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The Renminbi Bloc is Here: Asia Down, Rest of the World to Go?

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Abstract

A country's rise to economic dominance tends to be accompanied by its currency becoming a reference point, with other currencies tracking it implicitly or explicitly. For a sample comprising emerging market economies, we show that in the last two years, the renminbi (RMB) has increasingly become a reference currency which we define as one which exhibits a high degree of co-movement (CMC) with other currencies. In East Asia, there is already a RMB bloc, because the RMB has become the dominant reference currency, eclipsing the dollar, which is a historic development. In this region, 7 currencies out of 10 co-move more closely with the RMB than with the dollar, with the average value of the CMC relative to the RMB being 40 percent greater than that for the dollar. We find that co-movements with a reference currency, especially for the RMB, are associated with trade integration. We draw some lessons for the prospects for the RMB bloc to move beyond Asia based on a comparison of the RMB's situation today and that of the Japanese yen in the early 1990s. If trade were the sole driver, a more global RMB bloc could emerge by the mid-2030s but complementary reforms of the financial and external sector could considerably expedite the process.

JEL Codes: F31, F33

Keywords: Exchange rates, China, Renminbi, Currency internationalisation, de facto, basket peg

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"Is confidence based on a rate of exchange? We used to talk of sterling qualities. Have we got to talk now about a dollar love? A dollar love had good intentions, a clear conscience, and to hell with everybody."

– *Graham Greene, The Quiet American, 1955*

1. Introduction

The economic rise of China raises the question whether the Chinese currency could become an international/ reserve currency or possibly also the premier international currency, eclipsing the dollar.[1] Based on econometrics and history, Subramanian (2011) argued that the fundamental determinants of international currency status—not just the size of an economy but also the size of its trade and its external financial strength—were moving strongly in China's favor. If China could undertake the necessary reforms of its financial markets and allow greater access for foreigners to the RMB via capital account liberalization, the rise of the RMB to international currency status could be imminent, perhaps within the next 10-15 years.

A currency can become dominant when it acquires a heightened role and becomes the focus or a reference point for other currencies, leading to the formation of a currency bloc. This paper addresses the RMB's rise as a reference currency and the creation of a RMB currency bloc.

a. Clarifying international and reference currencies

An international currency is one that is sought by foreigners (official and private) for three reasons: as a store of value, medium of exchange, and unit of account. This leads to the famous 3x2 taxonomy (3 functions for 2 types of foreign actors) elaborated by Peter Kenen (1984) and illustrated in Table.

This paper does not address the store of value and medium of exchange functions of an international currency (the top two rows of Table 1). It addresses that situation when a currency becomes a reference point for other currencies which is related more to the unit of account function described in the third row of Table 1. One way it can become a reference point is when foreign governments and/or central banks often anchor/peg their currencies to a reserve currency. Another way is for foreign trade and financial transactions to be denominated/invoiced in the reference currency.

We study the case where a currency becomes a reference point manifested in greater degree of co-movements of other currencies with it. These co-movements could be the result of policy choices by countries to track the reference currency in the context of a fixed or semi-fixed exchange rate regime. Or, these movements could be market driven.

It is, of course, possible and perhaps even likely that being or becoming a reference currency will lead to its transition to an international currency: for example, if more countries track say the RMB, that stability in the bilateral exchange rate will be conducive to the private sector using the RMB as a

[1] Sometimes a distinction is made between a reserve and an international currency to correspond, respectively, to official and private sector uses of a currency. We use the term "international" in an encompassing sense.

unit of account in trade transactions. In this paper, we focus on establishing the fact that the RMB has become one of the major global reference currencies, along with the US Dollar and the Euro.

Figures 1a and 1b plot the exchange rates of a number of East Asian countries and the renminbi since 2005 and since 2010, respectively. The broad pattern is one of East Asian currencies broadly following the RMB.

The underlying causes of such co-movements could be common trade, financial or other real shocks. Central banks can wish to increase exchange rate stability with China to stabilize the trading environment of their domestic firms. Or they could result from competitiveness concerns. For example, since China which is a large trader, there is a fear on the part of other countries at similar income and productivity levels that they will be out-competed by China. A possible strategy for them is thus to minimize the cost-competitiveness difference with China and track the RMB more closely.[2] In a context where the RMB appreciates, a flexible peg to the RMB can allow competitor countries to appreciate their currency in order to limit inflation, while retaining competitiveness.

b. Contributions/findings

The contributions of this paper are the following. First, it establishes that since mid-2010, the RMB has made dramatic strides as a reference currency compared with the dollar and euro. This is happening at the extensive margin: when compared with the first period of RMB managed flexibility (from mid-2005 to mid-2008), many more countries have seen an increase in the co-movements of their currencies with the RMB (34 out of 52 cases) than with the dollar (14) or the euro (19). And it is happening at the intensive margin: the average magnitude in co-movements has been increasing for the RMB (6.9 percentage points), and decreasing for both the dollar (-11.1 percentage points) and the euro (-9.1 percentage points).

Second, and perhaps more dramatically, the RMB has now become the dominant reference currency in East Asia, eclipsing the dollar and the euro. There is now a de facto renminbi currency bloc in East Asia In this region, more currencies now co-move (in a statistically significant manner) with the RMB (8 out of 10 cases) than with the dollar (6 out of 10) or the euro. And the magnitude of these co-movements is greatest for the RMB in 7 cases compared with 3 for the dollar (the average magnitude is 0.53 for the RMB and 0.38 for the dollar). It is now the case that the currencies of South Korea, Indonesia, Malaysia, the Philippines, Taiwan, Singapore, and Thailand, more closely track the RMB than the dollar. The dollar's dominance as reference currency in East Asia is now limited to Hong Kong (by virtue of the peg), Vietnam and Mongolia.

Third, the RMB's role as a reference currency is not restricted to East Asia. For Chile, India and South Africa, the RMB is the dominant reference currency. For Israel and Turkey, the RMB is a more important reference currency than the dollar. Overall, 9 currencies out of 42 outside East Asia co-move significantly with the RMB. It is still the case that the dollar and the euro play a greater role beyond their natural spheres of influence than does the RMB but that is changing in favor of the RMB.

[2] Mattoo, Mishra, and Subramanian (2012) quantify the extent to which China competes with other developing countries.

Fourth, and related to the above, while the rise of the RMB as a reference currency is especially prominent in East Asia, this is as much a trade phenomenon, reflecting the increasing trade presence of China, as a regional one. This implies, consistent with the findings about the behavior of currencies outside East Asia such as South Africa, Israel, Chile and India, that it is possible for the RMB bloc to extend beyond East Asia. The RMB could become a global reference currency by the mid-2030s if trade were the sole driver and much sooner of China were to undertake broader reforms.

The final contribution of the paper is more methodological. We are able to establish the emergence of the RMB as a reference currency using a simple and straightforward application of the basic technique due to Haldane and Hall (1991), and Frankel and Wei (1994). This allows us to run a straightforward horse race between the major reserve currencies including the RMB without having to resort to econometric techniques (such as orthogonalization as in Balasubramanian et. al. (2011), or Fratzscher and Mehl (2012)) which militate against drawing simple inferences about the relative importance of the different reserve currencies.

Moreover, unlike in the literature, we show that the correlates of currency co-movements such as trade integration are symmetric across reference currencies. That is, if trade integration with China is associated greater co-movements with the RMB, so too trade integration with the US is associated with greater co-movements with the United States.

The paper is organized as follows. Section 2 describes our methodology. Section 3 presents the findings. Section 4 places our findings in the context of recent research on the RMB. Section 5 undertakes a brief historical comparison of the RMB today and the Japanese yen at a comparable point in time, the late 1980s, and provides some concluding thoughts.

II.Quantifying and explaining reference currencies: The methodology

We adopt a two-stage methodology. In the first, we identify and quantify reference currencies, focusing on the shift across time. In the second-stage, we use estimates from the first-stage to explain the characteristics that are associated with reference currencies.

a. Stage 1: Identifying reference currencies

In order to assess the importance of the RMB as a reference currency, we adapt the method developed by Frankel and Wei (1994; 2007). The basic idea is that countries which follow a peg to a basket of currencies often prefer not to disclose it. By regressing daily variations of the exchange rate against a limited number of candidate currencies, it is possible to recover the actual weight, and to assess the importance of key international currencies in the exchange rate arrangements of other countries. Equation (1) is thus run for each country in the sample.

$$(1) \qquad \boldsymbol{d}\ln\left(\frac{X_t}{CHF_t}\right) = \boldsymbol{\rho_1} * \boldsymbol{d}\ln\left(\frac{US\$_t}{CHF_t}\right) + \boldsymbol{\rho_2} * \boldsymbol{d}\ln\left(\frac{RMB_t}{CHF_t}\right) + \boldsymbol{\rho_3} * \boldsymbol{d}\ln\left(\frac{EUR_t}{CHF_t}\right) + \boldsymbol{\rho_4} * \boldsymbol{d}\ln\left(\frac{JPY_t}{CHF_t}\right) + \boldsymbol{\alpha} + \boldsymbol{\varepsilon_t}$$

X is the typical emerging market currency; four of the largest reference currencies (dollar, RMB, euro and yen) are on the right hand side. The coefficients of the individual currencies— ρ_1 to ρ_4—are their implied weights in the basket. Frankel and Wei (2007), based on the arguments in Calvo and Reinhart (2002) and

Levy-Yeyati and Sturzenegger (2005), suggested that in order to recover the true weights it is necessary to control for the different magnitude of shocks experienced by countries. Hence, they suggested modifying equation (1) along the following lines:

$$\textbf{(2)} \qquad \boldsymbol{d}\ln\left(\frac{X_t}{CHF_t}\right) = \sum_i \boldsymbol{\rho_i} * \boldsymbol{d}\ln\left(\frac{reference\ currencies_{it}}{CHF_t}\right) + \boldsymbol{\beta} * \Delta\, \boldsymbol{EMP_t} + \boldsymbol{\alpha} + \boldsymbol{\varepsilon_t}$$

with $\Delta\, \boldsymbol{EMP_t} = \Delta\, \boldsymbol{reserves_t} + \Delta\, \ln\left(\frac{X_t}{CHF_t}\right)$

The $\Delta\, EMP$ term captures the fact that changes in the demand for a currency can either be reflected in changes in its prices or quantities depending upon the reaction of the monetary authorities. The more they absorb it in quantities via exchange market intervention, the less the impact on prices. Indeed, the coefficient β can simply be interpreted as the de facto degree of exchange rate flexibility with β=1 denoting high flexibility and β=0 denoting a perfectly fixed exchange rate regime.[3]

In this paper, we are less interested whether countries are pegging de facto or de jure. We are simply interested in the unconditional co-movements between currencies regardless of whether they are due to central bank intervention or to market pressure. In both cases, a high coefficient for a given basket currency shows that its exchange rate matters for the left hand side currency. Hence we estimate equation (1) rather than equation (2).[4]

We call the coefficients in equation 1 "Co-movement coefficients" or CMCs. ρ_1 is the co-movement with the dollar, ρ_2 with the RMB, ρ_3 with the euro and ρ_4 with the Yen. In the case of a rigid basket peg to those four currencies, the sum of ρ will be equal to 1, and the R-squared will also be one.[5] And to repeat, when these co-efficients are high and significant that means that that currency is a reference currency. We call the currency with the greatest value of ρ—the co-movement coefficient—the dominant reference currency.

One problem with estimating equation (1) is the possible multicollinearity between the right hand side variables. In the case of China, there is a particular problem because of the de facto peg of the RMB to the US Dollar.

Most of the literature has addressed this problem in a way that entails costs which can be prohibitive. One strategy used, inter alia, by Balasubramaniam et. al. (2010) and Fratzscher and Mehl (2011), measures the effect of the RMB by first removing the dollar component from the RMB movements. They run a first stage variation:

$$\textbf{(3)} \qquad \mathbf{d}\ln\left(\frac{\mathbf{RMB_t}}{\mathbf{CHF_t}}\right) = \boldsymbol{\theta} * \mathbf{d}\ln\left(\frac{\mathbf{US\$_t}}{\mathbf{CHF_t}}\right) + \boldsymbol{\omega_t}$$

[3] Cavoli and Rajan (2010) apply this technique to Asian countries to show a lower dependency to the dollar when countries are managed floaters or peggers.

[4] It is also more difficult to estimate equation (2) because not all emerging market countries report reserves on a daily basis.

[5] Note that given that the equation is specified in terms of log changes, the constant is interpreted as the overall drift (appreciation if negative, depreciation if positive) of the exchange rate over the period, which could capture the Balassa-Samuelson tendency for exchange rates to appreciate over time as countries grow.

They then use the residual $\boldsymbol{\omega_t}$ as a proxy for the autonomous RMB factor, and plug it in a second stage:

$$\textbf{(4)} \qquad \boldsymbol{d \ln\left(\frac{X_t}{CHF_t}\right) = \rho_1 * d \ln\left(\frac{US\$_t}{CHF_t}\right) + \rho_2 * d \ln\left(\frac{\widehat{RMB}_t}{CHF_t}\right) + \rho_3 * d \ln\left(\frac{EUR_t}{CHF_t}\right) + \rho_4 * d \ln\left(\frac{JPY_t}{CHF_t}\right) + \alpha + \varepsilon_t}$$

where $\boldsymbol{d \ln\left(\frac{\widehat{RMB}_t}{CHF_t}\right) = \omega_t}$

This method, however, does not allow for a clean comparison of coefficients across countries and time; moreover, it is not possible to recover the weights in the basket either, since the coefficients in equation (4) are no longer supposed to sum to 1 in the ideal case. In other words, estimating equation (4) does not amount to running a clean and transparent horse race between the different reference currencies on the right hand side.[6]

We address this problem of multicollinearity in a different way. It turns out that there are two periods where the RMB exhibited a modicum of flexibility against the US dollar (Figure 2). The first period of relative flexibility starts after the announcement of the People's Bank of China (PBoC) on July 21, 2005[7] that the RMB would be allowed to float within a band against the dollar. Over approximately three years, the RMB appreciated by 17.5%. This policy of increased flexibility changed in the summer of 2008, leading to a quasi-fixed rate of 6.83 RMB/USD for the following two years. The following period started on June 19, 2010, when the PBoC announced that it would allow the RMB to go a back to a managed floating regime[8] against a basket of currencies. Between this announcement and the end of July 2012, the RMB was revalued by a further 6.4%.

In both these periods ("Period 2" and "Period 4" in Figure 2) there is sufficient variation in the RMB/dollar rate to distinguish between the effect of the RMB variations and the USD variations on other currencies. That is why we are able to estimate equation (1), a pure horse race that allows us to interpret the magnitude of the coefficients as pure co-movements.[9]

b. Stage 2: Explaining reference currencies

Having quantified reference currencies and their evolution over time, we attempt to see what underlying characteristics are associated with them. Thus, in a relatively novel second stage, we take the estimated CMCs derived from equation 1—for the RMB and for the US dollar—and regress it on a number of potential determinants of co-movements. So, in stage 1 we run regressions for each currency over time, while in stage 2, we run cross-country regressions because we are trying to explain the variation in the country-specific CMCs estimated in stage 1.

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[6] In simpler terms, estimating equation (4) presumes that any collinearity between the dollar and the RMB should be resolved entirely in favor of the dollar, i.e. any effect that is hard to attribute to either the dollar or the RMB is attributed entirely to the dollar.

[7] People's Bank of China (2005)

[8] People's Bank of China (2010).

[9] High multicollinearity between the RMB and US dollar does not pose an insurmountable problem as reflected in our findings below. Not only do we get reasonable standard errors, we get coefficient estimates that vary between Latin American and Asian countries that are a priori intuitive. Put differently, had multicollinearity been a serious problem, we would have seen unexpected/counter-intuitive values for the RMB and dollar CMCs across all regions.

Given our focus on China, it is natural to think that the rise of the RMB an anchor currency would be associated with trade integration. For example, between 2005 and 2010, the share of East Asian countries' manufacturing trade with China increased from 13.9 percent to 21.7 percent. This could matter both to be able to be cost competitive in the Chinese market, or because countries are part of a supply chain including China – and that a stable exchange rate against the RMB promotes such integration. However, concurrent explanations, such as the simultaneity of business cycle or financial shocks have to be taken into account as well. Thus, the equation we estimate is:

(5)

$$\rho^{\mathbf{RMB}}_{\mathbf{Country\ i}} = \alpha * ShTrade^{China}_{Country\ i} + \beta * CommonInflation^{China}_{country\ i} + \gamma * CommonFinancialShocks^{China}_{Country\ i} + \epsilon_i$$

Note that all the right hand side variables involve a country's economic relationship with China. We used two measures of trade integration with China: manufacturing trade with China over all manufacturing trade; and total trade of goods (except oil).[10] We measure common inflation shocks as the correlation between a country's inflation and that of China during the period 2010-2012.[11] And we measure common financial shocks as the correlation between a country's reference stock market index and that of Shanghai Stock Exchange A Share Index over the same period. The complete list is available in Appendix B, which describes all data used in this paper.

Finally, it is worth noting that we also estimate equation (5) for the CMC with the dollar, modifying all the right-hand side variables to a country's relationship with the United States. Thus, the trade variable becomes trade integration with the US and common real and financial shocks are measured relative to the US. Replicating equation (5) for the dollar not only allows us to identify differences between the RMB and dollar but also serves to validate the basic methodology embedded in equation 5.

c. The sample

In this paper, we focus on emerging market countries, which account for the bulk of manufacturing trade. These countries are the ones most likely to be in competition with China, or to be a part of the same supply chains. Because there is no single definition of what "emerging markets" mean, we choose to follow a wide list, which we borrow from IMF (2010) adapted to include the newly advanced economies of Asia. From this list, we only kept countries which have their own currency (e.g., excluding those fully dollarized such as Panama; or countries included in the euro), and we excluded energy commodity exporters. The full list, which contains 52 countries, is presented in Appendix Table 1.

III.Results

a. Evolution in reference currency status

We first present results for stage 1 of the analysis where we document the rise of the RMB as a reference currency.

[10]We used UN Comtrade for bilateral trade data, taking the average of 2010 and 2011 (or only 2010 for the countries which did not report their trade data in 2011). Data are described in Appendix B.

[11] The variable for inflation is the monthly CPI index taken from the IMF's International Financial Statistics (IFS).

i.Overall changes

We first show the dramatic nature of *changes* involving the different currencies as reference currencies (Tables 2a and b). The changes refer to the difference between the results in the second period (July 2005 – July 2008) and the fourth period (July 2010 – August 2012) in Figure 2. These changes can be along the extensive margin (Table 2a) and the intensive margin (Table 2b).

On the extensive margin, the first thing to note is that across the two periods, the largest increases (and hence the fewest decreases) in the CMCs occurred for the RMB. For 34 out of the 52 currencies, there were increases in the CMC relative to the RMB; the comparable numbers for the dollar and the euro were 14 and 19 respectively. In other words, whereas for the RMB nearly 70 percent of the time there was an increase in the CMC; for the dollar it was 25 percent and for the euro about 35 percent). Even if we restrict the comparison to the number of increases in the CMCs that are statistically significant (at the 10 percent level), the RMB comes out ahead with 9 instances compared to 4 for the euro and zero for the dollar. Interestingly, there were no instances of statistically significant declines in the CMCs relative to the RMB, whereas there were 10 and 14 cases of statistically significant declines for the dollar and euro, respectively.

On the intensive margin, we find that the magnitude of changes in the CMC is greater for the RMB than for the dollar and the euro (Table 2b). For example, between the two periods the simple average of the changes was +8 percentage points for the RMB (the average value of the CMCs rose from 11 percent to 19 percent) while the weight on the dollar *decreased* by 11 percentage points (from 56 to 45 percent), and 9.1 percentage points for the euro (from 47.5 to 38.4). The net differential thus swung 19 percentage points in favor of the RMB relative to the dollar and 17 percentage points relative to the euro.

ii.Dominance in East Asia: The RMB bloc

The most dramatic finding is illustrated in Tables 3a-3c. In East Asia, the RMB has not just risen to be an important reference currency; it is the dominant reference currency, eclipsing the dollar. There is de facto an unambiguous RMB currency bloc in East Asia. Tables 3a illustrates this. In the period before 2005-2008, the RMB was the dominant reference currency (in the sense of exhibiting the greatest co-movement amongst all possible reference currencies, dollar, euro, yen and RMB) in 3 out of 10 cases compared to 6 for the dollar and one for the euro (in Singapore). In the period 2010-2012, it had become the dominant reference currency in7 out of 10 cases in compared with 3 for the dollar (and none for the euro). Similarly, the number of CMCs that are statistically significant doubled from 4 to 8 for the RMB and declined from 9 to 6 countries (Table 3b).

This eclipse has occurred not just in terms of the number of countries but also in the strength of the co-movement (Table 3c). The average magnitude of the CMC for the RMB in the latest period was 53 percent compared now with 38 percent for the dollar, which represent respectively an increase of 27 percentage points and a decrease of 23 percentage points.

It is interesting to identify the countries that co-move more with the RMB than the dollar and vice versa. It is now the case that the currencies of Korea, Indonesia, the Philippines, Taiwan, Singapore, Thailand, and Malaysia more closely track the RMB than the dollar. In a number of cases the co-movement is close to one. The dollar's dominance as reference currency is now limited to Hong Kong (by virtue of the currency board regime), Mongolia and Vietnam. The RMB dominates in relation to the more economically significant countries while the dollar's role is more important in the smaller countries.

iii.Regional bloc or global bloc?

Is the rise of the RMB as a reference currency confined to Asia? There is a strong regional pattern to reference currencies. We can think of the euro as the natural currency (for historic, political and geographic reasons) for emerging market countries in Europe and the Middle east and North Africa, the dollar as the natural currency for Latin America and the RMB for east Asia. In the most recent period for example, in Emerging Europe, the euro is the dominant reference currency in 13 out of 17 cases (of course, all countries which have converted to the euro are excluded from this count); in Latin America, the dollar has this status in 13 out of 15 cases; and as discussed above the RMB has this status in Asia.

The question then is how do these respective reference currencies fare beyond their natural "backyards." The dollar does best on this metric. As Table 4 illustrates, the US is the dominant reference currency in 11 out of a total of 32 possible extra-backyard cases; the euro is the dominant reference currency in 4 out of a total of 28 possible cases; and the RMB in 4 out of a total of 42 possible cases.

But here too there has been some change over time. In the period 2005-2008, the comparable numbers for extra-backyard dominance was 16 for the dollar, 4 for the euro and 1 for the RMB.

Another metric for assessing the geographical reach of the different currencies is to look not just at cases where a currency is numero uno but all cases where the co-movements are significant (Table 4b). As a reference currency outside Asia, the RMB has increased its presence from 7 to 9 cases. In the case of the dollar, it has declined from 22 to 16 cases. Both the Euro and the Yen increased, respectively from 12 to 14 (out of 28) and from 2 to 3 (out of 42).

In terms of the magnitude of the average CMC outside the "backyard", the rise of the RMB appears modest (from .09 to .11), but this increase must be compared with a decline of 16 percentage and 10 percentage points for the dollar and euro, respectively. The net swing in favor of the RMB is thus not inconsiderable.

iv.Robustness checks

We check the robustness of our results in several ways.

a.Robustness to choice of numeraire

We have used the Swiss Franc as the numeraire to express values of individual currencies. According to Frankel and Xie (2011), if the exchange rate is truly a basket peg, the choice of numeraire currency is immaterial. However, if the true regime is more variable than a rigid basket peg, then the choice of numeraire might matter and they argue in favor of using the SDR as the numeraire.

But this is less important for us as our concern is with co-movements and less with whether countries are explicitly pegging to individual reference currencies. In any event, we re-estimated equation 1 using the SDR as numeraire. The results are presented in Annex Table 3, and are very similar: the average CMC for the RMB goes from .10 to .17 over the two periods, and is the dominant reference currency for 10 currencies, 6 of which are in East Asia. It is significant in 15 countries, 7 of which are outside the East Asian region.

b.Robustness to external financial environment

One issue relating to the estimation of equation (1), especially in relation to comparisons across the two time periods that we study, is the external environment. If this environment changed across the two time periods, and in a way that would move the RMB and an individual country under consideration in the

same way against the dollar (in market parlance this is known as risk-on/risk-off behavior), then our estimations would result in biases in a way that would render cross-period comparisons problematic. To guard against this, we need to control for the external environment.

The idea is that all emerging markets have common features with China and that a rising tide might lift all exchange rate boats at the same time. This might especially be a risk given the daily frequency of our data: on a day where EM risk is apparently lower, the RMB will appreciate more, as well as all the other emerging markets, especially in Asia. To avoid this spurious correlation, we included several indicators of common emerging market risk to equation 1 as follows:

$$(6) \qquad \boldsymbol{d}\ln\left(\frac{X_t}{CHF_t}\right) = \boldsymbol{\rho_1} * \boldsymbol{d}\ln\left(\frac{US\$_t}{CHF_t}\right) + \boldsymbol{\rho_2} * \boldsymbol{d}\ln\left(\frac{RMB_t}{CHF_t}\right) + \boldsymbol{\rho_3} * \boldsymbol{d}\ln\left(\frac{EUR_t}{CHF_t}\right) + \boldsymbol{\rho_4} * \boldsymbol{d}\ln\left(\frac{JPY_t}{CHF_t}\right) + \boldsymbol{Common\ EM\ risk_t} + \boldsymbol{\alpha} + \boldsymbol{\varepsilon_t}$$

4 different risk indicators are considered: Fitch Solutions' Probability of Default Index (PDI) year and at 5 years (F1 and F5), J.P.Morgan's Emerging Markets Bond Index Global and J.P.Morgan Emerging Markets Bond Index Global Diversified, two indicators of the bond markets (EMBI1 and EMBI2 in annex table 4). Finally, we include the VIX indicator for emerging market countries, which we take as the best indicator of the risk perception by the market. Unfortunately, it is available only from March 2011.

The EM VIX is our preferred indicator, since it is interpreted as a global index of risk perception by the market. It should accurately capture movement in the exchange rates which are purely induced by risk-on/risk-off behavior. Overall, however, it seems to reinforce the magnitude of the RMB on the sample. There are some instances where the inclusion of the VIX sharply reduces the RMB CMC, such as Chile (-0.16), but also some important instances where the reverse happens (South Africa or Thailand).

The equations where we include the JP Morgan's EMB indices ("Global" and "Global diversified") show a significant weakening of the RMB CMC, and unsurprisingly, concentrated on the largest and the richest emerging markets (South Africa, Turkey, Brazil, inter alia). When we use Fitch's probability of default, another indicator of general EM risk, the results are slightly weakened, but our conclusions remain valid. Overall, even with the indicator which reduces the most the RMB CMC, the RMB remains the reference currency in Asia in all specifications (see Annex Table 4 for details).

c.Robustness to reverse causation

Finally, we undertake a different kind of robustness test. Positing that the RMB is a reference currency and finding a high co-movement coefficient with other currencies, especially in East Asia, could reflect a kind of reverse causation. Specifically, it could the case that the high CMC is the result of the People's Bank of China actually tracking or targeting the East Asian currencies (individually or collectively). Now, causation cannot be easily established unless one deploys instrumental variables or for example by looking at windows around surprise announcements by the PBoC to see if other currencies moved significantly just after these announcements.

We do something different which is more suggestive than definitive. For each of those seven East Asian currencies where the RMB was the dominant reference currency (and had the highest CMC), we re-estimate equation (1), but making the RMB exchange rate the dependent variable and East Asian currencies the independent variable. We then also re-estimate the equation placing all the seven East Asian currencies on the right hand side. These eight regressions are presented in Annex Table 5.

The striking finding is that the CMC between the RMB and these individual currencies is substantially lower in every case than the CMC between these currencies and the RMB estimated in our baseline (for example, Korea: .045 versus 1.1; Malaysia: .09 versus 1.05 and so on). When all the East Asian currencies are introduced simultaneously (to capture the possible fact that the RMB is tracking a basket of currencies), only 3 of the seven are significant and their magnitudes are small. Even if we added the coefficients of all the East Asian currencies, their magnitude is 0.18. These smaller coefficients that are obtained could simply reflect the fact that East Asian currencies are more volatile than the RMB. But had these reverse regressions yielded high estimates for the CMC, and say comparable to those obtained from the baseline regressions, there would have been much greater cause for concern about reverse causation.

d.Robustness to direction of RMB movement

The sample for our baseline regressions comprises cases of both upward (appreciation) and downward (depreciation) movement in the RMB exchange rates. One natural question that arises is whether the co-movements that we observe are symmetric: do other currencies track the RMB both when it appreciates and depreciates? To test this we split our sample into two (which have broadly the same size) and estimated equation (1) separately for cases of RMB depreciation and appreciation (relative to the dollar). We report the results in Annex Table 6. The results are broadly unchanged. However, within East Asia, there is a small decline in the number of cases where the CMC coefficient is significant and dominant when the RMB depreciates compared to the baseline. Outside Asia, though, there is an increase in the number of cases when the RMB becomes a stronger reference currency, reflected not just in the number of cases but also in the average magnitude of the CMC which more than doubles from 0.11 to 0.25.[12]

b. What explains the rise of the RMB bloc (the co-movement coefficient)

In this section, we present the results of the second stage of the analysis which are based on estimating equation (5) discussed earlier. Trade is the obvious candidate for explaining the rise of the RMB. Indeed, a simple scatter plot shows that the correlation between trade integration with China and the co-movement coefficient with the RMB is positive and significant, when we take all data points, but also when we restrict the sample to significant co-movement coefficients. Charts 3a and 3b show the positive relationship, with a significant slope of 1.67 when all countries are in the regression and 1.7 when restricted to countries with a statistically significant CMC in the first stage.

The more formal results are presented in Table 5 below. We run equation 5 for 2 samples: the larger sample comprises the CMC for all available countries in the sample[13]; the smaller is restricted to those CMCs that are statistically significant.

The table shows that there is a positive and significant relationship between countries' CMC with China and their trade integration with China. The trade integration variable is significant in the larger sample when entered alone (column (1)) and even after controlling for common price and financial market shocks (column (4)) (in both cases at the 1 percent confidence level). For the much smaller sample too, the trade integration variable is significant but weaker after controlling for other shocks but given the very small sample this is not surprising.

[12] Pontines and Siregar (2010) make a similar point for Asian countries on monthly data: there seems to be a "fear of appreciation" relative to the RMB.

[13] Our original 52 countries sample falls to 48 in this part because trade data with China for Hong Kong, Mongolia, Serbia and Uruguay are either missing or of bad quality (Hong Kong due to entrepot trade)

i. Is the RMB bloc related to trade integration with or competition against China?

A currency could co-move with the RMB because it is integrated with China in terms of common supply chains. A related but distinctly different reason for co-movement could be if policy targets the RMB because countries do not want to lose competitive advantage vis-à-vis Chinese exporters and domestic manufacturers. In other words, the reason for the co-movement could be competition against rather than integration with China.

How can we distinguish the two? One way of measuring competition is to see if a country exports products similar to China's. Mattoo, Mishra and Subramanian (2012) develop such an index of competition relative to China. Unfortunately, they compute this index for fewer emerging market countries than contained in our sample.

When we introduce this index of competition (which is country-specific), it has consistently the right sign (the more a country competes with China, the more likely its currency to track the RMB). But is not consistently significant in a statistical sense (in Table 6, the index is statistically significant in column 2 but not in column 1). And when we run a horse race between this competition variable and a pure integration variable, the latter consistently trumps the former. So, the evidence, albeit limited, favors an explanation for co-movement that is more related to trade integration than competition, although a role for the latter cannot be ruled out. One reason for that last caveat relates to the findings reported in Table A6. It seems that outside East Asia, more countries track the RMB when it depreciates than when it appreciates. Moreover, the average magnitude of the CMCs outside East Asia more than doubles in such instances. So, we cannot rule out entirely a competitive pressure motivation for currencies to track the RMB.

ii. Is the RMB bloc an East Asia phenomenon or a trade phenomenon?

Given the fact that the rise of the RMB has been strongest in east Asia, we need to probe further to check if the observed correlation between trade and currency co-movements with the RMB represents a pure trade phenomenon or a regional phenomenon that have to do with characteristics (political for example) other than trade. We test this in Table 7.

When we introduce an East Asian dummy to explain the co-movements with the RMB, it is statistically significant on its own (columns 1 and 5) and after controlling for common price and financial shocks. When we add the East Asian dummy and the trade variable, their individual values and their statistical significance decline (compare column (4) with columns (1) and (3), respectively) indicating high collinearity between the trade variable and East Asian dummy. But the key point is that, the trade variable remains significant and strong despite the inclusion of the East Asian dummy, suggesting that the RMB bloc is not just an East Asian phenomenon but also a trade phenomenon.

This pattern is repeated when we substitute a broader trade integration measure to include all trade instead of just manufacturing trade. In column (8), both the East Asian dummy and the trade variables are significant at the 5 percent confidence level. This suggests the potential for a global RMB bloc beyond Asia with trade as a driving force. And the nascent signs of such a development are the earlier findings that the RMB is the dominant reference currency in Chile, India, and Israel (not to mention Macedonia) and is the second-most important reference currency for South Africa and Turkey.

iii. The importance of trade: other evidence from co-movements with the dollar

If indeed, there are economic explanations for co-movements with the RMB, they should in principle also be able to explain co-movements with other reference currencies. As a kind of robustness exercise, we extend the analysis to CMC with the dollar. We take the estimates of the CMCs with the dollar obtained from estimating equation 1 and correlate them with the same variables we used above in explaining CMCs relative to the RMB (i.e. we estimate equation (5) this time replacing all the China-related variables with US-related ones). These results are shown in Table 8.

We find, interestingly, that just as trade integration with China explained co-movements with the RMB, so too trade integration with the United States explain CMCs relative to the dollar. For example, in 3 out of 4 cases, the trade integration variable is statistically significant even after controlling for other common shocks with the United States. It is also striking that the trade coefficients in case of the dollar are consistently smaller than the counterpart coefficients for the RMB. For example, after controlling for all common shocks, the CMC relative to the dollar is 1.58 whereas the counterpart coefficient is 1.91 for the RMB. This means that a 1 percentage point increase in trade integration with the US will lead to a 1.6 percentage point increase in the CMC with the dollar but a 1.9 percentage point increase in the CMC with the RMB.

iv.Robustness

We conducted a number of robustness checks. First, we used alternative measures of trade integration (all non-oil trade instead of manufacturing trade) and found similar results (Table 6, columns 5-8 illustrate this). Second, trade could be endogenous to currency co-movements. To address this partially we used initial period (2005-08) values for trade instead of contemporaneous values and found similar results. It does not affect our baseline results – as shown in the Annex Table 7. It even reinforces the main coefficient, hinting at the fact that the CMCs are affected by financial common shocks, and to an even larger extent, bilateral trade.

IV. Comparison with other recent findings

The literature on the internationalization of the RMB has grown very large over the last couple of years.[14] But the relevant literature for us relates to currency movements. We are not the first one to look at the rise of the RMB through the method of Haldane and Hall (1991) and Frankel and Wei (1994). Chen, Peng and Shu (2009) analyze the inclusion of the RMB in a potential basket for Asian countries. They first remove the dollar component from the RMB exchange rate (as shown in equations (2) and (3), and over a sample of 9 East Asian countries, they find significant positive coefficients for the period after July 2005 until mid-2009. Park and Song (2011) prefer to neutralize the dollar effect by regressing the exchange rate of various Asian currencies to the dollar over the RMB/dollar exchange rate, and show a high degree of correlation. Pontines and Siregar (2010) find that the RMB has triggers a "fear of appreciating" for Indonesia, Korea, Philippines and Thailand.

[14] In addition to Subramanian (2011), see also Frankel (2011), Eichengreen (2010), Yu Yongding (2012), Ito (2012), and Mallaby and Wethington (2012). Most papers conclude that the Chinese currency will not be a significant player before China liberalizes its capital account and before significant progress is made in reforming its domestic financial markets. Yu (2012) worries about a possible backlash if internationalization were to precede domestic liberalization. Gao and Yu (2011) analyze the benefits and costs of the internationalization of the RMB, positing in particular the huge costs for China of holding reserves in US dollars. Most recently, Vallee (2012) takes stock of the steps already taken by Chinese authorities in setting a market for RMB assets.

Henning (2012) uses the four different periods in RMB regime evolution in the last 7 years to assess the weight of the RMB, and confirms this evolution for 8 Asian countries, especially in the most recent period, as does Ito (2012). In a more elaborate approach, Balasubramaniam et. al. (2011) observe a large number of currencies, and find that the RMB has played a significant role over several countries, both inside and outside of Asia (with a concentration in East Asia). However, they see this role as quantitatively small. An interesting innovation in their work is that they try to detect structural breaks (following Frankel and Wei (2010)) in their sample, and obtain 375 currency-period observations for which only a small subset outside Asia reveal a significant RMB effect.

In a similar spirit, Fang, Huang and Niu (2012) estimate a time-varying coefficient version of the de facto currency basket regression. They observe significant and continuously rising weights of the RMB over the period from 2005 to mid-2011 for five Asian currencies. Drawing on those consistent results, there is a rich literature concerned with the consequences of an Asian exchange rate convergence. For example, Kawai (2012) draws lessons from the Japanese experience for the internationalization of the RMB. He also argues for regional cooperation: "strategic regional cooperation could facilitate, and mitigate obstacles to, RMB internationalization", and the creation of an Asian Currency Unit. More technically, Girardin (2011) argues that Asian currencies have been targeting a synthetic composite exchange rate of various Asian currencies rather than a given dominant currency.

Finally, in a recent paper, most close to our approach, Fratzscher and Mehl (2012) analyze in depth the role of the RMB in the region. They analyze a set of 48 currencies, and show in a first step that a synthetic "regional exchange rate" has acquired a significant and rising importance in the determination of various countries' exchange rate in Asia, and then use a Granger causation approach to determine that RMB movements have an impact on regional exchange rates. They also analyze announcements by officials from the People's Bank of China to assess whether those could have an effect on other countries' currency through its impact on the RMB. In the last step, they show that the level of real and financial linkages with China matter for monetary influence. Fratzscher and Mehl thus claim to have found a 'tri-polar currency system', with the US dollar, the RMB and the euro all having a region of dominance.

However, as discussed earlier, one drawback is that their approach has the effect of assuming dollar dominance without allowing a fair horse race to be run between the dollar and other currencies, including the RMB. One consequence is that it is not possible to compare the effects of the different currencies.[15]

Thus, while the general trend toward a rising role of the RMB has been detected in the literature, ours is the first to compare clearly and directly their respective importance and to draw sharp conclusions, including the fact that the RMB has eclipsed the dollar in East Asia and is showing signs of moving beyond.

V. History and a Projection

The rise of the yen in the late 1980s offers a close historical precedent for the rise of the RMB today.[16] For East Asian countries, Japan accounted for 22.5 percent of total trade in 1991 compared with 24.4 percent today for trade with China. But the interesting contrast is this: the yen was never a reference currency and there was no yen bloc then like there seems to be today with the RMB as we have shown.

[15] In other words, they estimate equation (4) rather than equation (1) shown above.
[16] See in particular Takagi (2011) for an account of the failed attempt to internationalize the yen.

On the other hand, the extent to which East Asian trade with Japan was denominated and settled in yen was far greater than China's trade today.

Take currency first. Frankel and Wei (1994) estimated regressions very similar to equation (1) for eight Asian countries (Thailand, Malaysia, Singapore, Korea, Hong Kong, Indonesia, the Philippines, and Hong Kong). The average value of the CMC relative to the dollar for these countries (for the period 1991-92 that was in some ways the apogee of the Japan miracle) was 0.92 compared with 0.06 for the yen. The comparable numbers from our analysis today are 0.23 for the dollar and 0.65 for the RMB (Table 9). In other words, the yen at the peak of the Japanese miracle was not a significant reference currency at all even in neighboring East Asia and the dollar reigned supreme; in contrast, today, the RMB has eclipsed the dollar as the dominant reference currency.

In contrast, on an important metric of currency internationalization, namely the extent to which international trade is denominated in that currency, the yen then far surpassed the RMB today. Krugman (1984) has noted three rules with respect to denomination of trade. First, a higher share of exports than imports are denominated in home currency. Second, all else being equal the country that is larger in size tends to see its currency used as the unit of account; and third that for homogenous commodities and financial transactions the dominant global international currency tends to be used overwhelmingly.

Certainly, the Japanese yen even as a unit of account was never as pervasive as the Deutsche mark or the dollar. But for our purposes, the interesting evidence from Table 10 is that the yen was used to a much greater extent as a vehicle for trade transactions in the 1990s (one-third of Japanese exports and about 15 percent of Japanese imports were invoiced in yen) than the renminbi is today (less than 10 percent).

A number of reasons could explain the contrasting developments of the yen and the RMB as reference currencies and units of account. Overall trade can be dismissed as an explanation of the differences between the behavior of the yen and RMB as reference currencies. As Table 11 shows, the overall share of trade of East Asian countries with Japan in 1991 was very similar to the share of these countries' trade with China today. Of course, it is possible that the nature of trade differed: although our results do not provide strong evidence, East Asian countries perhaps compete more with China today than they did with Japan in the early 1990s because Japan's productivity differential with East Asian countries was far greater and hence the scope for competition more limited.[17]

And two reasons for the greater use of the yen in trade transactions could be that Japan's capital account was more open then than China's is today; and second, Japan had more multinational firms engaged in trade than China does today. For large firms with cross-border activities, accounting becomes easier if done in the home currency. In other words, China's financial and external sector opening may be a condition for a more rapid use of the RMB as a unit of account and medium of exchange.[18][19]

[17] It is worth noting that since 1991, trade with Japan declined sharply as Japan's growth decelerated sharply.
[18] It is possible that if we were to include countries in Central Asia or sub-Saharan Africa where China has been acquiring a significant trade, finance, and investment presence, there would be greater signs of RMB use as a conventional reserve currency.
[19] It is interesting to note that a lot of the discussion in the late 1980s and early 1990s was about why the yen had not assumed as large an international presence as say the Deutsche mark despite the size of Japan's economy and trade (Kawai, 2012). Invoicing in yen was lower than that for the mark and also as noted above the yen had did not become a reference currency in East Asia. In this paper we highlight a different contrast, where on trade invoicing the RMB has not even acquired the presence that Japan had at the time of Japan's rise.

What about the future? Our estimates suggest that the average value of the CMCs across all 52 countries was 0.45 for the dollar and 0.19 for the RMB. Can the RMB overtake the dollar as a global reference currency and if so when? In terms of our estimates that amounts to asking when the average CMC for the RMB will overtake that for the dollar.

Suppose, for example, that trade is a key driver of the CMC. Based on our results, we can make a prediction, admittedly rough. In the core specifications, as described earlier, the coefficient of trade integration for the RMB is 1.91 while that for the dollar is 1.58. In our sample, the average trade share with China and the US are, respectively, 13.4 and 12.8 percent. Based on simple gravity-based trade projections, and assuming future growth rates of GDP as in Subramanian (2011), the share of China in these countries' trade will increase by about 6 percentage points and that of the US will decline by about 4 percentage points. Applying these changes to the coefficient estimates suggest that by 2030 the average CMC for China (0.33) will approach that of the US (0.39) but will not surpass it.[20] Extending these projections yields 2037 as the date when the global RMB currency bloc emerges.

In other words, while trade has been and can be an important driver for the rise of the RMB as a reference currency, it cannot on its own ensure the eclipse of the dollar globally until the mid-2030s. However, if China reforms its financial and external sectors consistent with ensuring the rise of the RMB as the pre-eminent reserve currency within the next 10-15 years, that would also bring forward the date for the emergence of a global RMB currency bloc, eclipsing the dollar. At that point, and to paraphrase the Graham Greene character, one might ask whether we have to start talking of a renminbi rather than dollar love.

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[20] We assume the following annual GDP growth rates for the next 20 years for this calculation: China (6.5%); US (2.5%); Sample countries and rest of the world (4 percent).

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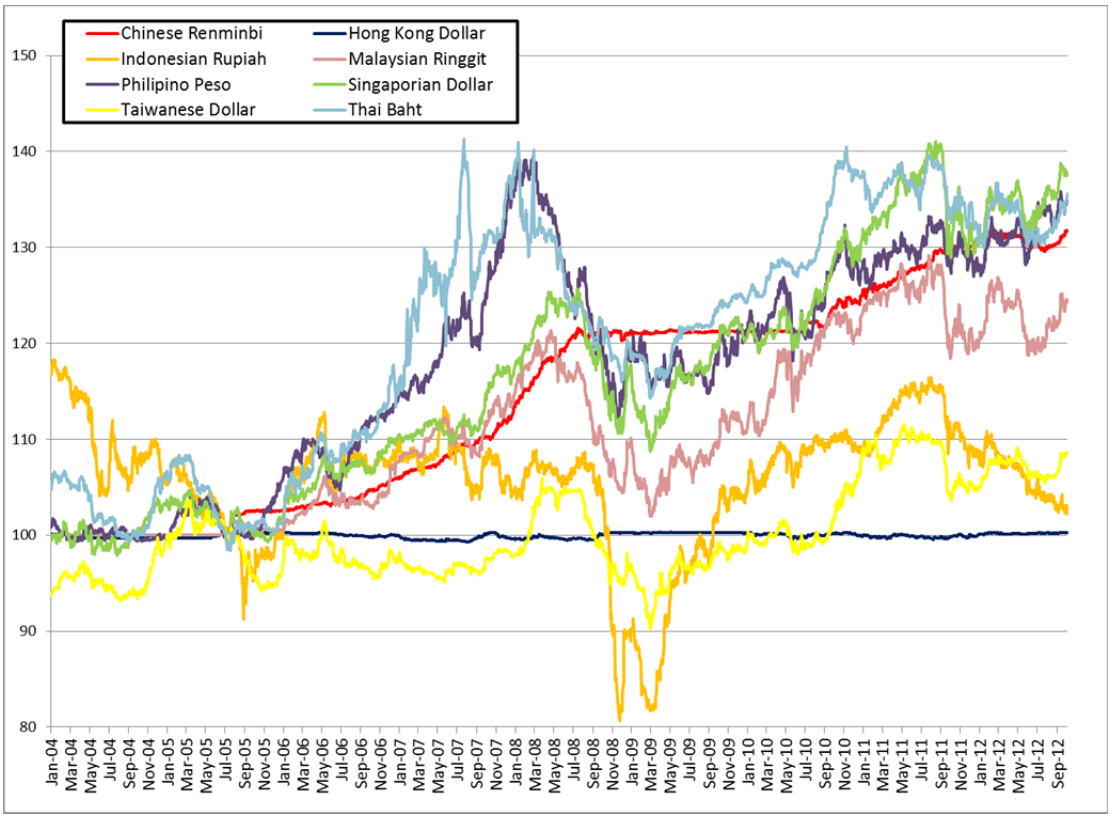
Table 1: Roles of an International Currency

Function	Use by governments	Use by private agents
Store of value (allows transactions to be conducted over long periods and geographical distances)	International reserves	Foreign currencies become substitutes for a domestic currency because the latter is prone to inflation and volatility. In the extreme, foreign currencies can even become legal tender
Medium of exchange (avoids inefficiencies of barter)	Vehicle for foreign exchange intervention	Settling trade and financial transactions
Unit of account (facilitates valuation and calculation)	Anchor for pegging local currency	Denominating/invoicing trade and financial transactions

Figure 1a: Exchange rate of selected East Asian currencies, Jan. 2004-Sep. 2012.

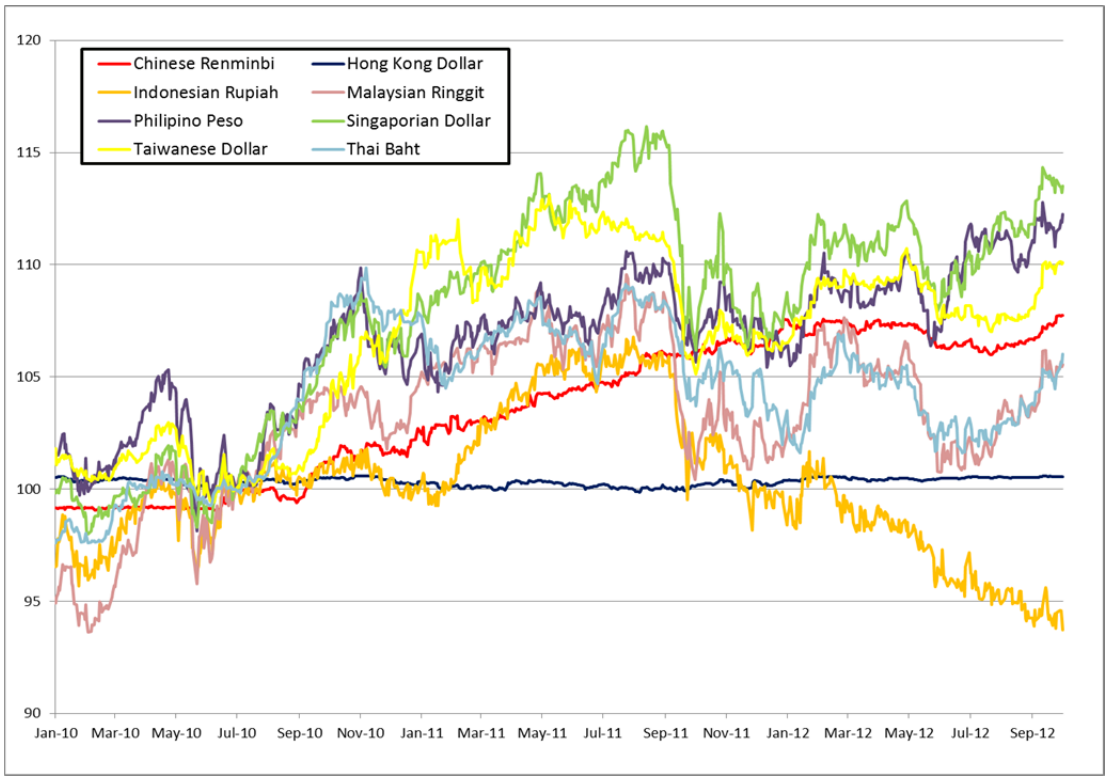
(nominal bilateral rate versus US dollar; normalized at 100 in July 2005)



Source: University of British Columbia, Pacific Exchange rate service. Computations of the authors

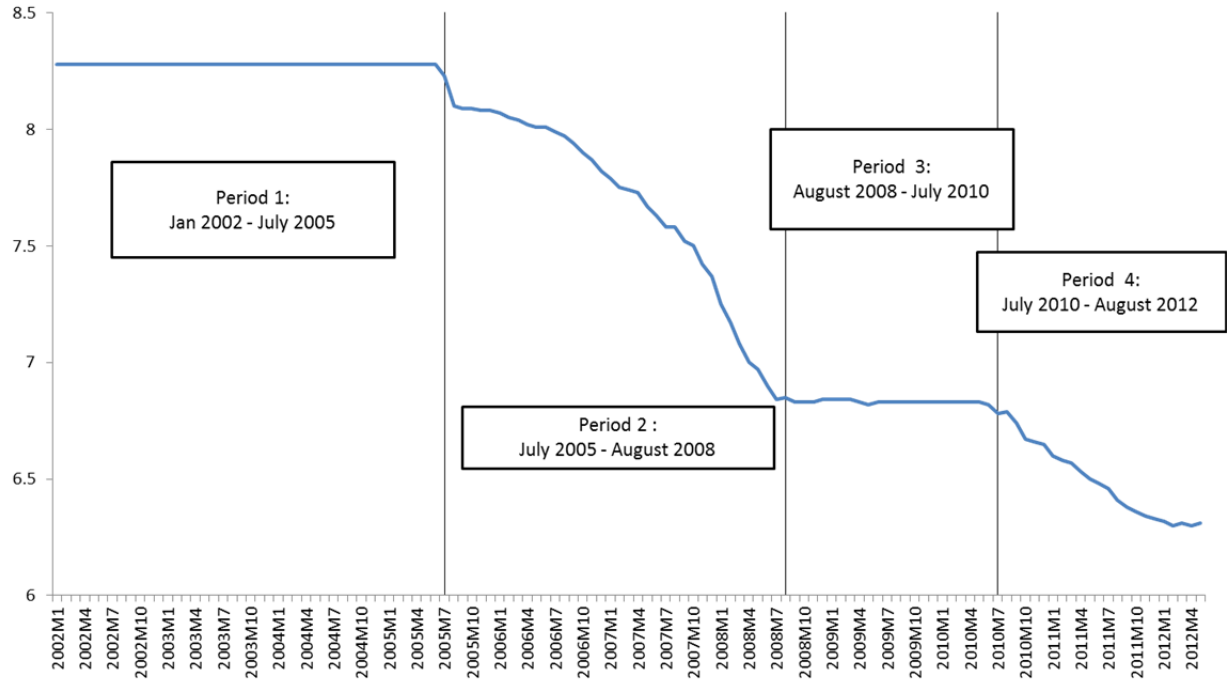
Figure 1b: Exchange rate of selected East Asian currencies, Jan. 2010-Sep. 2012.

(nominal bilateral rate versus US dollar; normalized at 100 in July 2010)



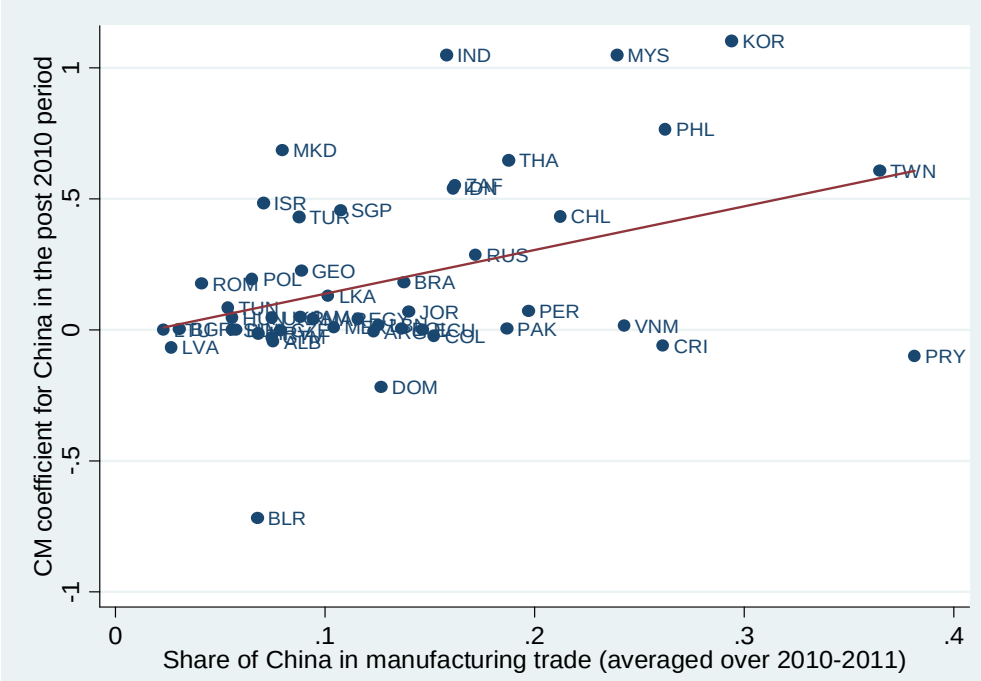
Source: University of British Columbia, Pacific Exchange rate service. Computations of the authors

Figure 2: The RMB/USD nominal bilateral exchange rate, Jan. 2002 – Aug. 2012



Source: International Financial Statistics, IMF

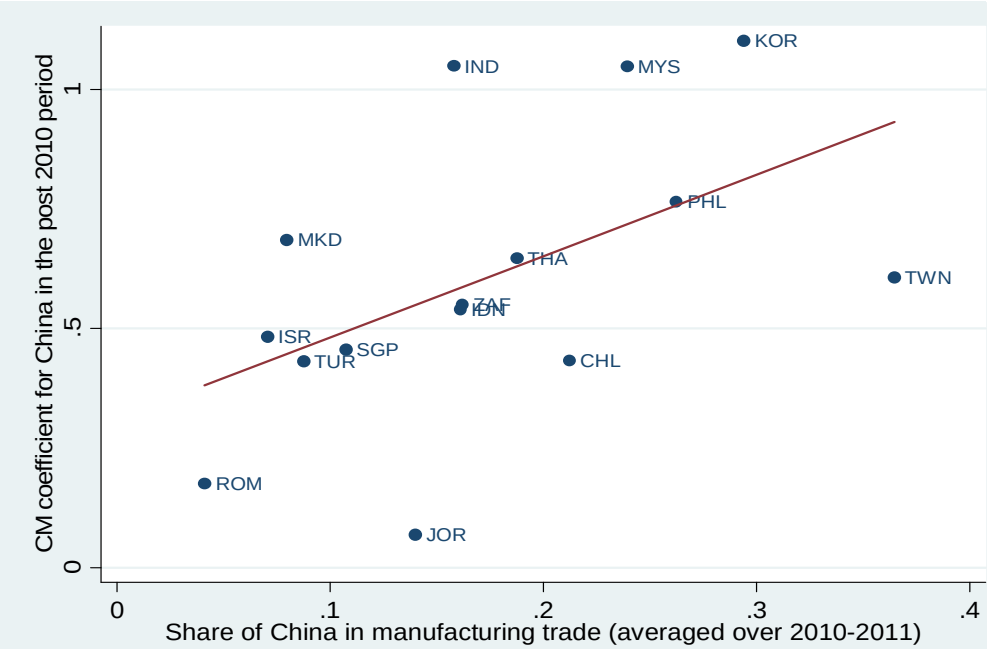
Figure 3a: Correlation between the co-movement coefficient (CMC) with the RMB and trade integration with China



Sources: Thomson Reuters for Exchange Rates, Comtrade for trade data, computations of the authors.

Figure 3b: Correlation between the co-movement coefficient (CMC) with the RMB and trade integration with China

(includes countries with statistically significant CMCs only)



Sources: Thomson Reuters for Exchange Rates, Comtrade for trade data, computations of the authors.

Table 2a: Evolution of CMCs: Number of increases and declines between July 2010 - August 2012 compared with July 2005 - July 2008.

	US Dollar	RMB	Euro	Yen
Declines	38	18	33	35
of which: significant	*10*	*0*	*14*	*12*
Increases	14	34	19	17
of which: significant	*0*	*9*	*4*	*4*
Total	52	52	52	52

Table 2b: Evolution in average magnitude of CMCs

Currency	July 2005 - July 2008	July 2010 - August 2012	Change
USD	0.56	0.45	-0.11
RMB	0.12	0.19	0.07
Euro	0.47	0.38	-0.09
Yen	-0.02	-0.04	-0.02

Note: For each currency, the number represents the simple average of the relevant coefficient (ρ_1 for USD, ρ_2 for RMB, etc.) estimated from equation (1) for 52 countries in the sample.

Table 3: CMCs in East Asia

Table 3a: Number of countries by dominant reference currency

	July 2005 - July 2008	July 2010 - August 2012	Change
USD	6	3	-3
RMB	3	7	4
Euro	1	0	-1
Yen	0	0	0
Total	10	10	n.a.

Table 3b: Number of countries with a significant CMC

	July 05 - July 08	July 10 - August 12	Change
USD	9	6	-3
RMB	4	8	4
Euro	7	8	1
Yen	4	0	-4
Total	10	10	n.a.

Table 3b: Average magnitude of CMCs

	July 2005 - July 2008	July 2010 - August 2012	Change
USD	0.61	0.38	-0.23
RMB	0.26	0.53	0.27
Euro	0.25	0.12	-0.13
Yen	0.04	-0.03	-0.07

In Tables 3a and b, the number in each cell represents the number of countries for which the reference currency has the highest value of CMC for that period or has a significant CMC.; in Table 3c, the number is the average (across all 10 East Asian countries) value of the CMC.

Table 4: CMCs "outside backyard"

Table 4a: Number of countries by dominant reference currency

	USD (N = 37)	RMB (N = 42)	Euro (N = 28)	Yen (N = 42)
July 05 - July 08	16	1	4	0
in % of "out of backyard" sample	*43.2%*	*2.4%*	*14.3%*	*0.0%*
July 10 - August 12	11	4	1	0
in % of "out of backyard" sample	*29.7%*	*9.5%*	*3.6%*	*0.0%*
Change	-5	3	-3	0
in % of "out of backyard" sample	*-13.5%*	*7.1%*	*-10.7%*	*0.0%*

Table 4b: Number of countries with a significant CMC

	USD (N = 37)	RMB (N = 42)	Euro (N = 28)	Yen (N = 42)
July 05 - July 08	22	7	12	2
in % of "out of backyard" sample	*59.5%*	*16.7%*	*42.9%*	*4.8%*
July 10 - August 12	16	9	14	3
in % of "out of backyard" sample	*43.2%*	*21.4%*	*50.0%*	*7.1%*
Change	-6	2	2	1
in % of "out of backyard" sample	*43.2%*	*21.4%*	*50.0%*	*7.1%*

Table 4c: Average value of CMCs

	July 05 - July 08	July 10 - August 12	Change
USD	0.449	0.287	-0.162
RMB	0.088	0.11	0.022
Euro	0.217	0.114	-0.103
Yen	-0.03	-0.044	-0.014

Note: "Backyard" refers to countries in the natural region of influence (regions are defined according to the broad categories of the World Bank). So, for the dollar, "outside backyard" means all countries except Latin America, for the RMB and the Yen, all countries except East Asia, and for the Euro, all countries except Emerging Europe, Middle East and North Africa.

Table 5: Correlation between CMCs with RMB and country's relationship with China

	1	2	3	4	5	6	7	8
	All countries				**Countries with significant CMCs only**			
Share of China in manufacturing trade	1.667**			1.907***	1.705*			1.388
	[0.769]			[0.646]	[0.796]			[0.979]
Co-movement of inflation with China		0.046		-0.065*		0.080		0.053
		[0.047]		[0.038]		[0.094]		[0.091]
Co-movement of stock market index with China			1.468***	0.936***			1.024	0.445
			[0.337]	[0.308]			[0.666]	[0.842]
Observations	48	50	39	39	15	15	15	15
Adjusted R-squared	0.140	0.016	0.244	0.384	0.212	-0.059	0.083	0.102

*Notes: Robust standard errors are in brackets. ***, **, and * denote significance at the 1, 5, and 10 percent confidence intervals, respectively. Share of China in manufacturing trade is an average taken over 2010 and 2011. Co-movement of inflation is constructed by regressing CPI in each country in the sample over Chinese CPI (CPI data come from the IMF's International Financial Statistics). The same is done for stock market index (Shanghai Index A for China, and reference index for other countries where such data was available: see full description in the Annex B).*

Table 6: Correlation between CMCs with RMB and country's relationship with China: Is it trade with or competition against China?

	(1)	(2)	(3)
Index of competition with China	1.354	2.170**	0.603
	[1.255]	[1.006]	[0.903]
Co-movement of inflation with China		1.469***	1.055**
		[0.404]	[0.405]
Co-movement of stock market index with China		-0.088**	-0.091**
		[0.039]	[0.039]
Share of China in manufacturing trade			1.842**
			[0.839]
Observations	41	32	32
Adjusted R-squared	0.014	0.232	0.294

Notes: Index of competition with China is taken from Mattoo, Mishra, and Subramanian (2012).

Table 7: Correlation between CMCs with RMB and country's relationship with China: Is it trade or East Asia?

	1	2	3	4	5	6	7	8
Share of China in manufacturing trade	1.667**	0.474	1.907***	1.093*				
	[0.769]	[0.562]	[0.646]	[0.631]				
Share of China in total trade					2.469***	1.354*	2.206***	1.534**
					[0.638]	[0.708]	[0.665]	[0.667]
Co-movement of inflation			-0.065*	-0.093**			-0.067*	-0.096**
			[0.038]	[0.040]			[0.039]	[0.042]
Co-movement of stock market index			0.936***	0.581			0.693**	0.371
			[0.308]	[0.394]			[0.315]	[0.347]
East Asia & Pacific dummy		0.490***		0.310*		0.383**		0.296**
		[0.137]		[0.157]		[0.146]		[0.143]
Observations	48	48	39	39	48	48	39	39
Adjusted R-squared	0.140	0.326	0.384	0.435	0.277	0.377	0.421	0.476

Notes: See notes to Table 5.

Table 8: Correlation between CMCs with Dollar and country's relationship with United States

	1	2	3	4	5	6	7	8
	All countries				**Countries with significant CMC only**			
Share of the US in manufacturing trade	1.315***			1.580***	0.614**			0.574
	[0.283]			[0.466]	[0.266]			[0.531]
Co-movement of inflation with the US		0.050***		-0.012		0.027		-0.001
		[0.007]		[0.073]		[0.034]		[0.052]
Co-movement of stock market index			-0.138	-0.200			0.172	0.123
with the Dow Jones			[0.327]	[0.331]			[0.186]	[0.224]
Observations	48	50	39	39	26	28	19	19
Adjusted R-squared	0.169	0.087	-0.020	0.103	0.112	-0.027	-0.034	-0.096

Notes: See notes to Table 5.

Table 9: Comparing reference currencies: the RMB now and the Yen in 1991-1992

Countries	CMC for Dollar 1991-1992	CMC for Dollar 2010-2012	CMC for Yen 1991-1992	CMC for RMB 2010-2012
South Korea	.98***	-.222	-0.10**	1.1***
Singapore	.72***	.111	0.16	0.456***
Hong Kong	1.00*	.929***	0.01	0.057***
Taiwan	.94***	.324***	0.1	0.607***
Malaysia	.77***	-.153	0.14**	1.047***
Indonesia	.98***	.427***	0.01	0.540***
Philippines	1.19***	.16	0.05	0.764***
Thailand	.81***	.234**	0.12***	0.646***
Average	**0.92**	**0.23**	**0.06**	**0.65**

Notes: The estimates for the yen and for the dollar for 1991-92 are from Frankel and Wei (1994). Estimates for the dollar and RMB for 2010-12 are from Annex Table 2. Frankel and Wei's estimates are computed based on a slightly different basket of currencies from ours.

Table 10: Share of trade denominated in own currency: the RMB now and the Yen in 1991-1992

Trading partner	Japan - 1990		China - 2011
	Exports	Imports	Trade
World	37.5%	14.4%	8.8%
East Asia	34.7%	14.1%	NA

Sources: Tavlas and Ozeki (1992), PBoC, Direction of Trade Statistics (IMF)

Table 11: Share of Trade with Japan then and China today

Share of manufacturing trade	Japan		China	
	1991	2011	1991	2011
Hong Kong, China	15.0%	8.5%	NA	NA
Indonesia	25.5%	13.9%	4.3%	16.6%
Korea, Rep.	24.8%	11.6%	2.4%	29.7%
Malaysia	21.6%	11.3%	1.2%	25.3%
Taiwan	20.9%	15.3%	3.0%	36.7%
Philippines	20.1%	19.1%	1.1%	32.4%
Singapore	16.4%	5.1%	1.5%	11.0%
Thailand	28.1%	17.9%	2.0%	19.1%
Average (excl. Hong Kong)	**22.5%**	**13.4%**	**2.2%**	**24.4%**

Source: Comtrade. Trade data, involving Hong Kong must be treated with caution because of the preponderance of entrepot trade.

Annex Table A1: Sample of countries by region

East Asia & Pacific	South Asia	Europe & Central Asia	Latin America & Caribbean	Middle East & Africa
Hong Kong	India	Albania	Argentina	Egypt
Indonesia	Pakistan	Belarus	Bolivia	Israel
Malaysia	Sri Lanka	Bosnia	Brazil	Jordan
Mongolia		Bulgaria	Chile	Lebanon
Philippines		Croatia	Colombia	Morocco
Singapore		Czech Republic	Costa Rica	Tunisia
South Korea		Georgia	Dominican Republic	South Africa
Taiwan		Hungary	Ecuador	
Thailand		Latvia	El Salvador	
Vietnam		Lithuania	Guatemala	
		Macedonia	Jamaica	
		Poland	Mexico	
		Romania	Paraguay	
		Russia	Peru	
		Serbia	Uruguay	
		Turkey		
		Ukraine		

Annex Table A2: Full results of estimating equation (1) in Text

Country	US $ CM Coefficient		RMB CM Coefficient		Euro CM Coefficient		R-squared	
	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12
Albania	0.266***	0.121	-0.067	-0.044	0.776***	0.913***	0.608	0.925
Argentina	0.888***	1.008***	0.113	-0.008	0.031	0.012	0.89	0.983
Belarus	0.972***	1.597	0.026**	-0.719	0.008	-0.112	0.998	0.085
Bolivia	1.031***	0.993***	-0.026	0.005	-0.006	0.002	0.96	0.999
Bosnia	0	0.001	0	-0.001	1.000***	1.000***	1	1
Brazil	-0.101	0.306	0.827***	0.18	1.343***	0.593***	0.426	0.512
Bulgaria	-0.006	0	0.008	0.002	0.997***	0.998***	0.993	1
Chile	0.31	0.225	0.414**	0.432*	0.673***	0.387***	0.489	0.563
Colombia	0.707***	0.780***	0.174	-0.024	0.845***	0.294***	0.472	0.639
Costa Rica	0.980***	1.045***	0.016	-0.062	0.001	0.031	0.884	0.901
Croatia	-0.049	0.002	0.07	-0.013	0.999***	0.994***	0.742	0.941
Czech Republic	-0.005	-0.162	-0.061	-0.002	1.077***	1.157***	0.398	0.813
Dominican Republic	0.988***	1.256***	0.039	-0.218	-0.024	-0.055	0.416	0.767
Ecuador	1.000***	1.000***	-0.000*	0	0	0	1	1
Egypt	0.936***	0.930***	0.068	0.043	-0.004	0.014	0.967	0.978
El Salvador	1.000***	1.000***	0	0	0	0	1	1
Georgia	1.021***	0.806***	0.008	0.224	0.042	0.027	0.851	0.831
Guatemala	0.966***	1.002***	0.03	-0.029	-0.035	0.012	0.919	0.958
Hong Kong	0.976***	0.929***	0.014	0.057***	-0.004	0.018***	0.997	0.998
Hungary	-0.228	-0.351	0.141	0.046	1.716***	1.531***	0.462	0.718
India	0.645***	-0.174	0.211*	1.048***	0.359***	0.213***	0.766	0.74
Indonesia	0.621***	0.427***	0.162	0.540***	0.467***	0.053**	0.567	0.867
Israel	0.212	0.122	0.408**	0.483***	0.618***	0.448***	0.457	0.782
Jamaica	0.944***	0.949***	0.06	0.048	0.023	-0.001	0.954	0.992
Jordan	1.027***	0.933***	-0.027	0.069*	0.012	0.002	0.988	0.988
Latvia	0.035	0.081***	-0.032	-0.068**	0.997***	0.988***	0.872	0.989
Lebanon	0.987***	0.983***	0.009	0.017	0.015	0.008	0.992	0.992
Lithuania	0.002	0.001	-0.002	-0.001	1.001***	1.000***	1	1
Macedonia	0.066	-0.175	0.877***	0.685***	0.015	0.552***	0.566	0.624
Malaysia	0.214**	-0.153	0.653***	1.047***	0.312***	0.167***	0.811	0.821
Mexico	0.668***	0.642***	0.258*	0.01	0.519***	0.563***	0.716	0.586
Mongolia	0.972***	1.004***	0.029	0.027	0.018	-0.02	0.985	0.845
Morocco	0.200***	0.140***	-0.007	0.042	0.806***	0.820***	0.907	0.987
Pakistan	1.046***	1.016***	-0.045	0.005	-0.027	-0.006	0.786	0.962
Paraguay	1.105***	1.128***	-0.12	-0.101	-0.12	-0.055	0.618	0.58
Peru	0.997***	0.886***	0.001	0.071	0.102	0.077***	0.761	0.94
Philippines	0.696***	0.16	0.163	0.764***	0.334***	0.122***	0.701	0.857
Poland	-0.166	-0.446**	0.097	0.194	1.347***	1.402***	0.413	0.762
Romania	0.093	-0.252**	-0.085	0.175*	1.557***	1.120***	0.455	0.896
Russia	0.506***	0.199	0.053	0.284	0.466***	0.659***	0.906	0.683
Serbia	0.201	-0.226	-0.141	0.304*	0.943***	0.978***	0.195	0.729
Singapore	0.343***	0.111	0.300***	0.456***	0.445***	0.414***	0.828	0.837
South Africa	0.271	-0.355	0.078	0.550*	1.782***	0.915***	0.362	0.465
South Korea	0.261	-0.222	0.580***	1.101***	0.498***	0.210***	0.647	0.677
Sri Lanka	0.973***	0.843***	0.036	0.129	-0.023	0	0.915	0.843
Taiwan	0.359***	0.324***	0.519***	0.607***	0.205***	0.091***	0.84	0.92
Thailand	0.522**	0.234**	0.29	0.646***	0.201*	0.113***	0.464	0.895
Tunisia	0.328***	0.239***	-0.056	0.085	0.662***	0.662***	0.884	0.923
Turkey	0.259	0.032	0.432	0.431**	1.681***	0.652***	0.464	0.675
Ukraine	0.959***	0.937***	0.019	0.047	0.091	0.016**	0.696	0.988
Uruguay	1.125***	0.634***	-0.101	0.326	-0.074	-0.046	0.793	0.666
Vietnam	1.112***	0.978***	-0.113**	0.014	0.024	0.012	0.962	0.878

Annex Table A3: Full results of estimating equation (1) but using SDR instead of Swiss Franc as numeraire

Country	US $ CM Coefficient		RMB CM Coefficient		Euro CM Coefficient		R-squared	
	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12	July 05 - August 08	July 10 - August 12
Albania	0.238*	0.221*	-0.065	-0.038	0.766***	1.012***	0.307	0.741
Argentina	0.886***	1.104***	0.112	0	0.019	0.097**	0.612	0.894
Belarus	0.968***	1.002	0.025**	-0.764	-0.002	-0.638	0.989	0.018
Bolivia	1.058***	0.977***	-0.026	0.004	0.026	-0.013	0.826	0.995
Bosnia	0.001	0.003***	0	0	1.001***	1.003***	1	1
Brazil	0.008	-0.636*	0.691**	0.117	0.375	-0.291	0.146	0.069
Bulgaria	-0.018	-0.004	0.009	0.002	0.988***	0.993***	0.992	0.999
Chile	0.21	-0.524	0.363*	0.374*	0.149	-0.273	0.101	0.059
Colombia	0.693*	0.422	0.077	-0.048	0.048	-0.04	0.145	0.063
Costa Rica	0.947***	1.018***	0.018	-0.061	-0.018	-0.011	0.597	0.55
Croatia	-0.112	-0.022	0.063	-0.016	0.877***	0.975***	0.688	0.828
Czech Republic	0.073	-0.232	-0.07	-0.01	1.089***	1.112***	0.418	0.676
Dominican Republic	0.529	1.118***	0.045	-0.229	-0.48	-0.173	0.127	0.362
Ecuador	1.000***	1.000***	0	0	0	0	1	1
Egypt	0.940***	0.995***	0.070*	0.047	0.016	0.073	0.853	0.859
El Salvador	1.000***	1.000***	0	0	0	0	1	1
Georgia	1.064***	0.507**	-0.002	0.205	0.006	-0.257*	0.544	0.403
Guatemala	0.790***	0.924***	0.036	-0.034	-0.182**	-0.065	0.69	0.758
Hong Kong	0.951***	0.886***	0.016	0.055***	-0.016	-0.026*	0.983	0.987
Hungary	-0.447*	-1.072***	0.062	-0.001	0.841***	0.848***	0.359	0.641
India	0.427**	-0.869***	0.178	1.001***	-0.148	-0.436**	0.309	0.195
Indonesia	0.26	0.572***	0.112	0.550***	-0.338*	0.192	0.129	0.444
Israel	0.208	-0.102	0.369*	0.468***	0.297	0.234	0.053	0.079
Jamaica	0.996***	0.956***	0.056	0.048	0.048	0.007	0.804	0.945
Jordan	1.048***	0.964***	-0.029	0.071*	0.021	0.033	0.942	0.92
Latvia	-0.012	0.013	-0.032	-0.072**	0.945***	0.922***	0.861	0.964
Lebanon	0.972***	1.012***	0.007	0.019	-0.016	0.031	0.96	0.943
Lithuania	0.001	0.001	-0.002	-0.001	0.999***	1.001***	1	1
Macedonia	-0.274	0.013	0.892***	0.699***	-0.242	0.722***	0.187	0.069
Malaysia	-0.001	-0.656***	0.624***	1.016***	-0.165	-0.320**	0.383	0.288
Mexico	0.519**	-0.648**	0.198	-0.08	-0.132	-0.633***	0.303	0.165
Mongolia	0.983***	1.199***	0.026	0.039	0.001	0.167	0.928	0.465
Morocco	0.130***	0.099**	-0.007	0.039	0.733***	0.779***	0.746	0.919
Pakistan	0.921***	1.048***	-0.038	0.007	-0.105	0.026	0.418	0.794
Paraguay	0.779***	1.026**	-0.091	-0.111	-0.251	-0.131	0.23	0.188
Peru	1.197***	0.669***	-0.018	0.057	0.174	-0.129	0.391	0.639
Philippines	0.514**	-0.091	0.135	0.747***	-0.09	-0.114	0.245	0.362
Poland	-0.307	-1.180***	0.059	0.144	0.877***	0.717***	0.355	0.678
Romania	-0.112	-0.510***	-0.157	0.161	0.751***	0.859***	0.3	0.763
Russia	0.509***	-0.742***	0.049	0.225	0.442***	-0.246	0.273	0.164
Serbia	0.104	-0.278	-0.136	0.301*	0.874***	0.927***	0.149	0.429
Singapore	0.049	-0.614***	0.274***	0.407***	-0.087	-0.267**	0.206	0.079
South Africa	-0.66	-2.018***	-0.046	0.436	-0.249	-0.632**	0.166	0.258
South Korea	0.193	-0.997***	0.525***	1.052***	-0.022	-0.532**	0.202	0.151
Sri Lanka	0.967***	0.837***	0.04	0.13	0.005	-0.015	0.681	0.431
Taiwan	0.282**	0.083	0.495***	0.593***	-0.069	-0.145	0.443	0.539
Thailand	0.379	-0.093	0.273	0.625***	-0.096	-0.199*	0.099	0.431
Tunisia	0.208***	0.02	-0.05	0.073	0.571***	0.443***	0.494	0.387
Turkey	-0.061	-0.488*	0.266	0.402**	-0.004	0.125	0.193	0.101
Ukraine	1.090***	0.932***	0.002	0.046	0.102	0.011	0.307	0.921
Uruguay	1.338***	0.207	-0.094	0.285	0.217*	-0.375*	0.451	0.217
Vietnam	1.162***	0.853***	-0.118***	0.007	0.038	-0.112	0.837	0.499

Annex Table A4: Robustness of CMC estimates: Controlling for external financial environment

Table 4A: Significant CMCs

Currency	Period	Baseline	Including F1	Including F2	JP Morgan's EMBI Global	JP Morgan's EMBI Global Diversified	VIX Emerging markets
RMB	07/2005 - 08/2008	11	11	11	11	9	NA
	07/2010 - 08/2012	17	18	19	12	13	17
USD	07/2005 - 08/2008	35	36	36	39	39	NA
	07/2010 - 08/2012	29	29	29	37	34	28

Source: Thomson Reuters Datastream

Note:This table compares the CMCs obtained from estimating equation 1 (column 1) with those obtained from estimating equation 6 in the text (last 5 columns). The numbers denote the number of cases in which the CMC coefficient is statistically significant (at the 10 percent confidence interval). Fitch PDI 1 year and Fitch PDI 5 year are Fitch Solution's Probability of Default Index for Emerging Markets, respectively at one year and five years. Both indices are interpreted as the likelihood of a default event occurring at a specified horizon (1-year or 5-year), aggregating over 25,000 entities in all sectors of the economy. See full description in Fitch Solutions (2008).JP Morgan EMBI Global and Global Diversified are bond indices across Emerging Market countries. See full description in JP Morgan (2011).The Emerging Market VIX index is produced by Chicago Board of Exchange (CBOE) and tracks the market perception of risk through a variety of futures. As it is only available since April 2011, the equation including EM VIX is run only for the shorter period April 2011 – August 2012.

Table 4B: Magnitude of CMCs relative to RMB

	Baseline	Fitch PDI 1 year	Fitch PDI 5 year	JP Morgan EMBI Global	JP Morgan EMBI Global diversified	VIX
Average CMC for USD	0.452	0.453	0.446	0.560	0.520	0.437
Largest deviation from baseline		0.001	0.033	0.055	0.044	0.401
Country with largest downward deviation from baseline		*Czech Republic*	*South Korea*	*Costa Rica*	*Costa Rica*	*Malaysia*

Notes: The only difference with Table 4A is that the numbers here represent the average CMC

Table 4C: Magnitude of CMCs relative to US dollar

	Baseline	Fitch PD 1 year	Fitch PD 5 year	JP Morgan EMBI Global	JP Morgan EMBI Global diversified	VIX
Average CMC for RMB	0.191	0.191	0.194	0.111	0.146	0.209
Largest deviation from baseline		0.000	0.001	0.438	0.259	0.164
Country with largest downward deviation from baseline		*Czech Republic*	*Albania*	*South Africa*	*South Africa*	*Chile*

Annex Table A5: Is RMB tracking East Asian Currencies?

	1	2	3	4	5	6	7	8
	Daily variations of the RMB, July 2010 - August 2012							
US Dollar	0.932***	0.910***	0.893***	0.937***	0.857***	0.894***	0.880***	0.810***
	[0.012]	[0.017]	[0.016]	[0.013]	[0.020]	[0.014]	[0.017]	[0.024]
Euro	0.023***	0.030***	0.022***	0.008	0.021**	0.017**	0.020**	0.012
	[0.008]	[0.008]	[0.008]	[0.011]	[0.008]	[0.008]	[0.008]	[0.010]
Japanese Yen	0.002	-0.001	0.003	-0.001	0.000	0.003	-0.002	0.002
	[0.009]	[0.009]	[0.009]	[0.009]	[0.008]	[0.008]	[0.008]	[0.008]
Korean Won	0.045***							-0.011
	[0.009]							[0.013]
Indonesian Ruppiah		0.064***						0.013
		[0.015]						[0.016]
Philippine Peso			0.085***					0.028
			[0.014]					[0.018]
Singaporian Dollar				0.060***				-0.003
				[0.015]				[0.018]
Taiwanese Dollar					0.123***			0.070***
					[0.019]			[0.024]
Malaysian Ringgit						0.088***		0.040**
						[0.012]		[0.018]
Thai Baht							0.104***	0.039*
							[0.017]	[0.020]
Observations	544	544	544	544	544	544	544	544
Adjusted R-squared	0.983	0.982	0.983	0.982	0.983	0.984	0.983	0.984

Note: In Annex tables A2 and A3, the dependent variable was the exchange rate of emerging market currencies with the RMB featuring as an independent variable on the right hand side. In this table, the RMB is the dependent variable, with the individual East Asian currencies on the right hand side individually (columns (1)-(7)) and collectively (column (8)).

Annex Table A6: Are CMCs Symmetric between depreciations and appreciations?

	No. of significant CMCs		No. of dominant CMCs		Average magnitude of CMCs	
Sample	*East Asia* (N = 10)	*Outside East Asia* (N = 42)	*East Asia* (N = 10)	*Outside East Asia* (N = 42)	*East Asia* (N = 10)	*Outside East Asia* (N = 42)
Baseline (527 observations)	8	9	7	4	0.53	0.11
Days where RMB depreciates relative to USD (282 observations)	5	10	5	7	0.53	0.25

The baseline comprises cases of RMB depreciations and appreciations (relative to the dollar).

Annex Table A7: Robustness of association between trade and CMCs

	1	2	3	4	5	6	7	8
	All countries				**Countries with significant RMB CMC only**			
Share of China in manufacturing trade (averaged over 2005-2008)	1.452*			2.142***	1.577*			0.951
	[0.831]			[0.658]	[0.829]			[1.031]
Comovement of inflation		-0.168***		-0.096*		-0.104		0.022
		[0.054]		[0.053]		[0.122]		[0.131]
Comovement of stock market index			3.494***	2.084**			2.617**	2.183
			[0.934]	[0.881]			[1.035]	[1.498]
Observations	50	49	38	37	15	15	15	15
Adjusted R-squared	0.094	0.073	0.278	0.445	0.138	-0.043	0.238	0.182

Notes: See notes to Table 5. The difference with Table 5 is that, to minimize concerns related to the endogeneity of trade to currency movements, the share of trade with China is measured for the period 2005-08, rather than 2010-2011.

Annex B: Data appendix

1. **Exchange rate data**

   All exchange rate data come from Thomson Reuters Datastream

2. **Trade data**

   Trade data are from the United Nations' Comtrade data base.

   We use data from the import side because they are considered more reliable to distortions due to entrepot trade. The two measures used in the paper are manufacturing trade (under SITC 2) and total trade (except Fuel and Lubricants in the BEC classification of trade).

   3 countries were excluded from the sample because Comtrade did not report their trade data for 2010-2011: Mongolia, Serbia and Uruguay. Hong Kong was also excluded, its entrepot trade with China makes it difficult to construct a reliable measure of 'actual' trade with China.

3. **Financial data**

   Data for inflation are CPI monthly data from the IMF's International Financial Statistics (IFS).

   Data on stock price indices were collected from Thomson Reuters Datastream, as the key index for each country. Here is the list of index by country:

Country	Name of Stock Exchange index	Country	Name of Stock Exchange index
Argentina	ARGENTINA MERVAL	Malaysia	FTSE BURSA MALAYSIA KLCI
Brazil	BRAZIL BOVESPA	Morocco	MOROCCO ALL SHARE (MASI)
Bulgaria	BULGARIA SE SOFIX	Pakistan	KARACHI SE 100
Chile	CHILE SANTIAGO SE GENERAL (IGPA)	Peru	LIMA SE GENERAL(IGBL)
China	SHANGHAI SE A SHARE	Philippines	PHILIPPINE SE I(PSEi)
Colombia	COLOMBIA IGBC INDEX	Poland	WARSAW GENERAL INDEX
Croatia	CROATIA CROBEX	Romania	ROMANIA BET (L)
Czech Republic	PRAGUE SE PX	Russia	RUSSIA RTS INDEX
Ecuador	ECUADOR ECU (U$)	South Korea	KOREA SE COMPOSITE (KOSPI)
Egypt	EGYPT HERMES FINANCIAL	Singapore	STRAITS TIMES INDEX L
Hong Kong	HANG SENG	Sri Lanka	COLOMBO SE ALL SHARE
Hungary	BUDAPEST (BUX)	Taiwan	TAIWAN SE WEIGHED TAIEX
India	INDIA BSE (100) NATIONAL	Thailand	BANGKOK S.E.T.
Indonesia	IDX COMPOSITE	Tunisia	TUNISIA TUNINDEX
Israel	ISRAEL TA 100	Turkey	ISTANBUL SE NATIONAL 100
Jamaica	JAMAICA SE MAIN INDEX	US	DOW JONES INDUSTRIALS
Japan	NIKKEI 225 STOCK AVERAGE	Serbia	BELGRADE BELEX 15
Jordan	AMMAN SE FINANCIAL MARKET	Ukraine	MSCI UKRAINE
Latvia	OMX RIGA (OMXR)	Vietnam	MSCI VIETNAM
Lebanon	LEBANON BLOM	Bosnia and Herzegovina	MSCI BOSNIA AND HERZEGOVINA
Lithuania	OMX VILNIUS (OMXV)	Macedonia	MACEDONIAN SE MBI 10
Mexico	MEXICO IPC (BOLSA)		