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The Role of Institutions: A Cross-country Analysis of Renminbi Trading in Foreign Exchange Markets

*Marina Zucker-Marques, Pedro Perfeito da Silva**

Abstract

We explore how China's geographically targeted policies impact RMB overseas use individually or in combination. The policies include swap agreements, clearing banks, investment quotas, and direct trading between Chinese renminbi (RMB) and non-USD currencies. Adopting a fuzzy-set qualitative comparative analysis and using Bank of International Settlements cross-country data on foreign exchange markets, we find that institution building has lowered the barriers to international adoption of the RMB. Specifically, for countries economically close to China, high RMB trading is explained by either (i) having a clearing bank in the host market and direct quotations between the RMB and the local currency, or (ii) being a financial center and having access to the Chinese capital market. This combination of policies is explained by the creation of (i) "trading posts" that provide RMB liquidity abroad, and (ii) channels that allow actors to "recycle" offshore RMB funds. We triangulate our results with interviews conducted with senior People's Bank of China officials.

Keywords: foreign exchange markets, fuzzy-set qualitative comparative analysis, institutional context, international monetary system, offshore RMB trading, RMB internationalization

JEL codes: E42, F31, O24

I. Introduction

The international monetary system is strongly hierarchical and path dependent. Since the end of the Second World War, most international transactions have been concentrated in the dollar, which stands at the top of the "currency pyramid" (Cohen, 2015). Yet, there are some other currencies, like the euro (EUR), the Japanese yen (JPY), the Swiss

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franc (CHF), and most recently the Chinese renminbi (RMB), which also belong to the restricted group of international currencies and can be used beyond the borders of the issuing countries. There are several advantages for countries whose currencies operate internationally, such as seigniorage gains, macroeconomic flexibility, price stability, and political influence (Cohen, 2015; Eichengreen, 2015). But the process towards achieving the status of an international currency is an uphill battle (Matsuyama et al., 1993; Eichengreen et al., 2005). To a large extent, international currency status depends on a country's structural characteristics such as economic size, low inflation record, low real interest rate, trade linkages, financial openness, military power, and sound domestic institutions. Given that international currency adoption is highly path dependent, meeting these criteria does not guarantee that new entrants will become international currencies (Helleiner, 2008; Cohen, 2015; Eichengreen et al., 2018). Even with the increasingly global and systemic importance of emerging market economies, currencies used internationally are still highly concentrated in the USD and the EUR (Armijo et al., 2014; Cohen and Benney, 2014).

Despite these obstacles, between 2010 and 2019, the RMB climbed from the world's 35th to the 5th most used payment currency (Society for Worldwide Interbank Financial Telecommunication, 2020). The RMB trading activity in global markets has increased from 0.5 percent to 4.3 percent within 12 years (Table 1). Although its participation is still small in comparison with other international currencies, it is the only emerging market currency in the top 10 list. The Mexican peso, which is the second most traded currency from an emerging market economy, ranks at 15th position, according to the Bank of International Settlements (BIS) 2019 survey.

The RMB's trading activity is distributed unevenly among different jurisdictions. Its trading volume accounts for 17 percent of total foreign exchange transactions in Hong Kong SAR, 6.65 percent in Singapore, and 5.65 percent in South Korea. In other countries, it accounts for a small fraction of transactions in the foreign exchange market. Why is the RMB's trading activity distributed unevenly among different offshore financial markets?¹ This is the leading research question of this article.

Beginning in 2009, Chinese policymakers started to encourage the RMB's international adoption. With the priority of maintaining economic stability and preventing the RMB from becoming a mere vehicle for speculation, the Chinese leadership opted for a gradual and, to some extent, geographically targeted set of policies to encourage RMB internationalization. Specifically, by 2020, China had signed swap agreements

¹In this article, the term "offshore" refers to foreign, external, abroad from the Chinese mainland. "Offshore RMB trading" refers to RMB use in countries/regions that do not issue this currency. It does not allude to "offshore financial centers," where business is oriented to nonresidents and has a favorable regulatory environment, and low or zero taxation schemes (Zaromé, 2007).

Table 1. Currency distribution on global foreign exchange market turnover, every April from 2007 to 2019 (%)

		2007	2010	2013	2016	2019
1	US dollar	85.6	84.9	87.0	87.6	88.3
2	Euro	37.0	39.0	33.4	31.4	32.3
3	Japanese yen	17.2	19.0	23.0	21.6	16.8
4	Pound sterling	14.9	12.9	11.8	12.8	12.8
5	Australian dollar	6.6	7.6	8.6	6.9	6.8
6	Canadian dollar	4.3	5.3	4.6	5.1	5.0
7	Swiss franc	6.8	6.3	5.2	4.8	5.0
8	Chinese renminbi	0.5	0.9	2.2	4.0	4.3
9	Hong Kong dollar	2.7	2.4	1.4	1.7	3.5
10	New Zealand dollar	1.9	1.6	2.0	2.1	2.1
11	Swedish krona	2.7	2.2	1.8	2.2	2.0
12	South Korean won	1.2	1.5	1.2	1.7	2.0
13	Singapore dollar	1.2	1.4	1.4	1.8	1.8
14	Norwegian krone	2.1	1.3	1.4	1.7	1.8
15	Mexican peso	1.3	1.3	2.5	1.9	1.7
16	Other	14.0	12.5	12.4	12.7	13.8
	Total	200.0	200.0	200.0	200.0	200.0

Source: Triennial Central Bank Survey of Foreign Exchange and Over-the-counter Derivatives Markets conducted by BIS.

Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200 percent instead of 100 percent, which is adjusted for local and cross-border interdealer double-counting (i.e., “net-net” basis).

with 39 overseas central banks, established RMB clearing banks in 25 countries, granted investment quotas to institutional investors located in 21 jurisdictions via a program named RMB Qualified Foreign Institutional Investor (RQFII), and implemented direct trading between the RMB and 23 non-USD currencies (PBOC, 2020).²

Although RMB internationalization has been under the spotlight of economists and political scientists (Cohen, 2015; Subacchi, 2016; Prasad, 2017; Eichengreen et al., 2018), except for swap agreements, there is little empirical research assessing whether China’s policies have an impact on the international use of the RMB. The few available studies present conflicting results (Cheung and Yiu, 2017; Bahaj and Reis, 2020; Chey and Hsu, 2020; Song and Xia, 2020). This article aims to fill this gap by exploring the effect of regionally targeted policies on RMB trading in offshore foreign exchange markets. Rather than testing the role of individual policies, we are interested in possible policy complementarities, understood as interactions among policies that can generate a specific outcome and their synergy with market conditions (Aziz and Wescott, 1997). We also consider that as international currencies are applied for distinct objectives (e.g., investment,

²Previously, RMB and non-USD currencies had to be exchanged using the dollar as an entrepot.

credit, trade payments), there may be more than one policy combination that leads to overseas adoption of the RMB (Cohen, 1971).

For this reason, we choose to address this question by utilizing the fuzzy-set qualitative comparative analysis (fsQCA) methodology because its epistemological foundation encompasses causal complexity. In other words, fsQCA assumes that (i) the potentially relevant factors do not work in isolation but in combination with other factors (referred to as conjunctural causation), and (ii) mutually nonexclusive conditions can explain the same event (referred to as equifinality) (Schneider and Wagemann, 2012). Unlike statistical analysis, which focuses on the net effect of independent variables on dependent ones, fsQCA relies on Boolean algebra to identify if a particular policy or varied policy combinations (X) are necessary and/or sufficient for an outcome of interest (Y) to occur.³ In addition to utilizing fsQCA, this article draws on interviews conducted by the authors with senior People's Bank of China (PBOC) and commercial bank officials in 2018 and 2019, during fieldwork research, to explain how the conditions identified impact RMB trading in offshore markets.

Our findings show that China's policies do matter for RMB high trading activity in offshore markets because they create the conditions that enable firms and financial institutions to adopt the RMB. Among these policies, RMB clearing banks are the core arrangement. According to our fsQCA analysis, the absence of RMB clearing banks is a necessary condition for low RMB trading. The RMB offshore clearing banks not only work as the gateway to the RMB payment system but also serve as RMB liquidity providers in overseas markets. We also find that, for countries economically close to China, high RMB trading in foreign markets is explained by either (i) having a RMB clearing bank and direct quotation between the RMB and local currency, or (ii) being a financial center and having access to the Chinese financial system. The first sufficient path highlights the importance of creating "trading posts" in offshore centers, which contribute to the liquidity of RMB in these jurisdictions and therefore collaborate with RMB high trading activity. The second path shows the importance of opening channels for foreign residents to invest in the Chinese mainland's financial market, including channels for "recycling" the funds they receive through payments. Finally, although we recognize the role of swap agreements in RMB adoption in offshore foreign exchange markets, we believe they play a more indirect and subtle role by comparison with international trade payments and credit, as shown by Bahaj and Reis (2020) and Song and Xia (2020). Specifically, swap agreements provide the last layer of liquidity insurance to markets, increasing confidence in RMB adoption.

³A condition (X) is necessary if, whenever the outcome (Y) is observed, the necessary condition (X) is also observed. On the other hand, the condition (Z) is sufficient if, whenever the sufficient condition (Z) is observed, the outcome (Y) is also observed.

This article contributes to two debates in the discipline of international political economy. The first one is an issue in currency internationalization theory. Until now, few policies have been recognized as useful tools for galvanizing the international use of a currency (Eichengreen and Flandreau, 2012; Bahaj and Reis, 2020). Our work identifies empirically that the toolkit available to central banks for encouraging currency internationalization consists of more than offering swap arrangements to partner countries. The various policies work in synergy with each other and with the host markets' features. Moreover, we show that these policies may supplement the mechanisms that, for core currencies, are provided by market forces. Second, this article speaks to the debate on the structure of the global monetary system. It is widely claimed that there is only room for one international currency (Kindleberger, 1967; Krugman, 1984; Matsuyama et al., 1993). Our findings challenge this assumption by showing that the international use of currencies is connected to whether the market institutions are well established. There may thus be room for more currencies in the international system under a different market institutional setting. We do not downplay the importance of a country's economic size, financial openness, low inflation record, among other factors shaping its currency's international status. However, by providing a cross-country analysis of RMB trading in offshore foreign exchange markets, we shed light on institutions' role in the currency internationalization processes.

The remainder of the paper proceeds as follows. Section II discusses the article's theoretical framework. Section III explains the methodology used for this study, namely fsQCA, and the advantages of using this methodology for researching currency internationalization processes. It also introduces the data that are analyzed. Section IV presents and discusses the main findings. Section V concludes.

II. Theoretical framework

The main difference between domestic and international transactions, a scholar on international currencies would argue, is the degree of freedom actors have when adopting a currency. For transactions within a country/region (or monetary union), firms and financial institutions are obliged to use the legal tender. In an international monetary system that lacks a supranational currency, actors are not legally compelled to adopt any particular domestic currency in the international business.

The absence of legally binding regulations does not result in a balanced adoption of domestic currencies in the international monetary system. On the contrary, by any measure, currency adoption is highly concentrated in a few currencies, especially the USD (Cohen and Benney, 2014; Iancu et al., 2020). The literature on currency internationalization

explains this pattern by highlighting two converging forces. On the one hand, as a result of economies of scale and network externalities, economic actors have incentives to use the currency of the leading economic power (Kindleberger, 1967; Krugman, 1984; Black, 1991; Rey, 2001). On the other hand, the existence of cross-border costs, and the smaller capital market of peripheral countries, discourage actors from diversifying currency adoption (Kindleberger, 1967; Eichengreen et al., 2005). Thus, if currency adoption in the international monetary system relies only on market forces, emerging market economies will remain in a subaltern position in the hierarchy of international monies.

This article sheds light on the role of institutions as tools to lower the barriers faced by emerging market currencies in their efforts towards international adoption. We define institutions, following North (1990), as “the rules of the game,” which constrain individual choices, enable behavior, and reduce uncertainty. Institutions can be formal or informal, evolving or being created. In this article, we are specifically interested in creating formal institutions that enable RMB adoption in overseas markets.

Until recently, the role of institution building in currency internationalization has been neglected in scholarship, with a few exceptions. For instance, Eichengreen and Flandreau (2012) show how the Federal Reserve System shaped financial infrastructures and built financial markets – specifically the dollar-denominated trade credit – to jumpstart the international use of the USD at the beginning of the 20th century. Song and Xia (2020) and Bahaj and Reis (2020) show that, since 2009, the Chinese central bank has used similar methods and also improved conditions for RMB use in international trade payments by offering swap agreements to central banks around the globe (39 agreements by 2020). Finally, Fritz et al. (2012) show that institutional building has also been used as a collective strategy to encourage local currency cross-border use, as cases of regional payment arrangements provide evidence.

This article aims to contribute to this debate by showing how the Chinese strategy of currency internationalization focuses on institutional building in overseas markets. It also examines how and to what extent these policies influence the overseas adoption of the RMB. We do not downplay the role of market forces in shaping RMB internationalization and RMB trading in offshore markets. Nevertheless, we believe that PBOC policies have played an important role throughout this process. Cheung et al. (2019), who analyze the diffusion of RMB trading in offshore markets, show that RMB trading is converging with the pattern of other international currencies. We agree with them that this tendency may reveal market forces, but the authors show that, in comparison with other emerging market economies currencies, RMB geography is changing much faster. In our view, this velocity may indicate that market forces are receiving an additional push from the visible hand of institutions (or of the state).

III. Research design

This section will first explain the assumptions, advantages, and procedures of our selected methodology, fsQCA. Following this, we introduce the data and the calibration criteria of our fsQCA.

1. Set theoretical methods and fsQCA

In methodological terms, this article seeks to offer a new perspective for investigating the drivers of currency internationalization by paying attention to the regularities underlying the adoption of RMB in different countries instead of estimating the net impact of individual variables. To do so, we rely on set-theoretic methods. The benefits of this approach lie in its assumption of causal complexity, which is based on three elements: (i) conjunctural causation, (ii) equifinality, and (iii) asymmetrical causation. Conjunctural causation indicates that a given outcome depends on a combination of causes instead of a single factor in isolation. Equifinality means that an event may be the consequence of several distinct conditions or a combination of conditions. Finally, asymmetrical causation indicates that if a given factor leads to a particular outcome, it does not imply that the nonoccurrence of this factor will automatically result in the absence of the outcome (Ragin, 2008; Schneider and Wagemann, 2012).

Although set-theoretic methods are rare in economic research, causal complexity is embedded in economists' reasoning, as demonstrated by the literature on international currencies. For example, in line with the notion of conjunctural causation, it is considered that a combination of factors (e.g., economic size, trade linkages, and price stability) – impact the status of a currency in international markets (Helleiner, 2008; Cohen, 2015).

Similarly, equifinality is recurrent in economic phenomena. For instance, Eichengreen et al. (2005) show that the ability of a country to issue foreign debt in local currency (thereby avoiding the “original sin”) is explained by a country's economic size (as in the case of the US) or by its historical role as a financial center (as in the case of Switzerland).

Finally, economic research has also investigated many cases of asymmetrical causation. For example, while balanced budgets are recognized as a pre-condition for currency internationalization (Walter, 2006), increasing the internationalization of a currency does not improve its country's fiscal soundness. The impact is often the opposite because monetary leaders exploit their privileged position to ease monetary constraints, and during times of crisis, they offer liquid assets to alleviate market conditions (Cohen, 2015; McCauley and Schenk, 2020).

For Ragin (2008, p. 13), “... theory formulated in terms of set relations should be evaluated on its terms, that is, as statements about set relations, not about correlations.”

Thus, given that the currency internationalization process has an affinity with set relations, this article adopts a set-theoretic method.

From among the family of set-theoretic methods, we use the fsQCA, which is the most formalized. Comparing fsQCA with statistical analysis is the simplest way to understand how this method functions. While statistical analysis focuses on the net effect of independent variables on dependent ones, fsQCA identifies underlying complex conditions (X) that lead to an outcome of interest (Y).⁴ These conditions are then interpreted as necessary (the condition is a superset of the outcome) or sufficient (the condition is a subset of the outcome). The fsQCA approach is considered the gold standard of set-theoretic analysis. It allows the use of qualitative and quantitative information to establish differences in kind among cases and differences in degree within the same category. Taking economic regimes as an example, fsQCA would allow researchers to separate capitalist economies (e.g., the US) from non-capitalist economies (e.g., Cuba) and also to make comparisons within a group (e.g., the US is more capitalist than France). Unlike conventional statistical analysis, fsQCA requires calibration of the variables into set membership. In other words, based on agreed standards and theoretical knowledge, the researcher must determine a threshold that separates membership from nonmembership (fuzzy value = 0.5), as well as qualitative anchors that determine the stage at which the condition is deemed fully present (fuzzy value ≥ 0.95), and fully absent (fuzzy value ≤ 0.05) (Ragin, 2008; Schneider and Wagemann, 2012).

To express the objectives of this article in fsQCA terminology, we seek to identify which individual or complex conditions are necessary and/or sufficient for countries to adopt different regimes of RMB offshore trading activity. More specifically, we classify the cases as high or low RMB adoption, using fsQCA to identify necessary and/or sufficient conditions for each one of these outcomes. Although we agree with Ragin (2008) regarding the importance of calibration based on external standards instead of self-referring to distribution within the adopted dataset, currency internationalization from emerging market economies is a relatively novel phenomenon. In the absence of agreed standards on this topic, we chose criteria for the conditions based on our specific knowledge of the subject. With full transparency, we present the logic applied to define the membership criteria for both the outcome and the relevant conditions.

2. Outcome

Given that our analysis focuses on national currency adoption in global foreign exchange markets, we rely on the Triennial Central Bank Survey conducted by the BIS. As far as we are aware, this survey is the most comprehensive source of information on the global foreign exchange market, covering 53 jurisdictions in its most recent survey and several currencies. It has been conducted since 1980, and it takes place in April of each year.

⁴Complex conditions refer to combinations of different individual conditions.

Based on the BIS survey information, we calculate the RMB market share in 51 jurisdictions for 2010, 2013, 2016, and 2019.⁵ We excluded the Chinese mainland from the whole dataset because it is the RMB's issuing jurisdiction, and Taiwan province because of lack of data on explanatory conditions. As data for the United Arab Emirates are only available for 2019, our dataset contains 201 observations in total. In this article, we refer to each observation as a case. Note that a case does not indicate a particular jurisdiction but a jurisdiction in a given year.

We then separate the cases into two regimes of RMB trading activity: low and high. The threshold that separates the regimes is based on other widely used currencies' market share in offshore centers. We consider that if a given jurisdiction has RMB trading activity as high as the average of other top traded currencies, then it has a high RMB regime. There are over 160 currencies globally;⁶ we have calculated the simple average of the top 15 currencies' relative participation in offshore markets in 2019 (Table 2).

Table 2. Market share of top traded currencies in foreign exchange offshore markets in 2019 (%)

Position	Currencies	Market share
1	US dollar	81.78
2	Euro	38.93
3	Japanese yen	4.47
4	British pound	6.99
5	Australian dollar	2.57
6	Canadian dollar	1.60
7	Swiss franc	3.43
8	Chinese renminbi	1.26
9	Hong Kong dollar	0.90
10	New Zealand dollar	0.79
11	Swedish krona	1.45
12	South Korean won	0.27
13	Singapore dollar	0.77
14	Norwegian krone	1.16
15	Mexican peso	0.60
Position 3–7 (simple average of market shares in 2019)		3.81
Position 9–15 (simple average of market shares in 2019)		0.85

Source: Authors' elaboration based on 2019 Triennial Central Bank Survey conducted by BIS.

Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies is not 100 percent.

⁵Our data sample comprises the following countries/regions: Argentina, Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, South Korea, Latvia, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Arab Emirates, United Kingdom, and United States. For United Arab Emirates, data are available only for the 2019 survey.

⁶Based on the International Bank Account Number.

Based on this information, we calculated the simple average of currencies above and below the RMB in the list, excluding the USD and the EUR, because they are vehicle currencies. In practical terms, this provides the average of Japanese yen, British pound, Australian dollar, Canadian dollar, and Swiss franc as the anchor for full membership in the outcome “high,” which amounts to 3.81 percent. We have adopted the anchor of 0.85 percent for the minimum membership threshold, which is the average of the currencies from the 9th to the 15th position, namely the Hong Kong dollar, Swedish krona, South Korean won, Singapore dollar, Norwegian krona, and Mexican peso. Although the minimum membership threshold may seem easy to cross, it is important to bear in mind that currency adoption in global foreign exchange markets is very hierarchical and concentrated in the USD and the EUR.

3. Explanatory conditions

This section presents the explanatory conditions, their operationalization, and calibration criteria. Given our interest in exploring the role of official policies in RMB trading in offshore clearing markets, we have included all policies that present regional variation as our explanatory conditions. They are: (i) if the country/region has signed a swap agreement with China or not; (ii) if the jurisdiction has an offshore RMB clearing bank or not; (iii) if the jurisdiction has RQFII investment quotas to access China’s financial market or not; (iv) if the jurisdiction’s local currency has direct trading with RMB or not. Apart from the policies already mentioned, we also consider that overseas markets’ economic and financial characteristics may affect RMB offshore trading activities. We have therefore also included the following conditions: (v) if the host country/region is economically close to China or not; (vi) if the jurisdiction is a global financial center.

We understand that other conditions discussed in the literature of currency internationalization (e.g., RMB inclusion on special drawing right, debt levels, GDP growth, financial account liberalization, inflation record, and among others) are important for RMB use in offshore trading activity. Yet, we refrain from including them in the analysis for two main reasons.

First, in statistical analysis, models may not rely on unlimited independent variables without excessive loss of degrees of freedom. In the face of limited diversity,⁷ qualitative comparative analysis (QCA) must also be careful about including explanatory conditions

⁷Qualitative comparative analysis solutions are based on truth table minimization, composed of all possible combinations among the explanatory conditions. However, because of limited diversity – that is, the absence of concrete cases to cover all potential combinations – it is not possible to ascertain if each combination of conditions leads to the outcome of interest. Even with simplifying assumptions, the excessive number of conditions tends to increase the ambiguity of solutions.

to avoid generating ambiguous solutions. For our number of cases (201), we judge it is adequate to limit the fsQCA to six explanatory conditions.⁸ These conditions cover all the policies we are interested in and the plausible host market characteristics that may affect RMB trading. Moreover, this number creates a ratio between conditions and the number of cases that ensure a negligible chance that our result is random (Marx, 2006).

Second, our focus is to understand the reasons underlining cross-country differences and explore the role of geographically targeted policies. Given the emphasis on this analysis, we abstain from incorporating changes in Chinese mainland characteristics like inflation record, GDP growth, liberalization of capital flows, exchange rate fluctuation, foreign exchange volume, etc. The main reason for this decision is that, in a given year, these factors affect all jurisdictions equally and, therefore, could not explain cross-country differences.

We are aware that our sample includes different time periods and that our analysis should ideally incorporate the conditions mentioned above. However, we judge that including them could bring more risks than benefits.

Furthermore, there is an alternative way to grasp the importance of these conditions. Specifically, if our result shows a prevalence of 2019 cases, we can deduce that these factors are relevant. On the other hand, if our results show a similar proportion (around 25 percent) in cases from 2010, 2013, 2016, and 2019, with no year prevalent, we can assume these variables are less relevant.

Given this possibility of grasping the importance of the conditions mentioned above without risking the fsQCA's soundness (adding more explanatory conditions), we prefer to refrain from including conditions related to the evolution of the Chinese mainland's economy and focus on the geographically targeted policies and the characteristics of the foreign markets (detailed in the following subsections).

(1) Currency swap agreements

Currency swap agreements (CSA) are arrangements between central banks, which allow them to provide foreign currency liquidity to resident commercial banks (Destais, 2016; Nozahie and Ibrahim, 2017). The existence of CSAs dates back to the 1960s, and they were significantly expanded during the 2008 global financial crisis and the 2020 COVID-19 crisis. Historically, CSAs have served different purposes for beneficiary central banks, such as managing exchange rates, avoiding yield spikes in offshore markets, and precautionary measures against crises (McCauley and Schenk, 2020; Kring et al., 2021). In

⁸Fuzzy-set qualitative comparative analysis is a relatively novel methodology, and therefore, the methodological consensus is not fully developed. However, there is an informal rule of thumb in fsQCA researches that the number of conditions (X) should be limited by the sample size (Y): $2^X \leq Y$.

2009, the PBOC started to offer swap agreements to partner central banks. Besides serving as crisis insurance, the arrangements have also been designed purposefully to facilitate RMB trade and investment. As Bahaj and Reis (2020) demonstrate, signing a CSA with the PBOC increases the probability of using the RMB for trade payments by 20 percent. In this study, we check whether CSA and its combination with other policies also impact RMB foreign exchange trading in the offshore markets.

Information on China's CSAs was provided by the PBOC (2020), including the signing and expiration dates, as well as the volume of each agreement. With this information, we calculated the agreement volume of each case on the date of the BIS survey.⁹ For the euro area, the PBOC has a swap agreement with the European central bank instead of individual central banks. For euro area countries in our dataset, we therefore calculated the weighted average of the swap amount considering each country's GDP.

To convert swap amount to membership, we considered 0.8 billion RMB as the indifference point,¹⁰ slightly inferior to the lowest value in our dataset (RMB0.81 billion for Latvia in 2016). Hence, all cases that had a valid agreement on the survey date are above the cross-over point of this condition. We also set the full membership anchor at RMB350 billion (existence of a swap agreement of large extension), and 0 as the criteria for non-membership (lack of swap agreement). The criterion for full membership was based on the average of Hong Kong SAR's agreements from 2010 to 2019. Since the beginning of RMB internationalization, Hong Kong SAR has been a RMB internationalization "testing ground" in terms of pioneering policy implementation and its high volume of arrangements (Cheung, 2012). For policy conditions in this study, we consider that a certain case is a full member of the condition if it has a policy at least equal to Hong Kong SAR's.

(2) RMB offshore clearing banks

Renminbi offshore clearing banks refer to designated commercial banks operating in overseas markets that are allowed to operate in RMB.¹¹ Specifically, these banks offer RMB-denominated accounts to overseas financial institutions and firms, hold RMB deposits, offer loans, and provide clearing and settlement services (PBOC, 2020). According to a PBOC senior official¹² and a Bank of China director,¹³ RMB clearing

⁹The survey does not have a specific date, so we assigned April 15th for our calculation.

¹⁰"Indifference point," "cross-over point," and "minimum membership threshold" are used interchangeably.

¹¹All RMB offshore clearing banks' information is from the Industrial & Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China, and the Bank of China, with the exception from New York (J. P. Morgan) and Tokyo (Mitsubishi).

¹²Interviewed in Beijing, November 2019.

¹³Interviewed in Shanghai, September 2019.

banks also serve as RMB market makers, liquidity providers, and offer RMB-denominated financial products to resident financial institutions.

A 2020 PBOC report offers information about the date of establishment and the location of all RMB clearing banks (PBOC, 2020). We assume that the age of each clearing bank can impact RMB offshore trading activity because, over time, resident financial institutions can gradually rely on the clearing bank's services. Using PBOC (2020) information, we therefore verified the number of days each clearing bank has operated in a jurisdiction since their establishment, ranging from 66 to 3,573 days. To classify all cases with an operational clearing bank into this condition's set, we defined 65.99 days as the cross-over point (minimum membership score). In line with the criteria adopted for other policy variables, we defined 1,929 days as the full membership score, because this is the average of Hong Kong SAR's cases covered by our analysis. Finally, zero days is the qualitative anchor for a being non-member of this condition's set.

(3) Investment quotas

Several scholars have emphasized the relationship between capital flows liberalization and currency internationalization (Yu, 2014; Cohen, 2015; Eichengreen, 2015). Chinese policymakers have been opening their financial accounts gradually and in a controlled manner via the creation of investment schemes (Prasad, 2017).¹⁴ Regarding financial inflows, three main programs give foreign residents access to Chinese mainland's capital market: the Hong Kong SAR bond connect, the Qualified Foreign Institutional Investors scheme (QFII), and the RQFII. All these schemes stipulate maximum quotas for foreign investors accessing the Chinese mainland's capital markets.

For our fsQCA analysis, we consider only information on RQFII, which was created in late 2011 and liberalized in late 2019. There are two reasons for considering this scheme. First, it is the only program that concedes investment quotas to jurisdictions instead of individual investors, and so it is the most adequate for our focus on cross-country analysis. Second, unlike other programs, RQFII allows investors to use RMB directly from offshore centers to invest in the Chinese mainland. In contrast, the QFII requires that investors first transfer USD or hard currencies to China and, then, exchange RMB on the Chinese mainland (Prasad, 2017; Shenzhen Stock Exchange, 2018). Therefore, unlike QFII, the use of RQFII can impact RMB foreign exchange activities.

To convert RQFII information into set membership, we considered the existence of a quota agreement with China for each country/region in a given year according

¹⁴According to the sixth edition of the IMF's Balance of Payments and International Investment Position Manual (BMP6), capital inflows and outflows are recorded in the financial account, which were recorded in capital account in BMP5.

to information provided by PBOC (2020). To encompass all jurisdictions with RQFII quotas as members of this condition, we defined RMB49.99 billion as the minimum membership score because the smallest quota extended to a country/region was RMB50 billion. Following the criteria adopted for other policy conditions, we considered that if a country/region has RQFII quotas as high as Hong Kong SAR's average, then it has a quota of large extension. Hence, we set RMB225 billion as the upper bond threshold and the absence of a quota agreement as the lower bond threshold.

(4) Direct trading between the RMB and local currencies

In 2019, over 88 percent of all foreign exchange market transactions involved the dollar. This figure demonstrates not only the weight of the American economy, but also the role of the dollar as a “vehicle currency.” In other words, non-USD currencies are usually only traded directly against the dollar, then, when agents from peripheral countries want to complete an exchange with each other, the dollar must be used as an entrepot (Devereux and Shi, 2013). In the aggregate world economy, the existence of a vehicle currency can improve the efficiency of markets (Krugman, 1984). But the benefits of vehicle currencies are not equally distributed among market participants. While residents of a vehicle currency-issuing country always benefit, residents of peripheral countries may lose when exchanging with partners from other peripheral economies because they need to exchange currencies twice, which imposes additional costs.

In 2010, the China Foreign Exchange Trade System (CFETS) introduced new currency pairs with the RMB. Today, in addition to the US and Hong Kong dollars, the RMB is traded directly against 23 other currencies. The CFETS is in Shanghai and, according to official information, by January 2021, it had 15 offshore RMB clearing banks and 71 foreign central banks as members (CFETS, 2021). This information provides evidence that foreign market participants may also have access to involve in foreign currency trading.

According to the Bank of Korea (2020), since the establishment of new currency pairs, some actors have reduced the use of the dollar as an entrepot: “As the won-yuan direct trading replaced the previous system of two stage trading, consisting of the initial won-dollar trade and the subsequent yuan-dollar trade, trading costs fell and big companies took the lead in using the yuan to pay more trade settlements, which also raised the ratio of yuan-based payments for trade settlements to China.”

Bearing this in mind, we included the direct quotation of the RMB against non-USD currencies as one of our conditions. The CFETS website provides information on local currencies traded directly against the RMB and the date of the introduction of each currency pair. We assume that, as well as noting the currencies involved in direct trading, it is also important to consider how long each currency pair is available for

market participants. So, we calculated how long the trading between the RMB and each local currency had been available to market participants by the time of the BIS survey. Regarding the calibration, we consider 4.99 days the indifference point because the lowest value in our database is 5 days, which allows us to include all cases in which currencies are traded directly with the RMB. Unlike other policy conditions in our dataset, we could not take Hong Kong SAR as the reference because this currency has historically traded against the RMB. We adopt 3,162 days as the upper limit because this is the length of time before the first non-USD currency pair was introduced (i.e., Malaysian ringgit).

(5) Economic proximity

As well as considering policies, we include whether each jurisdiction is economically close to China as a condition. To assess the existence of this condition, we used information from the UN Comtrade database. We calculated trade (exports and imports) with China as a percentage of a country's total international trade for each year.¹⁵ To convert this measure into set membership, we considered the degree of connectedness between China and the US, and between the Chinese mainland and Hong Kong SAR. We presume that if a given case is as economically close to China as the US, then this case is a member of the condition "economic proximity." Hence, we defined the indifference point as 15.2 percent, which is the average of the data for the US in 2010, 2013, 2016, and 2019. By the same logic, we consider that if a jurisdiction is as close to the Chinese mainland as the Hong Kong SAR, it is very close to China. The full-membership threshold was therefore fixed at 43 percent, which is Hong Kong SAR's average. The lower bound limit stands at 0 percent.

(6) International financial center

Our last condition is whether a given jurisdiction is an international financial center, which can be defined as hubs that attract financial institutions and flow from around the world. The reason for selecting this condition is the high trading of foreign currencies in these centers and their capacity to issue bonds in currencies besides their own (Park and Essayad, 1989).

The operationalization of this explanatory condition was based on the International Monetary Fund (IMF)'s Financial development index (Svirydzenka, 2016). This dataset is normalized within a 0–1 scale, so we set the qualitative anchors at 1 (fully developed) and 0 (fully non-developed). Considering that financial markets and the international financial

¹⁵We did not include information on bilateral financial connectedness because of data unavailability.

center are organized hierarchically (Kindleberger, 1973; Poon, 2003), we identify the threshold of 0.7199 as the indifference point, which breaks down our sample between the top 10 percent of most financially developed jurisdictions and the remaining 90 percent. Table 3 summarizes the explanatory conditions incorporated in our fsQCA analysis.

Table 3. Summary of the fuzzy set qualitative comparative analysis conditions

Conditions	Explanation	Operationalization	Anchor points	Sources
Swap	If the country/region's central bank has a valid local currency swap agreement with the PBOC	Size of bilateral swap agreement (RMB billion) For Euro area: average based on GDP	Fully in: 350 Cross-over: 0.8 Fully out: 0	PBOC (2020)
Clearing bank	If the country/region has an offshore RMB clearing bank	Duration of operation of clearing banks in country/region (days)	Fully in: 1929 Cross-over: 65.99 Fully out: 0	PBOC (2020)
Investment quotas	If the country/region has RQFII scheme to access China's financial market	Size of RQFII quotas (RMB billion)	Fully in: 225 Cross-over: 49.99 Fully out: 0	CFETS
Direct trading	If the country/region's local currency has direct trading with the RMB	Duration the trading between the RMB and a given local currency is available	Fully in: 3162 Cross-over: 4.99 Fully out: 0	PBOC (2020)
Economic proximity	If the country/region is economically closer to China	Sum of the imports from and exports to China as a percentage of the country/region's total trade	Fully in: 0.43 Cross-over: 0.152 Fully out: 0	UN Comtrade database
Financial center	If the country/region is financially developed	Index scale 1: fully developed; 0 : fully underdeveloped	Fully in: 1 Cross-over: 0.7199 Fully out: 0	IMF's financial development index

Notes: CFETS, China Foreign Exchange Trade System; IMF, International Monetary Fund; PBOC, People's Bank of China; RQFII, RMB Qualified Foreign Institutional Investor; UN, United Nations.

IV. Findings and discussion

After defining and calibrating the explanatory conditions and outcomes of interest, this section presents the main findings of the fsQCA. Specifically, we discuss the complex conditions that are necessary and sufficient for the adoption of each regime (high and low) of RMB offshore trading.

There are two key measures for evaluating sufficient solutions: coverage and consistency. The first refers to the extent to which the solution explains the outcome of interest, showing the empirical importance of causal combination. Although low coverage may reveal empirically less relevant causal combinations, high coverage is not necessarily desirable because it can only characterize a truism. Consistency, in turn, shows the extent to which the cases covered by the solution have membership in the outcome of interest. The QCA literature recommends a minimum consistency threshold of 0.85, especially for macro-level data, as in this article (Ragin, 2008; Rubinson et al., 2019).

This threshold is only a rule of thumb, however, because consistency thresholds depend on each truth table's analysis and the identification of discontinuities or gaps in the table. For our case, we defined the consistency threshold at 0.925.

There are three types of solutions for truth table minimization: conservative, most parsimonious, and intermediate. The conservative solution is based only on combinations of conditions observed in at least one of the cases covered. The most parsimonious solution incorporates some logical remainders – that is, the combinations of conditions that are not covered by any cases – and aims to find the least complex solution possible. Finally, the intermediate solution falls in between most parsimonious and conservative solutions, seeking some balance between theoretical plausibility and parsimony.

For each regime, we obtain and interpret the most parsimonious solution.¹⁶ Since the goal of this article is to uncover a causal relationship, we follow Baumgartner (2015, p. 854) that “... only the most parsimonious solution formulas of QCA are guaranteed to reflect causation.” As there are no incoherent counterfactuals with our selected explanatory conditions, there is no risk associated with choosing the most parsimonious solution for our analysis.

As explained in the introduction, this article focuses on the conditions underlying the high use of RMB offshore trading. However, understanding the determinants of low adoption of RMB also contributes to the main objective. We therefore performed the fsQCA for both outcomes to see which individual or complex conditions would be sufficient to produce the outcomes of interest.

Finally, following Skaaning (2011), we performed three types of robustness checks for the high and low regimes (which can be found in the Appendix A and Appendix B). Specifically, we changed the calibration threshold, the outcome anchor, and the excluded part of our dataset. All tests confirmed the robustness of our fsQCA analysis (Skaaning, 2011).

1. RMB high trading in offshore markets

In the most parsimonious solution for high regimes of RMB use in cross-border transactions, we found two sufficient paths (Table 4). Path 1 refers to jurisdictions that are economically close to China, have a RMB offshore clearing bank, and whose local currency has direct trading with the RMB. Path 2 also includes countries that are economically close to China, but in this case they also have financial centers with quotas to access the Chinese mainland's capital market. We did not find any necessary conditions for high RMB trading.

¹⁶In addition to the minimum consistency threshold of 0.925, we set the minimum threshold for the proportional reduction in inconsistency at 0.6 to exclude combinations that could be associated with either the occurrence or the absence of the outcome of interest.

Table 4. Most parsimonious solution for the high regime of RMB trading in offshore foreign exchange markets

	Path 1	Path 2
Clearing bank	•	
Currency direct trading	•	
Investment quotas		•
Swap		
Financial center		•
Economic proximity	•	•
Raw consistency	0.963	0.957
Raw PRI	0.898	0.864
Raw coverage	0.496	0.468
Unique coverage	0.057	0.029
Solution consistency		0.937
PRI		0.838
Solution coverage		0.525

Source: The authors' calculation.

Notes: “•” represents the condition is present. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

Table 5 summarizes the cases that are covered by each solution term. Given the low unique coverage of the solutions (0.057 and 0.029, respectively), many cases can be explained by both paths. This does not contradict our analysis because the conditions in path 1 may complement the role played by the combination of conditions in path 2.

Table 5. The typical case for high regime solution terms

Solution	Cases
Solution 1	Australia 2019, Australia 2016 , Hong Kong SAR 2010 , Hong Kong SAR 2013, Hong Kong SAR 2016, Hong Kong SAR 2019, Japan 2019, South Korea 2019, Malaysia 2016 , Malaysia 2019 , Thailand 2019, and US 2019
Solution 2	Australia 2019, Hong Kong SAR 2013, Hong Kong SAR 2016, Hong Kong SAR 2019, Japan 2019, South Korea 2016 , South Korea 2019, Thailand 2019, and US 2019

Source: The authors' calculations.

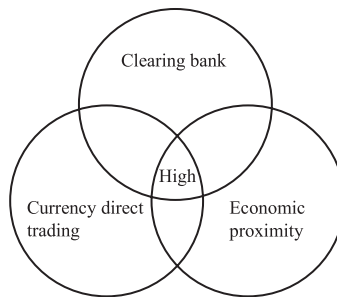
Note: Boldface indicates cases only explained by solution 1 or solution 2.

Note that there is a predominance of cases related to 2016 and 2019. Apart from promoting geographically targeted policies, Chinese policymakers have steadily advanced financial account and foreign exchange market liberalization. In September 2016, the RMB was introduced in the IMF's special drawing right basket (PBOC, 2020). We believe the preponderance of the 2016 and 2019 cases indicates the importance of these gradual measures.

(1) Solution 1: Setting up trading posts

According to the first solution, countries that are economically close to China, have operation clearing banks, and have direct trading between RMB and the local currency show high RMB trading in the host foreign exchange market. Figure 1 illustrates these situations using a Venn diagram.

Figure 1. Venn diagram for high regime, Solution 1



Source: Authors' drawing based on a Venn diagram.

We explain the first path as the creation of RMB “trading posts” in overseas markets. According to Devereux and Shi (2013, p. 98), trading posts are “locations where agents can buy or sell one currency to another.” In other words, they provide liquidity for a given currency to offshore markets. Operating trading posts in offshore markets involves fixed costs, at least in terms of the staff forming a financial institution that manages this trading post. For this reason, there are no trading posts for all currencies in all financial centers, and economic agents end up choosing a vehicle currency (today, USD). Left to private initiative, trading posts for peripheral currencies may not be viable. But for governments willing to encourage the internationalization of their currencies, or at least to minimize dependence on the vehicle currency, creating trading posts for their own currencies abroad is a solution.

To function, trading posts for emerging market currencies need two elements: first, a market where the emerging economy currency and the local currency can be exchanged, and second, a dealer that can execute the exchange. The first element is provided by the CFETS initiative to create new currency pairs between the RMB and non-USD currencies. The dealer’s role, in turn, is assumed by the clearing bank. As it was explained during an interview with a senior PBOC official, a clearing bank can be a market maker, or a liquidity provider for the local market, for the RMB.¹⁷ The

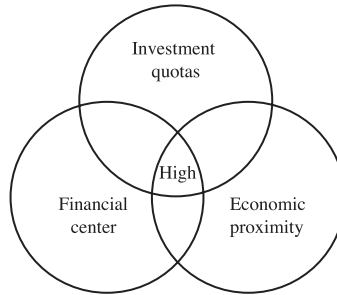
¹⁷Interviewed in Beijing, November 2019.

RMB trading posts can function in offshore markets because most clearing banks do have access to CFETS. Naturally, without demand for RMB, these mechanisms alone would not explain the RMB high trading activity in offshore markets, but the economic proximity to China fuels demand for RMB trading.

(2) Solution 2: Investment channels and the “recycling” of RMB offshore funds

According to our fsQCA analysis, a second path to RMB high trading in offshore foreign exchange markets includes the following: jurisdictions that are economically close to China, are financial centers, and have RQFII quotas to access the Chinese mainland’s capital markets. Figure 2 provides a visual representation of this solution.

Figure 2. Venn diagram for “high” regime, Solution 2



Source: Authors’ drawing based on a Venn diagram.

Imagine a Chinese company that uses RMB to pay a German supplier; subsequently, this supplier sells RMB for euros to an institutional investor willing to invest in the mainland’s bond market. This example illustrates the mechanism for the “recycling” of the RMB offshore funds, which the second fsQCA path indicates. According to the fsQCA solution, countries that are commercially close to China, are financial centers, and have RQFII quotas to access China’s financial market have a high use of RMB in foreign exchange markets.

Aware of the instability that a full financial account liberalization could bring, China’s policymakers have been exploiting the country’s international trade prominence to advance RMB internationalization (Yu, 2014; Subacchi, 2016). Nonetheless, “... the choice of currency for denomination and settlement of trade flows depends on the extent to which that currency can also be used in international financial transactions” (Prasad, 2017, p. 107). Thus, it soon became imperative for China to create channels for nonresidents to invest in the country. As early as August 2010, the PBOC started to

allow foreign central banks, clearing banks in Hong Kong and Macau SARs, and other selected overseas banks to use RMB offshore funds obtained through the cross-border trade and investment pilot program as the means to participate in the Chinese interbank bond market (PBOC, 2010). As Li Bo, a former PBOC director, has explained in a press release (PBOC, 2011; translated by the authors from Chinese):

“In order for the RMB to ‘go out’ serving trade and investment needs, it is necessary to solve the problem of the source and use of overseas RMB funds, by providing channels for the use and preservation of the value of overseas RMB, and setting up a cross-border circulation path for RMB funds.”

According to an interview conducted with a PBOC official, the importance of creating the RQFII scheme was to increase chances for foreigners to accept RMB for trade and foreign direct investment purposes.¹⁸ According to the same interviewed official, the establishment of financial investment opportunities is not understood by Chinese policymakers as an objective per se but as a tool to increase the payment function attractiveness of the RMB. As a senior PBOC official explained in an interview, use of any currency, should be based on the fundamentals.¹⁹ This means the demand in the real economy. So, demand from trade should be the number one source of demand for the internationalization of any currency.

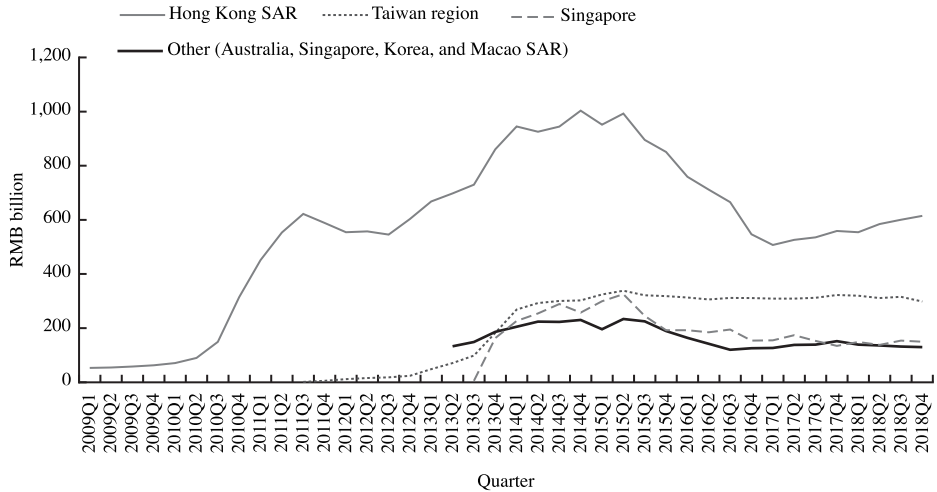
Apart from the demand for trade payments, other factors have also boosted the interest of financial institution investors in RMB-denominated assets: China’s economic growth prospects, the relatively higher interest rate of Chinese government bonds, and the inclusion of RMB bonds in the main index providers, such as MSCI and J. P. Morgan (Lardy and Huang, 2020). Countries/regions, being financial centers, economically close to China, and having RQFII quotas, therefore have an adequate environment for RMB cross-border circulation. This assures demand for RMB for payment and investment purposes and enables investors to return payments through the RQFII program.

According to an interview with a senior PBOC official, there are other alternatives for “recycling” RMB funds besides using RQFII quotas to invest in the Chinese mainland. One of these is maintaining RMB-denominated assets in deposits overseas or purchasing a negotiated certificate of deposits from a Chinese bank overseas. Although there is no integrated information about total RMB deposits and certificates of deposits abroad, Figure 3 provides data for regions that disclose it.

¹⁸Interviewed in Shanghai, November 2018.

¹⁹Interviewed in Beijing, October 2019.

Figure 3. Overseas RMB deposits and certificates of deposits held by residents and nonresidents of selected countries, (RMB billion)



Sources: Authors' elaboration based on data from Hong Kong Monetary Authority, People's Bank of China, Central Bank of Australia, Monetary Authority of Singapore, Bank of Korea, Monetary Authority of Macao Bank of England, and China Foreign Exchange Trading Center.

Another way to “recycle” RMB offshore funds is to invest in RMB-denominated bonds and shares in offshore financial centers. This opportunity is still restricted to only a few regions, such as Hong Kong SAR (Hong Kong Monetary Authority, 2016), Germany (China Europe International Exchange, 2015), the UK (London Stock Exchange Group, 2021), and Luxembourg (Luxembourg for Finance, 2021).

In September 2019, Chinese policymakers decided to remove the RQFII quotas assigned to each financial center so that they all have equal and unrestricted access to China's capital market using RMB offshore funds (Shen, 2019). Thus, we expected that, for the following BIS survey, only the factors of being economically close to China and being an offshore center could be sufficient to have high RMB trading activity.

2. Swap agreements and foreign exchange markets

Although our most parsimonious solution did not indicate the presence of swap agreements as part of a sufficient condition for a high RMB, we believe that swaps do play an indirect role in the functioning of offshore foreign exchange markets, and not just in international trade payments and credit, as shown by Bahaj and Reis (2020) and Song and Xia (2020).

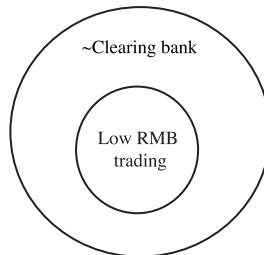
As a PBOC senior official explains, swap agreements are mainly for confidence. Swap agreements are activated especially in times of distress. But even during normal

periods, when swap agreements are activated, their existence may still indirectly support the functioning of foreign exchange markets because they generate confidence that RMB liquidity will be provided if necessary.

3. Low use of RMB offshore trading

Regarding the most parsimonious solution for low regimes of RMB adoption in offshore foreign exchange markets, we found that the absence of clearing banks is a necessary condition for RMB low trading activities. In other words, all instances of low RMB trading are contained within the set of the absence of a clearing bank, as Figure 4 illustrates.

Figure 4. Venn diagram for low regime solution



Source: Drawing by the authors.

Note: “~” represents the absence of the condition.

The fact that the absence of clearing banks is the only necessary condition for a low regime of RMB exchange demonstrates that clearing banks are the core arrangement for RMB overseas adoption. This can be explained by the multifunctionality of clearing banks. First and foremost, they serve as a gateway to China’s payment system. By offering RMB accounts to firms and financial institutions abroad, clearing banks enable economic agents to adopt the RMB. They also serve as liquidity providers in normal times (market makers) and, given their proximity to the Chinese central bank, also in a time of distress (similarly to swap agreements). Finally, because they offer deposits and certificates of deposits to host financial institutions, they also contribute to the RMB recycling mechanisms (similar to the role of RQFII quotas). In summary, clearing banks encompass the functions of other policies, suggesting they form a fundamentally important arrangement for RMB adoption overseas.

Moreover, regarding the analysis of sufficiency for a low regime of RMB trading, we found three solution terms: all paths involve the absence of clearing banks, combined

with (i) absence of RMB direct RMB trading with host market's local currency, or (ii) absence of economic proximity, or (iii) absence of swap agreements. Table 6 shows the solution table.

Table 6. Most parsimonious solution for low regime of RMB trading in offshore foreign exchange markets

	(1)	(2)	(3)
Clearing bank	○	○	○
Currency direct trading	○		
Investment quotas			
Swap			○
Financial center			
Economic proximity		○	
Raw consistency	0.934	0.95	0.944
Raw PRI	0.923	0.941	0.934
Raw coverage	0.774	0.777	0.808
Unique coverage	0.022	0.06	0.014
Solution consistency		0.924	
PRI		0.913	
Solution coverage		0.914	

Source: The authors' calculations.

Notes: "○" represents the condition is negated. PRI, the proportional reduction in inconsistency.

The analysis of the sufficient solution table for low regime brings additional insights to the understanding of the high regime. First, solution 1 – which encompasses the absence of clearing banks and the absence of direct trading between the RMB and host markets' local currencies – reinforces the fact that there is a synergy between these two policies. In other words, although clearing banks are the key arrangement, their role can be enhanced when direct trading between currencies is made possible by an organized market. Second, Solution 2 – which combines the absence of a clearing bank with the absence of economic proximity – brings to light the importance of market demand for high currency trading activity. In other words, apart from having the mechanisms that enable offshore currency adoption, having an extensive trade network and economic weight can create an adequate level of demand to put financial mechanisms to use. Third, Solution 3 – which combines the absence of clearing banks and the absence of swap agreements – highlights the importance of credit mechanisms for currency overseas adoption.

V. Final remarks

Despite the increasing economic and political importance of emerging market economies, their currencies remain under-represented in the international monetary system. Against this background and despite the high barriers for new entrants to become international currencies, the RMB climbed from the 35th to the fifth most adopted currency between 2010 and 2019.

Since 2009, China has used geographically targeted policies to promote RMB internationalization. Specifically, by 2020, China RMB signed swap agreements with 39 overseas central banks, established RMB clearing banks in 25 countries, granted investment quotas to institutional investors in 21 jurisdictions (the RQFII program), and implemented direct trading between the RMB and 23 non-USD currencies. This article explored whether and how these policies impact RMB trading activities in offshore foreign exchange markets.

For these purposes, we used the Triennial Central Bank Survey by the BIS and adopted a novel methodology to analyze currency internationalization, namely, a fsQCA. This method is particularly useful for studying how policies in combination impact certain outcomes and whether distinct associations of policies may lead to the same result. By triangulating the fsQCA analysis with interviews with PBOC senior officials, we conclude that China's policies for RMB internationalization, in synergy with country characteristics, create an environment that enables and encourages overseas actors to adopt this currency.

Specifically, our fsQCA analysis found two sufficient paths for high RMB trading in offshore markets for countries economically close to China: (i) having a RMB clearing bank in the host market and direct quotation between the RMB and local currency, or (ii) being commercially close to China and having access to the Chinese capital markets. We explain the first path as the creation of trading posts in offshore markets, which provide RMB liquidity to those markets. The second solution can be interpreted as creating channels that allow RMB funds abroad to be recycled, in other words, to return as investments to the Chinese mainland. We also find that, among all policies, RMB offshore clearing banks play a key role in RMB overseas adoption. They play a role in high trading activity, and their absence is a necessary condition for low RMB trading. Although clearing banks have received little attention in the literature of currency internationalization, we show that they play key functions for the international adoption of currencies, such as offering RMB accounts to overseas actors, providing liquidity, and contributing to the recycling mechanisms of RMB overseas circulation.

This article is relevant to the debate about the role of policies and institutions in currency internationalization. We empirically showed that the toolkit for central banks

willing to promote currency internationalization is larger than previously demonstrated. A combination of policies can reduce barriers to cross-border use of emerging market currencies. In the specific case of China, the geographically targeted policies combined with its economic weight, financial liberalization process, solid foreign exchange reserve position, among other factors, have allowed the currency to be among the top-10 most traded currencies in foreign exchange markets. Although other developing countries may not have the same economic conditions as China, our findings also provide insights and generate policy recommendations for these countries. More specifically, our article shows that using a currency in international markets is also connected to institutional market settings. Institutional innovations may therefore enhance the conditions for developing a country's currency to play a role in cross-border operations or even regionally.

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Appendix A. Robustness checks: Parsimonious solution for high regime

(1) Consistency threshold (moving to 0.96)

In this test, we have increased the consistency threshold from 0.925 to 0.96, which is a more demanding criterion. By doing so, the original first solution stayed the same, and the second one dropped. This shows that the first solution is stronger than the second. However, it is a normal occurrence in this test, and it does not invalidate the second solution.

Table A1. Consistency threshold (moving to 0.96)

	Solution 1
Clearing bank	●
Currency direct trading	●
Investment quotas	
Swap	
Financial center	
Economic proximity	●
Raw consistency	0.963
Raw PRI	0.898
Raw coverage	0.496

Source: Authors' calculation.

Notes: “●” represents the condition is present. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

(2) Outcome cross-over anchor (moving to 1 percent)

When we increased the outcome cross-over point from 0.85 percent to 1 percent, both solutions remained the same.

Table A2. Outcome cross-over anchor (moving to 1%)

	(1)	(2)
Clearing bank	•	
Currency direct trading	•	
Investment quotas		•
Swap		
Financial center		•
Economic proximity	•	•
Raw consistency	0.95	0.944
Raw PRI	0.865	0.825
Raw coverage	0.522	0.492
Unique coverage	0.058	0.028
Solution consistency		0.921
PRI		0.801
Solution coverage		0.55

Source: Authors' calculation.

Notes: “•” represents the condition is present. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

(3) Without 2010 cases

In this test, we excluded all cases from 2010. Both solution terms stayed the same.

Table A3. Without 2010 cases

	(1)	(2)
Clearing bank	•	
Currency direct trading	•	
Investment quotas		•
Swap		
Financial center		•
Economic proximity	•	•
Raw consistency	0.957	0.951
Raw PRI	0.89	0.863
Raw coverage	0.491	0.474
Unique coverage	0.051	0.034
Solution consistency		0.91
PRI		0.795
Solution coverage		0.535

Source: Authors' calculation.

Notes: “•” represents the condition is present. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

Appendix B. Robustness checks: Parsimonious solution for low regime

(1) Consistency threshold (moving to 0.96)

This test increased the consistency threshold from 0.924 to 0.96, which is a more demanding criterion. By doing so, the number of solutions reduced from three to two, but the conditions negated continued to be the same, namely, clearing bank, currency direct trading, swap, and economic proximity. Although in a slightly different configuration, this robustness check validates the relevance of the conditions above to the low regime.

Table B1. Consistency threshold (moving to 0.96)

	(1)	(2)
Clearing bank	○	○
Currency direct trading	○	
Investment quotas		
Swap	○	○
Financial center		
Economic proximity		○
Raw consistency	0.952	0.968
Raw PRI	0.944	0.961
Raw coverage	0.728	0.693
Unique coverage	0.101	0.067
Solution consistency		0.953
PRI		0.945
Solution coverage		0.794

Source: The authors' calculation.

Notes: "○" represents the condition is negated. Blank cells represent a "do not care" situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

(2) Outcome cross-over anchor (moving to 1 percent)

When we increased the outcome cross-over point from 0.85 percent to 1 percent, all solutions remained the same.

Table B2. Outcome cross-over anchor (moving to 1%)

	(1)	(2)	(3)
Clearing bank	○	○	○
Currency direct trading	○		
Investment quotas			
Swap			○
Financial center			
Economic proximity		○	
Raw consistency	0.942	0.958	0.952
Raw PRI	0.933	0.951	0.945
Raw coverage	0.768	0.771	0.803
Unique coverage	0.022	0.06	0.015
Solution consistency		0.934	
PRI		0.924	
Solution coverage		0.909	

Source: The authors' calculation.

Notes: “○” represents the condition is negated. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

(3) Without 2010 cases

In this test, we excluded all cases from 2010. All solution terms stayed the same.

Table B3. Without 2010 cases

	(1)	(2)	(3)
Clearing bank	○	○	○
Currency direct trading	○		
Investment quotas			
Swap			○
Financial center			
Economic proximity		○	
Raw consistency	0.918	0.944	0.943
Raw PRI	0.878	0.901	0.932
Raw coverage	0.301	0.28	0.758
Unique coverage	0.054	0.017	0.393
Solution consistency		0.934	
PRI		0.924	
Solution coverage		0.909	

Source: The authors' calculation.

Notes: “○” represents the condition is negated. Blank cells represent a “do not care” situation, where the condition may be either present or absent. PRI, the proportional reduction in inconsistency.

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