgit (0.41), followed by the Philippine peso (0.35) and the Korean won (0.32) (Figure 3). For the Indonesian rupiah, the impact is the most modest, at 0.07 (Figure 3).

5.2 Transmission of China's Monetary Stance

In the specifications where an indicator of China's monetary stance is included, the composite index of monetary policy is highly significant and carries a negative sign (Table 5). This suggests that the immediate impact on Asian currencies of China's monetary policy changes is from expected similar moves in the interest rate. That is, if China tightens monetary policy in response to inflation, it is often anticipated that regional economies will also raise policy rates. This may prompt international

investors to move funds from outside the region to Asia in view of higher returns for fixed income, resulting in currency appreciation across these economies.

Importantly the renminbi's regional influence remains largely unchanged even when the monetary stance indicator is included, and this holds for both the CNY and CNH markets in all the specifications. In particular, coefficients of these variables stay significant with the same positive sign, and their magnitudes are very close to those in the specifications where the same variant of the CNY and CNH variables are used, but without the monetary stance indicator. This suggests that impact of the renminbi exchange rate on Asian currencies is above and beyond what might be expected from changes to China's monetary policy.

5.3 Subsample Estimation

As discussed above, the CNY and CNH exchange rates deviated quite noticeably in two periods (Q4 2010 and Q4 2011) when markets were under stress due to either constraints on offshore markets or global factors. To investigate potential different market behaviour, we undertake estimation for a market stress period (covering Q4 2010 and Q4 2011) and the rest of the sample with more normal market conditions.

The subsample estimation shows that the impact of the CNY and CNH remains significant both for the normal market condition period and in the stress period (Table 6). However, their relative importance changes in the different periods. In the stress period, the coefficient for the CNY (0.72) is much bigger than that of the CNH (0.18), while the reverse is true in normal market conditions (0.42 for the CNY vs 0.87 for the CNH). This suggests that when the renminbi foreign exchange market is under stress, investors in other Asian currencies place greater emphasis on movements in the onshore market, while in normal market conditions, greater attention is paid to the pricing signals from the offshore market.

5.4 Robustness Check

Reverse Causality

One concern over the finding on the impact of the renminbi on Asian currencies is that causation may also potentially run from Asian currencies to the renminbi. Indeed, the currency basket disclosed by the PBoC includes a number of Asian currencies. We use two methods to address the potential reverse causality issue: (a) we use an instrumental variable (IV) estimation; and (b) we investigate to what extent Asian currencies with earlier opening hours than China's onshore and offshore foreign exchange markets might affect the renminbi's opening price.

For the IV estimation, two sets of instruments are considered. The first set is the lagged independent variables with the potential endogeneity problem, ie the CNY and CNH in this case. The second set is the stock indices: the Shanghai Composite 300 Index – the equity index for the Mainland market – as the instrument for the onshore exchange rate and the H-share Index – the index for Hong Kong-listed Mainland companies – for the offshore exchange rate. In the same way as the exchange rate, stock indices reflect, in a timely manner, market expectations for macroeconomic developments and policy changes. As in the case of the onshore and offshore foreign exchange markets, the Mainland and Hong Kong stock markets have dual listings of the same companies but are also somewhat segregated due to China's existing capital controls. Thus, the two stock markets can be driven by common factors, but also have movements independent of each other (Chung et al (2013)). These considerations suggest that the Mainland and Hong Kong stock indices constitute good instruments for the CNY and CNH rates, respectively. The IV estimation results show that the earlier results are robust (Table 7). Both the CNY and CNH remain statistically significant, and their magnitudes are in line with the OLS estimates. Similarly, estimates for other variables, the monetary policy stance indicator in particular, remain broadly unchanged.

Another way is to examine the impact on the renminbi of the Asian-Pacific foreign exchange markets that open earlier than Chinese foreign exchange markets. These include the Australian dollar, New Zealand dollar and Korean won. Due to the time lag, the change in their opening prices compared to the closing in the previous session may be considered to be more influenced by the latest developments in European and US markets, and thus exogenous to the renminbi markets. Regression analysis suggests that only the Korean won has some influence on the CNY opening price (Table 8). The Australian dollar and New Zealand dollar do not appear to affect the opening price of the CNY and CNH markets, and the CNH rate is not impacted by the Korean won either.

The various estimations in this section suggest that, while reverse causation might exist from other Asian currencies to the renminbi, it is probably relatively weak. This corroborates findings from previous work. Frankel and Wei (2007) find that, even in the managed floating regime, the US dollar dominates the basket of currencies that the renminbi tracks, and other currencies, including the euro, Japanese and other Asian currencies, do not have a strong impact on renminbi movements. Using more recent sample periods, Subramanian and Kessler (2012) also find that the causation from Asian currencies to the renminbi is much weaker than that from the renminbi to Asian currencies. This possibly suggests that, due to its economic weight, China has more independence than other economies in the region in its exchange rate determination. Our estimation indicates that the limited impact of Asian currencies on the renminbi seems to have continued.

Alternative Monetary Stance Measure

Apart from the index of monetary stance adopted in the previous regressions, the repo rate in the interbank market is found to be a good summary indicator of China's monetary stance (Zhang (2012)).

China has a dual-track interest rate system. Bank lending and deposit rates are regulated in that lending rates were not allowed to fall below 70% of the benchmark rates (this floor was removed in July 2013), and deposit rates are capped at 10% higher than the benchmark. In the meantime, money and bond market rates are determined by the markets. He and Wang (2012, 2013) show that, within the dual-track interest rate system, repo rates at the interbank market can best reflect the transmission from the regulated rates to market rates. Thus we use the seven-day repo rate as an alternative gauge for the monetary stance.

The estimation shows that the coefficient for the repo rate carries the same negative sign as the composite indicator of monetary stance (Table 9). However, it is less robust than the composite indicator, being significant in some specifications but not significant in others. Nonetheless, the impact of the CNY and CNH rates on regional currencies continues to hold, with the estimated coefficients staying close to those in specifications without a monetary stance indicator or with the composite monetary stance indicator.

Global Factors

Conceivably, the co-movement of the renminbi and other Asian currencies may be driven by global factors. For example, waning risk appetite on the part of international investors may lead them to withdraw funds from China and other Asian economies, thus moving the renminbi and other Asian currencies in the same direction. Omission of these variables may lead to the erroneous conclusion that the renminbi drives the regional exchange rates. To address this concern, two global factors are considered – credit default swap (CDS) spreads for emerging markets and oil prices.

These two global factors are found to be important drivers of Asian exchange rates (Table 10). The coefficient on the emerging markets' CDS spreads carries a positive sign. That is, when risk aversion rises – as indicated by a rise in the CDS spreads, the resulting withdrawal of funds by international investors will lead to weaker Asian currencies. By contrast, higher oil prices will lead to currency appreciation in Asia. This could be the case if higher oil prices lead to rising inflation expectations, and currency appreciation is anticipated as a tool for combating that inflation. Interestingly, the signs and sizes of the two variables are very close to those reported in Fratzscher and Mehl (2011), who also control for a similar set of global factors.

Even when the global factors are controlled for, the impact of CNY and CNH variables remain robust, with their magnitudes staying close to those in the previous estimations.

Alternative Panel

In an alternative panel for estimation, we add three other Asian-Pacific economies – Australia, New Zealand and Hong Kong SAR – to the original Asia panel. Regression results show that the overall

finding of significant impacts from both the CNY and CNH remains robust (Table 11). Indeed, the relative importance of the CNH market (0.48) rose, to a level similar to that of the CNY (0.40) (Table 11), compared to the case of 0.62 for the CNY and 0.40 for the CNH from the estimates of the benchmark panel. Estimation for individual countries shows that this bigger CNH coefficient is driven by the Australia dollar and New Zealand dollar, for which the CNH rate has a dominant impact and the coefficient for the CNY variable ceases to be significant (Tables 3 and 4). The Australian dollar and New Zealand dollar are very liquid, and may have greater flexibility than other Asian currencies. Thus it is possible that investors in these currencies place greater weight on the market signals sent out by the offshore market rather than the onshore market.

6. Conclusion and Policy Implications

The study is the first to provide evidence that the offshore market, the CNH, plays an important role in addition to the onshore market, the CNY, as a channel by which the renminbi can influence currencies in Asia-Pacific. Confirming evidence from previous studies, movements of Asian currencies are found to be affected by those of the onshore renminbi market. But the more remarkable finding is that, despite its short history and smaller market size, the CNH market is perceived to carry independent price signals of relevance to other Asian currencies. The exchange rate impact (from both the CNY and CNH markets) is highly robust, and remains significant even after controlling for the transmission of China's other monetary policy tools to the region.

These findings have a number of implications for a better understanding of China's influence on regional economies and the future path of renminbi internationalisation.

The emerging role of the renminbi suggests that China's regional influence now comes increasingly through financial channels, a mechanism that is much less studied and less understood than China's impact through real economy channels. It is well established that exports and the overall growth of Asian economies will be affected when changes in China's exchange rate alter their relative competitiveness or changes in China's monetary policy lead to fluctuations in the economy's external demand (eg Mattoo, Mishra and Subramanian (2012)). This study reveals that shocks to China's exchange rate can directly influence Asian currencies. The impact of China's exchange rate policy shock may arise for two reasons. First, the renminbi is one component of the basket that Asian central banks implicitly track. Second, international investors view the renminbi as a leading currency in the region and do not discriminate among Asian currencies. Transmissions through the currency markets would be much faster and potentially more volatile than through real economy channels, which tend to transmit effects with a lag.

The continuing growth of the renminbi offshore market may point to a rise in the influence of the CNH market, but how long the independent impact lasts may depend on the progress in China's capital

account liberalisation. Over the longer term, the CNY and CNH markets should converge eventually when full convertibility of China's capital account and the renminbi is achieved. Yet, in the transition period when the two markets remain somewhat segregated, the independent role of the CNH market in influencing Asian currencies will remain and may even strengthen. The renminbi offshore market is expected to continue to expand, as renminbi cross-border trade settlement becomes more prevalent and channels of outward and inward flows to and from Mainland China widen. This will increase both supply and demand for renminbi foreign exchange offshore, thus facilitating the growth of the CNH market. Financial institutions that are traditionally large players in the NDF market may also be increasingly attracted by the growing depth of the CNH market and shift their operations to this market, providing further boost to the CNH market (McCauley, Shu and Ma (2014)). With greater depth and liquidity, together with the absence of trading restrictions and central bank presence, the market will become more and more credible in reflecting economic and financial fundamentals. Thus, both central banks elsewhere in Asia and international investors may pay greater attention to the pricing signals from the CNH market. Nonetheless, the development of the offshore market itself is part of China's financial liberalisation (McCauley (2011)). In future, fewer restrictions on capital account and thus less onshore-offshore market segmentation, together with greater exchange rate flexibility in the onshore market, will mean that the influence of the CNH market as a market-driven indicator may be counterbalanced by that of a more open CNY market.

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Table 1. Onshore and Offshore RMB Markets

	CNY markets[1]	CNH markets[1]
Products	Spot, forward, swap and options	Spot, forward, swap, and options
Market participants	Central bank, domestic banks, finance companies (subsidiaries of large SOEs) and domestic subsidiaries of foreign banks	Exporters, importers, offshore financial institutions, hedge funds and Hong Kong residents
Price formation mechanism	Managed float	Free float
Central bank intervention	Yes	No
Trading band	± 2%	No
Regulatory authorities	PBoC	Hong Kong Monetary Authority
Daily turnover in April 2013		
Spot	US$ 17.6 bn	US$ 5.1 bn
Deliverable forward	US$ 2.4 bn	US$ 2.2 bn
Bid-ask spread[4]	17 pips	33 pips

[1] Against the US dollars. [2] Adjusted for local and cross-border inter-dealer doubling counting. [3] Average of 2013 Q4.

Sources: BIS Triennial Survey.

[4] Average of 2013 Q4.

Table 2. Asia Panel Benchmark Estimation

	(I)		(II)		(III)	
C	0.022	***	0.016	**	0.022	***
	(3.479)		(2.542)		(3.549)	
EUR	0.214	***	0.187	***	0.190	***
	(20.315)		(17.052)		(17.432)	
JPY	-0.025	**	-0.030	***	-0.028	***
	(-2.339)		(-2.829)		(-2.578)	
CNY	0.885	***			0.605	***
	(14.894)				(8.892)	
CNH			0.589	***	0.384	***
			(14.495)		(8.280)	
Adjusted R^2	0.127		0.125		0.139	
Observations	4,968		4,954		4,954	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per US dollar. T-statistics are reported in parenthesis. ***/**/* indicates significance at the 1/5/10% level.

Table 3. Individual Countries Benchmark Estimation

	AUD		NZD		HKD		IDR		INR		KRW		MYR		PHP		SGD		THB	
C	0.001		-0.003		0.001		0.036	*	0.064	***	0.009		0.027	*	0.012		-0.001		0.011	
	(0.042)		(-0.135)		(0.902)		(1.664)		(2.795)		(0.498)		(1.885)		(0.998)		(-0.102)		(1.072)	
EUR	0.658	***	0.616	***	0.010	***	0.081	**	0.245	***	0.181	***	0.129	***	0.126	***	0.373	***	0.200	***
	(17.588)		(14.380)		(5.102)		(2.169)		(6.085)		(5.662)		(5.217)		(5.917)		(19.956)		(10.789)	
JPY	0.123	***	0.142	***	-0.002		-0.054		-0.119	***	-0.030		-0.051	**	-0.047	**	0.064	***	0.035	*
	(3.363)		(3.374)		(-1.045)		(-1.464)		(-3.055)		(-0.940)		(-2.110)		(-2.241)		(3.470)		(1.944)	
CNY	-0.105		-0.070		0.041	***	0.428	*	0.734	***	1.072	***	0.836	***	0.630	***	0.196	*	0.349	***
	(-0.449)		(-0.262)		(3.344)		(1.828)		(2.933)		(5.369)		(5.419)		(4.706)		(1.679)		(3.017)	
CNH	0.858	***	1.052	***	0.033	***	0.142		0.700	***	0.328	**	0.547	***	0.361	***	0.478	***	0.158	**
	(5.382)		(5.764)		(3.935)		(0.884)		(4.154)		(2.406)		(5.189)		(3.957)		(5.998)		(1.992)	
Adjusted R^2	0.409		0.343		0.122		0.017		0.158		0.138		0.193		0.164		0.481		0.213	
Observations	721		721		721		721		632		721		721		717		721		721	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per US dollar. T-statistics are reported in parenthesis. ***/**/* indicates significance at the 1/5/10% level.

Table 4. Individual Countries Benchmark Estimation: Using Standardised Variables

	AUD		NZD		HKD		IDR		INR		KRW		MYR		PHP		SGD		THB	
C	-0.004		0.009		0.012		-0.004		-0.012		0.005		0.008		0.007		-0.002		0.013	
	(-0.139)		(0.303)		(0.34)		(-0.105)		(-0.33)		(0.151)		(0.249)		(0.208)		(-0.065)		(0.402)	
EUR	0.542	***	0.471	***	0.195	***	0.081	**	0.235	***	0.209	***	0.182	***	0.213	***	0.577	***	0.374	***
	(17.588)		(14.38)		(5.102)		(2.169)		(6.085)		(5.662)		(5.217)		(5.917)		(19.956)		(10.789)	
JPY	0.101	***	0.108	***	-0.039		-0.054		-0.114	***	-0.034		-0.072	**	-0.079	**	0.098	***	0.066	*
	(3.363)		(3.374)		(-1.045)		(-1.464)		(-3.055)		(-0.94)		(-2.11)		(-2.241)		(3.47)		(1.944)	
CNY	-0.015		-0.009		0.139	***	0.074	*	0.122	***	0.215	***	0.205	***	0.185	***	0.053	*	0.113	***
	(-0.449)		(-0.262)		(3.344)		(1.828)		(2.933)		(5.369)		(5.419)		(4.706)		(1.679)		(3.017)	
CNH	0.187	***	0.213	***	0.170	***	0.037		0.177	***	0.100	**	0.204	***	0.162	***	0.196	***	0.078	**
	(5.382)		(5.764)		(3.935)		(0.884)		(4.154)		(2.406)		(5.189)		(3.957)		(5.998)		(1.992)	
Adjusted R^2	0.409		0.343		0.122		0.017		0.158		0.138		0.193		0.164		0.481		0.213	
Observations	721		721		721		721		632		721		721		717		721		721	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per US dollar. T-statistics are reported in parenthesis. ***/**/* indicates significance at the 1/5/10% level.

Table 5. Asia Panel with the Composite Monetary Stance Indicator

	(I)		(II)		(III)	
C	0.023	***	0.017	***	0.023	***
	(3.612)		(2.707)		(3.692)	
EUR	0.215	***	0.188	***	0.190	***
	(20.363)		(17.1)		(17.473)	
JPY	-0.025	**	-0.030	***	-0.027	**
	(-2.306)		(-2.79)		(-2.544)	
CNY	0.882	***			0.601	***
	(14.855)				(8.835)	
CNH			0.589	***	0.386	***
			(14.514)		(8.321)	
MP	-0.085	**	-0.099	**	-0.091	**
	(-2.165)		(-2.52)		(-2.317)	
Adjusted R^2	0.128		0.126		0.140	
Observations	4,968		4,954		4,954	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported with associated p-values in parenthesis. MP is the composite monetary stance indicator. T-statistics are reported in parenthesis. ***/**/* indicates significance at the 1/5/10% level.

Table 6. Asia Panel: Normal Market Conditions Versus Stress Periods

	Market stress						Normal market conditions					
	(I)		(II)		(III)		(IV)		(V)		(VI)	
C	0.023		0.027	*	0.030	*	0.023	***	0.023	***	0.020	***
	(1.529)		(1.755)		(1.831)		(3.362)		(3.402)		(2.815)	
EUR	0.287	***	0.288	***	0.117	***	0.135	***	0.135	***	0.089	***
	(12.435)		(12.505)		(3.333)		(10.689)		(10.694)		(6.23)	
JPY	-0.072	**	-0.071	**	-0.042		-0.025	**	-0.025	**	-0.008	
	(-2.506)		(-2.467)		(-1.395)		(-2.258)		(-2.241)		(-0.69)	
CNY	0.706	***	0.704	***	0.717	***	0.359	***	0.357	***	0.427	***
	(6.145)		(6.136)		(5.635)		(3.988)		(3.966)		(4.53)	
CNH	0.131	**	0.135	**	0.177	**	0.933	***	0.930	***	0.872	***
	(2.105)		(2.17)		(2.578)		(11.279)		(11.241)		(10.218)	
MP			-0.122	*	-0.186	**			-0.066		-0.057	
			(-1.721)		(-2.235)				(-1.382)		(-1.188)	
EM_CDS					0.038	***					0.018	***
					(5.14)						(6.784)	
OIL					-0.026	**					-0.014	***
					(-2.512)						(-2.98)	
Adjusted R^2	0.213		0.214		0.250		0.126		0.126		0.142	
Observations	1,062		1,062		925		3,892		3,892		3,605	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per US dollar. T-statistics are reported in parenthesis. MP is the composite monetary stance indicator. EM_CDS is changes of CDS spreads for emerging markets. OIL is changes in oil prices. ***/**/* indicates significance at the 1/5/10% level.

Table 7. Asia Panel: Instrumental Variable Estimation

	Lags as IV						Stock prices as IV					
	(I)		(II)		(III)		(IV)		(V)		(VI)	
C	0.022	***	0.023	***	0.017	***	0.021	***	0.022	***	0.019	***
	(3.431)		(3.571)		(2.626)		(3.24)		(3.384)		(2.868)	
EUR	0.187	***	0.188	***	0.114	***	0.191	***	0.192	***	0.118	***
	(16.841)		(16.927)		(8.635)		(16.813)		(16.856)		(8.931)	
JPY	-0.028	**	-0.028	**	-0.009		-0.030	***	-0.029	***	-0.007	
	(-2.577)		(-2.54)		(-0.77)		(-2.665)		(-2.631)		(-0.644)	
CNY	0.595	***	0.593	***	0.615	***	0.651	***	0.644	***	0.658	***
	(8.47)		(8.444)		(8.328)		(8.81)		(8.702)		(8.897)	
CNH	0.426	***	0.422	***	0.391	***	0.352	***	0.356	***	0.375	***
	(8.578)		(8.525)		(7.797)		(7.206)		(7.294)		(7.318)	
MP			-0.091	**	-0.100	**			-0.098	**	-0.098	**
			(-2.312)		(-2.412)				(-2.409)		(-2.373)	
EM_CDS					0.023	***					0.022	***
					(8.97)						(8.373)	
OIL					-0.018	***					-0.020	***
					(-4.224)						(-4.597)	
Adjusted R^2	0.139		0.140		0.161		0.139		0.140		0.164	
Observations	4,802		4,802		4,418		4,456		4,456		4,374	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported in parenthesis. MP is the composite monetary stance indicator. EM_CDS is changes of CDS spreads for emerging markets. OIL is changes in oil prices. ***/**/* indicates significance at the 1/5/10% level.

Table 8. Impact of Early Trading Asian Currencies on the Renminbi

	CNY						CNH					
	(I)		(II)		(III)		(IV)		(V)		(VI)	
c	-0.011	**	-0.012	**	-0.011	**	-0.003	*	-0.003	*	-0.003	*
	(-3.821)		(-4.105)		(-3.807)		(-1.972)		(-1.993)		(-2.054)	
EUR	0.083	**	0.056	*	0.078	**	0.017		0.018		0.015	
	(2.988)		(2.234)		(2.907)		(1.269)		(1.378)		(1.132)	
JPY	0.023		0.033		0.024		-0.018		-0.017		-0.018	
	(0.837)		(1.269)		(0.883)		(-1.323)		(-1.310)		(-1.344)	
AUD	-0.022						0.009					
	(-0.586)						(0.507)					
KRW			0.064	**					0.005			
			(8.394)						(1.296)			
NZD					-0.003						0.022	
					(-0.098)						(1.568)	
Adjusted R^2	0.012		0.098		0.012		0.008		0.010		0.011	
Observations	742		741		742		741		740		741	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported in parenthesis. ***/**/* indicates significance at the 1/5/10% level.

Table 9. Asia Panel with Alternative Monetary Policy Measures

	(I)		(II)		(III)	
C	0.064	***	0.042	*	0.058	***
	(2.97)		(1.919)		(2.712)	
EUR	0.228	***	0.195	***	0.199	***
	(20.419)		(16.779)		(17.275)	
JPY	-0.027	**	-0.035	***	-0.032	***
	(-2.437)		(-3.152)		(-2.88)	
CNY	0.946	***			0.650	***
	(14.846)				(9.151)	
CNH			0.672	***	0.460	***
			(14.766)		(9.076)	
REPO	-0.011	*	-0.006		-0.009	
	(-1.878)		(-1.07)		(-1.555)	
Adjusted R^2	0.136		0.135		0.151	
Observations	4,533		4,519		4,519	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported in parenthesis. REPO is the 7-day interbank repo rate. ***/**/* indicates significance at the 1/5/10% level.

Table 10. Asia Panel with Global Factors

	(I)		(II)		(III)	
C	0.018	***	0.012	*	0.019	***
	(2.802)		(1.886)		(2.927)	
EUR	0.135	***	0.110	***	0.112	***
	(10.568)		(8.343)		(8.615)	
JPY	-0.004		-0.012		-0.008	
	(-0.346)		(-1.068)		(-0.681)	
CNY	0.898	***			0.618	***
	(14.021)				(8.523)	
CNH			0.606	***	0.403	***
			(13.723)		(8.08)	
MP	-0.086	**	-0.112	***	-0.100	**
	(-2.07)		(-2.693)		(-2.427)	
EM_CDS	0.023	***	0.022	***	0.023	***
	(9.063)		(8.817)		(8.992)	
OIL	-0.021	***	-0.019	***	-0.019	***
	(-5.012)		(-4.435)		(-4.568)	
Adjusted R^2	0.151		0.149		0.162	
Observations	4,544		4,530		4,530	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported in parenthesis. MP is the composite monetary stance indicator. EM_CDS is changes of CDS spreads for emerging markets. OIL is changes in oil prices. ***/**/* indicates significance at the 1/5/10% level.

Table 11. Asia-Pacific Panel

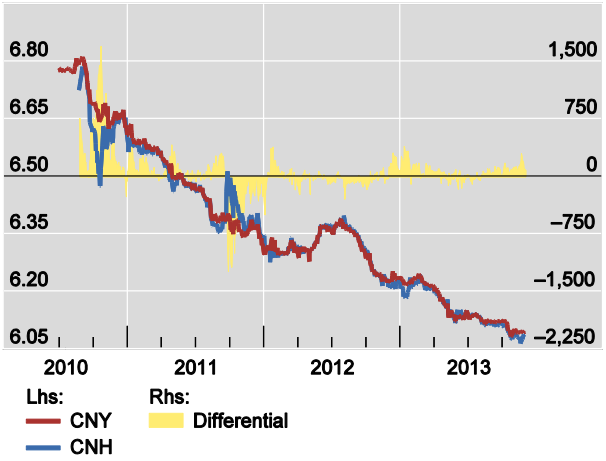
	(I)		(II)		(III)		(IV)		(V)	
C	0.015	**	0.011	*	0.015	***	0.016	***	0.011	*
	(2.56)		(1.926)		(2.649)		(2.804)		(1.91)	
EUR	0.292	***	0.260	***	0.262	***	0.263	***	0.158	***
	(30.075)		(25.944)		(26.201)		(26.245)		(13.215)	
JPY	0.010		0.005		0.007		0.008		0.037	***
	(1.029)		(0.543)		(0.743)		(0.779)		(3.641)	
CNY	0.744	***			0.406	***	0.402	***	0.403	***
	(13.619)				(6.498)		(6.439)		(6.074)	
CNH			0.602	***	0.464	***	0.466	***	0.477	***
			(16.208)		(10.897)		(10.939)		(10.461)	
MP							-0.088	**	-0.100	***
							(-2.457)		(-2.658)	
EM_CDS									0.028	***
									(12.12)	
OIL									-0.033	***
									(-8.557)	
Adjusted R^2	0.150		0.159		0.163		0.164		0.199	
Observations	7,137		7,117		7,117		7,117		6,504	

Note: The sample period is from 1 September 2010 to 30 September 2013. The exchange rates are expressed as the local currency per the US dollar. T-statistics are reported in parenthesis. MP is the composite monetary stance indicator. EM_CDS is changes of CDS spreads for emerging markets. OIL is changes in oil prices. ***/**/* indicates significance at the 1/5/10% level.

Figure 1. Renminbi Exchange Rate

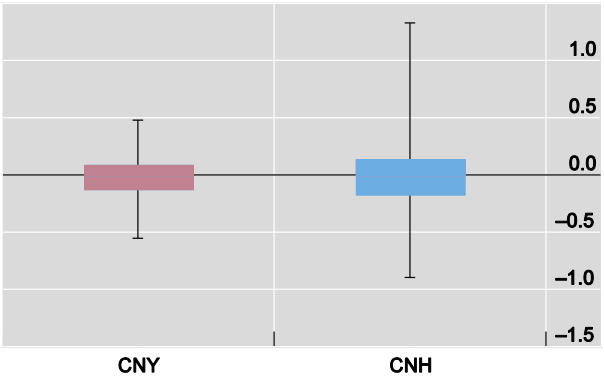
CNY and CNH differentials

Vis-à-vis USD In basis points



Market volatility[2]

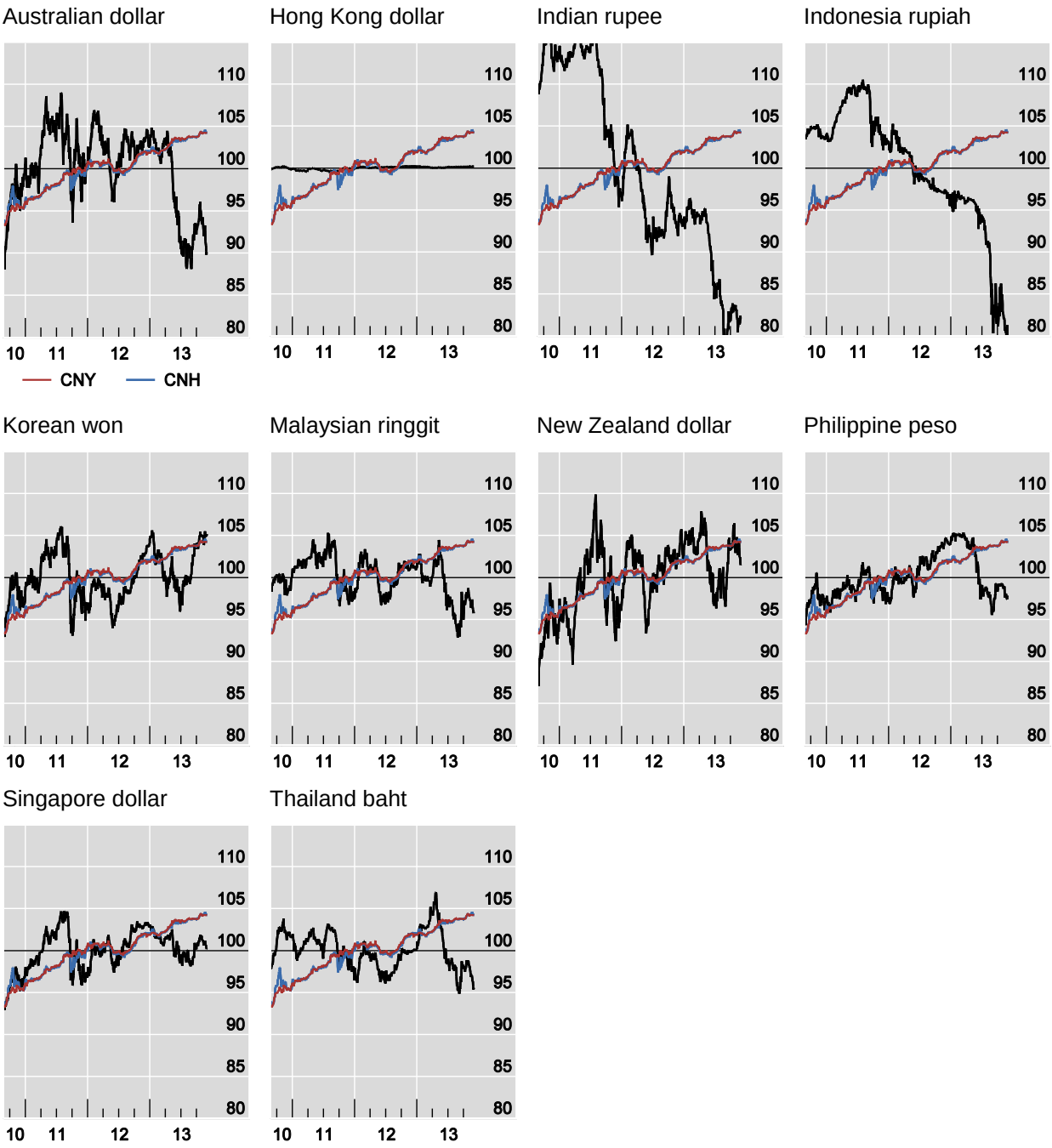
In per cent



[1] A positive number indicates depreciation. [2] Showing the maximum, minimum and mean plus/minus 1 standard deviation of daily changes of the RMB/USD rate between 1 September 2010 and 30 November 2013.

Sources: Bloomberg; author's calculations.

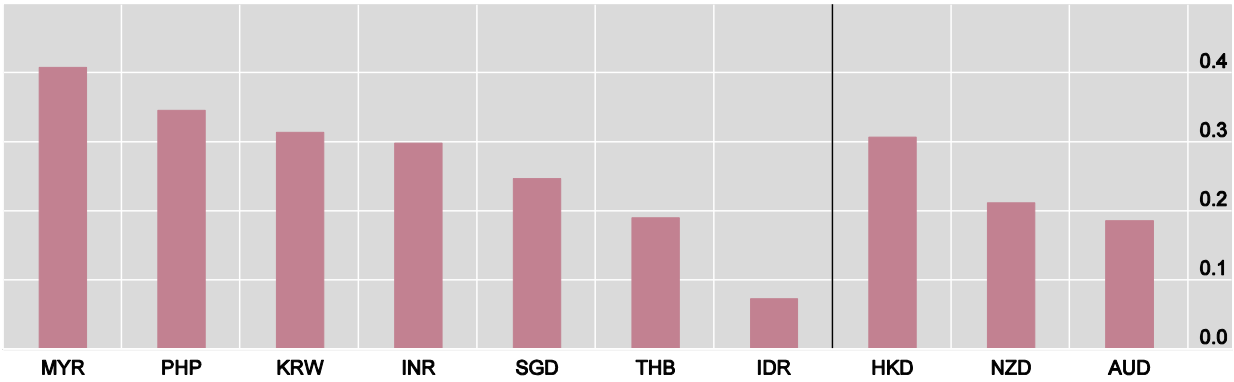
Figure 2. Asian Exchange Rates[1] (July 2010–November 2013 = 100)



[1] The black line is the US dollar vis-à-vis the currency shown in the subtitle. An increase indicates an appreciation.

Sources: Bloomberg; authors' calculations.

Figure 3. Impact of the Renminbi on Asia-Pacific Currencies[1]



[1] Sum of coefficients on the CNY and CNH from the regressions using standardised variables.

Source: authors' estimates.