

The Impacts of Policy Infrastructures on the International Use of the Chinese Renminbi: A Cross-Country Analysis

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Abstract

Despite the recent substantial growth in research on the internationalization of the Chinese renminbi, there has been surprisingly little systematic analysis of its actual use in foreign markets. This study fills this important gap in the literature by providing a cross-country analysis of renminbi use in offshore foreign exchange markets. It draws special attention to the effects of the cooperative policy measures adopted by China and foreign states aimed at promoting the international use of the renminbi. This research finds that a country's participation in the Renminbi Qualified Foreign Institutional Investor scheme (which increases its renminbi investment opportunities) and its establishment of an offshore renminbi clearing bank (which provides better renminbi payment services)—but not its entry into a renminbi-local currency swap agreement—facilitate use of the renminbi in its foreign exchange markets. These findings demonstrate that states do play significant roles in the internationalization of the renminbi.

Keywords: international currency, offshore renminbi clearing bank, renminbi currency swap, renminbi internationalization, RQFII

JEL classification: F33, F50

Introduction

The international use of the Chinese currency, the renminbi (RMB), has grown significantly since the global financial crisis of 2008/9. According to SWIFT, a global payment services provider, the RMB rose to a ranking as the world's fourth most used cross-border payment currency in August 2015, from thirty-fifth in October 2010, even overtaking the Japanese yen, although its rank has subsided somewhat since then and fluctuated between fifth and seventh during 2017. Reflecting the elevated international status of the RMB, in November 2015 the International Monetary Fund (IMF) announced its inclusion, effective from October 2016, in the currency basket of the Special Drawing Right—an international reserve asset issued by the IMF—along with the US dollar (hereafter dollar), the euro, the British pound and the yen.

In parallel with the notable progress in renminbi internationalization (hereafter RMBI), research on it has also exploded. Surprisingly, however, there have been few systematic studies of the *actual use* of the RMB in *foreign markets*. The majority of the studies of RMBI have instead focused mainly on analysis of the domestic conditions in China for RMBI.¹ There is no doubt that the Chinese domestic conditions are important factors that influence RMBI. Yet it should be stressed that the use of the RMB has differed substantially across countries, having been higher in some but lower in others. SWIFT announces every month a list of the top fifteen offshore RMB economies, by examining countries' shares in total global RMB payments, and there have been noticeable cross-country differences. For instance, in August 2017 Hong Kong, the United Kingdom, South Korea, the United States and Japan accounted for 76.2 percent, 5.2 percent, 3.4 percent, 2.5 percent and 0.8 percent respectively of the international RMB use. Therefore, in order to grasp more accurately how RMBI has been evolving greater attention needs to be paid to the actual uses of the RMB in foreign economies. And going further, for a more comprehensive understanding of the factors affecting RMBI we need to address the issue of which of them have resulted in these cross-country differences in use of the RMB.

Against this backdrop, this study provides a cross-country analysis of RMB use, with a particular focus on that in the foreign exchange (FX) markets. And in explaining the cross-country differences in RMB use, we draw special attention to the effects of cooperative policy measures introduced by China and foreign states to promote the international use of the RMB. More specifically, we examine three core policy infrastructures set up to help promote RMB use in foreign markets: RMB-local currency swap agreements, Renminbi Qualified Foreign Institutional Investor (RQFII) quotas, and offshore RMB clearing banks. A country's RMB swap line with China is one reliable channel through which it can acquire RMB liquidity, and is thus expected to help to increase RMB use in that country. The RQFII scheme grants investment quotas to licensed foreign institutional investors for investment in stocks and bonds in mainland China using offshore RMB. It therefore expands foreigners' RMB investment opportunities, thereby augmenting their incentives for holding and using the RMB. Meanwhile, an offshore RMB clearing bank offers clearing services for RMB transactions in the foreign country, providing RMB liquidity to banks joining its clearing system. It thus reduces the costs of settlement for RMB transactions, and increases the convenience of RMB use thereby. A number of observers of RMBI have in fact noted the significance of these policy measures for RMBI, but empirical research aimed at quantifying their actual impacts is still lacking. Our study offers one of the first systematic analyses of them.

The introduction of these RMB policy infrastructures in a country is the outcome of explicit policy cooperation between its own government and the Chinese government.² Thus, by examining their impacts on RMB use in foreign economies, this study can illuminate whether *states* play significant roles in RMBI. In the current early stages of its internationalization, the inherent economic attractiveness of the RMB—in particular, in terms of the convenience of its use—still lags far behind that of the incumbent leading international currency, the dollar. The RMB's initial rise as a new international currency may thus require strong policy support from states, and an investigation of states' roles in RMBI is hence

¹ See, for example, Chen and Cheung (2011), Chey and Li (2016), Cohen (2012, 2015), Dobson and Masson (2009), Eichengreen (2013), Eichengreen and Kawai (2014), Lee (2014), Li and Zhang (2017), McDowell and Steinberg (2017), Otero-Iglesias and Vermeiren (2015), Park (2010), Prasad (2017), Subacchi (2017), Subramanian (2011), Wu et al. (2010) and Yu (2014).

² These policies are initiated by the Chinese government, but the foreign governments must agree in order for them to be implemented in their own nations.

desirable. Note, however, that we do also consider the impacts of various economic and political factors on the international use of the RMB, along with the effects of the RMB policy infrastructures. This study finds that the RQFII scheme and RMB clearing banks facilitate RMB use in foreign economies, while RMB swap lines do not significantly affect it. More specifically, the share of the RMB in total FX turnover is found to be 1.69 percentage points higher in a country that both participates in the RQFII scheme and has an RMB clearing bank than in other countries. This difference is notable, given that the average RMB share in FX turnover of the countries in our dataset (which excludes Hong Kong) amounts to 1.02 percent. These findings highlight the significant roles in RMBI of states, and in particular of policy cooperation between China and foreign countries, even though not all cooperative policy measures have contributed to it. We do not, however, argue that market forces are irrelevant to RMBI. Rather, this research finds in addition that a country's export ties with China boost use of the RMB in its FX markets, suggesting a significant influence of market forces on RMBI as well.

The rest of this paper is organized as follows. The next section reviews the literature. The following two sections then explicate the design of our empirical study, while the subsequent section discusses its findings. The final section summarizes the major findings and notes their implications.

Literature review

The majority of studies of RMBI mainly analyze its feasibility, i.e. whether the RMB will ultimately develop into a major, or the leading, international currency in the future. Some adopt quantitative methods based upon that employed in Chinn and Frankel (2007)—which forecasts the future share of the euro in the world's foreign exchange reserves—by taking as the main determinants of RMBI China's economic conditions such as its share in global output and trade, its financial market development, and its price level. Subramanian (2011) and Lee (2014) are good examples. The former projects that the RMB will challenge or even overtake the dollar as the key reserve currency by the early 2020s, while the latter estimates that the currency's share in the world's reserves will grow to between 3 to 12 percent by 2035.

There are also a number of studies that rely more on qualitative analyses. Dobson and Masson (2009), Park (2010), Wu et al. (2010), Chen and Cheung (2011), Cohen (2012, 2015), Yu (2014) and Subacchi (2017), for instance, do so in examining mainly the Chinese economic conditions for RMBI. Meanwhile, some studies address the political factors that may affect RMBI. For example, Helleiner and Malkin (2012), Otero-Iglesias and Vermeiren (2015), Chey and Li (2016) and McDowell and Steinberg (2017) explore the domestic politics in China surrounding RMBI, by devoting particular attention to domestic actors' preferences regarding it. Eichengreen (2013), Eichengreen and Kawai (2014) and Prasad (2017) note the impacts on RMBI of China's domestic political institutions such as its authoritarian political regime. Meanwhile, Chey (2013) draws attention to the role of China's international power in RMBI.

Despite such variations in their methodologies and arguments, however, most of these studies share one common characteristic: they place their analytic focuses primarily on the domestic conditions in China, the issuer of the RMB itself, to thereby adopt "supply-side approaches" to the study of RMBI (Chey, 2015). And as a result the actual use of the RMB in foreign economies remains greatly underexplored. There is of course no denying the substantial influence of domestic conditions in China on RMBI. Yet, as noted earlier, the use of the RMB is markedly uneven across countries, being higher in some but lower in others.

This clearly suggests that RMBI is also shaped by factors other than Chinese domestic conditions. Thus, to achieve a better understanding of the determinants of RMBI, the factors behind the differences in the levels of RMB use across countries need also to be taken into account.

A few recent studies have in fact begun to pay growing attention to how foreign countries have coped with RMBI. Liao and McDowell (2015) for example conduct a cross-country analysis of which countries have established RMB swap lines with China, while Chey et al. (2016) carry out another cross-country study that examines the factors influencing the more overall level of the policy infrastructure supporting RMB use in a country. Liao and McDowell (2016) meanwhile explore the factors that have led central banks to hold RMB-denominated assets in their reserves. These studies do not however analyze the actual use of the RMB in foreign markets, but instead focus largely on foreign governments' policies toward the RMB as their dependent variables. There is also a group of studies that examine the co-movements between the RMB and other currencies, mainly by employing the Frankel and Wei (1994) method. For instance, Fratzscher and Mehl (2011), Ito (2017) and Subramanian and Kessler (2012) claim that an RMB bloc has already emerged in East Asia, while Tovar and Nor (2018) argue that an RMB bloc has arisen among the BRICS countries. Kawai and Pontines (2016), in contrast, contend that the dollar's status as the anchor currency in East Asia has not yet been challenged by the RMB. These studies, though, pay little attention to the effects on the formations of RMB blocs stemming from policy measures adopted to facilitate the RMB's international use. Notably, Chey's (2015) in-depth research on RMB use in South Korea shows that the Korean government's policy measures to support RMB use in that country have led to heightened interest among domestic actors in greater use of the RMB. However, although his study includes an examination of RMB use in the Korean markets, its nature as a single-case study limits the generalizability of its findings.

Meanwhile, a recent paper by He et al. (2016) builds a model that estimates a currency's use in the global foreign exchange market. Yet, while their model's predictions work fairly well for seven existing currencies (the dollar, the euro, the yen, the British pound, the Swiss franc, the Canadian dollar and the Australian dollar), a wide gap is found between the predicted and the actual geographic distributions of the RMB's use. This result suggests that, in order to analyze the actual international use of the RMB, attention should be turned to factors not covered in the model.³ And, notably, although that model does examine diverse economic, political and cultural conditions in both the countries using the international currencies and their issuers, it does not address the impacts of policy measures aimed at promoting the international use of a certain currency, which are the chief focus of our study.

The research design

Given the data limitations, which will be discussed in detail below, this study employs a cross-country regression model using ordinary least squares for its investigation of the determinants of the level of RMB use in a foreign economy. The model is specified as follows:

$$RMB\ use_i = \alpha + \beta(RMB\ policy_i) + \gamma E_i + \mu P_i + \tau X_i + \varepsilon_i$$

³ Similar to our study, He et al. (2016) examine the uses of international currencies in FX markets, using the data from the BIS.

where $RMB\ use_i$ denotes the level of RMB use in country i ; $RMB\ policy_i$ is a set of variables indicating the policy measures implemented in country i to facilitate RMB use; E_i is a group of variables reflecting the economic relations of country i with China; P_i is a set of variables reflecting the two countries' political relations; X_i is a group of variables controlling for other factors that might also affect RMB use; and ε is a disturbance term.

Measurement of RMB use

For the measurement of the level of RMB use in a country we examine the share of the RMB in its daily average FX turnover—which reflects, among the three functions of money, the currency's function as a medium of exchange.⁴ Our focus on use of the RMB in FX markets is based largely on the fact that, to our knowledge, this is the only area in which cross-country data on RMB use are available. In fact, one of the chief reasons for the limited research on RMB use in foreign markets has been the unavailability of necessary cross-country data. However, the 2016 Triennial Central Bank Survey of the Bank for International Settlements (BIS), which provides cross-country data on FX turnover by currency, including the RMB, was recently published. The scope of the economies covered by the survey is limited, as their number totals 48 only (excluding China but including Taiwan and Hong Kong). Nonetheless, the BIS data are the only cross-country data on RMB usage in foreign economies available, and we thus use them. The data are as of April 2016.

As our measure of the degree of RMB use in a country's FX markets, we employ the share of RMB transactions (denoted by $RMB\ share$ in our regression models), rather than their sheer volume, since our main objective is to address the question of which countries' market actors are more interested in using the RMB. Use of the volume of RMB transactions in a country could produce a misleading outcome, as it would likely to be heavily affected by the country's economic size. Table 1 shows the RMB's shares in FX turnover across countries. The RMB's share is highest in Hong Kong, followed by those in Taiwan, Singapore, South Korea and Malaysia.

[Insert Table 1 here]

Factors of primary interest: RMB policy infrastructures

Our principal interest is to explore the actual effects of the policy infrastructures that are aimed at supporting the use of the RMB in foreign markets. As discussed earlier, we focus on three specific policies among others: the establishment of an RMB swap line (*SWAP*), participation in the RQFII scheme (*RQFII*), and the establishment of an offshore RMB clearing bank (*RCB*)—which are the major policy infrastructures helping to promote the international use of the RMB. Each of them is a dichotomous variable, which we code as 1 for a country if it had been implemented in that country by the end of 2014, and 0 otherwise. In our baseline model we analyze the separate impact on $RMB\ share$ of each of the three variables. However, in additional models we develop alternative measures that may capture the effects of these policies more precisely, as will be discussed in detail in a following section.

⁴ The other two functions of money are as a unit of account and as a store of value. For more on the monetary functions of an international currency, see Chey (2012: 52-3).

Variables of economic and political relations

In addition to RMB policy infrastructures, this research also investigates the impacts on a country's RMB use of its various economic and political relations with China.

First we examine whether a country's economic ties with China influence its RMB use, looking into both its trade and its investment relations with China (denoted by *Trade* and *Investment* respectively in our regression models). A good number of studies anticipate a positive relationship between a country's economic integration with another country issuing an international currency and its use of that currency. For example, Subramanian and Kessler (2012) show that a country whose trade is deeply integrated with China is more likely to peg its currency to the RMB, while He et al. (2016) find that bilateral trade and capital flows significantly affect the international uses of currencies. Given this, we expect RMB use to be greater in a country having closer trade or investment relations with China.

We also analyze the effect of a country's political relations with China on its use of the RMB. A significant body of political economy research—including Cohen (2015), Helleiner (2008), Liao and McDowell (2015), Momani (2008) and Posen (2008)—notes that a country's security ties with foreign countries influence its use of international currencies. In addition, Liao and McDowell (2016) argue that a country's ideological distance from China affects its central bank's choice of reserve currencies. We however have reservations about any substantial effects of such political factors on the RMB use of market actors, whose main behavioral motivations tend to be profit-seeking, although they may affect foreign governments' policies concerning the RMB. To examine a country's political relations with China, we examine two particular factors. One is whether the country is involved in a territorial dispute with China (*Territorial dispute*). The other is whether it has a security/defense treaty with the United States (*Treaty with the US*), given that China itself has no formal allies other than North Korea, and that a state with a close security relationship with the US, China's main political and military rival, may be reluctant to use the RMB and prefer the dollar.⁵

Other control variables

Finally, we also control for some domestic characteristics of a country that may affect its RMB use. These control variables include the presence of a major international financial center in the country (*Financial center*), the size of its ethnic Chinese population (*Chinese population*), its geographical distance from China (*Distance*), the size of its gross domestic product (*GDP*), and whether it is a member of the eurozone (*Eurozone*).

We anticipate that RMB use will be higher in a country possessing a more developed international financial center, as it will tend to have more advanced financial systems and markets, which may reduce the obstacles to use of the RMB. Meanwhile, given the finding by He et al. (2016) of the significant effects of language and cultural factors on the uses of major international currencies, we control for these factors by adding the size of a country's Chinese population to our models. A greater distance between a country and China may adversely affect its use of the RMB. The volume of a country's GDP may have an impact on its RMB use as well, as a large country may have more interactions with China. We control

⁵ Meanwhile, although Liao and McDowell (2016) find a significant relationship between a country's ideological distance from China and its central bank's choice of reserve currencies, our preliminary analysis running binary regressions showed that a country's ideological distance from China did not have a significant effect on RMB use in its FX market, and we therefore do not include that in our regression models.

for a country's membership in the eurozone, because in our models each of the eurozone member countries is treated as holding a bilateral RMB currency swap agreement with China.

To sum up, we can express our baseline regression model as follows:

$$\begin{aligned} RMB\ share_i = & \alpha + \beta_1 SWAP_i + \beta_2 RQFII_i + \beta_3 RCB_i + \gamma_1 Trade_i + \gamma_2 Investment_i + \mu_1 Territorial \\ & dispute_i + \mu_2 Treaty\ with\ the\ US_i + \tau_1 Financial\ center_i + \tau_2 Chinese\ population_i \\ & + \tau_3 Distance_i + \tau_4 GDP_i + \tau_5 Eurozone_i + \varepsilon_i \end{aligned}$$

Data

This section describes the data used for our empirical analysis. Note that our dataset excludes Hong Kong—although we do include it in one model for a robustness check—given that the city is actually a part of China rather than a “foreign” region even despite its administrative independence from the country.

Dependent variable

RMB share is the percentage share of the RMB in the daily average FX turnover in a country in April 2016. The data are from the BIS (2016).

RMB policy infrastructures

Given that the dependent variable uses the data of April 2016, and that there is usually a lag before a policy takes its intended effect, we examine the employment/unemployment of the three RMB policy infrastructures as of the end of 2014. At that time a total of 27 central banks had RMB currency swap agreements with China, with one of them being the European Central Bank with its total of 19 member nations. Nine economies were meanwhile participating in the RQFII scheme at that time, and 11 economies had established RMB clearing banks. In this study's dataset, which covers 48 economies, 29 (since each of the eurozone member nations is treated as having an RMB swap line with China) economies have RMB currency swap agreements, seven RQFII quotas and eight RMB clearing banks. All of the data are from China's central bank, the People's Bank of China (PBoC).

Economic relations variables

Trade. We use the percentage share in its GDP of the sum of a country's exports to and imports from China in measuring its trade ties with China.

Investment. The degree of a country's investment relations with China is measured by the percentage share in its GDP of the sum of its outstanding stocks of FDI in and from the country.

The data on trade, investment and GDP come from, respectively, the IMF's Direction of Trade Statistics (DOTS), the United Nations Conference on Trade and Development (UNCTAD)'s FDI Statistics, and the IMF's World Economic Outlook (WEO) database.

Political relations variables

Territorial dispute. This is a dichotomous variable showing a country's territorial dispute(s) with China. A country is coded 1 if it has a territorial dispute(s) with China, and 0 otherwise.

Treaty with the US. A country with a security/defense treaty with the United States is coded 1, and a country without one 0.

The data on territorial disputes and security/defense treaties are acquired, respectively, from the US Central Intelligence Agency (CIA) and the US Department of State.

Other variables

Financial center. We build a categorical variable, measured on a seven-point scale, based on countries' ranks in *The Global Financial Centres Index 18* published by Long Finance in September 2015. Cities are ranked in the index, rather than their countries, and so we rank a country on the basis of the rank given to its city. Where multiple cities of a country appear in the index, the highest rank given is used. Countries ranked in the top ten, in the top 11 to 20, from 21 to 30, from 31 to 40, from 41 to 50, and from 51 to 60 are coded 6, 5, 4, 3, 2 and 1, respectively, and a country that is not included in the top 60 is given a code of 0. The use of this categorical variable has a substantial advantage in enabling an increased number of observations, as the index includes only 61 economies.

Chinese population. We measure the size of a country's ethnic Chinese population by using the data obtained from the *2013 Economic Year Book on Overseas Chinese* published by the Overseas Community Affairs Council, a Taiwanese government agency. The variable is log-transformed.

Geographical distance. The data on countries' distances from China are from CEPII.

GDP. This variable is the size of a country's GDP, with the data coming from the IMF's WEO, as mentioned earlier. The variable is log-transformed.

Eurozone. This is a dummy variable, coded 1 if a country is a eurozone member and 0 otherwise.

A list of the variables and the data sources is provided in Appendix 1, and descriptive statistics of the variables in Appendix 2.

Empirical results and discussion

In this section we discuss the results of our regression analyses.

Outcomes of the baseline model

The results of our baseline model are presented in the first column of Table 2. An RMB clearing bank (*RCB*) has a significant and positive impact on RMB use, while neither an RMB swap line (*SWAP*) nor RQFII participation (*RQFII*) have significant effects. As to the control variables, only trade with China has a significant impact on RMB use, and its influence is positive, as anticipated.

However, the correlation between *RQFII* and *RCB* is as high as 0.77, and this might distort the regression results for the model somewhat. In fact, in the majority of countries their participations in the RQFII scheme and their establishments of RMB clearing banks took place nearly simultaneously. Moreover, only one country in our dataset has a RQFII quota without an RMB clearing bank. The effect of RQFII may thus not be revealed completely by the baseline regression model.

Alternative measures for RMB policy infrastructures

We therefore design three additional models—Models I, II and III—that adopt alternative measurements for better capturing the effects of the three RMB policy infrastructures.

In Model I we create a composite variable *SWAP+RQFII+RCB*, which captures the aggregate effect of all three RMB policy infrastructures in a country without distinguishing their individual impacts. A value of 3 is allocated to the variable for a country if it has all three policies implemented, with values of 2 given where any two of them have been introduced, of 1 when only one has been employed, and of 0 if none are adopted. This composite variable allows us to prevent the multicollinearity problem, although there is a cost in losing the information about each policy's individual effects. In this model we focus on analyzing whether a higher number of RMB policy infrastructures will increase RMB use in the FX market.

In Model II we build a partial composite variable *RQFII+RCB* and test its effect, along with the impact of *SWAP*, in view of the fact that among the three RMB policy infrastructures only *RQFII* and *RCB* are highly correlated.⁶ We allocate a value of 2 for the partial composite variable where the country holds both RQFII and RCB, 1 if it has either one, and 0 when it has neither. This model does not distinguish the individual effects of *RQFII* and *RCB*, but focuses on their aggregate impact.

In Model III, in order to prevent the multicollinearity problem and also to maximize utilization of the information available from our data, we introduce three additional *RMB policy* measures, together with *SWAP*:

- (1) *RQFII&RCB*, which is coded 1 where both *RQFII* and *RCB* are present, and 0 otherwise;
- (2) *RQFIIwithoutRCB*, which we code 1 where *RQFII* is present while *RCB* is not, and 0 otherwise;
- (3) *RCBwithoutRQFII*, which is coded 1 where there is an *RCB* but no *RQFII* participation, and 0 otherwise.

In these three additional models all of the control variables remain unchanged, except that Model III excludes the variable *Investment* due to its substantial and significant correlation (correlation coefficient: 0.71) with *RCBwithoutRQFII*.⁷ The results of regression in these models are also presented in Table 2.

The results for Model I show that the composite variable *SWAP+RQFII+RCB* does not have a significant effect on use of the RMB in FX markets, which means that the addition of an RMB policy infrastructure does not necessarily lead to any growth in RMB use. This outcome is not surprising given the regression result of our baseline model, which shows that among the three RMB policy infrastructures only an RMB clearing bank has a significant effect. This does not necessarily mean, however, that any of the three RMB policy infrastructures is ineffective. In fact, as will be discussed shortly, the results in the other two

⁶ The correlation coefficient between *SWAP* and *RQFII* is 0.33, while that between *SWAP* and *RCB* is 0.24.

⁷ When Model III includes *Investment* its regression results are almost identical with those when the model excludes it, except that *Investment* itself shows a significant negative impact.

additional models demonstrate that both RQFII participation and an RMB clearing bank have significant impacts.

In Model II, *RQFII+RCB* positively and significantly affect RMB use, while the effect of *SWAP* remains insignificant. This suggests that either participation in the RQFII or establishment of an RMB clearing bank leads to increased RMB use, and that in a country having already achieved either one the additional adoption of the other also causes RMB use to increase.

The regression results for Model III show that both *RQFII&RCB* and *RCBwithoutRQFII* have significant and positive impacts on *RMB share*, while *SWAP* and *RQFIIwithoutRCB* do not. These outcomes reveal the effects of the three RMB policy infrastructures more precisely: use of the RMB tends to grow in a country that has both an RQFII quota and an RMB clearing bank, and also in a country that has established an RMB clearing bank but does not hold an RQFII quota; however, a country's participation in the RQFII scheme without having an RMB clearing bank does not significantly affect its RMB use. The value of the coefficient of *RQFII&RCB* is 1.69, meaning that the share of the RMB in the FX market tends to be 1.69 percentage points higher in a country having both an RQFII quota and an RMB clearing bank than it is in the other countries. The coefficient value of *RCBwithoutRQFII* is larger than this, at 4.78, but there are only two countries in our dataset that have RMB clearing banks but do not participate in the RQFII scheme, and the coefficient value of the variable should thus not be overemphasized even though it shows a significant effect on *RMB share*. Note also that the insignificance of *RQFIIwithoutRCB* may be because of there being only one country that participates in the RQFII scheme but does not host an RMB clearing bank, which hinders our reaching any clear-cut conclusion with regard to the effect of that variable.

Given the results for the three alternative models, we conclude that a country's establishment of an RMB clearing bank, or this together with its participation in the RQFII scheme, significantly increases use of the RMB in its FX markets, although the effect of RQFII participation itself is not clear due to the insufficient number of observations.

Meanwhile, the insignificant impact of an RMB swap line, which has persisted in all models, may be due in part to two factors. First, some countries may intend to use RMB swap lines as additional means for enhancing financial stability during a crisis, as it guarantees a supply of foreign exchange liquidity at such times, rather than as tools to boost RMB use in tranquil times (Chey, 2013: 365). Second, the interest rate of an RMB currency swap is based upon the Shanghai Interbank Offered Rate, and in consequence the cost of using an RMB currency swap tends to be higher than that of borrowing RMB in the Hong Kong RMB market. In fact, the actual activation of RMB-local currency swaps is in practice greatly limited in most countries other than Hong Kong (Prasad, 2017: 280-81). According to the PBoC, a mere 3.5 percent of the total RMB funds available through its RMB currency swap agreements has actually been drawn (Subacchi, 2017: 122).

With regard to the control variables, trade with China has a significant and positive effect on RMB use in the FX market in all three additional models, while GDP significantly and positively influences it in Models I and III. None of the other control variables show any significant impacts in any of the models.

[Insert Table 2 here]

Robustness check

Based upon Model II—which does not have a serious problem of multicollinearity between the *RMB policy* variables and any control variables, while allowing us to distinguish the effects of *SWAP* from those of *RQFII* and *RCB*—we build and test three additional models, Models IV to VI, for robustness checks. Table 3 reports the results. In Model IV, we include Hong Kong in our dataset. This model excludes *Investment*, however, as that variable is almost perfectly and significantly correlated with another control variable, *Trade* (correlation coefficient: 0.94) when Hong Kong is included in the dataset.⁸ *RQFII+RCB*, which counts the presences of an RQFII quota and an RMB clearing bank in a country, continues to have a significant positive effect on the dependent variable, while the effect of an RMB swap line remains insignificant. Trade with China has a constant significant and positive effect. We also find that, with the addition of Hong Kong, the coefficient of the Chinese population becomes significant and positive.

In Models V and VI we disaggregate a country's trade ties with China into its export and import relations with China, respectively. A country's export relations with China—as measured by the percentage share in its GDP accounted for by its exports to China—has a significant positive impact on RMB use in its FX market, but its import ties with China—which are measured by the percentage share in GDP of its imports from China—do not. These outcomes suggest that, in the case where China is an important market for a country's exports, its exporters to China are more interested in using the RMB than are its importers from China.

With regard to the RMB policy infrastructures, *RQFII+RCB* continues to show significant and positive effects in both models, while *SWAP* is still insignificant. Additional findings of note concerning these two models are a significant adverse effect of geographical distance from China and a significant positive impact of GDP in Model V, as well as a significant positive effect of the ethnic Chinese population in Model VI. None of the other variables show any significant influences on RMB use.

[Insert Table 3 here]

Conclusion

Despite the recent substantial growth in research on RMBI, the actual use of the RMB in foreign markets has rarely been analyzed in the literature. This study has provided one of the first cross-country analyses of RMB use in foreign economies, focusing on the use of that currency in FX markets. It has found that two particular RMB policy infrastructures, participation in the RQFII scheme and establishment of an RMB clearing bank, effectively promote the international use of the RMB, while, in contrast to the conventional expectation, RMB swap lines do not have significant effects on it. These findings suggest that the RMBI to date owes largely to foreign states' policy cooperation with China—even if not all cooperative policies have their intended effects—and thereby highlights the role of states in the RMBI process. This study does not however argue that market forces have been irrelevant to the recent rise of the RMB. In fact, it has shown as well that a country's trading, in particular its export, ties with China lead to increased use of the RMB in its markets. The internationalization of the RMB has been shaped by *both* states *and* markets.

⁸ In the dataset excluding Hong Kong, the correlation coefficient between *Trade* and *Investment* amounts to a mere 0.15, and is not statistically significant.

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Table 1. Shares of RMB in FX turnover by country, in April 2016 (daily average, %)

Rank	Country	RMB share	Rank	Country	RMB share
1	Hong Kong	17.659	25	Belgium	0.148
2	Taiwan	14.997	26	Poland	0.121
3	Singapore	8.224	27	South Africa	0.071
4	South Korea	5.519	28	Mexico	0.059
5	Malaysia	2.643	29	India	0.047
6	Indonesia	2.417	30	New Zealand	0.040
7	United States	1.906	31	Finland	0.030
8	Australia	1.781	31	Chile	0.027
9	United Kingdom	1.627	31	Czech Republic	0.026
10	Germany	1.356	34	Denmark	0.012
11	Philippines	0.931	34	Austria	0.011
12	Thailand	0.787	34	Norway	0.007
13	Canada	0.715	37	Turkey	0.004
14	Japan	0.706	38	Argentina	0.000
15	France	0.579	38	Bahrain	0.000
16	Brazil	0.451	38	Bulgaria	0.000
17	Italy	0.438	38	Colombia	0.000
18	Switzerland	0.432	38	Greece	0.000
19	Portugal	0.415	38	Ireland	0.000
20	Luxembourg	0.348	38	Latvia	0.000
21	Russia	0.262	38	Lithuania	0.000
22	Spain	0.221	38	Peru	0.000
23	Netherlands	0.186	38	Romania	0.000
24	Sweden	0.181	38	Slovakia	0.000

Source: Authors' calculations from data in BIS (2016).

Table 2. Factors affecting RMB use in FX markets

	Baseline Model	Model I	Model II	Model III
RMB policy				
RMB swap line (<i>SWAP</i>)	-0.228 (-0.40)			
<i>RQFII</i>	-1.867 (-1.65)			
RMB clearing bank (<i>RCB</i>)	3.760 (3.36) ***			
<i>SWAP+RQFII+RCB</i>		0.379(1.14)		
<i>SWAP</i>			-0.655(-1.09)	
<i>RQFII+RCB</i>			0.958 (2.25) **	
<i>SWAP</i>				-0.252 (-0.48)
<i>RQFII&RCB</i>				1.693 (2.39) **
<i>RQFIIwithoutRCB</i>				1.072 (0.80)
<i>RCBwithoutRQFII</i>				4.780 (4.54) ***
Trade	0.274 (5.27) ***	0.319 (5.53) ***	0.296 (5.27) ***	0.268(5.61) ***
Investment	-0.270 (-0.91)	0.235 (0.84)	0.185 (0.69)	-
Territorial dispute	-0.723 (-0.85)	-0.170 (-0.18)	-0.382 (-0.41)	-0.677 (-0.86)
Treaty with the US	-0.484 (-1.02)	-0.527 (-0.99)	-0.665 (-1.30)	-0.656 (-1.51)
Financial center	-0.064 (-0.47)	-0.080 (-0.52)	-0.119 (-0.81)	-0.182 (-1.47)
Chinese population	-0.057 (-0.38)	-0.151 (0.92)	-0.057 (-0.35)	-0.093 (-0.67)
Distance	-0.001 (-1.17)	-0.000 (-0.88)	-0.000 (-0.98)	-0.000 (-1.44)
GDP	-0.057 (-0.38)	0.590 (1.75) *	0.468 (1.43)	0.637 (2.39) **
Eurozone	0.023 (0.04)	-0.036 (-0.06)	0.495 (0.77)	-0.099 (-0.17)
Observations	43	43	43	43
Adjusted R ²	0.766	0.693	0.720	0.801

Notes: t values in parentheses. *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Table 3. Robustness check

	Model IV (Inclusion of Hong Kong)	Model V (Trade: exports)	Model VI (Trade: imports)
RMB Policy			
<i>SWAP</i>	-0.785 (-1.12)	-0.477 (-1.03)	-0.896 (-1.11)
<i>RQFII+RCB</i>	1.339 (2.82) ***	0.71 (2.13) **	1.499 (2.69) **
Trade	0.095 (6.34) ***	0.503 (8.23) ***	0.180 (1.16)
Investment	-	0.320 (1.54)	0.109 (0.30)
Territorial dispute	0.095 (6.34)	-1.058 (-1.46)	1.158 (0.99)
Treaty with the US	0.989 (1.00)	-0.479 (-1.21)	-1.128 (-1.66)
Financial center	-0.002 (-0.01)	-0.145 (-1.28)	-0.006 (-0.03)
Chinese population	0.304 (2.01) *	-0.069 (-0.59)	0.371 (1.83) *
Distance	-0.000 (-0.60)	-0.0001 (-2.07) **	-0.000 (-0.48)
GDP	-0.295 (-1.04)	0.534 (2.22) **	-0.375 (-0.93)
Eurozone	0.492 (0.67)	0.267 (0.493)	0.478 (0.55)
Observations	44	43	43
Adjusted R ²	0.795	0.834	0.49

Notes: t values in parentheses. *, ** and *** denote significances at the 10%, 5% and 1% levels respectively.

Appendix 1. Labels of variables, and data sources

Variable	Source
RMB share	BIS
SWAP	PBoC
RQFII	PBoC
RCB	PBoC
Trade	DOTS and WEO
Investment	UNCTAD and WEO
Territorial dispute	CIA
Treaty with the US	US Department of State
Financial center	Long Finance (2015)
Chinese population	2013 Economic Year Book on Overseas Chinese
Distance	CEPII
GDP	WEO
Eurozone	European Commission

Appendix 2. Descriptive statistics

Variable	Obs	Mean	Std. dev	Min	Max
RMB share	47	1.015	2.565	0	14.997
RMB policy					
<i>SWAP</i>	47	0.617	0.491	0	1
RQFII	47	0.149	0.360	0	1
RCB	47	0.170	0.380	0	1
<i>SWAP+RQFII+RCB</i>	47	0.936	0.965	0	3
<i>RQFII+RCB</i>	47	0.319	0.695	0	2
<i>RQFII&RCB</i>	47	0.128	0.337	0	1
<i>RQFIIwithoutRCB</i>	47	0.021	0.146	0	1
<i>RCBwithoutRQFII</i>	47	0.043	0.204	0	1
Trade					
Export	47	6.418	7.06	1.643	34.887
Import	47	3.034	4.672	0.139	26.147
Investment	47	3.384	2.870	0.940	14.453
Territorial dispute	47	0.234	0.942	-0.0205	6.152
Treaty with the US	47	0.128	0.337	0	1
Financial center	47	0.681	0.471	0	1
Chinese population	47	2.894	2.267	0	6
Distance	44	11.506	2.591	5.298	16.965
GDP	46	8226.979	4174.677	955.651	19297.47
Eurozone	47	26.961	1.334	24.188	30.489
	47	0.319	0.471	0	1

Note: Hong Kong is excluded from the dataset.