



## Internationalization of the Renminbi: The Role of Trade Settlement

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The prospect of a global renminbi (RMB) that could challenge the position of the dollar or the euro as a reserve currency has generated debate and captured the imagination of academics, pundits, and policymakers in recent years. Chinese officials embrace the limited goal of increasing usage of the RMB in international transactions without publicly advocating full reserve-currency status and free convertibility that such a status would require. Indeed, international use of the RMB is an important element of China's current reform strategy. China has drawn media and financial sector attention with its announcement of the opening of offshore RMB centers in Hong Kong, Singapore, Taipei, London, Frankfurt, Paris, and Luxembourg. Offshore investors have been keen to invest in a currency that has not depreciated significantly against the dollar since 1994 and is widely viewed as having further room for appreciation given China's rapid productivity growth and relatively low inflation.

This Policy Brief shows that one element of China's reforms is largely driving the growth of offshore RMB markets: the ability of Chinese exporters and importers to make and accept payments in RMB. In particular, the excess of payment,

or settlement, in RMB by Chinese importers over RMB settlement by Chinese exporters leads to growing volumes of RMB deposits offshore. This growth, in turn, results from the premium in the value of offshore RMB relative to onshore RMB. When foreign investors push up the value of offshore RMB relative to onshore RMB, Chinese importers increase their settlement in offshore markets, increasing the supply of offshore RMB and limiting the size of the premium.

The links between offshore and onshore RMB markets are strong and growing but far from complete. The RMB is not yet an international currency, although it is heading in that direction. It cannot become a true international currency until Chinese authorities drop the strict limits that remain on capital flows (that is, transactions in financial assets) between China and the rest of the world.

### OFFSHORE TRADING IN HONG KONG: AN OVERVIEW

Hong Kong is the oldest and largest offshore market for RMB. We therefore focus on this market. We follow market conventions and denote onshore RMB as CNY and RMB in Hong Kong as CNH. We use RMB when the term could apply equally to CNY or CNH.

Hong Kong holds a preeminent position, but Chinese authorities have plans to provide similar levels of support to other offshore centers. China designated clearing banks in Taipei in 2012 and in Singapore in 2013. In March 2014, officials in Frankfurt and London announced agreements with their Chinese counterparts to further develop RMB services for European investors and businesses. These services are intended to eventually include a broad range of capital market, trade settlement, and deposit capabilities.

In 2003 the Chinese authorities allowed individuals in Hong Kong to use the RMB for personal transactions, thus sanctioning the CNH market, which had previously operated in the shadows. Hong Kong banks were able to make loans and offer deposits in CNH to Hong Kong residents and foreign (non-mainland) businesses within prescribed limits.

Hong Kong banks were also allowed to offer limited amounts of CNH deposits to mainland residents who purchased them with CNY. Hong Kong residents were allowed to buy limited amounts of CNH deposits with foreign exchange, including Hong Kong dollars.<sup>1</sup> The ability of Hong Kong banks to back CNH liabilities with claims on CNY assets on the mainland was strictly limited to CNH liabilities created via the deposits of mainland and Hong Kong residents, as outlined above. The Bank of China's Hong Kong affiliate was declared the clearing bank for this market.

In 2005 China raised the daily limit of CNH Hong Kong residents could buy with foreign exchange to RMB20,000 and removed the limit on credit card borrowing in CNH.<sup>2</sup> The same year, it officially launched the nondeliverable forward market, with broad participation of Hong Kong banks. (Previously this market was limited to nonstandardized transactions without a centralized pricing mechanism.) In 2007 select Chinese institutions were permitted to issue limited amounts of bonds denominated in CNH in Hong Kong (known as “dim sum” bonds).

In 2009 and 2010, the authorities eliminated all restrictions on foreign exchange transactions, borrowing, and lending in CNH by Hong Kong and foreign institutions.<sup>3</sup> They established the necessary financial infrastructure, such as a bilateral swap line between the People's Bank of China (PBoC) and the Hong Kong Monetary Authority (HKMA)<sup>4</sup> and a cross-border payment system in which onshore and offshore banks can exchange customer claims.<sup>5</sup> They also allowed a limited number of mainland exporters and importers to settle their external trade in CNH.

In 2011 the authorities allowed all mainland exporters and importers to settle in CNH. In 2012 they allowed foreign individuals to buy and hold unlimited CNH deposits in Hong Kong (Hong Kong individuals are still limited to RMB20,000 per day).<sup>6</sup>

These reforms triggered a remarkable increase in both the demand for and supply of CNH deposits. Growth of the nondeliverable forward CNY market has slowed considerably

in recent years, as the CNH market has provided an alternative means to establish a short or long position in CNY (McCauley, Shu, and Ma 2014).

Trading has been completely liberalized between CNH and foreign currencies (including Hong Kong dollars), but restrictions remain on transactions between CNY and foreign currencies and on transactions between CNH and CNY. Trading between CNY and other currencies, including CNH, is limited to payments associated with imports and exports, inward and outward foreign direct investment (FDI), and inward and outward portfolio investments, which are subject to strict limits. For example, issuers of dim sum bonds (in CNH) require official approval to convert the proceeds to CNY for use on the mainland. All transactions between CNY and CNH occur at par (in other words, a claim in CNY is transferred for the same amount of CNH). However, restrictions on these transactions sometimes lead to differences in the values of CNH and CNY in terms of foreign currencies.

Hong Kong banks and other foreign institutions have been restricted in their ability to use CNY claims on mainland banks to buy other CNY assets, such as equity, bonds, and real estate.<sup>7</sup> Individuals are not allowed to own any CNY assets, except indirectly through intermediary institutions. Under a pilot program announced in April 2014 by the China Securities Regulatory Commission, individual and institutional investors in Hong Kong will be able to purchase onshore equities and onshore investors will be able to own equities in Hong Kong, subject to a quota.<sup>8</sup> The details of this program are not final and the authorities believe that it will take several months before the program is operational, but initial guidance suggests that it will have a gross quota of RMB550 billion.

## DEMAND FOR CNH

Demand for deposits and other assets denominated in CNH (purchased in foreign currencies) comes primarily from foreign investors (including Hong Kong residents) who want exposure to the RMB (Zhang and Xu 2012). Demand increases when CNH interest rates increase relative to foreign interest rates and when investors become more bullish about CNH appreciation or more willing to bear risk in the carry trade of borrowing in a foreign currency to invest in CNH. Changing expectations of apprecia-

1. Hong Kong Monetary Authority (HKMA) press release, November 18, 2003, [www.hkma.gov.hk/eng/key-information/press-releases/2003/20031118-4.shtml](http://www.hkma.gov.hk/eng/key-information/press-releases/2003/20031118-4.shtml).

2. HKMA press release, November 1, 2005, [www.hkma.gov.hk/eng/key-information/press-releases/2005/20051101-3.shtml](http://www.hkma.gov.hk/eng/key-information/press-releases/2005/20051101-3.shtml).

3. HKMA press release, July 19, 2010, [www.hkma.gov.hk/eng/key-information/press-releases/2010/20100719-4.shtml](http://www.hkma.gov.hk/eng/key-information/press-releases/2010/20100719-4.shtml).

4. HKMA press release, January 20, 2009, [www.hkma.gov.hk/eng/key-information/press-releases/2009/20090120-4.shtml](http://www.hkma.gov.hk/eng/key-information/press-releases/2009/20090120-4.shtml).

5. HKMA *Quarterly Bulletin*, June 2009, [www.hkma.gov.hk/media/eng/publication-and-research/quarterly-bulletin/qb200906/fa1\\_print.pdf](http://www.hkma.gov.hk/media/eng/publication-and-research/quarterly-bulletin/qb200906/fa1_print.pdf).

6. HKMA press release, July 25, 2012, [www.hkma.gov.hk/eng/key-information/press-releases/2012/20120725-3.shtml](http://www.hkma.gov.hk/eng/key-information/press-releases/2012/20120725-3.shtml).

7. The Renminbi Qualified Foreign Institutional Investor program, announced in 2011, was recently expanded to RMB580 billion. In addition, the PBoC has a program for investments in the domestic interbank bond market with a total approved quota of RMB600 billion. The PBoC program includes many Hong Kong banks (Becky Liu, “China Onshore Bond Compendium 2014,” Standard Chartered Global Research, April 29, 2014.)

8. China Securities Regulatory Commission press release, April 10, 2014, [www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201404/t20140410\\_246762.htm](http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201404/t20140410_246762.htm).

tion may be driven by news about the Chinese economy—especially China’s current account surplus—or changing views about the Chinese government’s currency policy. Hong Kong banks also contribute to CNH demand when they expand a net long position in RMB—that is, when they buy more assets denominated in RMB than they issue in RMB liabilities.

Subject to official approval, mainland investors may acquire CNH assets at par value with CNY. These transactions increase demand and supply equally, however, with no effect on price in terms of foreign currencies.<sup>9</sup>

Demand also comes from foreign businesses that find it convenient to transact in CNH because their customers prefer to do so. In particular, when Chinese exporters request settlement in CNH, their foreign customers must buy CNH to pay for the exports. A mainland exporter would prefer to settle in CNH when it trades at a discount to CNY, because the same amount of foreign currency will buy more CNH, which the exporter is entitled to convert to CNY at par. As the exporters repatriate the CNH to the mainland to pay their workers and suppliers, the volume of CNH deposits in Hong Kong drops as a result of an equal reduction in demand and supply.

## SUPPLY OF CNH

Supply of deposits and other assets denominated in CNH (purchased in foreign currencies) comes from channels that mirror those of demand: foreigners who wish to borrow in RMB (perhaps because CNH interest rates are low or they expect the CNH to decline in value) and mainland importers who settle their import bills in CNH.

There are no quantitative limits on the issuance of CNH (dim sum) bonds by foreign institutions that do not wish to use the funds on the mainland.<sup>10</sup> Mainland issuers of dim sum bonds that use the proceeds overseas (subject to official approval) also increase supply in the CNH market. However, dim sum issuers that repatriate their funds to the mainland have no net effect on the CNH market, because they increase supply in the bond market and reduce supply in the deposit market by equal amounts.<sup>11</sup> Hong Kong banks contribute to CNH supply when they expand a net short position in RMB.

9. The mainland investor’s deposit in Hong Kong reflects demand for CNH, but the funds transferred to make the deposit increase supply by an equal amount.

10. Such offshore issuance includes placements by America Movil, BMW, Lloyds Bank, and Lotte Shopping. Robert Cookson, “China: Issuers Develop a Taste for Dim Sum Market,” *Financial Times*, March 12, 2012, [www.ft.com](http://www.ft.com).

11. When an issuer of a dim sum bond repatriates the proceeds, it instructs a Hong Kong bank to credit its account (or pay its client’s account) on the mainland. The Hong Kong bank debits the CNH deposit of the dim sum issuer and reduces its CNY claims on the mainland.

At the same time that Chinese exporters were allowed to settle in CNH, Chinese importers were also allowed to do so. When a mainland importer pays for imports through Hong Kong, it transfers CNY funds to a bank in Hong Kong that then credits the deposit account of the foreign exporter, thus creating more CNH. The foreign exporter is free to hold these CNH deposits or to sell them to an investor for foreign exchange. A mainland importer will prefer to settle in CNH when it trades at a premium to CNY in terms of foreign currency because it is entitled to convert CNY to CNH at par (Garber 2011). Unlike capital transactions, there are no official limits on the ability of Chinese importers to pay for their imports through the CNH market. In principle, the supply of CNH could grow through this channel by as much as \$2 trillion per year—the total value of Chinese imports.<sup>12</sup> These transactions increase the total claims of Hong Kong banks on the mainland that are denominated in CNY.<sup>13</sup>

## MARKET EQUILIBRIUM

These demand and supply factors jointly determine the value of CNH in terms of foreign currency. We assume that the PBoC exogenously fixes the value of the CNY in terms of foreign currency through its foreign exchange intervention, so that equilibrium in the CNH market also determines the premium or discount between CNH and CNY. The issue of CNH market equilibrium can also be stated in terms of the forces that keep the CNH–CNY premium or discount from growing arbitrarily large. These forces can be grouped into two broad channels: trade settlement and capital flows.

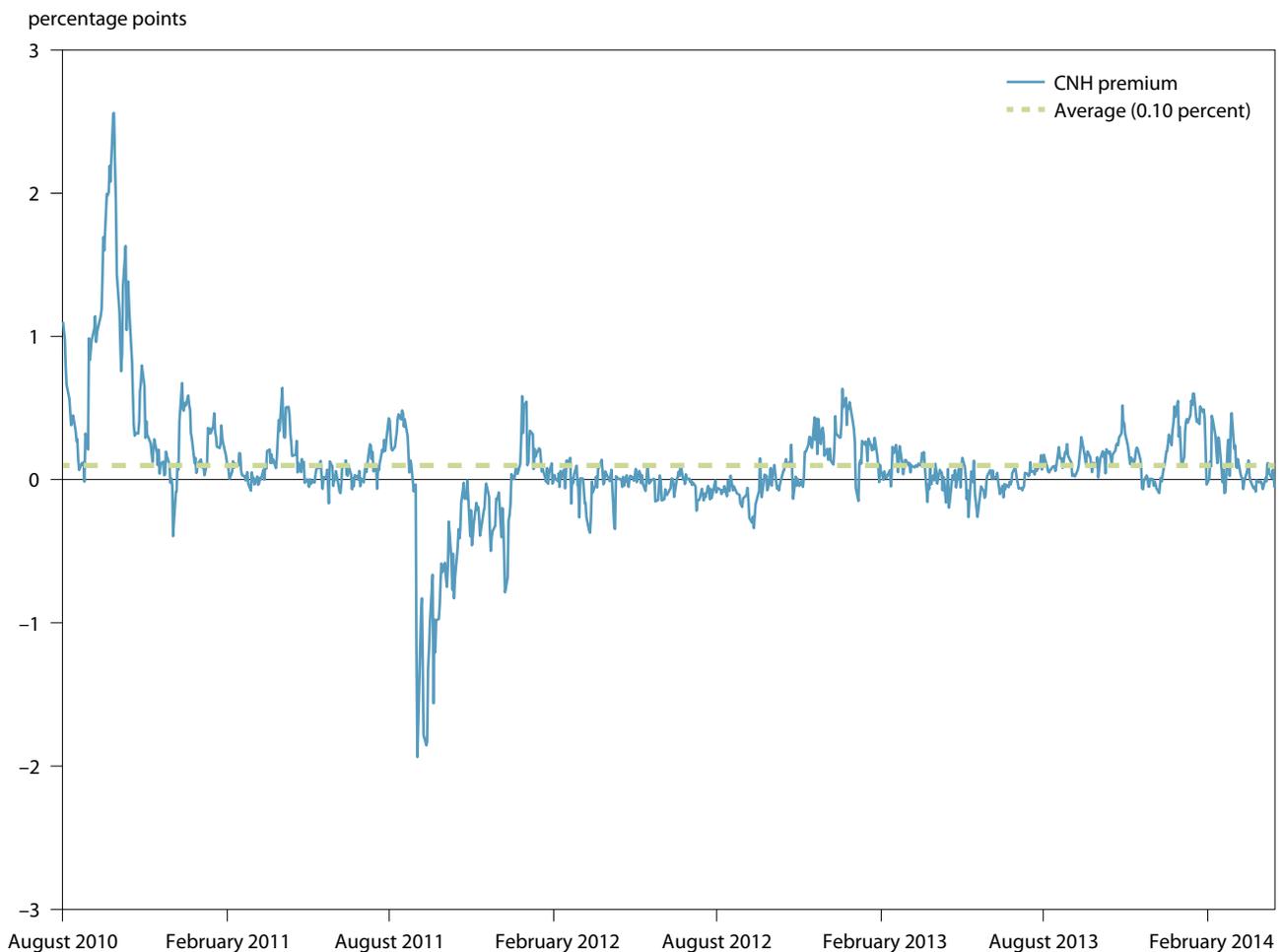
### Arbitrage through Trade Settlement

Chinese exporters have an incentive to settle in CNH when CNH trades at a discount to CNY; Chinese importers have an incentive to settle in CNH when CNH trades at a premium.<sup>14</sup>

12. In principle, export settlement in RMB could increase CNH demand by an even larger amount, reflecting the excess of China’s exports relative to its imports.

13. In 2011, the authorities began allowing a limited number of mainland and foreign firms to pay for their outward and inward FDI with CNH. Inward FDI increases the demand for CNH; outward FDI increases the supply of CNH.

14. Many observers have written about “invoicing” in RMB. For most countries, there is a high correlation between invoice currency and settlement currency, but the two need not be the same. Yu (2012) claims that most Chinese imports settled in RMB are invoiced in other currencies. A large body of literature examines the factors that influence the choice of invoice currency (Goldberg and Tille 2008). However, most of these factors are more relevant for invoicing than for settlement.

**Figure 1 CNH premium relative to CNY, August 23, 2010–May 7, 2014**

Source: Bloomberg.

CNH has traded at a premium to CNY for most of the past four years (figure 1). This premium has led to an excess of import settlement in CNH relative to export settlement. The excess reached a new high of more than \$60 billion in the fourth quarter of 2013.<sup>15</sup> The excess of CNH settlement in imports over exports lies in stark contrast to the pattern for other countries, where exporters tend to invoice (and settle) in the home currency more often than importers (Ito and Chinn 2014).

When CNH is more valuable than CNY, importers increase settlement in CNH and exporters reduce settlement in CNH, causing a net increase in the supply of CNH and putting downward pressure on its value. Arbitrage also works in the reverse direction: when CNH is less valuable than CNY, trade settlement moves to reduce net supply of CNH and thus put upward pressure on its value. Large deviations between

CNH and CNY have not lasted long, suggesting that this arbitrage mechanism is fairly strong (see figure 1).

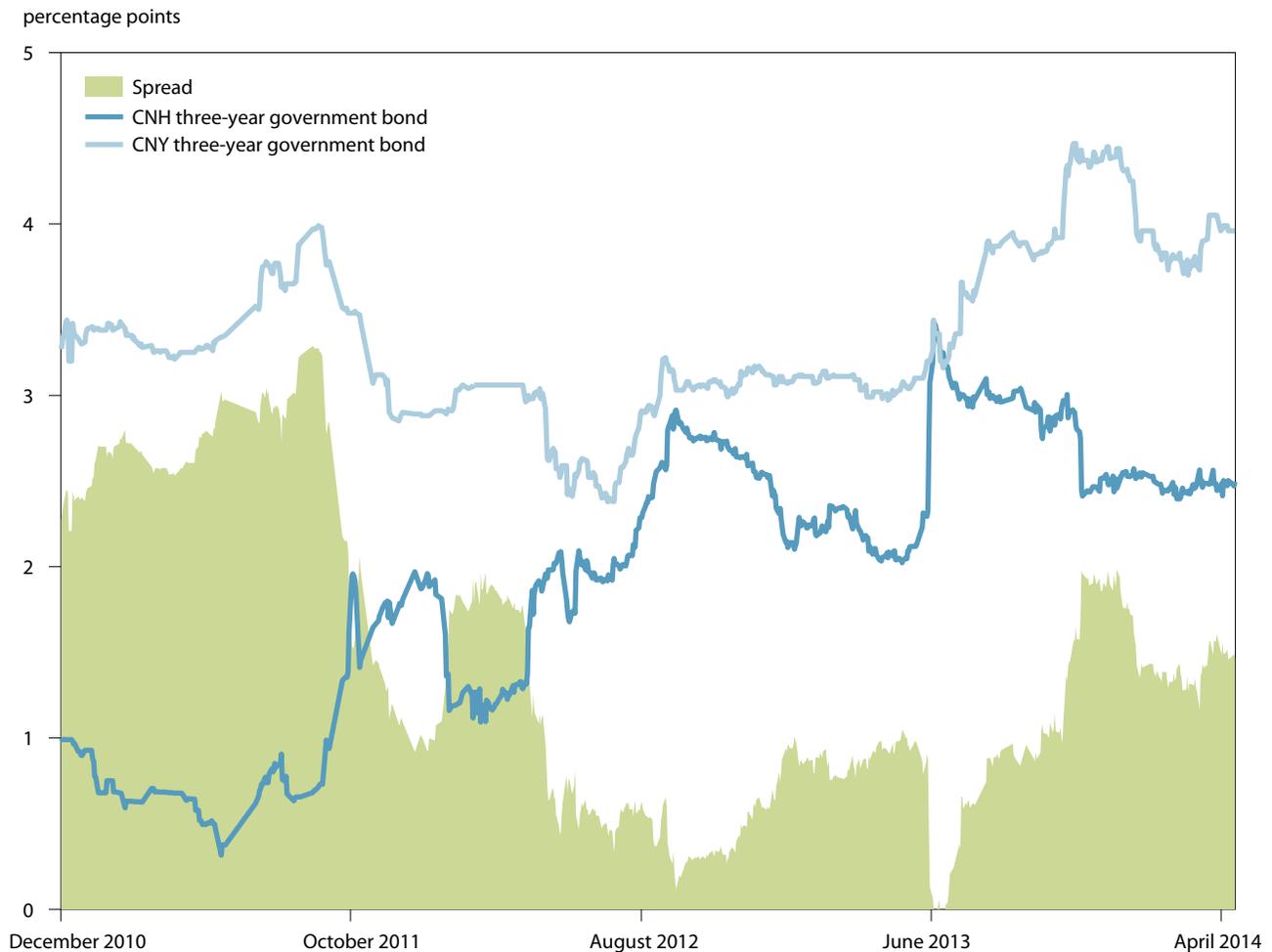
Note that an excess of importer settlement in CNH over exporter settlement in CNH will put upward pressure on the CNY exchange rate, as the extra CNY is diverted to Hong Kong. The PBoC will need to supply the missing CNY, thus accumulating more foreign exchange reserves, if it wishes to prevent an appreciation of the CNY exchange rate.

### Arbitrage through Capital Flows

The incentives for mainland and offshore investors differ.<sup>16</sup> Mainland investors are able to transact between CNH and CNY at par. They prefer to borrow where interest rates are lower and

15. M.K. Tang and Maggie Wei, “Under the Hood of RMB Inflows,” Goldman Sachs *Asia Economics Analyst* Issue No. 14/17, Exhibit 5.

16. Here we use the term *investor* to include both households and businesses with respect to saving, borrowing, and investment decisions. Some of these businesses may also be exporters or importers, but it is convenient to separate the issue of trade settlement from the issue of capital flows.

**Figure 2 CNH and CNY bond yields, December 23, 2010–May 7, 2014**

Source: Bloomberg.

lend where interest rates are higher. Bond yields are typically lower in CNH, providing an incentive for mainland investors to borrow in CNH and lend (or invest) in CNY (figure 2).<sup>17</sup> However, investors' ability to arbitrage between these rates is strictly limited by the Chinese authorities. As shown in figure 2, large deviations between these rates are long-lasting, suggesting that official restrictions are binding.

Except for a few specific, mainly official, institutions under strict quotas, foreign investors are not allowed to invest in CNY bonds or deposits. Foreigners are allowed to invest

in CNH bonds and deposits without limit. Foreign investors respond to interest rate differentials between CNH and foreign currencies, to expectations of CNH appreciation or depreciation, and to uncertainty surrounding these expectations. Although there are no limits on capital flows between CNH markets and foreign markets, it is widely accepted that financial markets do a poor job of equating expected returns across currencies (Gagnon 2011). Moreover, there is no good measure of expected future changes in exchange rates.

The most important driver of expectations of future changes in the value of CNH is views about China's policy toward the value of CNY. We believe that alternative bouts of optimism and pessimism about the future value of CNY are the most important factors affecting foreign investment in CNH, with expectations of CNY appreciation generally predominating.

17. Data for yields with shorter maturities were missing for much of 2010 and 2011. We do not show deposit interest rates, because CNY deposit interest rates are tightly regulated and CNH deposit interest rates were not available for most of this period. Currently, CNH three-month deposit rates are about 2 percentage points below three-month CNY rates (Bank of China [Hong Kong] and PBoC).

## EMPIRICAL ANALYSIS

Several recent papers measure the correlations between spot or forward exchange rates in CNH and exchange rates in CNY or between interest rates in CNH and interest rates in CNY (Li, Hui, and Chung 2012; Maziad and Kang 2012; Craig et al. 2013; Anderson 2014; and McCauley, Shu, and Ma 2014). They generally find strong and growing correlations between these markets, but significant disparities remain.

### The growth of the CNH market is driven largely by importer settlement, not capital flows.

Rather than measure the intensity of financial price linkages, this Policy Brief measures the responsiveness of market size, measured by total CNH deposits, to arbitrage opportunities created by gaps in financial prices. We assume that foreign investor demand driven by expectations of RMB appreciation is the primary source of the premium of CNH over CNY in foreign exchange markets. CNH supply responds endogenously, primarily through the import settlement channel, to limit the premium. Thus, we would expect the CNH market to grow most rapidly when the premium is large. This relationship is estimated using the following equation:

$$\Delta \text{deposits}_t = 30.8 * (\text{CNH-CNY premium})_t + 0.56 * \Delta \text{deposits}_{t-1} + 5.2$$

(*t*-statistics: 5.1, 6.1, 2.6;  
44 observations between August 2010 and March 2014;  $R^2 = 0.68$ )

We regress the monthly change in CNH deposits on the monthly average premium (or discount) between the CNH and CNY exchange rates.<sup>18</sup> Our results suggest that a 1 percentage point increase in the premium will increase the growth of CNH deposits by RMB31 billion in the same month. There is also a lagged effect of previous deposit growth, which means that a 1 percentage point higher premium for one month will increase deposit growth by a cumulative RMB70 billion ( $30.8/(1 - 0.56)$ ) over time. The equation suggests that even when the premium is zero, CNH deposits will grow by RMB12 billion per month ( $5.2/(1 - 0.56)$ ). Adding up all of these effects leads to a prediction that a sustained 1 percentage

18. CNH deposits are in RMB billions. The CNH–CNY premium is the percentage point difference between the value of CNH in terms of US dollars and the value of CNY in terms of US dollars. These exchange rates are monthly averages of daily closing values in the Hong Kong (CNH) and Shanghai (CNY) markets. Deposit data are from the HKMA's *Monthly Statistical Bulletin*. All other data are from Bloomberg.

point premium will be associated with steady CNH deposit growth of RMB82 billion per month.<sup>19</sup>

We tried including additional explanatory variables, including the CNY–CNH bond yield differential, the spread between the one-week CNY repo rate and the one-week US dollar Libor, and the 12-month nondeliverable CNY forward premium. None of these variables was statistically significant at even the 10 percent level. This finding supports our view that the growth of the CNH market is driven largely by importer settlement, not capital flows, because importers care only about the current exchange rate whereas investors care about both interest rates and expected future changes in the exchange rate. In addition, limits on importer settlement are not binding, whereas limits on capital flows are binding.

As China has relaxed restrictions on the supply of CNH through trade settlement, we would expect the effect of the CNH–CNY premium on deposit growth to increase over time.<sup>20</sup> We tried splitting the sample in September 2011, when trade settlement was fully liberalized, and also at the midpoint of the sample (May 2012). The estimated effect of the CNH–CNY premium was larger for the second part of the sample, but the difference was not statistically significant at any conventional level for either break date.

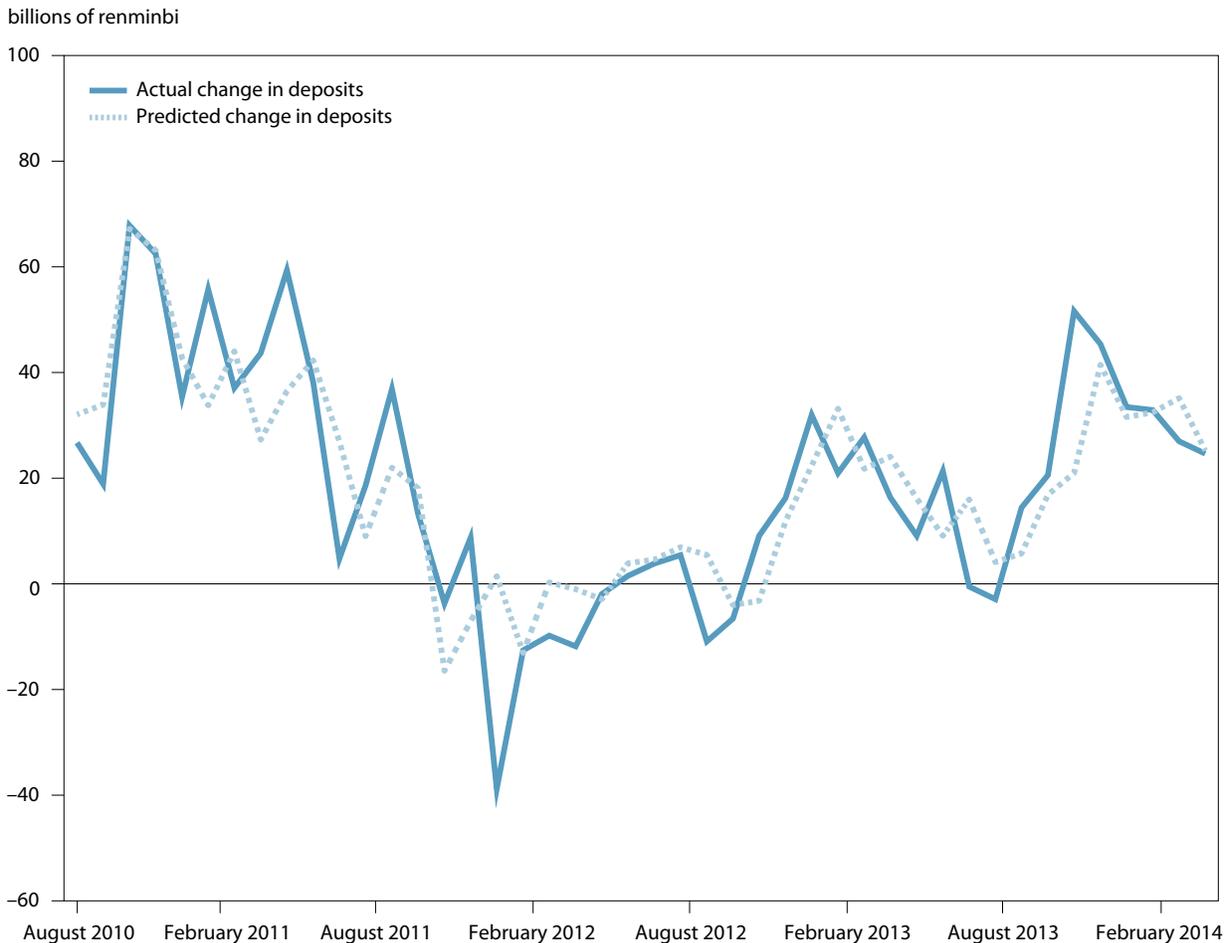
Figure 3 displays the change in CNH deposits (the solid line) and the predicted value based on the above regression (the dashed line). Since late 2012, there has been a modest tendency for the CNH market to grow even faster than our model would have predicted, raising the possibility of improved arbitrage over time that we were not able to detect by allowing a one-time break in the relationship.

## IMPLICATIONS FOR RMB INTERNATIONALIZATION

China continues to impose tight restrictions on capital transactions between the mainland and the rest of the world. For this reason, the values of onshore CNY and offshore CNH sometimes differ by as much as 1 or 2 percent. The primary mechanism for arbitraging these differences appears to be trade settlement. When CNH trades at a premium to CNY, Chinese

19. Monthly data on CNH bonds outstanding are available starting in early 2011. We found no significant effect of the premium on the growth of CNH bonds outstanding. We found a significant effect of the premium on the growth of the sum of CNH deposits and bonds. The estimated combined effect was larger than the effect on deposits only—RMB111 billion versus RMB82 billion for a sustained premium of 1 percentage point—but the equation fit was worse, with an  $R^2$  of 0.52.

20. It is not clear how relaxing capital flow restrictions might affect this coefficient.

**Figure 3 Change in CNH deposits, August 2010–March 2014**

Source: Hong Kong Monetary Authority (HKMA) and authors' calculations.

importers increase their settlement in CNH, thus increasing the CNH deposit base.

We estimate that a persistent CNH–CNY premium of 1 percentage point would lead to a steady growth of CNH deposits of RMB82 billion per month, or about \$160 billion per year. Our results imply that a larger premium—say, 5 percentage points—would lead to growth of more than \$700 billion per year.<sup>21</sup> There are reasons to believe that the efficiency of arbitrage is increasing. The response to a given CNH–CNY premium may thus be growing, but we were not able to find statistically significant evidence of such a change within our sample.

Full internationalization of the RMB and elimination of the CNH–CNY premium and CNH–CNY interest rate differentials requires greater capital account liberalization by China. Nevertheless, the capital account liberalization to

date, coupled with full convertibility for trade settlement, has allowed offshore RMB markets (CNH) to grow substantially, with moderately good linkages to onshore RMB (CNY). As of this writing, total offshore CNH deposits were RMB1,455 billion (\$234 billion) and offshore CNH bonds were RMB419 billion (\$67 billion).<sup>22</sup> The premium of CNH to CNY was close to zero. This market is large and growing, with moderately good linkages to the mainland.

21. A premium of this size has not been observed to date, so extrapolations of its effect are particularly uncertain.

22. Bond data are for Hong Kong, London, and Singapore only. Data for Hong Kong and Taiwan are for March 2014; they come from the central bank websites ([www.hkma.gov.hk](http://www.hkma.gov.hk) and [www.cbc.gov.tw](http://www.cbc.gov.tw)). Data for Singapore are for 2013; they come from a speech by Leong Sing Chiong, Assistant Managing Director of the Monetary Authority of Singapore, on March 13, 2014. Data for Luxembourg are for year-end 2013; they come from the Luxembourg RMB Initiative's website (<http://www.rmb-business.com/en>). Data for London are for June 2013; they come from a report by the City of London Corporation entitled *London RMB Business Volumes January–June 2013*. Data for Paris are for October 2013; they come from the Paris-Europlace website (<http://www.paris-europlace.net/>).

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