

Essays on renminbi internationalization

vorgelegt von Marina Zucker Marques

aus Campinas, São Paulo, Brazil

Inaugural-Dissertation zur Erlangung des Grades einer Doktorin der

Wirtschaftswissenschaft am Fachbereich Wirtschaftswissenschaft

der Freien Universität Berlin

Berlin, 2021

Erstgutachter: Prof. Dr. Barbara Fritz

Zweitgutachter: Prof. Dr. Yang Laike

Tag der Disputation: 19.07.2021

Publication and co-authorship

Apart from the introduction (chapter 1), this cumulative dissertation consists of the following three independent articles:

Chapter 2. Financial statecraft and transaction costs: the case of renminbi internationalization

This article was created without co-authors. It can be found as:

Marques, Z. M. (2021). Financial statecraft and transaction costs: the case of renminbi internationalization. Freie Universität Berlin, School of Business & Economics Discussion Paper No. 2021/09. Available at: <https://refubium.fu-berlin.de/handle/fub188/30516>

Chapter 3. The Chinese highways: building up payment infrastructures for RMB internationalization

This article was created without co-authors and has not been previously published.

Chapter 4. The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets

This contribution was made with Pedro Perfeito da Silva (Central European University). The share of each author's contribution is 50%. It has not been previously published.

Acknowledgements

The completion of this dissertation would not have been possible without the support of my professors, friends, and family. First and foremost, I am extremely grateful to my first supervisor, Prof. Dr. Barbara Fritz, for all her advice, patience, motivation, and trust. Her guidance on the thesis, her knowledge of economics and research, and her sensibility to tell me when to pause and take some time off were crucial to my ability of delivering this dissertation. I also want to thank Prof. Dr. Laike Yang, Prof. em, Dr. Manfred Nitsch and Prof. Dr. Gregory Jackson for their advice and support throughout my doctoral research.

I was very fortunate to be part of such an academic stimulating environment. It was a privilege to be a part of the Graduate School of East Asian Studies (GEAS) and the Economics' colloquium at the Latin America Institute. My thanks are addressed particularly to Prof. Dr. Verena Blechinger-Talcott, Dr. Katrin Gengenbach, Dr. Elena Meyer-Clement, Dr. Cornelia Reiher, and Dr. Genia Kostka, who organized GEAS colloquia every semester, as well as all participants that always brought critical and insightful comments to my article drafts. I must also thank Alejandro Márquez-Velázquez, Tharcisio Leone, Melike Döver, Laurissa Mühlich, Carmen Marull, Özlem Albayrak, Svenja Flechtner, and Christian Ambrosius for the always thoughtful comments on my drafts, and for always providing a stimulating debate in the colloquiums. I also appreciate the advice and support from my Brazilian professors and friends, Bruno de Conti, Daniela Prates, Marcelo Carvalho, and Olivia Bullio. A special thanks to my friend and co-author Pedro Perfeito da Silva, who embarked in this challenge with me of making sense the causal maze that is currency internationalization.

I am deeply indebted to all friends and professors that made my fieldwork easier to navigate. Special thanks to Prof. Dr. Hansjörg Herr, Ping Zhou, Prof. Haihong Gao, Prof. Ping He, Prof. Jie Meng, Prof. Dic Lo, Luciana Rangel and Alonso Rodriguez. Moreover, I appreciate the time and the patience of all the policymakers, managers, accountants, and bank staff who took time from their tight schedule to discuss renminbi internationalization with me.

I am also grateful to have amazing friends by my side. Special thanks to Mei, Qingye Gwendolyn, Lenard, John, Hendrik, Misun, Li Bin, Elizabeth, Yue, Teresa, Julia, and Italia, for all your support throughout this journey. I also want to thank for the emotional and financial support of my mother, Karin, my father, Mario, and my Aunt, Marcia. Finally, thank you Renato, my love, always encouraged me to be better and go further.

This dissertation is dedicated to the loving memory of my grandmothers, Áurea and Maria, two strong women that taught me to be strong and follow my dreams.

Table of Contents

Chapter 1. Introduction	6
I. <i>Research puzzle and objective.....</i>	6
II. <i>Research background.....</i>	7
III. <i>General research question</i>	14
IV. <i>Structure of the thesis and contribution to research.....</i>	14
Article 1. Financial statecraft and transaction costs: the case of renminbi internationalization	14
Article 2. The Chinese highways: building up payment infrastructures for RMB internationalization.	15
Article 3. The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets	16
V. <i>Final remarks.....</i>	17
Chapter 2. Financial statecraft and transaction costs: the case of renminbi internationalization.....	18
I. <i>Introduction.....</i>	19
II. <i>The mechanisms of international currency competition</i>	24
III. <i>Actor's choice of international currencies</i>	27
a. Research design.....	27
b. A model for international currency's choice	28
IV. <i>Chinese statecraft, reducing the transaction costs of cross-border renminbi use</i>	31
a. Access to the Payment system	31
b. Pecuniary transaction costs.....	34
Exchange rate risk and hedging cost	34
Credit cost	36
Fees	40
c. Time transaction costs	43
V. <i>The increase of dollar transaction costs.....</i>	47
a. Limited access to the American payment system	48
b. Pecuniary transaction costs	53
Cyclical dollar shortage in the 2008 crisis	53
Non-cyclical dollar shortage in peripheral countries	55
VI. <i>Conclusion</i>	56
VII. <i>Appendix.....</i>	59
Chapter 3. The Chinese highways: building up payment infrastructures for RMB internationalization	61
I. <i>Introduction.....</i>	62
II. <i>Bringing together the debates on currency internationalization and payment economics</i>	67
III. <i>The infrastructures of international exchange.....</i>	70
a. Payment channels as 'infrastructures'	76
IV. <i>The renminbi versus the dollar: a comparison</i>	78
a. The dollar.....	78
Correspondent banking relations and in-house operations at early stages of dollar internationalization.....	78
The internationalization of American banks	79
The emergence of a clearing house with international reach	80
The decline of correspondent banking relations: burning the bridges to dollar-denominated payments in peripheral regions	81

b.	The renminbi	83
	The creation of correspondent banking relations denominated in renminbi.....	83
	Chinese banks “go global”: channels for in-house operations.....	87
	Building the “highway” for renminbi internationalization: the construction of a clearing house with international reach.....	88
c.	The dollar and the renminbi: a systematic comparison of international payment infrastructures	94
V.	Conclusion	97
VI.	Appendix	100
Chapter 4. The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets		103
I.	Introduction.....	104
II.	Theoretical framework.....	109
III.	Research design.....	111
a.	Set theoretical methods and fuzzy set qualitative comparative analysis	111
b.	Outcome.....	114
c.	Explanatory conditions.....	116
	Currency swap agreements.....	117
	Renminbi offshore clearing banks.....	119
	Investment quotas	119
	Direct trading between the renminbi and local currencies	121
	Economic proximity.....	122
	International Financial center	123
IV.	Findings and discussion	126
a.	Renminbi high trading in offshore markets.....	128
	Solution 1: Setting up trading posts.....	129
	Solution 2: Investment channels and the “recycling” of renminbi offshore funds	130
b.	Swap agreements and foreign exchange markets	134
c.	Low use of renminbi offshore trading	135
V.	Final Remarks.....	137
VI.	Appendix	140
	Part 1. Main tests.....	140
	Part 2. Robustness Checks	151
	Part 3. Renminbi trading in advanced economies and emerging market economies	154
Bibliography		156
Appendix		166
	Abstract	166
	Zusammenfassung.....	168
	Prior publication	171
	Declaration of doctoral regulation	172

Chapter 1. Introduction

I. Research puzzle and objective

During the last 70 years, the international monetary system (IMS) has substantially changed in terms of economic integration, foreign exchange regimes, and capital controls (Bordo, 1993; Eichengreen, 2008; Ocampo, 2017). Despite of these fundamental shifts, the IMS has remained rigid when we consider the patterns of currency use. Since the end of the second world war, the dollar has been by far the most widely adopted currency for global transactions. Putting a handful of currencies- from core countries- aside, the remaining domestic currencies have played almost no role in international markets (Cohen, 2000; Cohen and Benney, 2014; Goldberg, 2010; Iancu et al., 2020).

This asymmetry of currency's use in the IMS is not a superficial detail, since it exacerbates countries' economic differences; it enhances the ability of advanced economies to pursue economic policies and limits emerging market economies' policy space (Ocampo, 2001; Cohen, 2015; Eichengreen, et al., 2005; Fritz, 2016; de Paula, et al., 2017; Prates, 2020).

Regardless of the strong path dependence of currency's use and the challenges for new currencies to enter the hall of internationalized currencies, in the past few years, currencies from emerging market economies started to expand their acceptability (Maziad et al., 2011; McCauley and Scatigna, 2011; Orsi, 2019). Mostly because of China's economic and geopolitical weight, the case of the renminbi has garnered the most attention from scholars and analysts (Eichengreen and Kawai, 2014; Helleiner and Kirshner, 2014; Prasad, 2017; Subacchi, 2016; Yu, 2014). However, there are three other important factors where the renminbi excels. Firstly, the renminbi has presented a sharp expansion: between 2010 and 2019, the renminbi climbed from the world's 35th

to the 5th most used payment currency (SWIFT, 2020). Secondly, the renminbi internationalization pattern is qualitatively different from other EME currencies. While other EME currencies adoption are mostly confined to the short-term investment function,—which can be economically harmful (Orsi, 2019)—the renminbi’s adoption, in its turn, has been more diverse, and has included trading payments and reserve assets to central banks. Lastly, the Chinese case is the only one where currency internationalization became a national strategy. Promoting the renminbi cross-border use and internationalization are goals present in the 12th (2011-2015), 13th (2016-2020), and 14th (2021-2025) five-year plans, which are the major policy document of the country (NDRC, 2011, 2016, 2021). Bearing this in mind, the common objective of the three independent articles that compose this cumulative dissertation is to unfold the drivers behind the renminbi’s rise, and to pay special attention to the role of policies in this process.

II. Research background

Broadly speaking, an international currency (IC) can be defined as one that is used beyond the borders of the issuing country, regardless of whether the goal is to purchase goods, services, or financial assets (Kenen, 2009; Cohen 1971). Being an IC is a matter of degree. The dollar, which stands at a top of the monetary hierarchy is fully internationalized. But to a lesser degree, the euro, the Japanese yen, the Swiss franc, and the British pound are also used for international transactions (Cohen 1998, de Conti and Prates, 2018). Although the pattern of currency use in the IMS is slow-moving, it is not stationary. The course of a currency gaining international appeal, independently whether it substitutes a given dominant currency or not, *is called currency internationalization*.

Analytically, it is possible to notice currency international use (and its internationalization process), by observing the functions money performs. Whereas domestic currencies fulfil three functions (unit of account, store of value, and medium of exchange), in the international context, the role of money is expanded to six functions because it is not only used by private actors – companies, banks, individuals – but also by foreign central banks and monetary authorities. Table 1 summarizes IC functions.

Table 1: Six dimensions of international currency use

	Medium of Exchange	Unit of Account	Store of Value
Private	(1) Trade and investment settlement; Vehicle currency	(2) Price setting, invoice currency, funding currency	(3) Investment currency (in different maturities and jurisdictions)
Official	(6) Intervention currency	(5) Exchange rate reference (anchor)	(4) Reserve currency

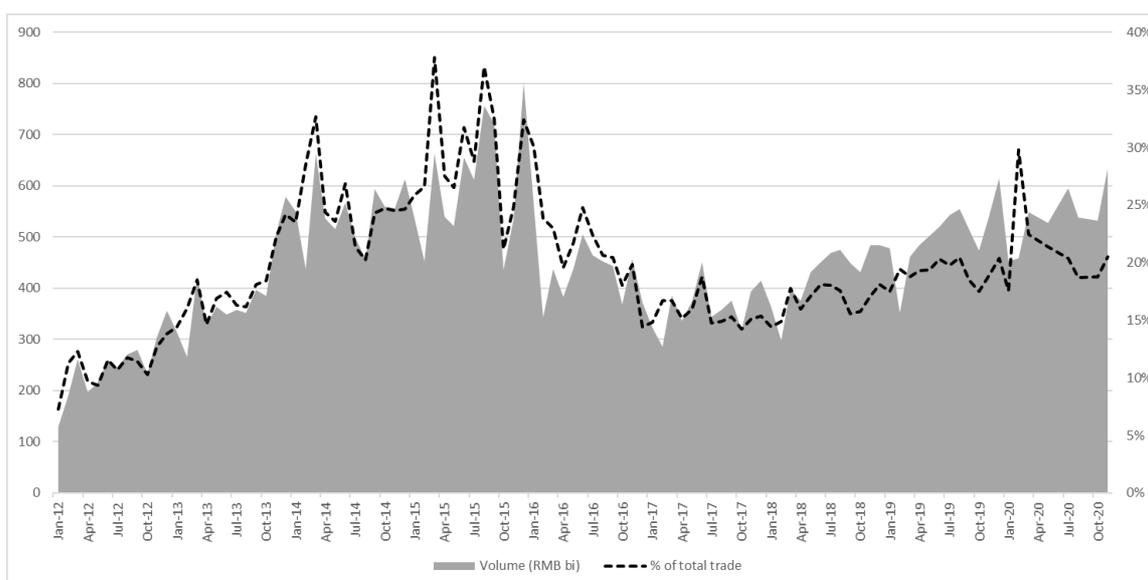
Source: based on Belfrage et al. (2016) and Cohen (1971)

Apart from the dollar, the use of international currencies is heterogeneously dispersed among currency functions (Cohen, 1971, De Conti and Prates, 2018, Orsi, 2019). There may be positive or negative macroeconomic impacts on countries, depending on which function their currency performs internationally. For instance, currencies which use is concentrated on the short-term investment function can suffer harmful volatilities on their foreign exchange rates (Kaltenbrunner and Paineira, 2015, Belfrage et al., 2016, Orsi 2020).

Using Cohen’s (1971) framework, it is possible to map the adoption pattern of the renminbi, as well as its evolution. So far, the renminbi international use has been concentrated on trade and investment settlements (table 1, quadrant 1). By the end of 2020, roughly 20% of China’s total trade was settled using its domestic currency. This is significant considering that most international trade, especially from emerging market

economies, is invoiced and settled in dollars. Whereas Argentina, Algeria, Brazil, Colombia, Indonesia, Malaysia along with other EMEs use the dollar for roughly 100% of international trade payments, by 2019, only 65% of China’s total cross-border payments relied on the USD (Auboin, 2012; Gopinath, 2015; Ito et al., 2010; Tenreyro, 2021, SAFE 2021).¹ To date, the renminbi has been adopted mainly between Chinese residents and their trade partners. So, this currency does not play the role of “vehicle currency”, in other words, it is not used to settle transactions *among* non-Chinese residents. Figure 1 present data for renminbi cross-border use in trade.

Figure 1. Cross-border RMB Settlement under current account, Monthly (RMB bi), China, Jan. 2012- Nov. 2020*



*Source: Own elaboration based on data from the People’s Bank of China (PBOC) and General Administration of Customs of the People’s republic of China (GACC) (Extracted from CEIC data). *Information for April, June and September 2020 is missing.*

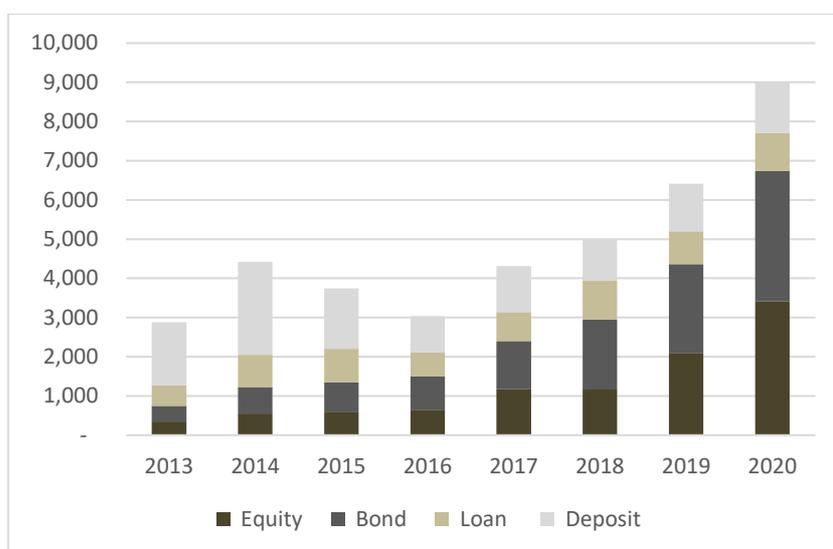
China’s foreign exchange regime reform in 2015, as well as that years’ market turmoil explains the fluctuation in renminbi adoption in 2015-16 (Prasad, 2017). Yet,

¹ Apart from the renminbi and the dollar, China uses other currencies to settle cross-border payments, especially the Euro, the Japanese yen, and the Hong Kong dollar.

this dissertation is concerned with the long-term tendencies instead of conjunctural analysis. Moreover, regardless of the 2015-16 fluctuation, the renminbi continued to be adopted internationally.

The role of the renminbi as store of value at the private level has also expanded throughout the years (table 1, quadrant 3). By 2020, non-residents held roughly RMB 9 trillion in renminbi-denominated financial assets, which is three times higher than the 2013 level. This increase is explained mainly by the rise in bond and equity held by overseas institutions and individuals (figure 2).

Figure 2. Domestic RMB financial asset held by overseas entities (RMB billion), China, 2013-2020*

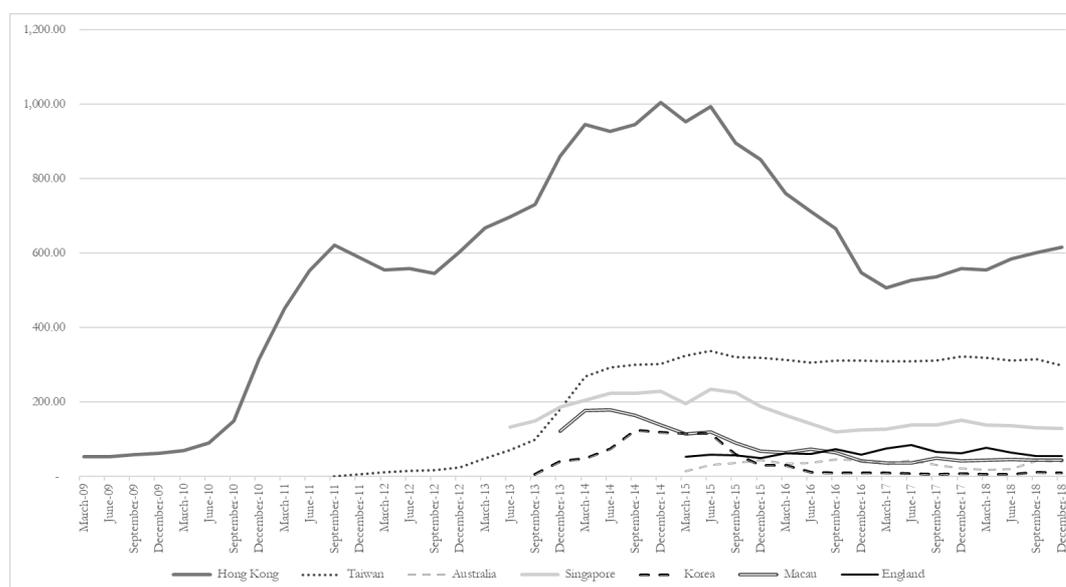


*Source: Own elaboration based on data from the PBOC. *December each year*

Renminbi financial assets are also issued and traded outside mainland China, at offshore financial centres. Hong Kong is the leading offshore hub not just because it was pioneering, but it also leads in terms of market volume. Nonetheless, the existence of renminbi financial assets is not exclusive to this region. Currently, Singapore, London, Frankfurt, along with other offshore hubs also offer renminbi-denominated deposits, certificate of deposits, as well as companies' and government bonds (Subacchi

2016, Prasad 2017). Although there is no aggregated information available on organizations and individuals holding renminbi-denominated assets abroad, Figure 3 shows a compilation of renminbi-denominated deposits and certificate of deposits in regions where this data is available.

Figure 3. Overseas renminbi deposits and certificates of deposits hold by residents and non-residents of selected countries, Quarterly, March 2009- December 2018 (RMB billion)



Source: Own elaboration based on data from Hong Kong Monetary Authority (HKMA); Central Bank of the Republic of China (CBRC); Central Bank of Australia (CBA); Monetary Authority of Singapore (MAS); The Bank of Korea (BOK); Macau Monetary Authority (MMA); Bank of England (BoE); China Foreign Exchange Trading Center (CFETC)

The renminbi is also used as store of value to overseas central banks and monetary authorities (table 1, quadrant 4). According to the People’s Bank of China, by December 2019 more than seventy central banks and monetary authorities have included the Renminbi in their foreign reserve’s portfolio (PBOC, 2020). Between 2016 and 2020,² renminbi holdings by central banks increased from 90 billion to 267 billion

² COFER data is available since 2016, when the renminbi was included in the International Monetary Fund’s Special Drawing Right (SDR) basket.

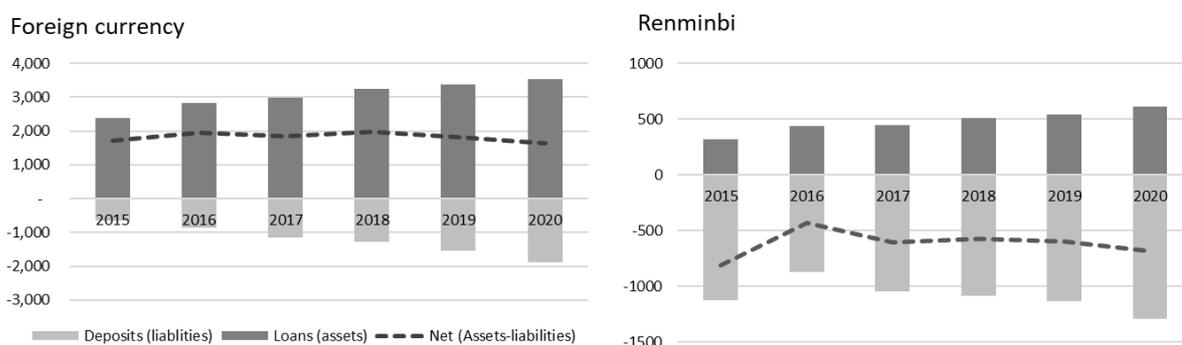
dollar-equivalent. By December 2020, this amount corresponds to 2.25% of the world's total foreign reserves.

Regarding the renminbi's role as foreign exchange anchor (table 1, quadrant 5), to date, there is not consensus whether a currency bloc tied to the value of the renminbi exists. However, many studies suggest that this currency has become an exchange rate reference point, in special to Asian countries (Subramanian and Kessler 2013; Tovar and Nor 2018; Chow 2014; Fratzscher and Mehl 2014; McCauley and Shu 2018).

Yet, at the private level, the renminbi has not significantly progressed as unit of account, as evidenced by information on commodities exchanges and financial markets. Although Chinese commodity exchanges (like the Dalian Commodity Exchange, and the Shanghai International Energy Exchange) have grown in terms of volume and products, these markets are mostly a domestic business, with few and only recent involvements of international companies (Evans, 2018; Gloystein 2018; ECB 2019; Argus 2021)

Apart from the dollar, the euro, the yen, and the Swiss franc play the role of “funding currency”, in other words, they serve as a denominator for international financial obligations (Belfrage et al., 2016, He et al., 2016). As things stand, the role of the renminbi as a “funding currency” appears limited. Although renminbi-denominated loans to non-residents increased twofold between 2015 to 2020, they still represent a fraction of total renminbi-denominated deposits. This is in sharp contrast to China's position in foreign currency. This suggests that, although China is the world's largest creditor nation, it remains an “immature” international creditor, because it lends mostly in foreign currency (McKinnon and Schnabl, 2009) (figure 4). In sum, the renminbi has not become a unit of account to international financial obligations.

Figure 4. China's financial institutions* overseas assets and liabilities by currency (RMB bn), 2015-2020**



Source: own elaboration based on data from the PBOC. * Includes the PBOC, banking depository financial institutions, trust and investment corporations, financial leasing companies. **Refers to December each year.

Table 2 summarizes the dimensions where the renminbi has expanded its international role. Among the six functions that international currencies play, the renminbi advanced mostly as a medium of exchange for trade and investment between Chinese residents and their partners. To a lesser degree, the renminbi has also advanced as an investment currency, a reserve currency, and an exchange rate reference. Yet, to date, the renminbi has not become a price reference to commodities or to financial markets.

Table 2. Renminbi internationalization: advancements between 2009 to 2019

	Medium of Exchange	Unit of Account	Store of Value
Private	(++) Trade and investment settlement	(=) Price setting, invoice currency, funding currency	(+) Investment currency
Official	Intervention currency (no data available)	(+) Exchange rate reference (anchor)	(+) Reserve currency

Source: Own elaboration based on Cohen's framework (1971). (++) refers to substantial progress, (+) moderate progress, (=) continuity.

III. General research question

Although currency use in the IMS is highly path-dependent and despite of the difficulties of becoming an international currency, between 2009 and 2018, the renminbi has expanded its international use. Bearing this in mind, the three articles that compose this cumulative dissertation aims to answer the following research question: what are the drivers of renminbi internationalization between 2009 and 2019?

Aware of the Chinese government's interest in projecting the renminbi as an international currency and the distinct pattern of currency internationalization between the renminbi and other EMEs, this dissertation aims, additionally, to give special attention to how Chinese policymakers have guided this process.

IV. Structure of the thesis and contribution to research

In addition to this introduction, the following dissertation is organized in 3 chapters. Each of them is an independent article.

Article 1. Financial statecraft and transaction costs: the case of renminbi internationalization

From 2010 to 2019, the expansion of the renminbi for cross-border payments has largely come at the expense of the dollar's market share. In the first article,³ I draw on 13 semi-structured open-ended interviews with commercial and development banks, manufacturing companies from light and heavy industries as well as senior Chinese policymakers from the central bank and the Ministry of Commerce to show why firms

³ This article has been published as:

Marques, Z. M. (2021). Financial statecraft and transaction costs: the case of renminbi internationalization. Freie Universität Berlin, School of Business & Economics Discussion Paper No. 2021/09. Available at: <https://refubium.fu-berlin.de/handle/fub188/30516>

and banks decided to switch currencies and how Chinese policies influenced this process.

This article shows that Chinese policies have reduced the transactions costs related to cross-border use of the renminbi. Yet, the Chinese statecraft alone does not explain this phenomenon. Apart from the China's actions, economic actors' recent difficulties in using the dollar because of American financial sanctions against Chinese trade partners, the cyclical instability of international finance, as well as peripheral countries' low inflows of dollars have encouraged firms and banks to use the renminbi as an alternative to the dollar.

In addition to contributing to a broader understanding of the drivers of renminbi internationalization, this article proposes a model that explains the mechanisms that push firms and banks away from the incumbent international currency. I posit that changes in domestic and international conditions influence currency transaction costs, thereby propelling economic actors to increase their use of currencies with relatively lower transaction costs.

Article 2. The Chinese highways: building up payment infrastructures for RMB internationalization.

Although overlooked by the academic community, there are specific channels supporting the circulation of international currencies, which are referred to by central bankers as global pipelines or roads. The second article sheds light on these channels and evaluates their role for currency internationalization.

By comparing the institutional context in which the dollar and the renminbi circulate internationally and their historical evolution, this article contributes to the refinement of the theory of international currency. This comparison shows that although the participation of the public sector and the context of the international monetary

system are distinct in each case, the creation and expansion of payment infrastructures are a necessary condition for currency internationalization to occur. I show that, aside from complying with the standard characteristics that favor the internationalization of its currency, new entrants to the selective group of international currencies must “catch-up” with the extant payment infrastructures.

Article 3. The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets

To a large extent, the renminbi internationalization strategy relied on geographically-targeted policies. The third article explores *whether* and *how* these policies, individually or in combination, impact the renminbi use in offshore foreign exchange markets.⁴

We chose to address this question by utilising a novel methodology in the field of currency internationalization, namely, fuzzy-set Qualitative Comparative Analysis (fsQCA). This method is particularly useful for studying how *a combination* of policies 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 renminbi internationalization, in synergy with country characteristics, create an environment that enables and encourages overseas actors to adopt this currency.

Specifically, our analysis shows that for countries economically close to China, high renminbi trading in foreign markets is explained by either: 1) having a renminbi clearing bank in the host market and direct quotation between the renminbi and local currency, or 2) being economically close to China, being a financial center and having

⁴ Written in collaboration with Pedro Perfeito da Silva (Central European University).

access to the Chinese capital market. We explain this combination of policies as 1) the creation of “trading posts” that provide renminbi liquidity abroad, and 2) the creation of financial channels for economic agents to “recycle” offshore renminbi funds. Our findings shed light not only on the drivers of renminbi use in foreign exchange markets, but also bring insights to the institutional context that may support a larger adoption of emerging market currencies in foreign markets.

V. Final remarks

The currency hierarchy in the international monetary system has been widely recognized as a source of constraints to the policy space of peripheral countries (Ocampo, 2001; Eichengreen, et al., 2005; Cohen, 2015; Ocampo, 2017; Fritz, 2016; de Paula, et al., 2017; Prates, 2020). Peripheral countries have utilized a series of tools to mitigate the effects of their subordinate position in the international monetary system, such as capital controls, foreign exchange rate manipulation, foreign reserve accumulation, to mention some of them (Armijo and Katada, 2015). This dissertation shows that renminbi internationalization is not a goal per se, but it is a novel strategy of an emerging market economy to shield itself from the shocks emerging from the functioning of the international monetary system.

Chapter 2. Financial statecraft and transaction costs: the case of renminbi internationalization

The scholarly debate on currency internationalization focuses on country characteristics and policies as the main determinants in currency competition. However, this literature has neglected the fact that, given the intertwined nature of the international monetary system, other countries' actions and the functioning logic of international finance can also impact a currency's international status. This article shows that RMB usage has been boosted not only by Chinese statecraft but also by economic actors' recent difficulties in using the dollar. The American financial sanctions against Chinese trade partners, the cyclical instability of international finance, as well as peripheral countries' low inflows of dollars have encouraged firms and banks to use the renminbi as an alternative to the dollar. In addition to contributing to a broader understanding of the drivers of currency internationalization, this article proposes a model that explains the mechanisms that push firms and banks away from the incumbent international currency. I posit that changes in domestic and international conditions influence currency transaction costs, thereby propelling economic actors to increase their use of currencies with relatively lower transaction costs. Interviews with Chinese senior officials from the PBOC and the Ministry of Commerce, manufacturing companies, and bank staff are the main primary sources for this article. I triangulate this information with news reports and speeches both in Chinese and English.

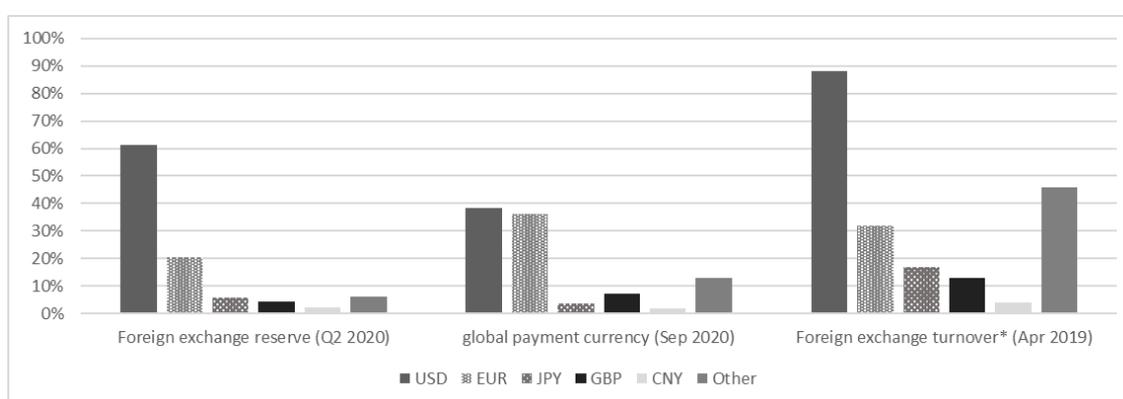
Keywords: International monetary system, renminbi internationalization, financial statecraft, dollar, currency competition

* This article has been published as: Marques, Z. M. (2021). *Financial statecraft and transaction costs: the case of renminbi internationalization*. Freie Universität Berlin, School of Business & Economics Discussion Paper No. 2021/09. Available at: <https://refubium.fu-berlin.de/handle/fub188/30516>

I. Introduction

There are over 160 domestic currencies in the world,⁵ but only a handful of them also play the role of a unit of account, medium of exchange, and store of value beyond their jurisdiction, and therefore can be considered international currencies (Cohen, 1971). The dollar is by far the most widely adopted international currency (see graph 1), but to a lesser degree, the euro, the Japanese yen, the Swiss franc, the British pound, and most recently the renminbi, are also adopted for international transactions.

Graph 1. Asymmetry of currency adoption in the international monetary system.



*Source: IMF, SWIFT, BIS. Note: *Including intra-European transactions; **Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.*

There are many advantages to being at the top of the international monetary hierarchy; from the economic point of view, international seigniorage gains, macroeconomic flexibility, and price stability are the most cited (Cohen, 2012; Eichengreen, 2011; Gopinath, 2015; Papaioannou and Portes, 2008; Zhang and Tao, 2014). In addition, issuing countries can increase their political leverage and international reputation (Cohen, 2012; Helleiner, 2008; Helleiner and Kirshner, 2009; Kirshner, 1995; Norrlof, 2014; Strange, 1971). But the international monetary hierarchy

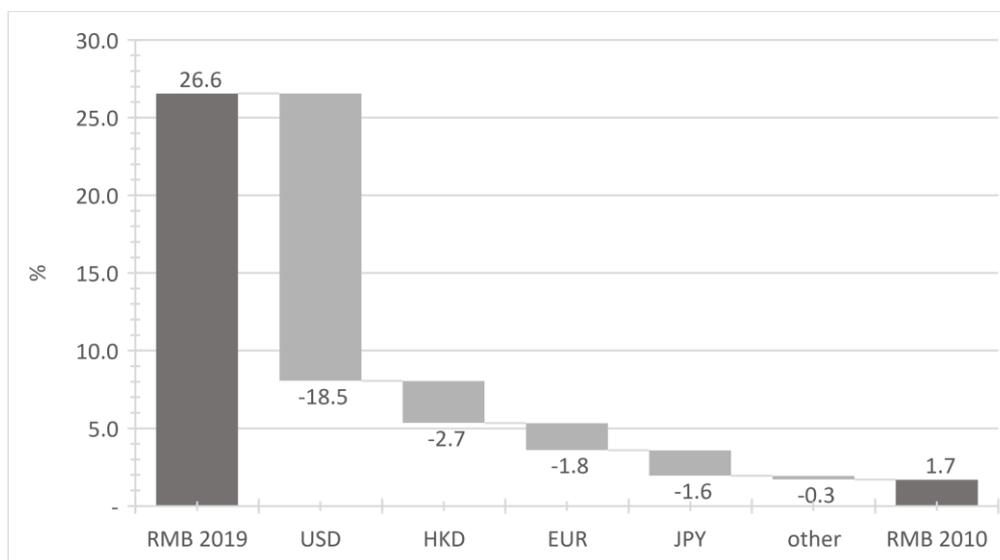
⁵ Based on the IBAN.

is highly path-dependent, so any new entrant to the hall of international currencies faces an uphill battle (Eichengreen et al., 2005; Matsuyama et al., 1993).

Despite this challenge, international use of the renminbi has expanded by an unprecedented degree. Between 2010 and 2019, the renminbi climbed from the world's 35th to the 5th most used payment currency (SWIFT, 2020). During the same period, cross-border renminbi payments increased from 630 billion to 15.86 trillion renminbi, and currently, over 25% of Chinese cross-border payments are denominated in this currency. Moreover, by 2020, more than 70 central banks held renminbi-denominated assets in their portfolio (PBOC, 2020). To date, there is no consensus about the drivers behind renminbi internationalization, despite extensive investigation (Bowles and Wang, 2013; Eichengreen and Kawai, 2014; Prasad, 2017; Subacchi, 2016; Yu, 2014). As Eichengreen and Kawai put it: “whether wider international use of the RMB is a spontaneous market reaction or a manifestation of the PRC’s growing ability and willingness to influence the shape and structure of the global economy is a matter of interpretation” (Eichengreen and Kawai, 2014 p.3).

Most puzzlingly, data on cross-border payments between China and the rest of the world show that the expansion of the renminbi has largely come at the expense of the dollar’s market share. Although the absolute volume of dollar transactions between China and the rest of the world has increased during the period analyzed, its market share contracted by 18.5%, as graph 2 shows.

Graph 2. Changes in RMB cross-border payments and currency market share substitution, 2010-19, (% of total cross-border payments)



Source: Own elaboration based on data from the State Administration of Foreign Exchange (SAFE).

Given the inertia the international monetary system, and the supremacy of the dollar's status, why did economic actors decide to switch from dollars to renminbi in this period? This article sheds light on this question by collecting in-depth information about actors' decision-making on currency adoption. I draw on 13 semi-structured open-ended interviews with commercial and development banks, manufacturing companies from light and heavy industries as well as senior Chinese policymakers from the central bank and the Ministry of Commerce, which were collected during fieldwork in China in 2018 and 2019. I triangulate this information with surveys, news reports, and leadership speeches both in Chinese and English.

The interviews conducted show that, although PBOC policies contribute to the rising use of the renminbi, they are not the only driver. For many firms and banks, the difficulty in accessing dollar services encouraged them and their commercial partners to use the renminbi as an alternative. Specifically, interviewed actors reported the

American financial sanctions on their commercial partners as a key obstacle. Moreover, the dollar's cyclical liquidity shortage in foreign markets,⁶ as well as limited dollar inflows to peripheral countries, were also acknowledged as an important reason for switching to renminbi transactions.

In addition to systematically identifying economic and political drivers that encouraged actors to substitute the renminbi for the dollar, this article also proposes a model that explains the *mechanisms* that compel economic agents to switch from an incumbent international currency to a new entrant. The model was developed inductively based on primary material collected during fieldwork, and is also informed by insights from the economic literature on transaction costs (Eichengreen et al., 2005; Krugman, 1984; Matsuyama et al., 1993). The model highlights that changes in currency transaction costs, influenced by changes in domestic and international conditions, impel economic agents to increase their use of currencies with relatively lower transaction costs.

This article contributes to two debates on the international political economy. The first one concerns the role of financial statecraft (FS) (Armijo and Katada, 2015; Katada et al., 2017) and the state use of financial and monetary leverage to achieve foreign policy goals. According to Armijo and Katada's (2015) systematization, financial statecraft can be classified as *offensive or defensive* depending on whether the primary goal is, respectively, to influence foreign states, market conditions, and governance regime, or to create domestic policy space. Moreover, FS can be

⁶ In this article, the term "dollar shortage" refers to the difficulty of actors obtaining dollar credits because of lenders' changes in liquidity preference. It does not refer to the scarcity of dollar assets resulting from American chronic current account surpluses during the post-war period, as used in the "Triffin Dilemma" debate (Bordo and McCauley (2018); Triffin (1960)).

characterized as *bilateral or systemic* according to whether it is targeted at specific nations or on altering conditions in the overall international system.

Although renminbi internationalization can be placed within these categories, it also illustrates something else: it is an example of what happens when the financial statecraft of different countries *collides*. Specifically, Chinese statecraft is an attempt to neutralize the effect of American statecraft, although the latter was not explicitly aimed at China.

This article also contributes to work on the political economy of networks (Farrell and Newman, 2019; de Goede, 2020), which sheds light on how powerful states can use global networks—such as payment and message systems, the internet, supply chains—to coerce others. Although this literature stream does include consideration of vulnerable actors' responses to coercion, it is largely focused on *the state's* responses. Here, I present an empirical case where an alternative network was created bottom-up and developed organically with the active participation of non-state actors. Although this process was authorized by Chinese policymakers, banks and firms took the lead in creating a payment alternative that could bypass the American sanctions targeted at their commercial partners.

This article is organised as follows: after the introduction, I first show how economists have adopted the concept of transaction costs to analyze international currency status, and then I demonstrate that this concept can be useful for a systematic understanding of the political economic aspects of currency competition. The third section presents the research design and the model that captures the actors' decisions about switching from a dominant international currency to a new entrant, the renminbi, using the concept discussed. Sections 4 and 5 contain the empirical part of the study. I first present evidence of how Chinese policies have reduced renminbi transaction costs

and then how American statecraft and the cyclical instability of international finance have increased the dollar's transaction costs. The final section concludes.

II. The mechanisms of international currency competition

The literature on international currencies is split between the authors who argue the international monetary system tends to unipolarity (Kindleberger, 1967; Krugman, 1984; Matsuyama et al., 1993) and those who defend the claim that a multicurrency system is possible (Eichengreen et al., 2018). What is beyond dispute between the two groups is that the existence of transaction costs is the main force behind the tendency towards concentration on one currency.

According to the first group (also referred to as the “traditional” or the “Harvard” view), the international monetary system only has room for one currency because the economic size of the leading economy and its currency's high trading volume dramatically reduces the costs of operating in that currency. In Kindleberger's (1967, p. 11) words: “[...] for better or worse [...] the choice of which language or which currency is made not on merit, or moral worth, but on size”. This view argues that diversifying currency use becomes prohibitively costly for everyone. For the authors subscribing to this view, the impact of the scale of operations in reducing transaction costs is so strong and self-reinforcing that it leads to a “winner takes all” effect and inertia in the use of a key currency.

The second view (referred to as the “new” or “Berkeley” view) also accounts for the importance of market forces in reducing a currency's transaction costs. But these authors recognized that, in addition to the scale of operations, technological development—such as high-speed communication—and the existence of future markets can reduce the cost of exchanging currencies. Moreover, for the “Berkeley” view,

market forces are less self-reinforcing, therefore, more domestic currencies can be adopted internationally at the same time (Eichengreen et al., 2018).

Although the “new” view amplifies the factors reducing international currency transaction costs, such factors are still narrowly defined, and the the state's role is almost an afterthought. While the “traditional” view relies on the “invisible hand” for its explanation, the “new” view is still hesitant in grasping the impact of state actors' actions.

Recent studies have started to shed light on more aspects that shape the transaction costs of currencies abroad and how states play a role in this process. For example, Rhee and Sumulong (2014) show that the construction of an adequate payment infrastructure can reduce the costs of bilateral exchange between non-US dollar currencies, thus eliminating the need to use the dollar to triangulate the operation. Other examples of how policymakers can shape the transaction costs of currencies are provided by Bahaj and Reis (2020) and Eichengreen and Flandreau (2012). They show (for the renminbi and the dollar respectively) that central banks can create institutional arrangements that reduce the cost of credit abroad and therefore jumpstart the use of their currencies.

Governments can also (intentionally or not) increase the cost of using their currency abroad. Cohen (2019) gives historical evidence that Germany in the 1960s and Japan in the 1980s tried to actively prevent the international use of their currencies by impeding non-residents' access to local banking and capital markets, imposing complex regulations, and levying taxes. Recently, although not deliberately, US foreign policy actions—i.e., sanctions on oil-rich countries—have also increased the expected costs of international use of the dollar, as argued by McDowell (2020).

Apart from economic size and trading volume, there are many other economic and political factors shaping currency transaction costs, as demonstrated by the work of Rhee and Sumulong (2014), McDowell (2020), Bahaj and Reis (2020), Eichengreen and Flandreau (2012), and Cohen (2019). But, until now, these factors have only been analyzed individually. The first contribution of this article is to systematize the relevant variables and present a model that incorporates those variables altogether into a coherent analysis.

Furthermore, this article makes a contribution by giving attention to the intertwined nature of the international monetary system. Previous studies have focused on how country characteristics and policies affect the status of their currencies (Bahaj and Reis, 2020; Cohen, 2019; Eichengreen and Flandreau, 2012; McDowell, 2020). There are exceptions, such as Eichengreen et al. (2005), who explain the “original sin” (that is, the difficulty for small countries of issuing foreign debt in local currency) and the concentration of foreign debt in few currencies more as a result of aspects of the international monetary system than of an individual country’s characteristics or policies. This article contributes to the debate by identifying other external forces that do not drive currency concentration, but rather dissipation. In particular, I focus on how other countries' actions and the functioning logic of the international monetary system have contributed to increasing renminbi cross-border use. To be sure, Farrell and Newman (2018) have suggested that the American sanctions on Iran could impel countries to use substitutes, especially the euro. This article not only shows empirically that American statecraft has indeed pressured actors to look to the euro and the renminbi as alternatives, but also shows how the cyclical instability of finance and the limited inflow of dollars in peripheral countries can enhance the status of a new entrant currency, such as the renminbi.

III. Actor's choice of international currencies

Although countries may want to promote their currencies, ultimately, the decision on which currency to adopt lies with firms and banks (Cohen, 2019; Cohen, 2015; Eichengreen et al., 2005). Even in countries like China that have stronger public sector participation in the economy, governments do not manage such micro-level decisions. As such, based on the concept of transaction costs—which is prominent in the debate on currency internationalization—and on the access to a country's payment system, the following section models actors' decision making when switching from an already adopted currency (henceforth incumbent) to a new one (new entrant).

a. Research design

Most articles that provide economic models build them from empirical quantitative data. Given the nature of the phenomenon investigated here, this article will not follow this conventional research design, for it is not possible to satisfactorily quantify variations in a currency's transaction costs, nor firms' access to national payment systems. Therefore, this article's model design is based on grounded theory (GT). Broadly speaking, this methodology establishes guidelines for a systematic comparison of qualitative data, and the inductive development of theories (Glaser and Strauss, 2017). Although grounded theory is not widespread in economic research, Finch (2002) and Lee (2005) advocate for broader use of this methodology in the field. According to Finch (2002, p. 214), "Grounded theory procedures provide a basis for economists to make effective use of case studies, and of qualitative and quantitative data in general, by connecting case studies together in order to generalize, and in so doing verify, emerging novel contributions to knowledge".

In terms of data, the construction of this model is based on primary data collected during fieldwork in Shanghai, Beijing, Hangzhou, and Guangdong in 2018

and 2019. For this article, I use information from 13 interviews with individuals including senior officials from the Chinese central bank (the PBOC) and the Ministry of Commerce (MOFCOM), representatives of commercial banks (Bank of China, Bank of Communications, China Construction Bank, and Bank of Kunlun), development banks (China Development Bank, and New Development Bank), as well representatives of light and heavy manufacturing companies.⁷ I followed a process of theoretical sampling for controlled data collection (Glaser 1978). The objective was to cover a broad variety of economic actors in order to understand diverse motives for international currency choice. The sampling strategy was snowballing (Creswell and Poth, 2018): from initial contacts with academics and the business community I reached the abovementioned interviewees. The sampling size was determined based on the GT principle of “theoretical saturation”, which is when the researcher carries on with subsequent interviews until the point that they no longer contribute to the model's development (Finch, 2002). All the interviews were semi-structured with open-ended questions. I triangulate and complement this primary data with surveys, speeches from the firms’ leadership, news, reports, and secondary literature on currency internationalization in English and Chinese.

b. A model for international currency's choice

I posit that there is a higher probability of an economic actor reducing, or abandoning, the use of an incumbent currency when its relative transaction costs increase. It is possible to explain this decision in the form of the following basic equation, where TC stands for transaction costs:

⁷ A list of the interviews can be found in the appendix.

$$(1) \quad \textit{Probability switch to new entrant} = \frac{\Delta TC (\textit{new entrant})}{\Delta TC (\textit{incumbent})}$$

If this ratio decreases, *ceteris paribus*, there is a higher probability that firms and banks will avoid using the given incumbent currency. If this proportion increases or remains the same, actors will continue using the incumbent currency. It is important to emphasize that this is a matter of probability, so even if this ratio increases because the transaction costs of the incumbent currency have increased, it is still possible that some actors will just accept the higher transaction costs and continue with operations in the vehicle currency.

The probability of an actor switching to the new entrant currency also varies depending on the actor's characteristics. In my interviews, two main aspects were relevant: actors' nationality, and the location of the foreign trade or investment partner. When the actor is from a country that issues the newcomer currency, they are more responsive to small changes in the relative transaction costs of that currency. So, a Chinese firm is more susceptible to switch to renminbi operations when the renminbi relative transaction costs decrease than a British company, even if the British company operates in China. The reasons for this discrepancy lie in the accounting system, debt, and revenue structures of each company. Finally, those companies that have trading or investment partners in countries that have difficulty accessing the payment system of the incumbent currency country will have strong incentives to abandon or reduce the use of this currency.

Now that the firm's calculus is explained, let us consider the main factors shaping currency transaction costs:

$$(2) \quad TC_{total} = (TC_{pecuniary} + TC_{time}) * AccessPS$$

The first type of transaction cost has been more studied by the literature on currency internationalization. Pecuniary transaction costs include fees, commissions,

interest, bid-ask spreads, etc., in sum, all direct monetary costs related to the cross-border use of a currency. The second type, time transaction costs, refers to how fast firms have access to their assets. The speed of cross-border transfers and the completion of foreign exchange-related bureaucratic tasks are the main components of this category.

A decisive component of a currency's transaction costs is whether foreign firms can access the payment system denominated in that currency. When foreigners cannot access the payment system, then the cost of accessing it tends to infinity. In this case, even if the pecuniary and time transaction costs are very low, the overall transaction costs tend to infinity. As the empirical part of this study will demonstrate, this is the case, for example, for Chinese companies trading with Iranian firms. Undoubtedly, the dollars pecuniary and time transaction costs are very low, but it does not matter because Iran is basically excluded from the dollar payment system. Therefore, in this case, the total dollar transaction costs tend to infinity. In this situation, even if the renminbi pecuniary, time, and information transaction costs are not as low as the dollar's, Iranian firms can at least access the renminbi payment system, so the total renminbi transaction costs will be much cheaper compared to those of the dollar.

Until 2009, the total transaction costs of cross-border renminbi use also tended towards infinity because, as I show in in section 4.1 of this article, until that year, Chinese banks could not offer renminbi correspondent bank accounts to foreign banks, and the Cross-Border Inter-Bank Payments System (CIPS) did not exist. Therefore, until 2009, the total renminbi transaction costs relative to the dollar tended towards infinity, and the use of the dollar for cross-border transactions was the best option. The following section will show empirically how the transaction costs of the renminbi have reduced since 2009 while those of the dollar have increased.

IV. **Chinese statecraft, reducing the transaction costs of cross-border renminbi use**

Renminbi internationalization is mostly a company behaviour, *government only gives some encouragement*. (Excerpt from interview with a former director of department from the Chinese Ministry of Commerce,⁸ emphasis added)

We are not pushing for the international use of the renminbi; *we are giving support to market participants* interested in adopting it. (Excerpt from interview with senior PBOC official,⁹ emphasis added)

The above excerpts from interviews with Chinese officials illustrate the policymakers' approach to renminbi internationalization policies: they favor facilitating the conditions for market participants to adopt renminbi for cross-border transactions. As the following subsections will show empirically, designated policies facilitated renminbi adoption by 1) enabling non-residents to access the Chinese payment system, 2) reducing pecuniary transaction costs, and 3) reducing time transaction costs.

a. Access to the Payment system

Whether a non-resident can access the Chinese payment system is a crucial element for renminbi cross-border use. One interviewee,¹⁰ a Bank of China director, observes: "If a location is able or not to accept renminbi is a very important condition. If there is no possibility to open a renminbi account, how are they going to receive renminbi?"

For the last 30 years, China has been integrated into the world economy, and into the dollar payment system.¹¹ However, foreign banks' connection to the renminbi-

⁸ Beijing, October 2019. Own translation from Chinese.

⁹ Senior Official, Shanghai, November 2018.

¹⁰ Shanghai, September 2019. Own translation from Chinese.

¹¹ It is estimated that the Clearing House Payment Company (CHIPS) is responsible for handling 95% of cross-border dollar transactions (Federal Reserve Bank of New York,

denominated payment system is a recent phenomenon that has its roots in the Pilot Program of Renminbi Settlement of Cross-border Trade Transactions issued by the PBOC in conjunction with other authorities in 2009. For the first time, banks in China could offer renminbi-denominated correspondent bank accounts to overseas financial institutions, thereby enabling those institutions to make renminbi-denominated transactions for themselves and on behalf of their clients. The same program also selected the Bank of China's Hong Kong and Macau branches to be the first renminbi offshore clearing centers, thus giving overseas financial institutions the possibility to directly access the mainland's payment system from abroad (PBOC et. al, 2009).

Since the pilot program was implemented, an additional 24 renminbi offshore clearing banks have been established covering the 5 continents, as appendix 1 shows. Also, since 2009, renminbi-denominated correspondent bank accounts have surged in number. From 2010 to 2012, Hong Kong's correspondent banking relations denominated in renminbi increased from 200 to 1.100 accounts, as disclosed by the region's monetary authority (Yu, 2012). Bank of China, the country's largest commercial bank, reported that by 2014 alone they had offered over 1200 renminbi correspondent bank accounts to overseas banks (He, 2014). More recent and comprehensive research from the consulting group Accuity shows the same tendency. Between 2012 and 2016 the worldwide number of RMB correspondent bank accounts increased from 3,600 to 8,800 (Accuity, 2017).

Not only did the number of correspondent bank accounts and clearing banks expand, but the PBOC also created a new and more efficient channel to connect non-residents to China's payment system. In 2015, the PBOC launched the Cross-border

2002). By April 2020, almost 10% of CHIP's 5387 members were from Mainland China (CHIPS, (2020).

Interbank Payment System (CIPS), which streamlines the transmission of payment messages and funds. With good reason, it is referred to by PBOC officials as the “highway” to renminbi internationalization (CIPS, 2021; PBOC, 2018b).

Chinese policymaking follows a logic of gradualism and experimentation (Brunnermeier et al., 2017); regarding renminbi internationalization policies, the same rationale was applied. Although non-residents could open a renminbi account as early as 2009, the use of these accounts was restricted. In 2009, only 365 firms, from Shanghai and the Pearl River Delta metropolitan area, exporting to partners from ASEAN regions, could use renminbi for cross-border transactions. Over time, Chinese authorities expanded the geographical scope and the type of transactions allowed in these programs. By 2013, all domestic companies could use renminbi for trade payments and for FDI, and banks could offer renminbi loans to projects abroad. In addition, in late 2011, China created the Renminbi Qualified Foreign Institutional Investor program (RQFII) which, by a quota mechanism, gradually granted access to the mainland’s capital markets for foreign investors (Central Government Portal, 2009; PBOC et. al, 2013, 2012, 2009; Prasad, 2017).

Although China’s capital account opening process is not yet complete (Miao and Deng, 2020), and the international reach of the renminbi’s payment system still pales in comparison to the dollar's,¹² the fact is that within 6 years China has constructed channels that allow non-residents to access the mainland’s payment system. This initiative was crucial to enable economic actors to adopt renminbi.

¹² By 2016, the number of renminbi correspondent bank accounts overseas represented roughly 10% of the dollar's (Accuity 2017). The number of CIPS participants is 5 times lower than its American analogue, the CHIPS.

b. Pecuniary transaction costs

The possibility of using renminbi for cross-border operations does not by itself ensure that actors would switch to this currency. The firms and banks interviewed decided to adopt the renminbi because doing so reduces pecuniary and time transaction costs; this section focuses on the former type. Specifically, the primary sources collected show three types of pecuniary costs that could be diminished or even avoided: currency hedging, credit, and commissions and fees. In addition to the Renminbi Settlement of Cross-border Trade Transactions program, which started as a pilot scheme in 2009, other policies have also contributed to the reduction of renminbi pecuniary transaction costs, as this section shows in detail.

Exchange rate risk and hedging cost

Under a fixed exchange rate regime, firms and banks do not have to hedge against exchange rate risks. This was the case for Chinese actors from 1994 to 2005 while the renminbi was pegged to the dollar. In 2005, Chinese policymakers started to allow renminbi daily fluctuations within a range that started with 0.3% and evolved to 2% over time. Since 2015, in addition to daily fluctuations, the PBOC also started tolerating broader accumulated fluctuations (China Daily, 2015; Das, 2019). It is not coincidence that, between May and November 2020, the CNY/USD exchange rate oscillated between 7.12 and 6.57 (data from the China Foreign Exchange Trading Center).

Under the current regulations, it is much more important for some companies to find ways to protect themselves from exchange rate fluctuations. One strategy is to sign forward or option contracts, but it comes with a *fee*. From some firms' point of view, adopting the renminbi for cross-border transactions is a costless way to gain protection

from foreign exchange fluctuation. This motive for adopting the renminbi was mentioned in 6 interviews.¹³

“When renminbi cross-border settlements started to be allowed”, explains an interviewee from a pet products supplier,¹⁴ “we locked our prices in renminbi and asked some of our foreign customers to pay in renminbi. In this way, we could avoid exchange rate changes, which have caused some unexpected losses and gains for us”. She explained that some clients still pay in dollars but then “we [interviewed company] sign a forward contract with the bank to lock the dollar price. This means we have to pay a fee and keep a deposit at the bank to guarantee the contract”.

Hedging against exchange rates was also an important motive for currency choice in bank loans, as an interviewee from the New Development Bank reported:¹⁵

We are interested in lending in local currency because we do not want our clients dealing with currency risks. Many of our clients have local revenue and long-term projects. As much as possible, we want them to be able to mitigate this huge risk. One of the solutions is to issue credits in the client’s currency because the bank cannot take that risk either. We have to avoid this currency mismatch in our books, so we neutralize our risk exposure by issuing and lending the same amount in the same currency.

In 2019, a survey conducted by the PBOC with 500 enterprises operating in China (including foreign-owned firms) shows that the main reason for companies choosing renminbi cross-border payments was “mitigating foreign exchange risks”, as

¹³ With 1) accountant from pet products supply company, Shanghai, September 2019; 2) analyst from China Construction Bank, Shanghai September 2019; 3) research analyst from Bank of Communications, Shanghai September 2019; 4) senior official from New Development Bank, Shanghai September 2019; 5) senior official from People’s Bank of China, Shanghai November 2018; 6) former director of department from Ministry of Commerce, Beijing October 2019.

¹⁴ Shanghai, September 2019. Own Translation from Chinese.

¹⁵ Senior Official, Shanghai September 2019. Own translation from Portuguese.

65% of respondents chose this option (PBOC, 2020). A similar pattern was found in the survey conducted with 3,900 Europe-based corporate clients that have business interests in Asia. In the same year, 73% of the participant firms indicated that currency hedging played an important factor in using the renminbi (Commerzbank, 2019).

Credit cost

“From a commercial bank perspective, I think there are two aspects for currency use: first is the currency our clients need to use, and the second is the *credit cost* of currencies” (own emphasis). This excerpt from an interview with a Bank of China director illustrates one more aspect considered by economic actors when choosing a currency, namely, the interest rate.¹⁶

Interest rates are not homogenous among currencies. As de Paula et al. (2017) explain, the currencies of peripheral countries tend to have higher interest rates when compared to those of central countries. According to the authors, the reason behind this pattern is the lower liquidity premium and the higher exchange rate volatility in peripheral countries, which compel policymakers to increase the domestic interest rate in order to attract foreign capital.

The structurally higher interest rate of peripheral economies, as well as impacting their employment, output, and debt levels, also reinforces their currency’s subordinated position in the international monetary hierarchy. As interviews with bank representatives have shown, under ordinary macroeconomic circumstances, it may be more advantageous to take a loan in hard currencies and sign a forward contract to gain protection from exchange rate volatility, rather than to use domestic currencies directly. As a senior official from the New Development Bank noted, “Although we are

¹⁶ Shanghai, September 2019. Own translation from Chinese.

interested in using local currencies, in many cases it is beneficial to lend and borrow in dollars. Given our bank's rating,¹⁷ we can issue dollar debt at a very competitive interest rate and transmit this advantage to local clients". According to one interviewee,¹⁸ a director from Bank of China, exchange rate tendencies can even amplify the advantage of using hard currencies: "under the situation of renminbi devaluation expectation, offering a loan in the dollar and making a forward or swap contract is the cheaper option for the client".

Under other conditions, however, the advantages of taking hard currency credit disappear. The cost and availability of credit are intrinsically connected to the cyclical character of capitalist economies. While actors experience easing in financial conditions during expansionary phases of the cycle, in bust phases interest rates soar and borrowing opportunities shrink (Borio, 2012; Kindleberger, 1978; Minsky, 2016). According to an interviewee who is a PBOC senior official in Beijing,¹⁹ the seed of renminbi internationalization lies in the credit crunch for hard currencies during the 2008 crisis:

Initially we did not plan the renminbi internationalization. It was an opportunity that emerged from the global financial crisis. By the time, the PBOC was contacted by many central banks and some governments because the foreign exchange rate of the USD and euro has depreciated by 10% or 20%. So, the market was *very short of liquidity* in USD and Euros, many companies and governments *needed liquidity* and they see at the time RMB was a fairly stable and strong currency. They contacted the PBOC to allow them to use the RMB (own emphasis).

¹⁷The Japan Credit Rating Agency assigned AAA to New Development Bank's long-term issuing, which is higher than some individual member countries' credit rating.

¹⁸ Shanghai, September 2019. Own translation from Chinese.

¹⁹ Beijing, October 2019.

According to another interviewed PBOC senior official from Shanghai,²⁰ allowing the cross-border transaction of renminbi was a solution designed to support trade during times of constrained international financial conditions; as he put it, “with the dollar shortage of the period, trading directly in a local currency supported the maintenance of trade and investment relations with commercial partners”.

Chinese policymakers cannot mitigate the cyclical instability of foreign currencies in international markets. Nonetheless, as interviews with PBOC senior officials demonstrate, in a constrained macroeconomic situation they could provide the renminbi as an alternative for cross-border transactions. Over time, the PBOC has also built overseas institutions—namely, *swap agreements* and *renminbi offshore clearing centers*—which ease renminbi credit constraints abroad and smooth its credit cyclicity.

Currency swap agreements establish credit lines between central banks. By the end of 2020, China had negotiated 39 of these agreements, with a total value of 3.7 trillion RMB (PBOC, 2020).

Different from the FED swap agreements, which were designed specifically for financial market stability, officially the PBOC swap lines were also designed to facilitate trade and investment in renminbi (PBOC, 2020). As an interviewee from the Bank of Communications,²¹ one of the five largest commercial banks in China, explains:

Until now, one problem that exists specially in regions like east-Asian countries, when we sell products there is no way to use RMB for settlement if there is no SWAP agreement between China and the country. There is not enough renminbi to settle the transaction if they do not have enough RMB reserves. Having the

²⁰ November 2018.

²¹ Research analyst, Shanghai September 2019. Own translation from Chinese.

renminbi swap agreement helps bringing more convenience when carrying out trade and investment in RMB.

Song and Xia (2020) and Bahaj and Reis (2020) show that there is a correlation between signing a PBOC swap agreement and using renminbi for cross-border payments (measured by SWIFT messages). Bahaj and Reis (2020) find that signing renminbi swaps increases the probability of a country using RMB by 20%. For the authors, such arrangements increase renminbi liquidity abroad and set a ceiling for working capital credit cost abroad. An interview with a PBOC senior official gives more evidence of the swap role as a liquidity supplier:²² “Swap agreement is mainly for confidence [...] telling the markets that [...] [it] does not matter how much your demand is, I have this line of credit from PBOC, and they can provide us with RMB”.

Swap agreements are not the only arrangements that can ease renminbi credit conditions overseas. In addition to serving as a gateway to the mainland’s payment system, as section 4.1 explains, renminbi offshore clearing banks can also help to put a ceiling on renminbi credit cost abroad. This is because—similarly to foreign central banks that sign swap agreements—renminbi offshore clearing banks also have access to PBOC liquidity. According to one interviewed senior PBOC official,²³ “When they [clearing banks] need liquidity, they can come to us (PBOC), and then we can provide RMB liquidity directly to them”. Moreover, renminbi offshore clearing bank activities can also reduce the bid-ask spread of renminbi assets negotiated in offshore markets. As explained by the same PBOC senior official, offshore clearing banks act as “a market maker, a liquidity provider for the local market, for the renminbi”.

²² Beijing, October 2019.

²³ Beijing October 2019.

Fees

Exempting overseas investors from fees and taxes is another approach used by Chinese policymakers to encourage renminbi desirability. For instance, in November 2018, China's State Administration of Taxation exempted overseas institutional investors from bond market taxes for 3 years. According to the authorities, the goal was to push forward the opening-up of China's bond market (Liangyu, 2018). This decision makes renminbi-denominated investments, which already offer higher yields compared to those in advanced economies, even more profitable.

Foreign central banks willing to hold renminbi assets in their portfolios also receive pecuniary incentives. As explained by an interviewed PBOC senior official,²⁴ central banks that issue international reserve currencies offer asset management services to other central banks, governments, and international organizations. For instance, if Korea has dollar-denominated reserves, they are maintained by the FED, but if they are in renminbi, the administration is carried out by the PBOC. However, according to the PBOC senior official, "Differently from other central banks, like the FED, we [the PBOC] do not charge them [other central banks and international organizations] for this service [reserve management]. Added to that, we offer one of the best return rates of the market." Although it is not plausible that central banks, foreign governments, and international organizations would decide to hold renminbi-denominated reserves purely because fees are not charged, nevertheless, considering other factors altogether—such as Chinese government bonds high returns and renminbi inclusion in SDR²⁵—the omission of these fees brings additional advantages to renminbi holders.

²⁴ Shanghai. October 2018.

²⁵ 3,7% p.a. at the time of the interview.

According to PBOC (2020) information, by December 2019, at least 70 foreign central banks held renminbi assets in their portfolio. Although the total volume represents a small fraction of worldwide reserves—2.13% in September 2020, according to IMF—from December 2016 until September 2020, this volume increased by 2.7 times.²⁶

Using renminbi was able to diminish operation fees not only because of waived exemptions for foreign investors but also because of the new currency pairs offered in China's interbank market, which allowed actors to reduce their costs from conversion fees.

Before 2010, if any firm or bank wanted to trade RMB for a non-USD currency, they had no choice but to use the dollar as a vehicle currency, as there was no direct trading between RMB and other local currencies, with the exception of the Hong Kong dollar. In 2010, this situation was reversed: the renminbi started to be directly quoted against the Malaysian ringgit and the Russian ruble in the mainland's interbank market, and soon other currencies followed suit. Between 2011 and 2018, an additional 23 currencies were available for direct trading in renminbi, as table 1 shows.

²⁶ From approximately 90 billion USD (equivalent) in December 2016 to 244 billion USD (equivalent) in September 2020, according to IMF/ COFER data.

Table 1. Currencies available for RMB direct trading

Since	Currency
2010	Malaysian ringgit, Russian ruble
2011	Vietnamese dong*, Kazakhstani tenge*
2012	Japanese yen,
2013	Australian dollar
2014	New Zealand dollar, Great Britain pound, euro, Singapore dollar,
2015	Swiss franc
2016	South African rand, Korean won, Saudi riyal, United Arab Emirates dirham, Mexican peso, Turkish lira, Norwegian krone, Swedish krona, Danish krone, Polish zloty, Hungarian forint, Canadian dollar
2017	Cambodia riel*, Mongolia tugrik*
2018	Thai baht

*Source: CFETS (2021), PBOC (2020). *Regional trade, only available in neighboring provinces.*

Having direct quotations between the renminbi and non-USD currencies can lower pecuniary transaction costs to investors and traders because they can reduce conversion fees (Prasad, 2017). One of the interviewees reported that some of their clients in southeast Asia started to adopt renminbi because of this quotation arrangement;²⁷ as he put it: “they would need to exchange their currency to a foreign currency anyway. According to the Chinese policy, they (clients) could exchange their local currency to renminbi and then diminish a bit in exchange fees.” Official information from the Bank of Korea (2021) corroborates my interviewee’s statement:

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

²⁷ Former manager in a Chinese ship building company, Shanghai, November 2018. Own translation from Chinese.

trade settlements, which also raised the ratio of yuan-based payments for trade settlements to China. (own emphasis).

For some currencies, such as the Thai baht, conversion fees were even eliminated. To encourage the Belt and Road Initiative (BRI),²⁸ Chinese policymakers decide to remove renminbi-Thai baht trading fees for 30 months (CFETS, 2018).

Table 2. Direct trade RMB to non-USD currencies on the Chinese foreign exchange spot market.

	Volume (trillion yuan)	Ratio of total onshore interbank spot market (%)
before 2010	ni	less than 0.5%
2014	1.05	4.7
2015	1.42	4.6
2016	1.13	2.9
2017	1.40	3.3
2018	1.60	3.2
2019	2.30	4.2

Source: PBOC (2015, 2016, 2017, 2018a, 2019, 2020)

As table 2 shows, the trading between RMB and non-USD still represents a small fraction of overall foreign exchange transactions. Nonetheless, including new currency pairs in the foreign exchange market allows actors to reduce pecuniary costs, thereby encouraging renminbi use.

c. Time transaction costs

In addition to the reduction of hedging costs, credit costs, and fees, some interviewees also reported that saving time was an important consideration when

²⁸ BRI is a Chinese-led initiative which aims at infrastructure development along the route of the historic Silk Road.

switching to renminbi operations. Specifically, adopting the renminbi could result in less time spent on bureaucratic tasks, and cross-border payments could be accelerated.

Reducing bureaucracy

According to the PBOC survey, the second most-cited reason for companies choosing renminbi for cross-border transactions is the “simplification of settlement process”. Over 43% of respondents selected this motivation (PBOC 2020). Interviews²⁹ with firms and a bank representative show that, by adopting renminbi, economic actors can avoid or at least reduce administrative work related to Chinese foreign exchange controls, which otherwise would be much stricter if hard currencies were adopted.

In China, the State Administration of Foreign Exchange (SAFE) is the institution responsible for supervising and regulating foreign exchange activities. SAFE’s supervisory activities are conducted within commercial banks, which host SAFE officials (Sun, 2020). During an interview with an analyst from the state-owned commercial bank,³⁰ China Construction Bank, it was explained how SAFE activities may affect cross-border operations: “Independently of the currency, SAFE officials have to check the authenticity of the operation. But if it is in renminbi, they will not control the amount or conduct a more stringent review. So, if the company adopts renminbi, payments are received in the account faster”.

An interviewee,³¹ who is a former manager at a Chinese-owned ship building company, described SAFE’s foreign exchange settlement process (结汇), which is necessary for companies who receive hard currency as “extremely troublesome”. In his words: “You must enter in a system, then complete a declaration form. You must

²⁹ 1) Former manager at a Chinese-owned ship building company, Shanghai, November 2018;

2) CFO at a foreign-owned outsourcing and supply chain company, Zhuhai, October 2018;

3) analyst at China Construction Bank, Shanghai, September 2019.

³⁰ September 2019. Own translation from Chinese.

³¹ November 2018. Own translation from Chinese.

present a schedule for every payment you are supposed to receive. If your client delays the payment, you must complete a new declaration form all over again. It requires a lot of routine and procedural work. *But if you receive in renminbi, then the procedure is much simpler*” (emphasis added). The impact of China’s foreign exchange controls on currency choice was summarized by an interviewed company CFO:³² “The more and more difficult Chinese authorities make it for people accepting dollars, it happens to push more and more people to use the renminbi”.

The use of local currency for cross-border transactions to avoid foreign exchange bureaucratic work is not exclusive to the Chinese case. A similar pattern is found in South America by Fritz (2018). With the establishment of a regional payment system between Brazil and Argentina, some Brazilian firms started to adopt the real instead of dollars to avoid the time-consuming procedures established by the monetary authority.

Making fast payments

As a branch director from the Bank of China explains: “One of the key factors of RMB internationalization is the convenience of clearing, with CIPS, the settlement is in real-time”. She adds: “CIPS make the transaction more convenient, it speeds the liquidation, what is important for clients with high timeliness requirements” (Bank of China, 2019).

As mentioned in section 4.1, until 2015, correspondent banking relations (CBR) were the major channel for connecting non-residents to the mainland’s payment system. With CBR, however, there were technical barriers that hampered the efficiency of renminbi cross-border transactions. One of them concerns the incompatibility of Chinese characters with SWIFT codes, which is the message network mostly adopted in

³² Foreign-owned outsourcing and supply chain company, Zhuhai, October 2018.

the banking industry. It is not by accident that, in 2013, 15% of renminbi cross-border payments were rejected by SWIFT, whereas this rate is only 3% for the dollar. A high rate of rejection in financial messages mean that transactions can take longer to conclude (Global Capital, 2013). Another issue that delayed renminbi cross-border transactions is related to time-zone differences. China Standard Time is eight hours ahead of Greenwich Mean Time and thirteen hours ahead of Eastern Standard Time. For this reason, there was no overlap between China's central bank clearing house (CNAPS) working hours and European and US business hours, making it impossible to carry out same-day transactions with these regions.

The construction of a Cross-border Interbank Payment System (CIPS) solved both problems. First, CIPS operates with the internationally accepted ISO20022 message standard that is compatible with English and Chinese languages. Moreover, since CIPS phase-2 was launched in 2018, it operates 24 hours during normal business days, covering financial center business hours in all continents. In sum, with CIPS, all renminbi cross-border transactions happen in real time.

Table 3 summarizes the Chinese policy initiatives discussed in this section, and their impact on reducing renminbi transaction costs. As interviews with firms and banks demonstrated, the possibility of reducing transaction costs was the reason for many actors switching to renminbi cross-border operation.

Table 3- Summary of policies reducing renminbi transaction costs

Transaction Cost	Policies	Impact
Access to the payment system	Authorize mainland banks to offer renminbi-denominated correspondent bank accounts to overseas financial institutions.	Allow non-residents' financial institutions access to the mainland payment system.
	Establish Renminbi Offshore Clearing Banks	Allow non-residents to open a renminbi-denominated account, enabling them to pay and receive renminbi
	Construct Cross-border Interbank Payment System (CIPS)	
Pecuniary Transaction Costs	Renminbi trade and investment settlement scheme	Avoid currency hedging costs
	The signing of Swap agreements with overseas central banks	Set a ceiling for renminbi credit cost overseas
	Establish Renminbi Offshore Clearing Banks	Set a ceiling for renminbi credit cost overseas Reduction of bid-ask spreads for renminbi-denominated assets in overseas markets
	Tax exemption for institutional investors	Increase investors' return
	Management fee exemption for central banks holding renminbi reserves	
	Direct trading between renminbi and non-USD currencies	Reduces foreign exchange conversion fees
Time Transaction Cost	Renminbi trade and investment settlement scheme	Reduces time spent on bureaucratic tasks
	Cross-border Interbank Payment System (CIPS)	Reduces time for the cross-border transfer. Instant payments

V. The increase of dollar transaction costs

Although the Chinese policies for reducing renminbi transaction costs are an important explanation for the rise of the renminbi in cross-border transactions, they are not the only explanatory factor. In the words of an interviewed senior PBOC official:³³ “In the use of any currency, there is also a path dependence. If you are used to USD for your transaction, you tend to be dependent on it, until you see very much disadvantage to do so”. This section will show some difficulties that actors encounter in dollar cross-

³³ Beijing, October 2019.

border operations, how these adversities impact the currency transaction costs, and how actors respond to the dollar's higher transaction costs.

There are two causes of increases in dollar transaction costs. The first one is the American financial sanctions that have limited some countries' ability to access the dollar-based payment system. The second one is related to the cyclical and structural dollar shortage in international markets, which makes the dollar's interest rate rise, leading to higher pecuniary transaction costs.

a. Limited access to the American payment system

For a long time, the USA has adopted many forms of economic statecraft to put pressure on foreign states. In addition to the traditional sticks, i.e., trade embargos, aid suspension, punitive taxation, and the well-known carrots, i.e., subsidies, preferential tariffs, investments guarantee, since the beginning of the 21st century, the USA has also included financial sanctions in their statecraft toolkit. These are different from other forms of statecraft inasmuch as the successful use of financial sanctions depends on the centrality of the dollar in global finance, and on the fact that the key nodes of the international payment and message systems are under American jurisdiction.³⁴ In practical terms, these conditions allow the USA to freeze accounts or block transfers from and to selected countries, banks, firms, or individuals (Drezner, 2019, 2015; Farrell and Newman, 2019).

The Trump administration has escalated the use of financial sanctions, and the case of Iran is the prime example of his approach. In 2015, the United Nations Security Council signed the Joint Comprehensive Plan of Action (JCPOA) with Iran, popularly known as the Iranian nuclear deal, which limited the country's uranium-enrichment

³⁴ Such as the Clearing House Interbank Payments System (CHIPS) and the Society for Worldwide Interbank Financial Telecommunication (SWIFT).

activities in return for the lifting of financial sanctions. In 2018, however, the USA unilaterally withdrew from the JCPOA, and introduced what the US Department of the Treasury called “the toughest U.S. sanctions ever imposed on Iran”. As well as restricting Iranian financial institutions from the dollar payment system, the USA has also pressured the global provider of the financial message, the SWIFT, to disconnect Iranian banks. As a result, Iran is practically banned from the dollar payment system. Although formally there are payment channels for humanitarian purposes, many banks, afraid they could be fined, adopt the “zero risk” approach and refuse to make any transaction with the country (Drezner, 2019; Mallard et al., 2020; U.S. Department of the Treasury, 2018).

In the view of a PBOC senior official interviewed,³⁵ during the Trump administration, the USA “started to weaponize the dollar”. She explains in detail as follows:

They [USA] have the power to impose sanctions because of the US financial system dominance in the international monetary system. According to their domestic law, their judges can order any financial institution located in the USA to provide the necessary information they demand [...] These laws have come a long way, but they have been rarely used before. But in recent years, especially after Trump, I think for the financial society it is very clear they started to weaponize the dollar and their financial sanctions against Iran, North Korea... They [USA] have the laws, they have the power, any other country is too weak to countermeasure.

Considering the case of Iran along with 20 other countries that have been damaged by the American financial sanctions,³⁶ some scholars have already discussed the possibility that the financial sanctions could impact the international status of the dollar (Drezner, 2019, 2015; Farrell and Newman, 2019; Farrell and Newman, 2018;

³⁵ Beijing, October 2019.

³⁶ See the US Department of the Treasury for a complete list of sanctioned countries.

McDowell, 2020). So far, this American statecraft has not threatened the dollar dominance, but it has produced spillover effects for the adoption of other currencies, including the renminbi. Chinese policymakers are aware of this tendency, as a speech from a former PBOC vice-governor, Yin Yong, demonstrates:

We also have seen that due to changes on international geopolitics, in particular some countries abusing their currencies dominant positions, seeking unilateral benefits, using domestic law to engage in a long-arm jurisdiction, such as imposing unilateral international financial sanctions, etc. These practices have prompted many countries and regions to turn their eyes to more responsible currencies, and *the renminbi has also become an option for them* (Sina Finance 2018, own translation, emphasis added).

In order to preserve business opportunities, firms and banks have explored various possibilities for making and receiving payments from sanctioned countries. According to my fieldwork material, the strategies varied depending on the size and sector of the organizations. Smaller businesses tend to find more rudimentary solutions, as was the case for an interviewed Chinese-owned manufacturing company³⁷. According to the company's sales staff, the company has Iranian clients but after the escalation of the US bilateral sanctions in 2018, it became impossible for their clients to pay directly from Iran, so they started to use a neighboring country as a depot for payment transactions. At the time of the interview, they declared they were exploring the possibility of receiving direct payments in renminbi from Iran. The experience reported by this company parallels what is happening on a much larger scale in countries that are affected by financial sanctions. Looking to the case of Iran, for example, since the US sanctions escalated, networks of cross-border smugglers and

³⁷ Sales staff at an industrial pump company, Hangzhou, November 2018.

money collectors have emerged to support the country's imports and exports (Hafezi, 2019).

Bigger companies, such as oil companies, have more sophisticated solutions. The China National Petroleum Corporation (CNPC), for instance, uses their controlled bank, the Bank of Kunlun, to make payments to sanctioned countries. In July 2010, the US Treasury barred the Bank of Kunlun from the American payment system due to their financial relations with Iranian institutions (Bank of Kunlun, 2010). According to an interviewee who is an accounting manager at Bank of Kunlun,³⁸ the American treasury's decision did not prevent the bank from continuing to make transactions with Iran, Russia, or other oil and gas exporting countries, because the bank started to rely on the euro and the renminbi for cross-border operations. As this manager explained, since they were banned from American payment systems, they are not under the jurisdiction of American law, and this allows them to continue making transactions with their clients as long as this was done in other currencies. He added that sanctioned countries that accumulate renminbi claims can either offset them by the value of imported goods or accumulate claims on Chinese government bonds. Further, according to the interviewee, the Bank of Kunlun's renminbi operations for international transactions is an increasing trend.

There are not many gateways for Chinese companies to access sanctioned countries' payment systems apart from the Bank of Kunlun. According to an interviewed PBOC senior official: "In China, the commercial banks are so careful about not offending or breaking any rule, because [they know] if they are punished or sanctioned without base, China does not have strong enough power to counter the measures that the USA would do against us". An interviewee from the China

³⁸ Beijing, November 2019. Own translation from Chinese.

Construction Bank reported that, “we, the big-four, large state-owned banks are not allowed to do business with Iran now”. She explained that, in early 2018, a chemical company needed a loan to import from Iran, but that because of the tightening of sanctions throughout the year, the bank decided to shelve the loan agreement. According to her, “Later, I heard the company went through with Bank of Kunlun”.

Although the Trump administration has pushed actors to find alternatives to the dollar, concerns about relying on this currency are of long-standing for some organizations, especially those connected to oil imports, as an interviewee from the China Development Bank (CDB) reported.³⁹ In 2005, the CDB started to finance imports of commodities, including oil, for Chinese enterprises. As the official explained, because of the increased use of sanctions by the US on oil-exporting companies, the bank was aware that using the dollar could bring commercial risks. As he put it, “using dollars means being at the hands of the US”. So, for more than 10 years, the bank has been trying to diversify the use of currencies for their foreign operations as much as they can, including euro and renminbi loans. However, as the official explained, there are limits to the adoption of the renminbi: not all buyers are interested in receiving renminbi payments given the still relatively small size of renminbi trading in international markets. So, the bank continues to have a large amount of dollar operations.

It is not only firms, but also commercial banks, and development banks that have decided to expand their renminbi use as a solution to the difficulty of accessing the dollar system. As the case of Russia exemplifies, the same pattern can be seen with central banks. In 2014, when the US treasury first imposed sanctions on Russia for its Crimea operations, Russia started a “de-dollarization” process. Between

³⁹ Foreign relations official, Beijing October 2019.

2017 and 2018, the central bank of Russia completely reallocated its foreign assets portfolio. In 2017, Russian USD denominated foreign claims accounted for roughly 50%, which declined to a mere 10% in the following year. At the same time, euro-denominated claims increased from 26% to 40%, and renminbi-denominated from 4% to 29% (Bank of Russia, 2018; McDowell, 2020).

Although the US use of sanctions has not yet put at risk the dominance of the USD, it has impelled states, firms, and banks to look to alternative currencies. The possible impact of American statecraft on the euro has already been suggested by Farrell and Newman (2018), and the European initiative to create a payment mechanism (the INSTEX) to bypass American sanctions has already received some attention in the media (Deutsche Welle, 2019; Girardi, 2019). As shown in this section, the renminbi has also been adopted as an alternative to the dollar. Even though the Chinese state is sanctioning this process, to a large extent, firms and banks have been actively creating the routes to this development.

b. Pecuniary transaction costs

Cyclical dollar shortage in the 2008 crisis

During the 2008 crisis, the international monetary system witnessed a dollar shortage in interbank and foreign exchange markets. Either because financial institutions were concerned about their future dollar funds or the creditworthiness of their counterparts, after the Lehman Brothers bankruptcy in September 2008 financial institutions were unwilling to extend dollar credit to each other. Their behavior reflected interest rate levels, which soared in the last quarter of 2008 (McCauley and McGuire, 2009).

This crisis affected banks' capacity to lend even to financially healthy enterprises. As Ivashina and Scharfstein (2010) show, between the last quarter of 2007 and 2008, bank lending decreased by 79% for large corporate borrowers. As banks, especially non-US ones, heavily rely on short-term debt rather than time-deposits to fund their credit operations, the freezing of interbank markets undermined banks' abilities to expand or even roll over debts for their clients.

The impact of the temporary dollar credit crunch was especially harmful to international trade. Many authors have already pointed out that, as well as the decline in demand during the 2008 crisis, inadequate trade finance supply and costly interest rates were also responsible for export decline (Amiti and Weinstein, 2011; Auboin, 2009; Coulibaly et al., 2013). According to Auboin (2009), during the crisis, the letter of credit spread for emerging economies increased from an average of 10-16 points to 250-500. As most of the global trade depends on some form of trade finance, it is not surprising that studies estimate that 15% to 20% of international trade decline was due to credit shock (Clark, 2014).

While the banking credit crunch was a global phenomenon, emerging market economies faced additional challenges—capital outflows, the volatility of exchange rates, and foreign reserves decline—that accentuated their dollar shortage problem. Unlike developed economies, which had a readily available dollar liquidity supply through the FED SWAP agreements (Board of Governors of the Federal Reserve System, 2020), most emerging market economies had much less access to short-term crisis finance.

Companies, banks, governments, and central banks all tried to find solutions to mitigate this dollar shortage. From an individual perspective, some firms were able to rely on credit from suppliers (Coulibaly et al., 2013). From a governmental standpoint,

many countries, including China, used public banks to ease trade finance conditions (Chauffour and Farole, 2009; Malouche, 2009).

Another institutional response to the credit crunch was to allow the cross-border use of local currencies. As explained in section 4.2.3, interviews with PBOC senior officials and leadership speeches show that the catalyst for renminbi cross-border transactions was the 2008 credit crunch.⁴⁰ Although dollar credit conditions improved after 2009, instability is an intrinsic characteristic of capitalist economies, and “it” can always happen again (Minsky, 2016). But for the next time, the possibility for firms and banks to use the renminbi as an alternative is already open.

Non-cyclical dollar shortage in peripheral countries

Another dollar-related tendency that contributes to renminbi adoption is the dollar shortage in peripheral economies. According to Bai Yi, senior staff from Huawei, adopting the renminbi for cross-border operations solved the problem of customers’ repayment in countries with dollar shortages. He cited the case of America Movil, which in 2012 issued RMB 1 billion bonds in Hong Kong to repay Huawei’s equipment purchases (Global Capital, 2012; PBOC, 2014). Companies and banks from peripheral countries with current account deficits may have worse financial conditions for taking dollar credit. When these companies have commercial ties with China, as America Movil does, it may be less expensive to use the renminbi directly.

Table 4 below summarizes the types of event that increase the transaction costs of using the dollar. As section 5 demonstrates, the increased adoption of the renminbi cannot be explained exclusively by the Chinese policies, but is also due to the higher pecuniary transaction costs related to the cyclical instability of international finance and

⁴⁰ 1) Shanghai, November 2018, and 2) Beijing, October 2019.

dollar shortage in peripheral countries. Moreover, the imposition of US financial sanctions on Chinese trade partners impelled some companies to rely on the renminbi payment network. Although these events have not threatened the dollar's prominence in international markets, it has produced spillover effects on the adoption of other currencies, including the renminbi.

Table 4- Summary of events increasing dollar transaction costs

	Events	Impacts
Access to Payment System	Financial Sanctions	Restrict non-residents access to the dollar-payment system and global message system
Pecuniary Transaction Costs	Cyclical Instability of Finance	Increases borrowing costs during the crisis
	Low inflow of dollars on peripheral economies	Increases borrowing costs for peripheral economies

VI. Conclusion

Despite the challenges for new entrants into the hall of international currencies, in the last 10 years, the renminbi has expanded its international use, climbing from the 35th to the 5th most used currency for international payments. In addition, despite the advantages of the dollar as the incumbent monetary power, renminbi cross-border operations between China and the rest of the world have increased at the expense of the dollar share. Why have actors decided to change from an already established and competitive currency to a new entrant? This article finds that, apart from China's policies to promote renminbi internationalization, various obstacles to using the dollar for international operations are impelling economic actors to search for new alternatives, the renminbi being one of these. Among these obstacles, the most notable are American financial sanctions on Chinese commercial partners, the cyclical instability of international finance, and the dollar shortage in peripheral countries.

This article not only sheds light on external factors for countries that lead to currency internationalization of new entrants, but also posits a model that explains the mechanisms of currency competition. I show that changes in currencies' transaction costs induce actors to readjust their choices, by giving preference to a currency with lower transaction costs.

More than ever before, “this is the golden age of economic statecraft” (Drezner, 2015 p. 755), and this article gives evidence for a novel aspect of how nations are employing statecraft. Armijo and Katada (2015) have shown how states can defend themselves from or influence other states and market conditions. I show here that states have also begun to create tools to neutralize the side-effects of other countries' financial statecraft. Furthermore, this article also shows that financial statecraft is much more organically developed than previously thought. For instance, Farrell and Newman (2019) have demonstrated how states with authority over strategic networks can impose financial statecraft, and have also pointed out that affected states may find alternatives to mitigate their vulnerability. I show that commercial actors play an active and creative role in this process. Although sanctioned and supported by the Chinese state, to a large extent firms and banks were themselves responsible for crafting new channels through which to bypass American financial statecraft.

This research brings insight to the prospects for renminbi internationalization, the dollar's status, and the efficiency of American statecraft. As yet, there is no indication that the dollar's dominance is jeopardized. However, the tendency of firms, banks, and states to find channels to bypass financial sanctions can put the efficiency of this coercive measure at risk. Regarding the renminbi's status, as yet, neither the Chinese efforts nor the problems with using the dollar in the international context have been sufficient to project the renminbi to the position of a new incumbent currency. In

fact, overthrowing the dollar's status does not seem to be the Chinese leadership's goal. The PBOC leadership has repeatedly announced that renminbi use in the international market should be around 10-15%, reflecting the country's weight in the world economy. This does not mean, however, that Chinese policymakers' actions have been innocuous. On the contrary, renminbi cross-border use has had the very practical effect of shielding the country from external shocks and threats, allowing the Chinese development process to continue.

VII. Appendix

Table 1. Offshore Renminbi Clearing Centers

Region	Since	Bank
1 Hong Kong	Dec. 2003	Bank of China (Hong Kong)
2 Macau	Sept. 2004	Bank of China Macau Branch
3 Taiwan	Dec. 2012	Bank of China Taipei Branch
4 Singapore	Feb. 2013	Industrial and Commercial Bank of China Singapore Branch
5 United Kingdom	June 2014	China Construction Bank (London)
6 Germany	June 2014	Bank of China Frankfurt Branch
7 South Korea	July 2014	Bank of Communications Seoul Branch
8 France	Sept. 2014	Bank of China Paris Branch
9 Luxembourg	Sept. 2014	Industrial and Commercial Bank of China Luxembourg Branch
10 Qatar	Nov. 2014	Industrial and Commercial Bank of China Doha Branch
11 Canada	Nov. 2014	Industrial and Commercial Bank of China (Canada)
12 Australia	Nov. 2014	Bank of China Sydney Branch
13 Malaysia	Jan. 2015	Bank of China (Malaysia)
14 Thailand	Jan. 2015	Industrial and Commercial Bank of China (Thailand)
15 Chile	May 2015	China Construction Bank Chile Branch
16 Hungary	June 2015	Bank of China Limited Hungarian Branch
17 South Africa	July 2015	Bank of China Johannesburg Branch
18 Argentina	Sept. 2015	Industrial and Commercial Bank of China (Argentina)
19 Zambia	Sept. 2015	Bank of China (Zambia)
20 Switzerland	Nov. 2015	China Construction Bank Zurich Branch
21 United States	Sept. 2016	Bank of China New York Branch
22 Russia	Sept. 2016	Industrial and Commercial Bank of China (Moscow)
United Arab 23 Emirates	Dec. 2016	Agricultural Bank of China Dubai Branch
24 United States	Feb. 2018	JP Morgan Chase & Co.
25 Japan	Oct. 2018	Bank of China Tokyo Branch
	May 2019	Mitsubishi UFJ Bank
26 Philippines	Sept. 2019	Bank of China Manila Branch

Source: PBOC (2019, 2020).

Table 2. Interviews conducted during fieldwork

Institution	Role	Place	Date	Language of interview
Ministry of Commerce	Former director of department	Beijing	Oct. 2019	Chinese
People's Bank of China	Senior official	Shanghai	Nov. 2018	Chinese and English
People's Bank of China	Senior official	Beijing	Oct. 2019	English
Bank of China	Branch director	Shanghai	Sep. 2019	Chinese
Bank of Communications	Research analyst	Shanghai	Sep. 2019	Chinese
China Construction Bank	Analyst	Shanghai	Sep. 2019	Chinese
Bank of Kunlun	Accounting manager	Beijing	Oct. 2019	Chinese
Pet products supplier (Chinese owned)	Accounting manager	Shanghai	Sep. 2019	Chinese
Ship building company (Chinese owned)	Former manager	Shanghai	Nov. 2018	Chinese and English
Outsourcing company (Foreign Owned)	CFO	Zhuhai	Oct. 2018	English
Industrial pump company (Chinese Owned)	Sales staff	Hangzhou	Nov. 2018	English
New Development Bank	Senior official	Shanghai	Sep. 2019	Portuguese
China Development Bank	Foreign relations official	Beijing	Sep. 2019	English

Source: the author

Chapter 3. The Chinese highways: building up payment infrastructures for RMB internationalization

The internationalization of the renminbi has challenged the existing theory of international currency. This theory assumes that countries that issue internationally accepted currencies should have a large and integrated economy, full capital account convertibility, developed and deep financial markets, liberal domestic institutions. Although China does not satisfy all the requirements, within 10 years, the renminbi has climbed from the 35th to the 5th most used international payment currency. Reforms could indeed boost the renminbi's status, but the apparent mismatch between practice and theory presents an opportunity for researchers to reassess the latter. Although overlooked by the academic community, there are specific channels supporting the circulation of international currencies, which are referred to by central bankers as *global pipelines or roads*. Since 2009, China has been inaugurating their own *highways*, but we know little about their role in the currency internationalization process. Is the Chinese case unique? By comparing the dollar's and the renminbi's institutional context, this article shows that regardless of their different historical backgrounds and contrasting public sector participation, the creation of payment infrastructures is a necessary condition in both cases for currency internationalization. In addition to central bank and payment systems websites, this article uses interviews conducted with Chinese banking sector representatives, including those of the central bank.

Keywords: China, currency internationalization, renminbi, payment infrastructure.

I. Introduction

A persistent characteristic of the international monetary system is the absence of a supra-national currency. This has not prevented international transactions from occurring when domestic currencies are used outside their jurisdiction. National currencies that fulfill the functions of unit of account, medium of exchange, and store of value for cross-border transactions are called international currencies (IC) (Cohen, 1971). Today, the dollar is by far the most used IC, but this status is a matter of degree; other currencies also play this role on a smaller scale, such as the euro, the Japanese yen, and the British pound. Since 2009, the renminbi has been ascending towards this select group of international currencies.

For a long time, economists and political scientists have investigated why some currencies are internationally adopted while others are not. According to the theory of international currency⁴¹, the main characteristics of a country that issues an international currency are: large economy size, broad international trade linkages, monetary stability, financial markets that are open, deep, and liquid, liberal domestic institutions (such as rule of law and democracy), as well as strong foreign policy ties with other nations (Cohen, 2015; Eichengreen et al., 2018; Helleiner, 2008; Kindleberger, 1967; Krugman, 1984; Strange, 1971).

In light of this theory, renminbi internationalization can be considered a special case. As Cohen (2015) and Eichengreen et al. (2018) point out, except for economic size and monetary stability, the Chinese economy and its political system do not comply with the standard characteristics that favour the internationalization of its currency. McCauley (2011), Prasad (2017), and Subbachi (2016), among others, indicate the historical uniqueness of the Chinese case of expanding renminbi use without full capital

⁴¹ Tavlas (1990) is the first to point out a coherent body of literature on IC as a theory.

account liberalization and with a financial system that is still underdeveloped and repressed. Nonetheless, despite the deviation of the Chinese case from the norm, the fact is that within ten years, the renminbi has ascended from the 35th to the 5th most used payment currency (SWIFT, 2020, 2011). According to data from China's State Administration of Foreign Assets (SAFE), in 2019 more than one-fourth of China's cross-border transactions were denominated in renminbi. The People's Bank of China (PBOC), the country's central bank, announced that in 2020 at least 70 overseas monetary authorities held renminbi-denominated assets in their portfolio (PBOC, 2020).

The exceptionalism of the Chinese case has led many authors to suggest that the prospect of increased renminbi internationalization depends on the country's economic and political reforms (Cohen, 2015; Eichengreen et al., 2018; Prasad, 2017; Subacchi, 2016 among many others). Although reforms could indeed boost the international use of the renminbi, the apparent mismatch between practice and theory in the case of China is also an opportunity for researchers to rethink the latter.

The theory could be reassessed in two ways. First, the relative importance of each factor for currency internationalization could be reevaluated. As Chey (2012) notes, there is far from a consensus on the relative weight of each determinant. The Chinese case may reveal that economic size may be the most important aspect. The importance of economic size has been highlighted by Eichengreen et al. (2005), who found that this factor is key to determine a country's ability to borrow abroad in local currency (avoiding the "original sin"). This theory could also be reassessed by incorporating a new determinant, one that has so far been overlooked in the literature. Although both possibilities are not mutually exclusive, I will focus on the investigation of the second one.

International currencies are transmitted through specific channels. Central bankers usually refer to them as *global pipelines* or *roads* (Cunliff, 2017; Kahn and Roberds, 2009; PBOC, 2018b). The channels that allow international payments are correspondent banking relations (CBR), banks' international branches, clearing-houses, and interbank payment systems with international reach (Bech and Hancock, 2020). In this article, I refer to them as *payment infrastructures*⁴². *Payment economics* is a specialist field in economics dedicated to researching the institutional arrangements that support exchange, such as payment infrastructures (Kahn and Roberds, 2009; Lacker and Weinberg, 2003). But this field has been mostly confined to work on central banks circles and has rarely crossed paths with the literature on currency internationalization. Discussing currency internationalization without considering a currency's underlying payment infrastructure is analogous to examining railway transport without looking at the train's tracks—*how are trains supposed to move without them?*

Since 2009, China has been inaugurating a series of payment infrastructures. In that year, the PBOC initiated a pilot program, which allowed banks in China to offer for the first time renminbi-denominated correspondent bank accounts to overseas financial institutions. In addition, the program elected the Bank of China's Hong Kong and Macau branches to be the first renminbi clearing centers (PBOC et al., 2009). Over time, these payment channels have expanded. Today, as well as those in Hong Kong and Macau, there are 24 additional offshore renminbi clearing centers (see the complete list in appendix 1), and in 2015, China launched the first phase of the Cross-border

⁴² Different from the BIS definition of *Financial Market Infrastructure (FMI)*, *Payment Infrastructures* encompass intra-bank operations and correspondent banking relations but do not include systems that record securities, derivatives, etc. Although I am not directly considering these systems, once securities and derivatives transactions involve one cash leg, which usually goes through a payment system, these transactions are indirectly included in the analysis (Rambure and Nacamuli, 2008).

Interbank Payment System (CIPS), referred to by the PBOC as the “highway” for renminbi internationalization (PBOC, 2018a, 2018b, 2019).

What is the role of payment infrastructure *creation* in the currency internationalization process? Is the buildup of payment infrastructure an exception of the Chinese case? These are the research questions on which this article will focus. For these purposes, I compare the current institutional settings of the renminbi with those of the dollar, together with their historical evolution, and I draw on the theoretical contributions of payment economics. For this comparison, I mostly rely on primary sources such as reports, regulations, and statistics from central banks, interbank payment systems, and the Bank of International Settlement (BIS). I also use information collected from fieldwork research in China during Fall 2018 and 2019 when I interviewed Chinese banking sector representatives, including those of the PBOC. For the historical evolution of the dollar, I use secondary literature.

This comparison shows that, despite the differences between the two currencies in terms of historical background and participation of the public sector, the creation of new payment infrastructures is a common condition in both cases. Moreover, my findings show that the design of payment infrastructures can influence a currency's international status if it can increase the speed as well as reduce the cost and risk of international payments.

This article has two main contributions, one descriptive and the other theoretical. There is growing interest among scholars in the topic of renminbi internationalization. Very little is known, however, about the institutions that underpin renminbi international use. Rhee and Sumulong (2014), and Liang (2017) have contributed to the description of these, but their work was published before the launch of the Cross-Border Inter-Bank Payments System (CIPS) second phase in 2018. The new version of CIPS

reduces the frictions involved in using the renminbi for cross-border payments and expands its scope of operations. So, it is important to incorporate in the analysis the developments of CIPS phase two. As well as providing a more up-to-date description of the Chinese case, this article also aims to contribute to the theory of currency internationalization. As George and Bennett (2005) explain, the analysis of a deviant case—as the renminbi is for the theory of international currency—can bring to light new variables and help to refine an existing theory. Therefore, a comparison of the renminbi case with the dollar's can bring to the fore one more *necessary but not sufficient condition* for currency internationalization: the existence of an adequate payment infrastructure that supports the international adoption of a currency. Although Rhee and Sumulong (2014), and Liang (2017) have pointed to similar conclusions, the novelty of this article is to reevaluate the theory of international currency considering this new factor.

In recent years, political economists have become increasingly interested in the political dimensions of the infrastructures that support international markets. as indicated, for example, by the special issue on “The changing technological infrastructures of global finance”, in the *Review of International Political Economy* (June 2019). So far, this debate has focused on how changes in infrastructures impact financial inclusion (Langevin 2019, Bernards 2019) and financial instability (Genito 2019, Campbell-Verduyn, Goguen and Porter 2019). Little is known, however, about the influence of these infrastructures on changes in the global monetary order. To fill this gap, this article discusses how the new Chinese payment infrastructure is shaping the status of the renminbi abroad.

This article is structured as follows: The next section will review the literature on international currency and payment economics. The 3rd section will provide the

theoretical bases of payment systems and infrastructures. Based on that discussion, section 4 will present and compare these channels for the cases of the renminbi and the dollar, as well as explain how they were created. The final section concludes.

II. Bringing together the debates on currency internationalization and payment economics

Countries that issue international currencies may enjoy many advantages. To begin with, their domestic firms and banks can eliminate risks and costs associated with foreign exchange operations (Tavlas, 1991). From a macroeconomic point of view, it can help a country to ease its external constraints. A country may have its borrowing capacity enhanced by issuing an international currency, and thus may be able to postpone or even avoid the burden of domestic adjustments to restore external balances (Cohen, 2015). In addition to increasing the nation's policy autonomy, having an internationally accepted currency can boost its capacity to influence other states, either by giving inducements (e.g. offering credit) or coercing (e.g. blocking access to payments) (Kirshner, 1995). These are some examples of the benefits of having an international currency. There are also associated costs (such as currency appreciation, the responsibility of being the international lender of last resort), but in any case, the benefits seem to outweigh the costs (Papaioannou and Portes, 2008; Zhang and Tao, 2014).

For countries interested in increasing the status of their currency, however, it is not a simple task to accomplish. Unlike in a domestic context, a currency's use cannot be enforced in international markets. To a large extent, the adoption of an international currency depends on a currency's qualities, which are grounded in the economic and political conditions of the issuing country (Cohen, 2015). Based on economic logic and previous experiences of currency internationalization (such as that of the dollar, the

British pound, the Japanese yen, etc.), economists have identified three main country attributes that shape the acceptability of currencies abroad (Helleiner, 2008). Economic size and international linkages are the first factors. It is explained that, because of economies of scale and network externalities, it is easier and cheaper to use a currency that is already accepted on a large scale. So, currencies from large economies that have strong trade linkages with other countries have a higher chance of becoming international currencies (Cohen, 2015; Eichengreen et al., 2018; Kindleberger, 1967; Krugman, 1984; Matsuyama et al., 1993; Tavlas, 1990) The second aspect is low inflation record and exchange rate stability, because these generate confidence in the currency's role as a store of value (Krugman 1984, Tavlas 1990, Cohen 2015). Developed, deep, liquid and open financial markets are the third economic condition because these would guarantee the adequate supply of assets denominated in the currency for domestic and international users (Krugman 1984, Tavlas 1990, Cohen 2015, Eichengreen et al. 2018).

It is not only economic characteristics that can define which currencies will be adopted internationally, but also political factors. For Eichengreen et al. (2018), Cohen (2015), and Prasad (2017), there are some domestic institutions that can increase the confidence of foreign investors, such as protection of property rights, rule of law, and political democracy. Strange (1971), Helleiner (2008), and Cohen (2015) explain that the nature of political ties among states can also shape the international use of certain currencies.

In light of the theory of international currency, there is not much room for countries to shape the international status of their currency, at least in the short term. At most, countries could improve their macroeconomic management, liberalize capital accounts, enhance domestic institutions, etc. But these are all processes that take time

and can not even guarantee that countries will succeed in their goal because the use of international currencies is subject to path-dependence behavior, i.e., incumbents have first-mover advantages that are hard to overcome by newcomers (Cohen, 2015).

Furthermore, for an emerging market economy, like that of China, following the theory's playbook can be risky, at least if implemented too quickly since promoting full capital account convertibility and reforming the domestic financial sector can jeopardize financial stability and the development strategy. Designing *payment infrastructures*, however, can be a more safe and manageable strategy in the short term.

Like railway systems, telephone networks, or the internet, payment infrastructures can be categorized as a *network product* (Shy, 2004), or as a *two-sided market* (Rochet and Tirole, 2006; Ugolini, 2017). For both classifications, the main idea is that the value of this group of goods comes not from direct consumption but from the connectivity it generates, and the more people (or locations) are integrated into the systems, the better it is. In other words, the users of these goods benefit from network externalities. Furthermore, both concepts involve the idea that the interactions among users (or between users and producers) do not occur in a vacuum, and, therefore, a platform must be established to enable interactions. Although the adoption of the *network externalities* concept to analyze IC is not new in the literature (Cohen, 2015; Eichengreen et al., 2018; Krugman, 1984), so far, most authors have overlooked the platforms that make international payments possible, and *how they came into existence*.

Payment economics is a field of study that investigates the design of institutional arrangements that underpin exchange, including payment infrastructures. Because these arrangements are important for a country's financial stability and payment efficiency, discussion of it has been concentrated among central bank practitioners and policymakers (Lacker and Weinberg, 2003; Steigerwald, 2014). Given the sometimes

very technical nature of the debate, academics have largely left this field to the specialist policy makers.

Nevertheless, payment economics can clarify many aspects of the functioning of the international monetary system. The theory of international currency, therefore, could benefit from incorporating the analytical tools and insights of payment economics. Very few works have bridged the two fields. The work of Rhee and Sumulong (2014) is one of these. Although they do not provide a comparative analysis, they argue that the renminbi case provides evidence that the crucial impediment to the cross-border use of local currency is not the extension of capital controls (as most of the literature on currency internationalization would argue) but rather the non-existence of an adequate payment infrastructure. Liang (2017) which is only available in Chinese, investigates the adequacy of the Chinese payment infrastructure for supporting renminbi internationalization, taking into consideration the historical experiences of other currencies. She points out that, even though not all payment infrastructures were created with the specific goal of promoting currency internationalization, they are a necessary pre-requisite for this phenomenon to occur.

Despite their insightful results, Rhee and Sumulong (2014) and Liang (2017), do not engage in a reassessment of the theory of international currency. Integrating the debates on currency internationalization and payment economics is not only useful for shedding light on an additional necessary condition for currency internationalization, but it is also useful for understanding Chinese policymaking regarding renminbi internationalization.

III. The infrastructures of international exchange

Regardless of whether the goal is to pay an overseas supplier, or to buy foreign

government bonds, international transactions fundamentally depend on non-resident banks⁴³ being able to access, directly or indirectly, the issuing country's payment system (Committee on Payment and Settlement Systems, 2003; Rambure and Nacamuli, 2008).

Payment systems are complex arrangements that ensure the circulation of money within a country or a currency area. They are composed of various types of participants (such as central and commercial banks, clearing houses, depository institutions, communication systems, etc.), and various types of sub-systems (such as retail, which serves consumer payments, and wholesale, which serves payments among banks), and they depend on various payment instruments (cash, cheque, electronic payments, bank liabilities, etc. (Listfield and Montes-Negret, 1994; Rambure and Nacamuli, 2008). For international payments, non-resident banks need to access a very specific part of the domestic payment system: the *interbank system*.

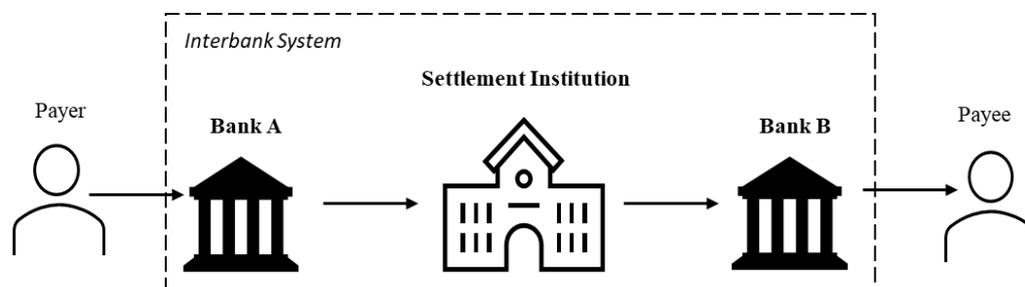
The interbank system is the core part of a domestic payment system. While firms, households, and even other financial institutions have access to payment services using a commercial bank account, the interbank system permits commercial banks to make payments among themselves. Thus, the interbank system is the arrangement that unifies a domestic payment system. This arrangement depends on an intermediary to work, the *settlement institution*, which in most cases is owned and operated by central banks⁴⁴ (BIS, 2020). The settlement institution in the USA is the *Fedwire Funds Service* (hereafter Fedwire), while in China it is the *High-Value Payment System of China*

⁴³ “The term ‘resident banks’ refers to banks with some specified form of authorised establishment within the currency area, which may include banks with local branches but primarily chartered elsewhere” (Committee on Payment and Settlement Systems (2003, p. 27).

⁴⁴ The exceptions are Canada and Hong Kong (China) BIS (2020).

National Advanced Payment System (HVPS-CNAPS). They are operated by the FED and the PBOC, respectively.

Figure 1. Payment through an interbank payment system



Source: *Own elaboration based on BIS (2003)*

Figure 1 illustrates a payment within the same currency area, where the payer and the payee⁴⁵ have accounts in different banks, Bank A and Bank B, respectively. This chain of payment is possible, because these banks participate in the same interbank system and have accounts in the settlement institution.

The various central banks have different policies regarding which financial institutions can access the interbank system. Nonetheless, one rule is common to most of the cases: non-resident financial institutions are not allowed to participate (Committee on Payment and Settlement Systems, 2003).⁴⁶ So, there are three possible channels that allow banks from different jurisdictions participate in a common payment system.⁴⁷

The first channel is through an in-house operation. There are two tracks for this. First, non-resident banks can open a branch in the country that issues the currency they wish to engage with in transactions. For example, an Argentinian bank could open a branch in New York to allow the bank to make cross-border payments in dollars.

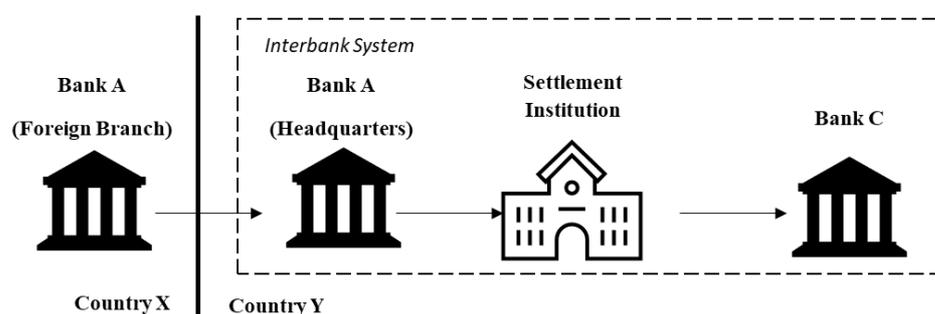
⁴⁵ Payer and payee can be a firm, a person, or even another financial institution.

⁴⁶ The only exceptions are the Swiss National Bank (SNB) (Committee on Payment and Settlement Systems, 2003).

⁴⁷ One single transaction may involve one or more channels.

Second, a domestic bank can open a branch abroad. In this case, an American bank could open a branch in Buenos Aires, thus allowing Argentinian firms, households, or other financial institutions to access the dollar payment system. In both cases, there is one bank corporation operating in more than one jurisdiction. It is estimated that in 2011 this procedure channeled 13% of cross-border customer payments (SWIFT 2012). Figure 2 illustrates this case.

Figure 2. “In-house” cross-border payments.



Source: the author

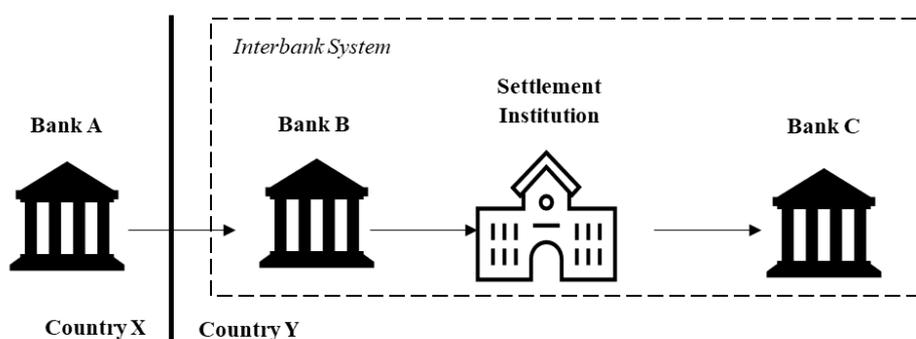
In figure 2, the foreign branch of bank A, which is in country X, makes a transfer to Bank C, in its home country Y. This operation can be conducted using the currency of country Y because Bank A (foreign branch) is connected to Y's payment system through its headquarters. Note that for this channel to exist, the internationalization of commercial banks is essential.

The second channel is through correspondent banking relations (CBR). This is the most adopted option; according to SWIFT, in 2011 around 67% of international transactions were channeled through this mechanism (SWIFT 2012). CBR is defined as “the provision of a current or other liability account, and related services, to another financial institution, including affiliates⁴⁸, used for the execution of third party payments and trade finance, as well as its own cash clearing, liquidity management, and

⁴⁸ When the parent banks hold a minority stake in the ownership of the bank.

short-term borrowing or investment needs *in a particular currency*” (Wolfsberg Group, 2014, p. 1. Own emphasis). In practical terms, a bank (respondent) opens an account in another bank (correspondent). When payments are required, banks transmit messages, and by debiting and crediting the respondent’s account, they settle transactions. In cross-border payments, sometimes more than two banks are involved in reaching the final payee, and depending on how long these chains are, the cost of the transactions can be higher and the processing time longer.

Figure 3. Cross-border payment through correspondent banking relations.



Source: the author

Figure 3 illustrates a similar operation to that of figure 2: bank A in country X is making a payment to bank C in country Y. The difference between the cases is that for CBR operations the banks in the two countries do not belong to the same corporation. Instead, in figure 3, Bank A can access country Y's payment system because it has an account at Bank B in country Y.

The third and final channel is for banks from different jurisdictions to join a clearing house that has a less constrained access rule than the system operated by central banks. In the case of the dollar, the *Clearing House Interbank Payment System (CHIPS)* is an example of such an institution. For the renminbi, the equivalent is the *Cross-Border Inter-Bank Payments System (CIPS)*. In fact, these institutions are an

association of commercial banks that serve as connectors: at one end they have access to the country's central bank, and at the other end they serve commercial banks that can not directly access the interbank payment system. Figure 4 illustrates this option.

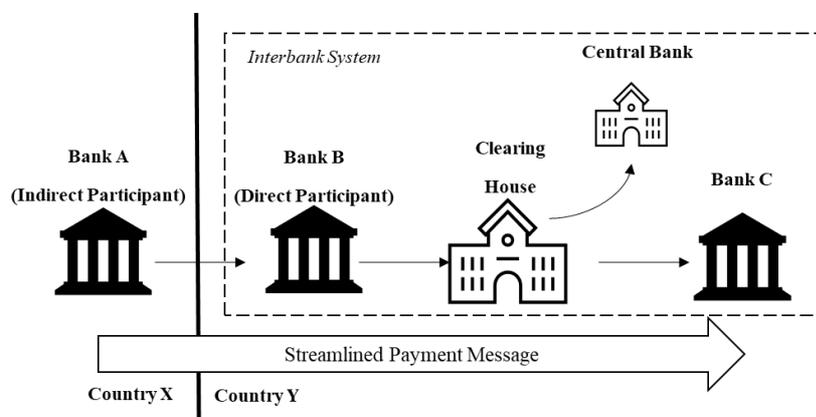


Figure 4. Cross-border payment using a clearing house with international reach.

The functioning organization of the clearing houses that support cross-border payments is specific to each one, but in all cases, they operate through a tier mechanism. The banks that belong to the association of the clearing house are called direct participants (like bank B and C in figure 4), and are usually resident banks. Overseas banks, called *indirect participants* (like Bank B in figure 4) can have access to the payment system using the services of one *direct participant*. Figure 4 replicates the same payment chain as figures 2 and 3, with the difference that all banks involved belong to the same clearing house, which is connected to the central bank. This arrangement resembles the CBR case (figure 3) because bank A has access to the payment system through bank B. The main distinction is that the participation of banks in the clearing house, even though some are indirect participants, streamlines the payment messages, thereby reducing the international payment frictions. Under figure 4's system, international payments can occur faster.

Cross-border payments have many more frictions than domestic ones (Bech and Hancock, 2020; BIS, 2020). In the domestic context, banks operate in the same

language, with the same message standards, and even if the country has more than one time-zone (as the USA has) the banks share common deadlines for processing payments, etc. Commercial and central banks have developed forms to reduce the frictions, increase the speed, and reduce the cost of international payments. Joining a common clearing house is one solution; another is participating in the same communication network and adopting the same message standard. The Society for Worldwide Interbank Financial Telecommunication (SWIFT) was created by a cooperative of commercial banks in the 1970s to meet this need (Scott and Zachariadis, 2013). It is important to bear in mind the existence of payment frictions because, as the dollar and renminbi cases will demonstrate, central and commercial banks have not only established the payment channels but also actively worked to improve them so as to reduce payment frictions.

a. Payment channels as ‘infrastructures’

As mentioned in the introduction, I refer to the three channels that bridge the gap between domestic payment systems and non-resident banks—correspondent banking relations, in-house operations, clearing houses with international reach—as *payment infrastructures*. One may question the analogy by saying they only represent relations among banks and are very different from real infrastructures such as train tracks, or internet cables. But this is not the first text to make such an analogy (Bernards and Campbell-Verduyn, 2019; Cunliff, 2017; Kahn and Roberds, 2009; Lee, 2011), and there are three points that make the analogy relevant here.

To begin with, like other infrastructures they are the basic arrangements that support an activity. They not only facilitate the use of money in the international context, but they are an essential component of the process. Although there are new

technologies emerging that could challenge these channels—such as crypto-currencies and peer-to-peer platforms(World Bank, 2018)—today it is still hard to imagine how a payment network could be operated without these payment infrastructures.

In addition, they not only have to be installed but also establishing them requires immobile and sunk investments. Of course, of the three channels, creating a clearing house with international reach and opening foreign branches may be the more expensive options. They require the acquisition of computers, data processing, and storage equipment, the hiring of staff, just to mention a few fixed and sunk costs. Establishing CBR is by far the cheapest option, but it is also not free of charge. Usually, respondent banks are required to maintain a positive balance at the correspondent bank, and although banks try to keep this value at a minimum to avoid excessive idle balances, there is an opportunity cost from keeping a positive balance. Further, establishing CBR may also require due-diligence and compliance check costs. Last but not least, the increased payment volumes resulting from the establishment of a CBR may induce some banks to increase investments in equipment or staff, but given the existence of internal economies of scale, this cost should be minimum (Frankel and Marquardt, 1987; Osterberg and Thomson, 1999; World Bank, 2018).

Finally, once these payment infrastructures are established the additional cost of increasing the volume of transfers is minimal. There is little difference in costs between transferring one thousand or one million dollars, ten or a hundred times a day. In other words, similarly to other infrastructures, they generate economies of scale.

Now that I have explained the infrastructures that underpin international transactions, the next section will show how they came into existence in the case of the dollar and the renminbi and will then compare the similarities and differences between them.

IV. The renminbi versus the dollar: a comparison

a. The dollar

The birth of dollar internationalization can be traced back to the beginning of the 20th century (Eichengreen and Flandreau, 2012). The process began a few years after the creation of the Federal Reserve and the Fedwire, in 1913 and 1918, respectively. Prior to this, payments within the United States depended on a hierarchical and scattered network of correspondent banking relations, where banks in the countryside had accounts in larger banks in the cities. Although there was no publically operated interbank system until 1918, large banks in New York participated in private clearing houses. Until the establishment of the Fed and the Fedwire, however, there were different exchange rates across regions in the United States, and the financial system was prone to crises (Davies, 2002; Gilbert et al., 1997). It comes as no surprise that dollar internationalization began after the US consolidated and stabilized its payment system.

Correspondent banking relations and in-house operations at early stages of dollar internationalization

In the early stages of the dollar internationalization process, the use of the dollar depended more on the expansion of correspondent banking accounts than any other channel. According to Panza and Merret (2019), in 1935, American banks were offering 1427 correspondent bank accounts to foreign banks—just behind English banks with a total of 1748, and way ahead of Swiss banks with 155 accounts. As explained in section 3, correspondent banking relations are the cheapest form of payment infrastructure, and given the political and economic instability of the period, it is understandable why CBRs were the preferred option.

The internationalization of American banks

The use of in-house operations to serve international dollar payments started to be more common in the 1960s and 1970s when American banks intensified their activities in the internationalization process.

Table 1. Foreign branches of US insured commercial banks, selected years, 1955–98 (Billions of dollars) except as noted

	Number of Banks with foreign branches	Number of Foreign branches	<u>Assets of foreign branches</u>	
			Adjusted total assets	Claims on unrelated parties
1955	7	115	2,0	n.a
1960	8	131	3,5	n.a
1965	13	211	9,8	n.a
1970	79	532	52,6	n.a
1975	126	762	162,7	n.a
1980	159	787	343,5	292,8
1985	162	916	329,2	243,3
1990	122	833	304,4	217,6

Source: Houpt (1999)

As table 1 shows, in 1960, there were only 8 American banks with foreign branches, accounting for 131 foreign units, whereas in 1970 there were 401 new foreign branches, and the number of American banks involved multiplied by 10. It was not only the number of branches that increased but also their assets.

It is also from the 1970s that the US started to host foreign banks. As Houpt (1999) explains: “The large and open economy of the United States, *combined with the key role of its currency in world markets*, has attracted foreign banks and investors to this country throughout its history” (p. 609, own emphasis). In 1972, foreign banks represented only 3.4% of US-booked commercial banking assets, whereas in 1998 their participation increased to 23% (Houpt, 1999).

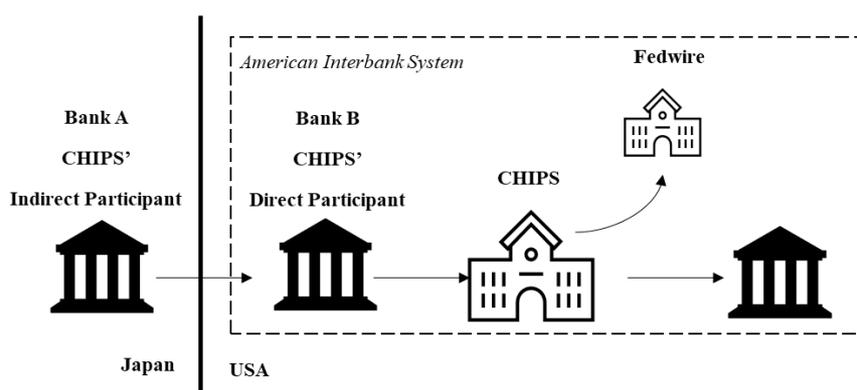
There are many drivers of bank internationalization, such as attempts to circumvent domestic banking regulations or to assist firms in their internationalization strategies (Frankel, 1975). Among these drivers, there are also concerns related to payment mechanisms (Frankel and Marquardt, 1987).

As explained in section 3, although CBR is cheaper to create and maintain than opening foreign branches, payments through the CBR channel take more time on average to reach the final payee. Changes in the international monetary system during the 1970s—such as the US interest rate increase, the end of the fixed exchange rate system—combined with the increased volume of international payments, made commercial banks and firms more sensitive to the speed of international payments. Therefore, “[they] became willing to pay more for the faster and more certain execution of payments made possible by direct participation in core dollar clearing and settlement systems” (Frankel and Marquardt, 1987, p. 123).

The emergence of a clearing house with international reach

Opening foreign branches was not the only strategy for banks to accelerate payments; it was also possible to join a common clearinghouse that could offer cross-border payments. Given the Fedwire's strict rules on non-domestic banks' participation, the Clearing House Interbank Payments System (CHIPS), a privately owned clearing house, started to serve foreign banks' needs for dollar clearing and settlement services (FED 2002, 2007). This is how the third channel for cross-border payment emerged. Figure 5 below illustrates how dollar international payments occurs under the CHIPS structure, using the example of a Japanese firm paying a supplier in the US.

Figure 5. Dollar international transaction under CHIPS



Source: Own elaboration based on CHIPS and FED websites.

In this case, Bank A in Japan does not have a branch in US territory, so it is not eligible for CHIPS direct membership. So, they need to settle funds via an agent, in this case, Bank B (USA). In CHIPS, Bank B funds will be reduced and the beneficiary bank, Bank C, will have an increase in its funds.

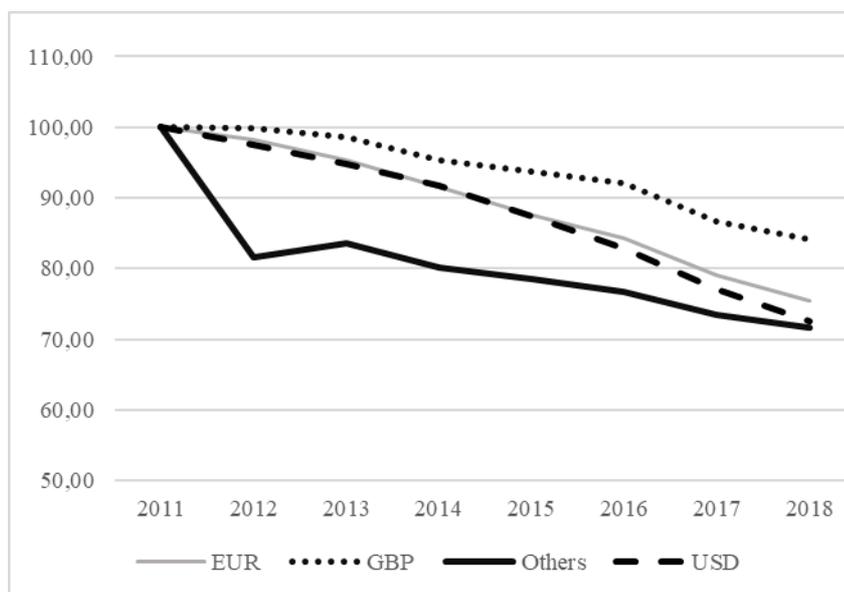
Today, the Fedwire participation policy is more flexible than 50 years ago, but foreign banks can only participate in the system if they have a branch in the US. CHIPS direct participants (today a selected group of 43 banks) have the same rule, but banks outside the US which are willing to use CHIPS services can do so by selecting one of the direct participants as an agent (FED 2002; CHIPS 2020). Today, according to CHIPS website information, there are over 5 thousand banks worldwide that participate in their payment network.

The decline of correspondent banking relations: burning the bridges to dollar-denominated payments in peripheral regions

Just as the creation of payment infrastructures can enable agents to use a currency, their elimination can cause the opposite effect. As mentioned in section 3, CBR is still a widely adopted channel for international payments, but between 2011 and 2018 correspondent banking relations shrank 20%, and among the key currencies, the dollar

was the most affected, see graph 1 (BIS, 2019, FBS 2019).

Graph 1. Number of active correspondents* by currency index, Jan 2011 = 100



Source: National Bank of Belgium; SWIFT BI Watch. Reproduced from BIS.

The factors leading to the decline of CBR are multiple, including tighter banking regulations, banks' risk assessment and profitability considerations, etc. (CPMI-BIS, 2016; see further IMF, 2017). It is not within the scope of this article to discuss the drivers for CBR decline but it is important to point out the effects. The decline of dollar-denominated CBR has not impacted the status of the dollar in the international monetary system because in most countries the flows of dollar payments are concentrated in the remaining CBRs or in other payment arrangements. Nonetheless, the CBR decline has affected the ability of some smaller and peripheral countries to access the dollar-denominated payment system. According to the BIS Committee on Payments and Market Infrastructures, “banks in some jurisdictions have *lost their ability* to make cross-border payment” (CPMI-BIS, 2016, p. 10), especially small size banks. It has also affected country access to credit; in Latin America, for instance, the withdrawal of CBR lines to medium-sized banks led some firms to lose their credit from US exporters (IMF, 2016).

b. The renminbi

Unlike most scholars researching international currencies, Chinese policymakers are aware of the importance of payment infrastructures to the international use of the renminbi. Recently, Yi Gang, PBOC's governor, affirmed that “We [the PBOC] try to *provide the infrastructure*, we try to liberalize our restrictions [...]. We want to treat all the currencies equal so that it’s up to the market to decide which currency they are going to use” (Shen, 2020, own emphasis). During an interview with a PBOC senior official (interview A in appendix 3), it was explained that the reason for the PBOC creating a new clearing house with international reach (Cross-border Interbank Payment System, CIPS) was precisely to facilitate the adoption of the renminbi abroad.

In fact, without a proper payment infrastructure, the renminbi has no chance of being selected from the realm of international currencies. As a branch director from the Bank of China put it: “how are overseas companies and banks accepting renminbi if they do not have access to a bank account denominated in renminbi?” (interview B). The director explained that, the final word on which currency to use belongs to their clients, but if they cannot access renminbi-denominated services and loans, then the renminbi has no chance of being selected.

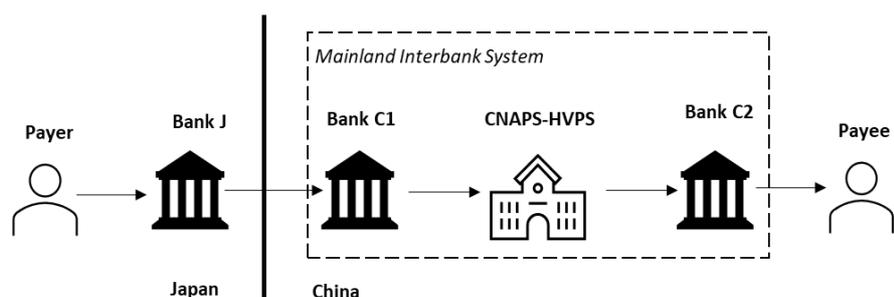
The creation of correspondent banking relations denominated in renminbi

For a long time already, China has been integrated into the world economy and into the network of dollar currency payments and credit. Its integration has reached the point that 5 of the 43 direct participants in CHIPS are Chinese banks, and there are more than 500 indirect participants in CHIPS located in China (CHIPS, 2020). Banking system connections denominated in renminbi, however, are part of a rather recent development that has its roots in the “Pilot Program of Renminbi Settlement of Cross-

border Trade Transactions” issued by the PBOC and other authorities in 2009. A meticulous reading of the 2009 pilot scheme document shows that this policy is mostly aiming at *allowing, regulating, and providing guidelines for renminbi cross-border CBR between Chinese domestic banks and foreign banks*. Correspondent banking relations is by far the most important and most discussed topic in the document—10 articles out of 27 are entirely devoted to it (PBOC et al., 2009).

This program allowed renminbi-denominated correspondent banking relations to be created by Chinese domestic banks (under a model that this article refers to as the *domestic agent model*) and by the Bank of China Hong Kong and Macau branches (here referred to as the *clearing bank model*). The difference between these models is *who* accesses the core of the Chinese payment system, the HVPS-CNAPS. In the first model, banks in mainland China access the HVPS-CNAPS; in the second, banks in Hong Kong and Macau. Figure 6 illustrates the domestic agent model.

Figure 6. RMB payments: domestic agent model

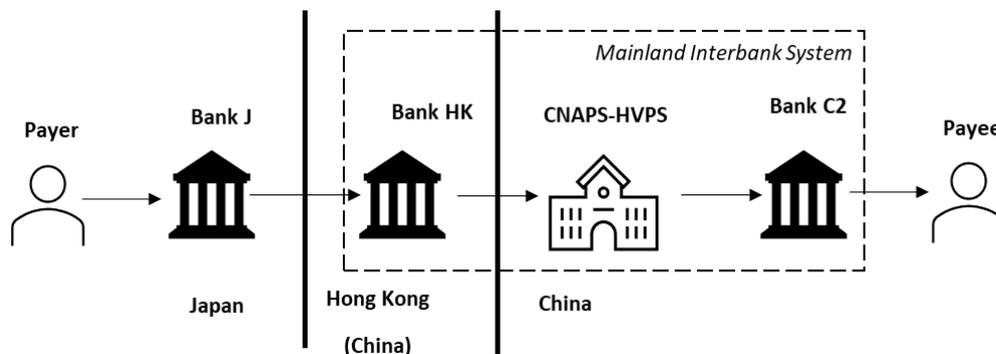


Source: Own elaboration

In figure 6, a Japanese payer, who is Bank J's client, is transferring funds to a Chinese Payee, Bank C2's client. In this case, bank J can access the Chinese payment system because it has a correspondent banking relation with bank C1. It is possible to

conduct this payment chain because both banks C1 and C2 have an account at HVPS-CNAPS.

Figure 7. RMB payments: clearing bank model



Own elaboration based on PBOC (2018b)

Figure 7 illustrates a similar operation but is conducted through the clearing bank model. Similarly, the Japanese payer, Bank J's client, will transfer funds to the Chinese Payee, Bank C2's client. However, in this case, Bank J has a correspondent bank account at Bank HK, located in Hong Kong (China). Bank HK has access to HVPS-CNAPS and may transfer the funds to any bank participating in the Chinese interbank market, including bank C2 in this case.

Giving the importance of Hong Kong as a financial center in Asia, the use of the *clearing bank model* is more prevalent than the *domestic agent model*. According to SWIFT data, three-fourths of their renminbi transactions message traffic involves the Hong Kong offshore center (SWIFT, 2020). This does not mean that all the payment volume is directed to or from Hong Kong, but it is an indication of the important role that this city plays as a payment hub.

When the pilot program started in 2009, these channels could only be used for trade goods payments, or related letters of credit. Only companies localized in Shanghai and 4 cities in Guangdong Province (Shenzhen, Zhuhai, Dongguan, and Guangzhou) could use renminbi for imports. Export payments were even more restricted: only 365

companies in these regions were granted access to the pilot program. From the overseas actors' point of view, only those present in the ASEAN region could participate (PBOC 2009). From 2010 onwards, the PBOC gradually started to ease the criteria on geographical areas, participants' eligibility, and scope of operations allowed through these channels. For instance, in 2010, the number of eligible exporting companies increased to 67,359 distributed over 20 Chinese provinces that could have clients in any overseas regions. By 2011, FDI transactions were included in the pilot program. Finally, by March 2012, these channels were free for transactions under the current account. In addition, the PBOC gradually started to open channels through which foreign financial institutions that received renminbi funds could relocate them back to China. For instance, in 2010 the PBOC allowed foreign central banks, Hong Kong and Macau clearing banks, as well as other financial institutions involved with renminbi payments, to access China's domestic money market.

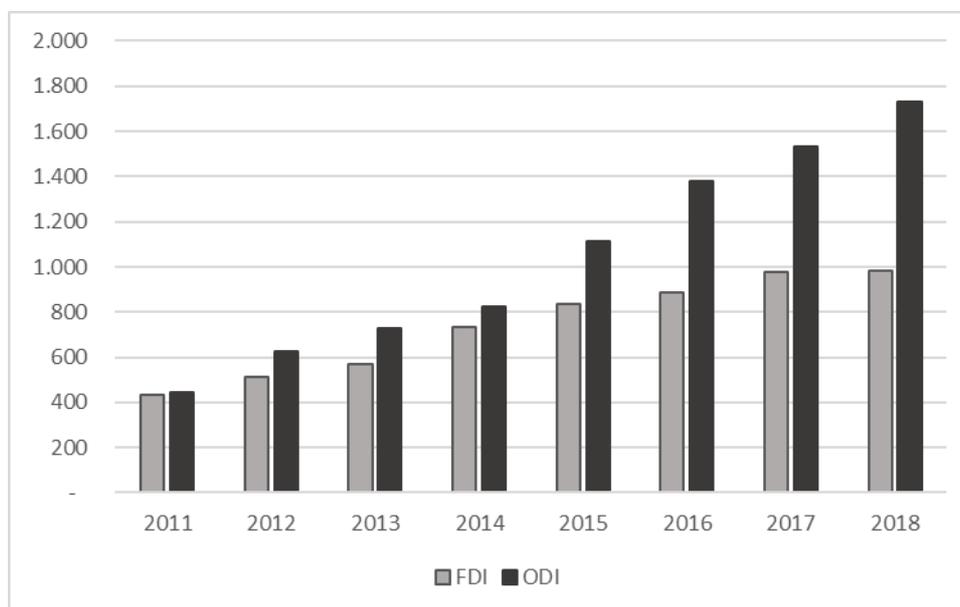
Since 2009, renminbi-denominated CBR has surged. According to the Vice President of the Hong Kong Monetary Authority, by the end of 2010, Hong Kong's correspondent banking relations denominated in renminbi with overseas banks had not reached 200, whereas by mid 2012 this number had increased to 1,100 (Yu, 2012). The Bank of China has reported that by 2012 they had increased their renminbi-denominated correspondent bank accounts by 600, and two years later the figure increased to 1,200 accounts (He, 2014). More recent data show the same increasing tendency: according to research made with 29,000 banks located in more than 200 jurisdictions, in 2012 the number of RMB correspondent banking relationships was 3,600 and this number increased to 8,800 in 2016 (Accuity, 2017).

Chinese banks “go global”: channels for in-house operations

As the previous section showed, overseas bank branches provide another channel for international payments. Data on China's financial institutions' OFDI (graph 2) show that Chinese financial institutions are expanding their presence abroad. According to data from SAFE, between 2011 and 2018 the stock of China financial institutions' OFDI multiplied by roughly 4 times.

According to an analyst from the Bank of Communications, “Renminbi internationalization, and Chinese bank development abroad is a reciprocal advancement” (interview C). As the analyst explained, while Chinese banks can benefit from the increase of renminbi-denominated business abroad, they are also the propellers of this process.

Graph 2. Stocks of financial institutions' foreign direct investment, 2011-2018 (end of the years, RMB billion), China



Source: Own elaboration based on SAFE data.

Among the Chinese financial institutions abroad, it is worth mentioning the role of selected commercial banks as renminbi offshore clearing houses. Between 2012 and

2019, there were 24 new offshore renminbi clearing banks established in different regions (see appendix 1). Similar to the cases of Hong Kong and Macau, other offshore centers also help to make the bridge between overseas regions and Mainland China's payment system. As explained by a PBOC senior official, these clearing banks can directly offer renminbi-denominated accounts to foreign clients. They can also offer correspondent accounts to local banks, allowing them, and their clients, to participate in the renminbi payment network. Additionally, they play the role of market makers: if foreign markets need liquidity, they can request PBOC to provide it to financial institutions (interview D). Every offshore renminbi clearing bank belongs to one of the "big four" Chinese state-owned commercial banks, with only two exceptions (see appendix 2): in the US (JP Morgan) and in Japan (Mitsubishi UFJ Bank).⁴⁹

Building the "highway" for renminbi internationalization: the construction of a clearing house with international reach

In 2012, the PBOC started to organize the construction of a cross-border payment system. According to China's central bank, due to the increasing scale of renminbi cross-border use witnessed from 2009 and 2012, it became imperative to develop a financial infrastructure that could improve the *efficiency* of renminbi international transactions. CIPS was constructed in two phases, launched in 2015 and 2018, respectively. As I will show below, there were additional system enhancements between the two phases and also an increase in the scope of operations allowed in the system, especially regarding financial flows. In 2018, a PBOC spokesperson affirmed that with CIPS China was paving a "highway" for renminbi internationalization (CIPS 2020,

⁴⁹ Although there are several offshore renminbi clearing banks, only those in Hong Kong and Macau have direct access to the HVPS-CNAPS. Consequently, offshore renminbi clearing banks in other localities adopt "in-house" cross-border transactions because their access to HVPS-CNAPS takes place through their head office or parent bank (PBOC 2015).

PBOC 2018b).

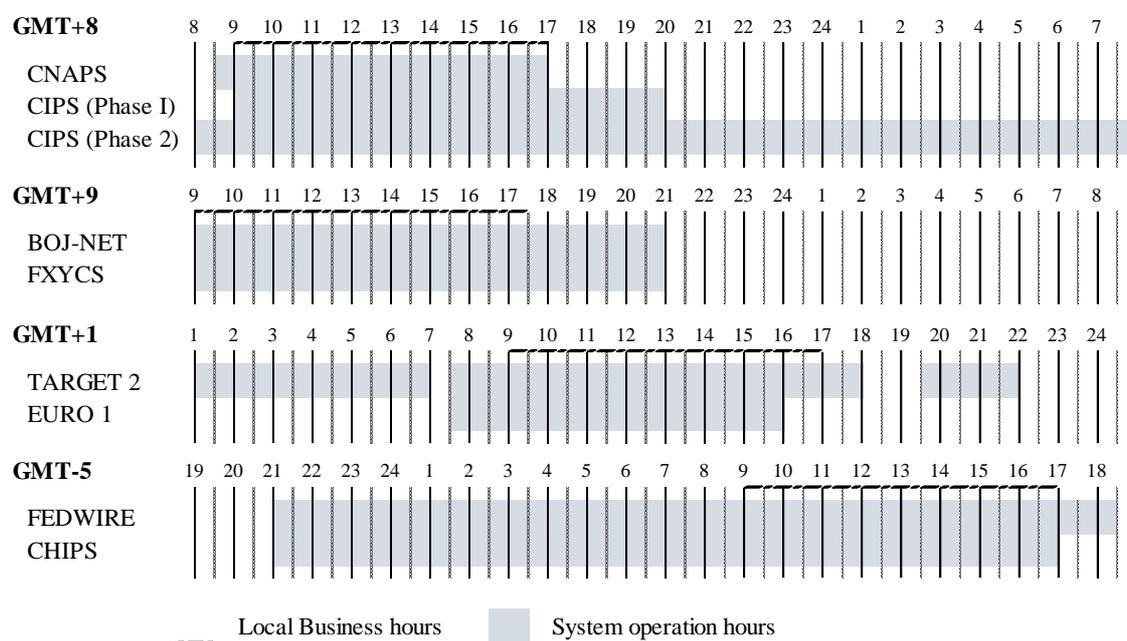
In fact, there were technical barriers that hampered the international use of the renminbi when it relied on correspondent banking relations. One of these involves the different messaging formats of onshore and offshore clearing systems. When China's HVPS-CNAPS was created, it was not designed to be an international platform, therefore its code table was only in Chinese. When this system started being used for cross-border renminbi-denominated settlement, Chinese characters could not be transmitted through SWIFT message types. For this reason, the banking industry developed the *Chinese Commercial Codes (CCC)*, which is a decoding/encoding mechanism that translates each Chinese character into a 4-digit number. The language issue was not solved, however, because the CCC was not standardized among financial institutions. Thus, in 2013, 15% of renminbi cross-border payments were rejected by SWIFT system, while this rate is only 3% for the dollar. A high rate of rejection in financial messages means that transactions can take longer to conclude and bear higher operational risk since they require substantial manual intervention (Global Capital 2013, PMPG 2015).

The adoption of CIPS essentially eliminates this technical issue. CIPS operates with the internationally accepted ISO20022 message standard that is compatible with English and Chinese. Although the CIPS system is not dependent on SWIFT's services and CIPS accepts participants that do not have a SWIFT code, the CIPS message standard is now convertible to the SWIFT message standard.

Time-zone differences cause another problem for renminbi-denominated payments that are dependent solely on correspondent banking relations. As figure 8 shows, there are very few overlaps between HVPS-CNAPS working hours and other continents' business hours. This impacts the speed of renminbi-denominated

transactions as well as the settlement risk. CIPS (Phase I) already had more extended working hours than HVPS-CNAPS. Since the second phase was launched, CIPS has the *longest* operational hours compared with the payment systems that support the international use of euro, yen, and USD. Now CIPS operates 24 hours during normal business days, and on Mondays they begin their procedures 4 hours earlier than other business days, resulting in a weekly operational availability of 124 hours. Hence, CIPS covers the business operation hours of financial centers in all continents. According to a Bank of China branch director, the use of CIPS is especially important to clients that need fast renminbi cross-border payments, because this system allows real-time transactions (interview B).

Figure 8. National large-value payment systems business hours in global time zones perspective.

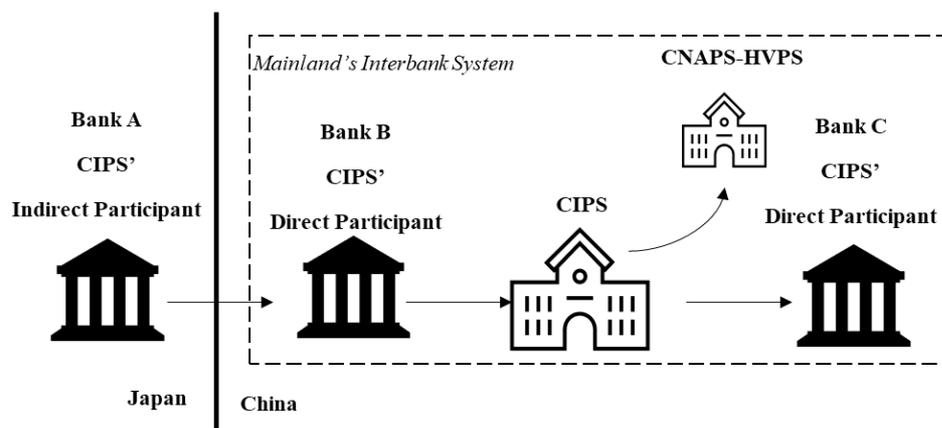


Source: Own elaboration based on PBOC, CIPS, BOJ, ECB, EURO1, FED, and CHIPS websites.

Figure 9 illustrates how transactions occur through CIPS. As in the previous example, the Japanese bank J wants to make a payment to the Chinese Bank C. In this

case, because all the banks belong to CIPS, the transfer can occur with less friction. But because Bank J is a CIPS indirect participant it must access China's payment system through a direct participant, in this case, Bank B.

Figure 9. RMB Payments: CIPS model

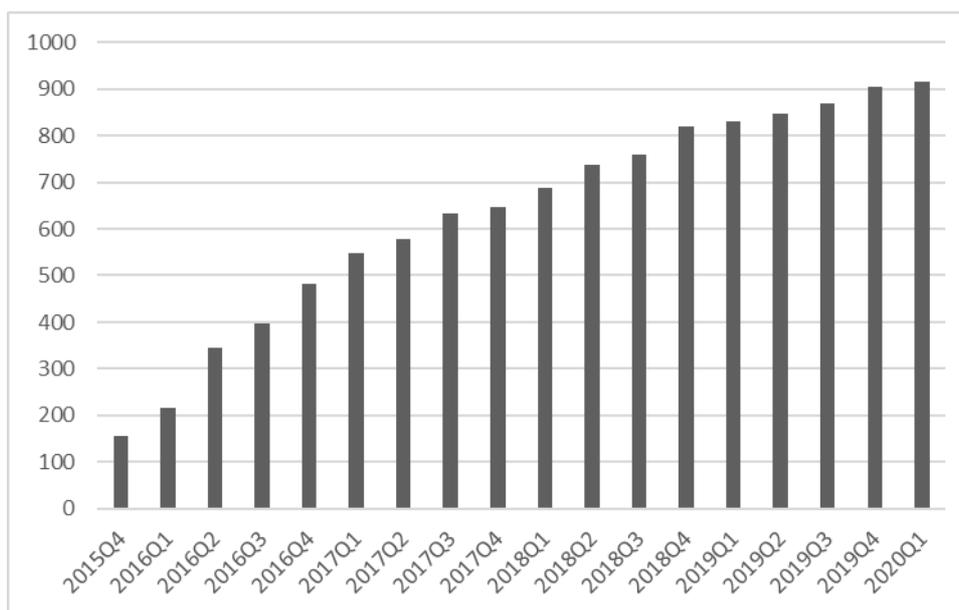


Source: Drawn by the author based on PBOC (2015).

Following China's policy-making approach of gradualism, CIPS phase two expanded the scope of operations allowed in the system. While CIPS phase one supported only cross-border transactions related to trade and foreign direct investments, in the second phase, financial market transactions were also included. For this reason, CIPS integrated into its systems two of China's central securities depositories: the Shanghai Clearing Center and the China Central Depository & Clearing Co. Ltd.

The network of CIPS participants has increased over time. As appendix 2 shows, CIPS now has 33 direct participants, of which 17 are Chinese domestic-owned banks, 12 foreign-owned banks, and 4 financial markets participants. Its members have increased from 19 in 2015, and the number of indirect participants has multiplied by almost 6 times between 2014 Q4 and 2020 Q1, as graph 3 displays.

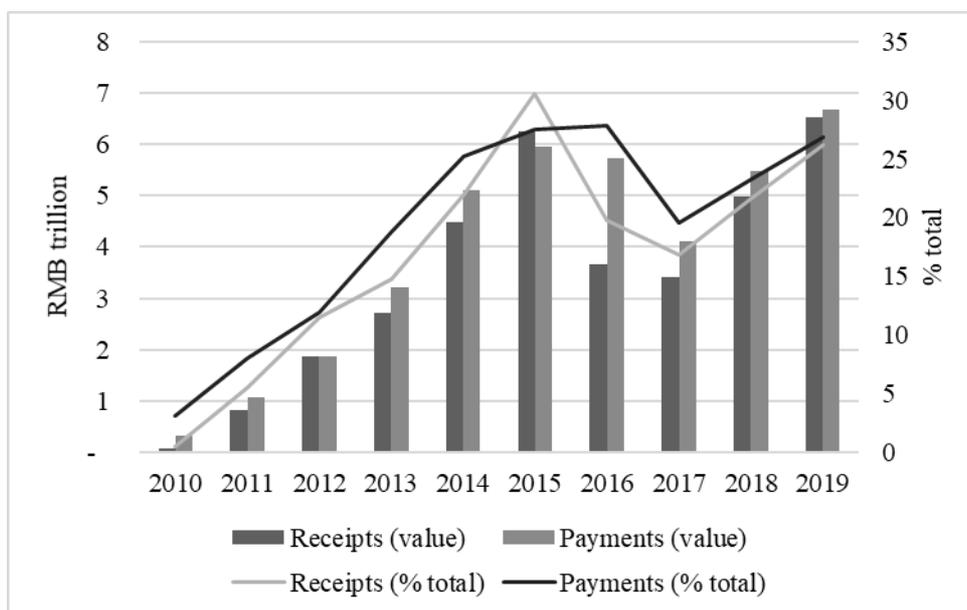
Graph 3. Number of CIPS' indirect participants, 2015Q4- 2020Q1



Source: Own elaboration based on information at CIPS's website.

Data from Chinese monetary authorities show that the payment infrastructure that has been in place since 2009 (which I have shown previously), is indeed being used to support the international use of renminbi. According to SAFE, in 2019, more than 26% of China's receipts and payments (under current and capital accounts) were transacted in renminbi, (see data plotted in graph 4). In 2010, renminbi payments represented only 3% of total cross-border payments and receipts a mere 0,5%. the renminbi's increased share of the market largely represents the portion where it has replaced USD-denominated transactions, which decreased by 18 percentage points during the period analyzed.

Graph 4. Renminbi international receipts and payments via banks, 2010-2019, annual (RMB trillion, percentage of total).

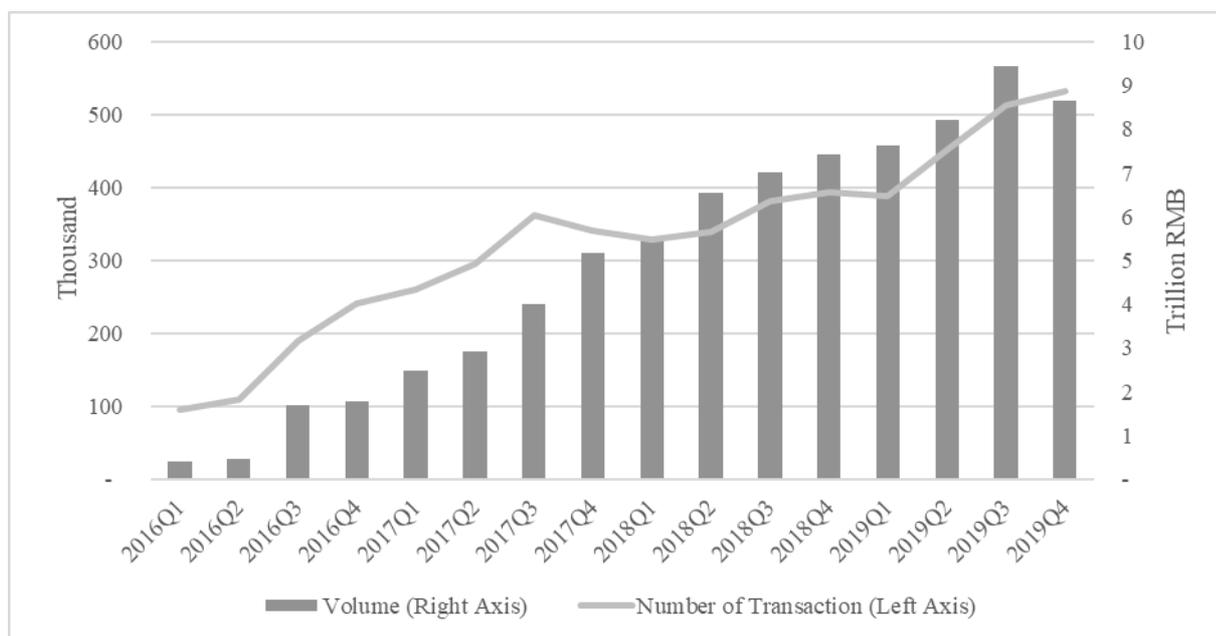


Source: Own elaboration based on SAFE data.

As graph 5 shows, not only has the number of CIPS participants increased since the launch of the system, but also the transacted volume. CIPS's business volume in 2016 represents 13% of its 2019 volume. It is important to note that with the advent of the CIPS, previous models for transacting renminbi were not eliminated. Now the different channels co-exist, and it is up to financial institutions to choose which one they prefer to use (PBOC 2015). However, using CIPS generates faster and less risky renminbi transactions. It is not surprising that renminbi transactions under CIPS have increased substantially since its launch.

Graph 5. Cross-Border Inter-Bank Payments System (CIPS) business volume

2016Q1-2019Q4



Source: Own elaboration based on PBOC reports.

c. The dollar and the renminbi: a systematic comparison of international payment infrastructures

The analysis of the institutional settings that allow the renminbi and the dollar to circulate internationally show that both cases experienced phases of payment infrastructure build-up and expansion. However, the cases differ mainly in the following dimensions: historical background, public sector participation, and extent of the overseas payment network.

Table 2. Differences between the renminbi's and the dollar's cases international payment infrastructures

		<i>Dollar</i>	<i>Renminbi</i>
<i>Historical Background</i>	Beginning of CI	Early 20 th Century	2009
	Main Payment Infrastructure at time	(2) Correspondent Banking Relations; In-house (less significant)	(3) Correspondent Banking Relation, In-house, Payment System
	Establishment of payment Infrastructure	Gradual	Concentrated in time (less than 10 years)
<i>Public/ Private Participation</i>	Clearing house with international reach	Created by Private Sector	Created by Public Sector
	In-house operations	Private Banks	State-owned Banks
<i>Payment Network</i>	Extent	Extensive	Small
	Growth tendency	Shrinking	Growing

Comparing the historical background of both cases shows that the internationalization of the dollar began in the early 20th century, when one of the payment infrastructures used today—clearing house with international reach—did not even exist. At that time, international payments relied mostly on correspondent banking relations, which is the cheapest payment infrastructure to establish. So, the buildup of the initial payment infrastructure for the dollar was relatively simple. The creation of the CHIPS and the expansion of the in-house payment channels in the 1970s were both adaptations of the earlier scheme to meet the new demands of banks and firms for fast and frictionless payment arrangements. These payment infrastructures were not

designed to underpin the emergence of a new international currency, but rather to support the continued dominance of an already established currency as the international monetary system evolved with modified characteristics. The internationalization of the renminbi, however, started its process in a completely different environment, when the need for fast payments was already an imperative. Therefore, unlike the dollar, the renminbi had to catch up with three new payment channels at once.

Apart from their historical background, the cases differ also in the participation of the public sector. Although the core of the American and the Chinese payment systems are owned and operated by their respective central banks, the presence of the public sector is much stronger in the Chinese case. This is the case not only for the payment system CIPS, which was created by the PBOC, but also for the ownership of the banks that serve as renminbi offshore clearing banks abroad, as only 2 out of 26 are not Chinese state-owned enterprises. There are two explanations for this pattern. The first is the interest of Chinese policymakers in encouraging the internationalization of their own currency. As already noted by many authors, Chinese policymakers still keep a firm grip on capital controls, and liberalizations tend to be gradual. Establishing payment infrastructures is a strategy that is useful for currency internationalization and, moreover, does not require full capital account liberalization. The second reason is the different character of the American and Chinese economic systems. Chinese banking systems are largely dominated by state-owned financial institutions, and the existence of private banking is a recent phenomenon that only started in 2015. Until that date, Minsheng Bank was the only fully privately-owned bank in the country (Lu, 2016). The American banking system is the complete opposite. Only a few financial institutions, usually those that cover specific market niches, are state-owned or sponsored, such as

the US Export-Import Bank or the Federal National Mortgage Association (Fannie Mae) (US-OEG 2020).

Comparing the extent of each currency’s payment infrastructure shows that the renminbi payment network abroad, despite its fast growth, represents today only a small fraction of the dollar-based ones. As table 3 shows, the American CHIPS has more than 5 times the number of participants than its Chinese analogue, the CIPS.

Table 3. Geographical distribution of CIPS’ and CHIPS’ indirect participants by April 2020

	CIPS		CHIPS	
	Number of participants	% of total	Number of participants	% of total
Mainland China	399	43	513	10
Asia (excluding Mainland China)	310	34	2.206	41
Europe	118	13	1.284	24
Africa	38	4	373	7
North America	26	3	663	12
Oceania	18	2	107	2
South America	15	2	241	4
Total	924	100	5.387	100

Source: Own elaboration based on information from CIPS’s and CHIP’s website.

The same is true for the number of the renminbi- and dollar-denominated CBR.

According to research from Accuity (2017), US-dollar CBR diminished from 87,515 to 72,619 between 2009 and 2016. Although RMB CBR increased from 3,600 to 8,800 between 2012 and 2016, they represent only around one-tenth of the dollar's.

V. Conclusion

The standard theory on currency internationalization assumes that a country should meet a series of conditions for its currency to be selected as international money. The main factors emphasized in the literature are economic size, international linkages,

currency convertibility, financial development, and liberal domestic institutions. Despite not complying with all requirements, the renminbi has increased its international status, climbing within ten years from the 35th to the 5th position as the most adopted currency. What explains the apparent mismatch between the theory on currency internationalization and the Chinese case? This article has shed light on a possible explanation.

International currencies are transmitted through specific channels, such as correspondent bank accounts, intra-group transfers, and clearing houses with international reach. Despite the importance of these payment infrastructures for the adoption of international currencies, the literature on the subject has overlooked their creation as a factor that allows and encourages currency internationalization. By comparing the institutional context in which the dollar and the renminbi circulate internationally and their historical evolution, this article contributes to the refinement of the theory of international currency. This comparison shows that although the participation of the public sector and the context of the international monetary system are distinct in each case, the creation and expansion of payment infrastructures are a necessary condition for currency internationalization to occur.

Furthermore, the case of renminbi internationalization suggests that policymakers may have more space for maneuver in shaping the international status of their currency, through a process that goes beyond liberalizing capital accounts or seeking 'sound' monetary and fiscal policies. The design of payment infrastructures not only creates the possibility for domestic currency to be adopted abroad but can also shape its attractiveness as international currency by reducing the frictions and costs of international payments. This article's findings also put into question the need for full capital account convertibility when pursuing currency internationalization. Although

some degree of capital account freedom is necessary, our findings raise the possibility that keeping certain capital controls does not preclude a country from having an international currency.

Finally, this research offers some insights into the prospects for the renminbi's internationalization and the dollar's status. First, in the near future, it is expected that the international use of the renminbi will expand faster in countries that already have an established payment infrastructure, especially where there are offshore clearing houses and CIPS members. Until now, these infrastructures are installed mostly in Asia and Europe. Second, Chinese payment infrastructures can impact the efficiency of the dollar's instrumentalization in coercive statecraft. Now that the renminbi international payment infrastructures are already in place, it costs less for companies, banks, and countries to switch their choice of currency to renminbi. Previously, agents willing to use the renminbi had to face a "dirt road"; now they have a highway available. This means that economic agents that are unsatisfied with the adoption of other currencies, such as the dollar, now have one more reliable alternative.

VI. Appendix

Table 1. Offshore Renminbi Clearing Centers.

Region	Since	Bank
1 Hong Kong	Dec. 2003	Bank of China (Hong Kong)
2 Macau	Sept. 2004	Bank of China Macau Branch
3 Taiwan	Dec. 2012	Bank of China Taipei Branch
4 Singapore	Feb. 2013	Industrial and Commercial Bank of China Singapore Branch
5 United Kingdom	June 2014	China Construction Bank (London)
6 Germany	June 2014	Bank of China Frankfurt Branch
7 South Korea	July 2014	Bank of Communications Seoul Branch
8 France	Sept. 2014	Bank of China Paris Branch
9 Luxembourg	Sept. 2014	Industrial and Commercial Bank of China Luxembourg Branch
10 Qatar	Nov. 2014	Industrial and Commercial Bank of China Doha Branch
11 Canada	Nov. 2014	Industrial and Commercial Bank of China (Canada)
12 Australia	Nov. 2014	Bank of China Sydney Branch
13 Malaysia	Jan. 2015	Bank of China (Malaysia)
14 Thailand	Jan. 2015	Industrial and Commercial Bank of China (Thailand)
15 Chile	May 2015	China Construction Bank Chile Branch
16 Hungary	June 2015	Bank of China Limited Hungarian Branch
17 South Africa	July 2015	Bank of China Johannesburg Branch
18 Argentina	Sept. 2015	Industrial and Commercial Bank of China (Argentina)
19 Zambia	Sept. 2015	Bank of China (Zambia)
20 Switzerland	Nov. 2015	China Construction Bank Zurich Branch
21 United States	Sept. 2016	Bank of China New York Branch
22 Russia	Sept. 2016	Industrial and Commercial Bank of China (Moscow)
23 United Arab Emirates	Dec. 2016	Agricultural Bank of China Dubai Branch
24 United States	Feb. 2018	JP Morgan Chase & Co.
25 Japan	Oct. 2018	Bank of China Tokyo Branch
	May 2019	Mitsubishi UFJ Bank
26 Philippines	Sept. 2019	Bank of China Manila Branch

Source: PBOC (2020)

Table 2. List of CIPS's direct participants by April 2020

Domestic Owned Banks		Since
1	Industrial and Commercial Bank of China	Oct. 2015
2	Agricultural Bank of China	Oct. 2015
3	Bank of China	Oct. 2015
4	China Construction Bank	Oct. 2015
5	Bank of Communications	Oct. 2015
6	China Merchants Bank	Oct. 2015
7	Industrial Bank Co. Ltd.	Oct. 2015
8	Huxia Bank	Oct. 2015
9	Pingan Bank	Oct. 2015
10	SPD Bank	Oct. 2015
11	China Minsheng Banking Corp. Ltd.	Oct. 2015
12	CGB Bank	Jul. 2016
13	China Citic Bank	Jul. 2016
14	Bank of Shanghai	Jul. 2016
15	Bank of Jiansu	Jul. 2016
16	Bank of China (Hong Kong)	Jul. 2016
17	China Everbright Bank	Dec. 2016
Foreign Owned Banks		
18	HSBC	Oct. 2015
19	DBS Bank	Oct. 2015
20	Bank of East Asia	Oct. 2015
21	Deutsch Bank	Oct. 2015
22	BNP Paribas	Oct. 2015
23	Australia and New Zealand Banking Group Ltd.	Oct. 2015
24	Standard Chartered	Oct. 2015
25	Hang Seng Bank	Jul. 2016
26	Mizuho Bank	Jul. 2016
27	MUFG Bank	Jul. 2016
28	JP Morgan Chase	Jun. 2017
29	Citi Bank	n.i
Financial Market Direct Participants		
30	China Central Depository & Clearing Co. Ltd	Jun. 2017
31	Shanghai Clearing House	Jun. 2017
32	City Commercial Banks Clearing Co. Ltd.	n.i
33	NetsUnion Clearing Corporation	n.i

Source: Own elaboration based on information available at CIPS's website

Appendix 3. Interviews.

Code.	Institution	Role	Place	Date
A	People's Bank of China (Central Bank)	Senior official	Shanghai	Nov-18
B	Bank of China (Commercial Bank)	Branch Director	Shanghai	Sep-19
C	Bank of Communications (Commercial Bank)	Analyst	Shanghai	Sep-19
D	People's Bank of China (Central Bank)	Senior official	Beijing	Oct-19

Source: the author

Chapter 4. The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets

With Pedro Perfeito da Silva

The trading volume of renminbi in global foreign exchange markets increased fourfold between 2010 and 2019, and today the renminbi is the only emerging market currency placed among the top 10 most traded currencies. Since 2009, China has implemented a series of geographically targeted policies, including swap agreements, clearing banks, investment quotas, and direct trading between renminbi and non-USD currencies. This article explores whether and how these policies, individually or in combination, impact renminbi overseas use. Adopting a fuzzy set Qualitative Comparative Analysis (fsQCA) and using BIS cross-country data of renminbi trading in foreign exchange markets for 2010, 2013, 2016, and 2019, this paper finds that institutional building has lowered the barriers to renminbi international adoption. Specifically, we found that, for countries economically close to China, high renminbi trading in foreign markets is explained by either: 1) having a renminbi clearing bank in the host market and direct quotation between the renminbi and local currency, or 2) being economically close to China, being a financial center and having access to the Chinese capital market. We explain this combination of policies as 1) the creation of “trading posts” that provide renminbi liquidity abroad, and 2) the creation of financial channels for economic agents to “recycle” offshore renminbi funds. We triangulate the fsQCA results with interviews conducted with senior PBOC officials.

Keywords: International monetary system, renminbi internationalization, foreign exchange markets, offshore renminbi trading, institutional context, Fuzzy-set Qualitative Comparative Analysis (fsQCA).

I. Introduction

The dollar, the euro, the Japanese yen, the Swiss franc, and most recently the renminbi belong to the restricted group of international currencies (IC); they operate not only within their domestic jurisdictions, but also across national borders. There are several advantages for countries whose currencies operate internationally, such as seigniorage gains, macroeconomic flexibility, price stability, and political influence (Cohen, 2012; Eichengreen, 2011; Gopinath, 2015; Kirshner, 1995; Zhang and Tao, 2014). But the process towards achieving the status of an IC is an uphill battle (Eichengreen and Hausmann, 2005; Matsuyama et al., 1993). To a large extent, international currency status depends on a country's structural characteristics such as economic size, trade linkages, financial openness, military power, and domestic institutions. Given that IC adoption is highly path-dependent, however, meeting these criteria is not a guarantee that new entrants will become an international currency (Cohen, 2015; Eichengreen et al., 2018; Helleiner, 2008). Even with the increasing global and systemic importance of emerging market economies, international currency use is still highly concentrated in the dollar and the euro (Armijo et al., 2014; Cohen and Benney, 2014).

Despite these obstacles, between 2010 and 2019, the renminbi climbed from the world's 35th to the 5th most used payment currency (SWIFT, 2020). Renminbi trading activity in global markets has increased from 0.5% to 4.3% within 12 years (see table 1). Although its participation is still small compared to other international currencies, it is the *only* emerging market currency to be among the top10 in the list. The Mexican peso, which is the second most traded currency from an emerging market economy, ranks at 15th position, according to the BIS 2019 survey.

Table 1. Currency distribution on global foreign exchange market turnover in April 2007- 2019. Net-net basis, percentage shares of average daily turnover in April of each year

	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 Sterling pound	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 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
Other	14.0	12.5	12.4	12.7	13.8
Total	200.0	200.0	200.0	200.0	200.0

Source: Bank of International Settlements. Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%. Adjusted for local and cross-border inter-dealer double-counting (i.e., “net-net” basis)

Renminbi’s trading activity is unevenly distributed among offshore jurisdictions.⁵⁰ While renminbi trading activity represents 17% of Hong Kong SAR's, 6.65% of Singapore's, and 5.65% of Korea's foreign exchange market, in other countries it accounts for a small fraction of the host market. What explains the different levels of renminbi trading in offshore markets? This is the leading research question of this article.

“Jurisdiction” and “country” are used interchangeably. Although Hong Kong SAR belongs to Chinese territory, we use the word “country” for simplification purposes.

Beginning in 2009, Chinese policymakers started to gradually encourage the renminbi's international adoption, with the priority of maintaining economic stability and preventing the renminbi from becoming a mere vehicle for speculation. To a large extent, China has used geographically-targeted policies. Specifically, by 2020, China had signed swap agreements with 39 overseas central banks, established renminbi clearing banks in 25 countries, granted investment quotas to institutional investors located in 21 jurisdictions (via a program named Renminbi Qualified Foreign Institutional Investor, RQFII), and implemented direct trading between the renminbi and 23 non-USD currencies⁵¹ (PBOC, 2020).

Although renminbi internationalization has been under the spotlight of economists and political scientists (Cohen, 2015; Eichengreen et al., 2018; Prasad, 2017; Subacchi, 2016), except for swap agreements, there is little empirical research assessing whether China's policies have an impact on the international use of the renminbi. The few available studies present conflicting results (Bahaj and Reis, 2020; Cheung and Yiu, 2017; Chey and Hsu, 2020; Song and Xia, 2020). This article aims to fill this gap by exploring the role of regionally-targeted policies on renminbi trading in offshore foreign exchange markets. Rather than testing the role of individual policies, we are interested in possible *policy complementarities*⁵², understood as interactions among policies that can generate a certain outcome, as well as their synergy with market conditions. We also consider that—since international currencies are adopted for distinct objectives (e.g. investment, credit, trade payments, etc.)⁵³—there may be more than one policy combination that leads to overseas adoption of the renminbi. For this

⁵¹ Previously, renminbi and non-USD currencies had to be exchanged using the dollar as an entrepot.

⁵² First referred to by Aziz and Wescott (1997), who investigate investment and growth.

⁵³ See Cohen (1971) for a typology of international currency uses.

reason, we choose to address this question by utilizing the fuzzy set Qualitative Comparative Analysis (fsQCA) methodology, since its epistemological foundation encompasses *causal complexity*. In other words, fsQCA assumes that 1) relevant factors do not usually generate an outcome in isolation, but in combination with other factors (referred to as conjunctural causation), and 2) mutually non-exclusive 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 individual or complex⁵⁴ conditions (X) are necessary and/or sufficient⁵⁵ for an outcome of interest (Y) to occur. In addition to utilizing fsQCA, this article draws on interviews conducted with senior PBOC officials in 2018 and 2019 to explain *how* the conditions identified impact renminbi trading in offshore markets.

Our findings show that China's policies do matter for renminbi high trading activity in offshore markets because they create the conditions that *enable* firms and financial institutions to adopt renminbi. Among these policies, renminbi clearing banks are the core arrangement. According to our fsQCA analysis, the absence of renminbi clearing banks is a necessary condition for low renminbi trading. Renminbi offshore clearing banks not only work as the gateway to the renminbi payment system but also serve as renminbi liquidity providers in overseas markets. Furthermore, we also found that, for countries economically close to China, high renminbi trading in foreign markets is explained by either 1) having a renminbi clearing bank and direct quotation between the renminbi and local currency, or 2) being a financial center and having

⁵⁴ A complex condition refers to a combination of different individual conditions.

⁵⁵ The 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.

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 renminbi in these jurisdictions and therefore collaborate with renminbi high trading activity. The second path shows the importance of opening channels for foreign residents to invest in the mainland's financial market, including channels for “recycling” the funds they receive through payments. Finally, although we recognize the role of swap agreements in renminbi 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, which can increase confidence in renminbi adoption.

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 (Bahaj and Reis, 2020; Eichengreen and Flandreau, 2012). Our work shows empirically that the toolkit available to central banks for encouraging currency internationalization consists of more than offering swap arrangements to partner countries, and that the various policies work in synergy with each other and with host markets' components. 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 markets' institutional components.

Therefore, there may be room for more currencies in the international system under a different market institutional setting.

The remainder of the paper proceeds as follows: Section 2 discusses the article's theoretical framework. In section 3, we explain the methodology used for this study, namely fsQCA, as well as the advantages of using this methodology for researching currency internationalization processes. In the same section, we introduce the data analyzed. In the fourth section, we present and discuss the main findings. The final section concludes.

II. Theoretical framework

The main difference between domestic and international transactions, a scholar on international currencies would argue, is the *degree of freedom* that actors have when adopting a currency. For transactions within a country (or monetary union), firms and financial institutions are obliged to use the legal tender. In an international monetary system that lacks a supranational currency, however, actors are not legally compelled to adopt any particular domestic currency when conducting 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 dollar (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, given the pecuniary advantages derived from economies of scale and network externalities, economic actors have microeconomic incentives to use the currency of the leading economic power (Black, 1991; Kindleberger, 1967; Krugman, 1984; 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

(Eichengreen and Hausmann, 2005; Kindleberger, 1967). 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 and institutional building*, 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” (p. 3) that not only constrain individual choices but also *enable behavior* and *reduce uncertainty*. Institutions can be formal or informal, and they can evolve or be created. In this article, we are specifically interested in the *creation of formal institutions* that enable renminbi adoption in overseas markets.

Until recently, the role of *institutional building* in currency internationalization has been neglected in scholarship, with a few exceptions. Eichengreen and Flandreau (2012), for instance, show how the FED shaped financial infrastructures and built financial markets—specifically the dollar-denominated trade credit—to jumpstart the international use of the dollar at the beginning of the 20th century. Song and Xia (2020) and Bahaj and Reis (2020) show that since 2009, the Chinese central bank (the PBOC) has used similar methods and also improved the conditions for renminbi 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, first, by showing how the Chinese strategy of currency internationalization is focused on *institutional building* in overseas markets. Additionally, we examine *how* and *to what extent* these policies influence = the overseas adoption of renminbi. We do not downplay the role of market forces in

shaping renminbi internationalization and renminbi trading in offshore markets, but we believe that PBOC policies have been playing an important role throughout this process. Cheung et al. (2019), who analyse the diffusion of renminbi trading in offshore markets, show that renminbi trading is converging with the pattern of other international currencies. While we agree with them that this tendency may reveal market forces, the authors themselves show that, in comparison with other EME currencies, renminbi 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

In this section, we first explain the assumptions, advantages and procedures of our selected methodology, fuzzy set Qualitative Comparative Analysis. Following this, we introduce the data and the calibration criteria of our fsQCA.

a. Set theoretical methods and fuzzy set qualitative comparative analysis

In methodological terms, this article seeks to offer a new perspective for the investigation of the drivers of currency internationalization, by paying attention to the regularities underlying the adoption of renminbi 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: 1) conjunctural causation, 2) equifinality, and 3) 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

certain outcome, it does not imply that the non-occurrence of this factor will automatically result in the absence of the outcome (Ragin, 2008; Schneider and Wagemann, 2012).

Although set-theoretical methods are rare in economic research, causal complexity is embedded in economists' reasoning, as demonstrated by the literature on International Currency. For example, it is considered that a combination of factors—economic size, trade linkages, price stability, etc.—impact the status of a currency in international markets; this is a case of conjunctural causation (Cohen, 2015; Helleiner, 2008). Equifinality is also acknowledged: 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, in this literature, there is also evidence of asymmetrical causation: 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, since 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 fuzzy-set qualitative comparative analysis (fsQCA), which is the most formalized. A comparison of 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 complex⁵⁶ conditions (X) that lead to an outcome of interest (Y). 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). FsQCA is considered the gold standard of set-theoretic analysis. It not only allows the use of qualitative and quantitative information to establish differences-in-kind among cases but also 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). Therefore, unlike conventional statistical analysis, fsQCA requires calibration of the variables into set membership. In other words, based on agreed upon standards and theoretical knowledge, the researcher must determine a threshold that separates membership from non-membership (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 *renminbi offshore trading activity*. More specifically, we classify the cases as High or Low renminbi 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 a distribution within the adopted dataset, currency internationalization from emerging market economies is a relatively novel

⁵⁶ Complex conditions refer to combinations of different individual conditions.

phenomenon. In the absence of agreed standards on this topic, we chose criteria for the conditions based on our specific knowledge of the subject, and with full transparency, we present the logic applied to define the membership criteria for both the outcome and the relevant conditions.

b. Outcome

Given that the focus of our analysis is on national currency adoption in global foreign exchange markets, we rely on the *Triennial Central Bank Survey* conducted by the Bank of International Settlements (BIS), which is, to our knowledge, 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.

Based on information from BIS, we calculate the renminbi market share in all jurisdictions available in the survey for 2010, 2013, 2016, and 2019. Our dataset contains 201 observations in total, after excluding data about mainland China (since it is the local market for the renminbi), and a few other jurisdictions (due to lack of data availability). In this article, a *case* refers to a particular jurisdiction in a given year.

We then separate the cases into two regimes of renminbi trading activity: low and high. The threshold that separates the regimes is based on other currencies' market share in offshore centers. We consider that if a given jurisdiction has renminbi trading activity as high as the average of other top traded currencies, then it has a high renminbi regime.

There are over 160 currencies in the world⁵⁷; 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 (simple average, 2019)

1 USD	81.78%
2 EUR	38.93%
3 JPY	4.47%
4 GBP	6.99%
5 AUD	2.57%
6 CAD	1.60%
7 CHF	3.43%
8 CNY	1.26%
9 HKD	0.90%
10 NZD	0.79%
11 SEK	1.45%
12 KRW	0.27%
13 SGD	0.77%
14 NOK	1.16%
15 MXN	0.60%
Position 3-7 (average)	3.81%
Position 9-15 (average)	0.85%

Source: Own elaboration based on BIS 2019 triennial survey. Note: Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies is not 100%.

Based on this information, we calculated the simple average of currencies above and below the renminbi in the list, excluding the dollar and the euro, since they are vehicle currencies. In practical terms, this provides the average of JPY, GBP, AUD, CAD, and CHF as the anchor for full membership in the outcome “high”, which amounts to 3.81%. For the minimum membership threshold, we have adopted the anchor of 0.85%, which is the average of the currencies from the 9th to the 15th position,

⁵⁷ Based on IBAN.

namely the HKD, SEK, KRW, SGD, NOK, MXN. 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 highly hierarchical and concentrated in the dollar and the euro.

c. Explanatory conditions

In this section, we present the explanatory conditions, their operationalization, and calibration criteria. Given our interest in exploring the role of official policies in renminbi trading in offshore clearing markets, we have included *all policies* that present regional variation as our explanatory conditions. They are: 1) if the country has signed a swap agreement with China or not; 2) if the jurisdiction has an offshore renminbi clearing bank or not; 3) if the jurisdiction has RQFII investment quotas to access China's financial market or not; 4) if the jurisdiction's local currency has direct trading with renminbi or not. Although we understand that other conditions that are absent from the list may have impacted the overall renminbi offshore trading activity (e.g., renminbi inclusion on SDR, price and debt levels, etc.), we refrain from including them in the analysis because they equally affect all countries, and therefore cannot explain the different levels of renminbi adoption, which is our main concern. Apart from the policies already mentioned, we also consider that overseas markets' economic and financial characteristics may affect renminbi offshore trading activities. Therefore, we have also included the following conditions: 5) if the host country is economically close to China or not; 6) if the jurisdiction is a global financial center or not.

In statistical analysis, models must not rely on unlimited independent variables without excessive loss of degrees of freedom. In the face of limited diversity⁵⁸, QCA

⁵⁸ QCA solutions are based on the truth table minimization, composed of all possible combinations among the explanatory conditions. However, because of limited diversity,

must also be careful about the inclusion of explanatory conditions to avoid generating ambiguous solutions. For our number of cases (201), we selected a maximum number of 6 explanatory conditions. These cover all policies we are interested in as well as the plausible host market characteristics that may affect renminbi trading. Moreover, this number creates a ratio between conditions and number of cases that ensures there is a negligible chance that our result is random (Marx, 2006).

Currency swap agreements

Currency swap agreements (CSA) are arrangements between central banks, which allow them to provide foreign currency liquidity to resident commercial banks (Nozahie and Ibrahim, 2017; Destais, 2016). The existence of CSAs dates back to the 1960s, and they were significantly expanded during the 2008 Global Financial Crisis and 2020 Covid Crisis. Historically, CSA has served different purposes for beneficiary central banks, such as managing exchange rates, avoiding yield spikes in offshore markets, and as precautionary insurance against crises (Kring et al., 2021; McCauley and Schenk, 2020). Beginning in 2009, the PBOC started to offer swap agreements to partner central banks. Besides serving as crisis insurance, the arrangement has also been purposefully designed to facilitate renminbi trade and investment. As Bahaj and Reis (2020) demonstrate, signing a CSA with the PBOC increases the probability of using the renminbi for trade payments by 20%. In this study, we check whether CSA also impact renminbi foreign exchange trading in the offshore market, and in combination with other policies.

that is, the absence of concrete cases to cover all potential combinations, it is not possible to define 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.

Information on China's currency swap agreements 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.⁵⁹ For the euro area, the PBOC has a swap agreement with the European Central Bank instead of individual central banks. Therefore, for euro area countries in our dataset, we calculated the weighted average of swap amount considering countries' GDP.

To convert swap amount to membership we considered 0,8 billion renminbi as the indifference point,⁶⁰ which is slightly inferior to the lowest value in our dataset (0,81 billion renminbi for Latvia 2016). Hence, all cases that had a valid agreement on the date of the survey are above the cross-over point of this condition. We also set the full membership anchor at 350 billion renminbi (existence of a swap agreement of large extension), and 0 as the criteria for full non-membership (lack of swap agreement). The criterion for full membership was based on the average of Hong Kong's agreements from 2010 to 2019. Since the beginning of renminbi internationalization, Hong Kong has been a renminbi internationalization "testing ground" (Cheung, 2012), not only in terms of pioneering policy implementation, but also for its high volume of arrangements. Therefore, 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's.

⁵⁹ Since the survey does not have a specific date, we assigned April 15th for our calculation.

⁶⁰ Indifference point, cross-over point, and minimum membership threshold are used interchangeably.

Renminbi offshore clearing banks

Renminbi offshore clearing banks refer to designated commercial banks⁶¹ operating in overseas markets that are allowed to operate in renminbi. Specifically, these banks offer renminbi-denominated accounts to overseas financial institutions and firms, hold renminbi deposits, offer loans, and provide clearing and settlement services (PBOC, 2020). According to an PBOC senior official⁶² and a Bank of China director⁶³, renminbi clearing banks also serve as renminbi market-makers, liquidity providers, and offer renminbi-denominated financial products to resident financial institutions.

A 2020 PBOC report offers information about the date of establishment and the location of all renminbi clearing banks. We assume that clearing banks' length of operating time can impact renminbi offshore trading activity because over time resident financial institutions can become aware of and adopt clearing banks' services. Therefore, using PBOC (2020) information, we verified the number of days clearing banks have operated in a jurisdiction since their establishment—a number which ranges from 66 to 3573 days. Then we defined 65.99 days as the crossover point (minimum membership score), to include all cases that have an operational clearing bank as members of this condition. Following the criteria of other policy variables, we defined 1929 days as the full membership score, because it is the average of cases that include Hong Kong (2010, 2013, 2016, 2019). Finally, 0 days is the qualitative anchor for a non-member in this case.

Investment quotas

Several scholars have emphasized the relationship between capital account

⁶¹ Mostly Chinese big-four commercial bank branches, with the exception of J.P. Morgan in the US and MUFG Bank in Japan.

⁶² Interviewed in Beijing, November 2019.

⁶³ Interviewed in Shanghai, September 2019.

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

For our fsQCA analysis, we consider only information on RQFII, which was created in late 2011 and totally 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 renminbi directly *from offshore centers* to invest in the mainland, whereas the QFII, on the other hand, requires that investors firstly transfer USD or hard currencies to China and exchange to RMB in mainland China. (Prasad, 2017; Shenzhen Stock Exchange, 2018). Therefore, unlike QFII, the use of RQFII can impact renminbi foreign exchange activities.

To convert RQFII information into set membership we considered the existence of a quota agreement with China for each country in a given year (according to information provided by PBOC (2020)). To encompass all jurisdictions that have RQFII quotas as members of this condition, we defined 49.99 billion renminbi as the minimum membership score, since the smallest quota extended to a country was 50 billion renminbi. Following the criteria of other policy conditions, we considered that if a country has RQFII quotas as high as Hong Kong's (average) then it has a quota of large

extension. Hence, we set 225 billion renminbi as the upper bond threshold, and 0 as lack of quota agreement.

Direct trading between the renminbi and local currencies

In 2019, over 88% 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 an agent from a peripheral country wants to complete an exchange with another peripheral country, 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) started to introduce new currency pairs with the renminbi, and today, as well as the American and Hong Kong dollars, the renminbi is traded directly against 23 additional currencies. The CFETS is in Shanghai and, according to official information, by January 2021, it had 15 offshore renminbi clearing banks and 71 foreign central banks as members (CFETS, 2021). This provides evidence that foreign market participants may also have access to (CFETS) foreign currency trading.

As shown by information from 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 renminbi against non-USD currencies as one of our conditions. The China Foreign Exchange Trade System (CFETS) website provides information on local currencies that are traded directly against the renminbi, as well as 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, by the time of the BIS survey, the trading between the renminbi and a given local currency had been available to market participants. 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 directly traded with the renminbi. Unlike other policy conditions in our dataset, we could not take Hong Kong as the reference, because this currency has historically traded against the renminbi. As such, we adopt 3162 days as the upper limit because this is length of time before the first non-USD currency pair was introduced (Malaysian ringgit).

Economic proximity

As well as considering policies, we also 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 the sum of imports from and exports to China each year as a percentage of the jurisdiction's total trade in

that respective year⁶⁴. To convert this measure into set membership, we considered the degree of connectedness between China and the USA, and between China and Hong Kong. We presume that, if a given case is as economically close to China as the USA is, then this case is a member of the condition "economic proximity". Hence, we defined the indifference point as 15.2%, which is the average of the data for the USA in 2010, 2013, 2016, and 2019. By the same logic, we consider that if jurisdiction is as close to China as Hong Kong is, then it is highly close to China. Therefore, the full-membership threshold was fixed at 43%, which is Hong Kong's average. The lower bound limit stands at 0%.

International Financial center

Our last condition is comprised of whether a given jurisdiction is an international financial center (IFC), 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 Essayyad, 1989).

The operationalization of this explanatory condition was based on the 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), 0 (fully non-developed). Considering that financial markets and the IFC 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% of most

⁶⁴ We did not include information on bilateral financial connectedness because of data unavailability.

financially developed jurisdictions and the remaining 90%. The following table summarizes the explanatory conditions incorporated in our fsQCA analysis:

Table 3. Summary of fsQCA conditions

Condition	Explanation	Operationalization	Anchor points	Sources
Financial Center	If the country 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.
Economic Proximity	If the country is economically closer to China	Sum of the imports from and exports to China as % of the jurisdiction's total trade	Fully in: 0.43 Cross-over: 0.152 Fully out: 0	UN Comtrade database
Clearing Bank	If the jurisdiction has an offshore renminbi clearing bank	Time (in days) of operation of clearing banks in each jurisdiction	Fully in: 1929 Cross-over: 65.99 Fully out: 0	PBOC (2020)
Direct trading renminbi-local currency	If the jurisdiction's local currency has direct trading with the renminbi	Time (in days) the trading between the renminbi and a given local currency is available	Fully in: 3162 Cross-over: 4.99 Fully out: 0	PBOC (2020)
Investment quotas	If the jurisdiction has Renminbi Qualified Foreign Institutional Investor Scheme (RQFII) to access China's financial market	Size of RQFII quotas (RMB billion)	Fully in: 225 Cross-over: 49.99 Fully out: 0	China Foreign Exchange Trade System (CFETS)
Swap	If the jurisdiction'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)

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 renminbi offshore trading.

There are two key measures for evaluating sufficient solutions: coverage and consistency. The first refers to the extent to which the outcome of interest is explained by the solution, and it shows the empirical importance of causal combination. Note that 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 is only a rule of thumb, however, because consistency thresholds depend on each truth table's analysis and on the identification of discontinuities or gaps in the table (see part 1 of the appendix). 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 regime⁶⁵, we obtain the most parsimonious solution and the intermediate solution by utilizing “easy counterfactuals”, but we interpret only the most parsimonious solution (the intermediate solution can be found in part 2 of the appendix). Since the goal of this article is to uncover a causal relationship, we follow Baumgartner: “only the most parsimonious solution formulas of QCA are guaranteed to reflect causation” (Baumgartner, 2015, p. 854). As there are no incoherent counterfactuals with our selected explanatory conditions, for our analysis there is no risk associated with choosing the most parsimonious solution.

As explained in the introduction, this article focuses on the conditions underlying the *high* use of renminbi offshore trading, however, understanding the determinants of *low* adoption of this currency also contribute to the main objective. Therefore, we performed the fsQCA for both outcomes to see which individual or complex conditions are sufficient to produce the outcomes of interest. As a complement, we separated our dataset into emerging market economies and advanced economies and performed a fsQCA for each group separately (analysis and solution table in part 3 of the appendix).

Finally, following Skaaning (2011), we performed three types of robustness checks (which can be found in appendix part 2). 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).

⁶⁵ In addition to the minimum consistency threshold of 0.925, we set the minimum threshold for the proportional reduction in inconsistency (PRI) at 0.6 to exclude combinations that could be associated with either occurrence or absence of the outcome of interest.

a. Renminbi high trading in offshore markets

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

Table 4 – Most parsimonious solution for high regime of renminbi trading in offshore foreign exchange markets

	(1)	(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

Obs: ● Core condition present. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

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 equally explained by both paths. This does not contradict our analysis because the role played by the conditions in the first solution term may be complementary to the role played by the combination of conditions in the second path.

Table 5: Typical case for “high” regime solution terms

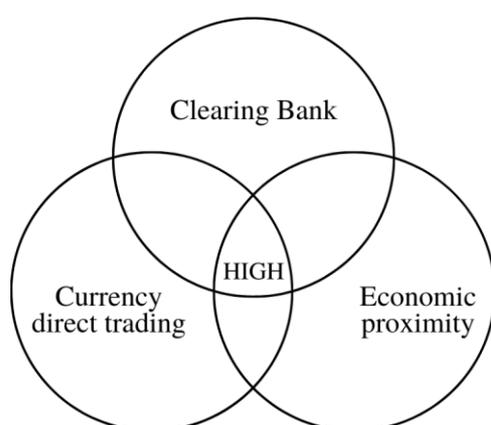
Solution	Cases
1	Australia 2019, Australia 2016, Hong Kong SAR 2010 , Hong Kong SAR 2013, Hong Kong SAR 2016, Hong Kong SAR 2019, Japan 2019, Korea 2019, Malaysia 2016, Malaysia 2019 , Thailand 2019, United States 2019
2	Australia 2019, Hong Kong SAR 2013, Hong Kong SAR 2016, Hong Kong SAR 2019, Japan 2019, Korea 2016 , Korea 2019, Thailand 2019, United States 2019

Source: the authors. Obs: bold face indicates uniquely covered cases.

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 renminbi and local currency, present high renminbi trading in the host foreign exchange market. Figure 1 illustrates these situations using a Venn diagram.

Figure 1: Venn diagram for “high” regime, first solution



Source: the authors

We explain the first path as the creation of renminbi “trading-posts” in overseas markets. According to Devereux and Shi (2013, p. 98), trading-posts are “locations where agents can go in order to buy or sell one currency to another”. In other words,

they provide liquidity of 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 centres, and economic agents end up choosing a vehicle currency (today, the dollar). 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.

In order 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 China Foreign Exchange Trade System's (CFETS) initiative to create new currency pairs between the renminbi 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 official⁶⁶: clearing banks "can be a market maker, or a liquidity provider for the local market, for the renminbi". The renminbi trading posts can function in offshore markets because most clearing banks do have access to CFETS. Naturally, without demand for renminbi, these mechanisms alone would not explain the renminbi high trading activity in offshore markets, but the economic proximity to China fuels demand for renminbi trading.

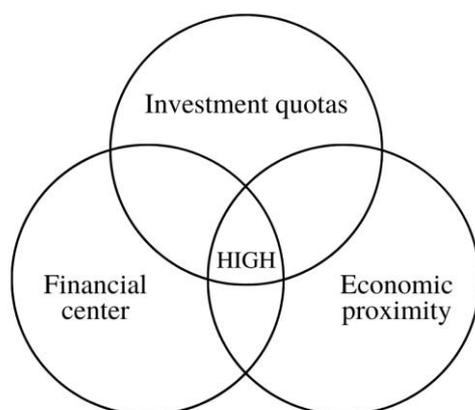
Solution 2: Investment channels and the "recycling" of renminbi offshore funds

According to our fsQCA analysis, a second path to renminbi high trading in offshore foreign exchange markets includes the following: jurisdictions that are economically

⁶⁶ Beijing, November 2019.

close to China, are financial centers, and have RQFII quotas to access the mainland's capital markets. Figure 2 provides a visual representation of this solution.

Figure 2: Venn diagram for “high” regime, second solution



Source: the authors

Imagine a Chinese company that uses renminbi for paying a German supplier; subsequently, this supplier sells renminbi 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 renminbi 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 renminbi in foreign exchange markets.

Aware of the instability that a full capital account liberalization could bring, China's policymakers have been exploiting the country's international trade prominence in order to advance renminbi internationalization (Subacchi, 2016; Yu, 2014). Nonetheless, “[t]he 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 non-residents to invest in the country. As early as August 2010, the PBOC

started to allow foreign central banks, clearing banks in Hong Kong SAR and Macau, and other selected overseas banks to use renminbi offshore funds obtained through the cross-border trade and investment pilot program as the means to participate in the Chinese interbank bond market (People's Bank of China, 2010). As Li Bo, a former PBOC director, has explained in a press release: “In order for the renminbi 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 value of overseas RMB, and setting up a cross-border circulation path for RMB funds” (own translation and own emphasis, PBOC 2011).

According to an interview conducted with a PBOC official⁶⁷, the importance of creating the RQFII scheme was to increase chances for foreigners to accept renminbi for trade and FDI purposes. According to the same interviewed official, the establishment of financial investment opportunities are not understood by Chinese policymakers as an objective per se, but as a tool to increase the payment function attractiveness of the renminbi. As a senior PBOC official⁶⁸ explained in an interview: “the use of any currency, should be based on the fundamentals. This means the demand of the real economy. So, demand from trade *should be the number one source of demand for the internationalization of any currency*” (own emphasis).

Apart from the demand for trade payments, other factors have also boosted the interest of financial institutional investors in renminbi-denominated assets: China’s economic growth prospects, the relatively higher interest rate of Chinese government bonds, and the inclusion of renminbi bonds in the main index providers, such as MSCI and J.P. Morgan (Lardy and Huang 2020). Therefore, countries that are economically

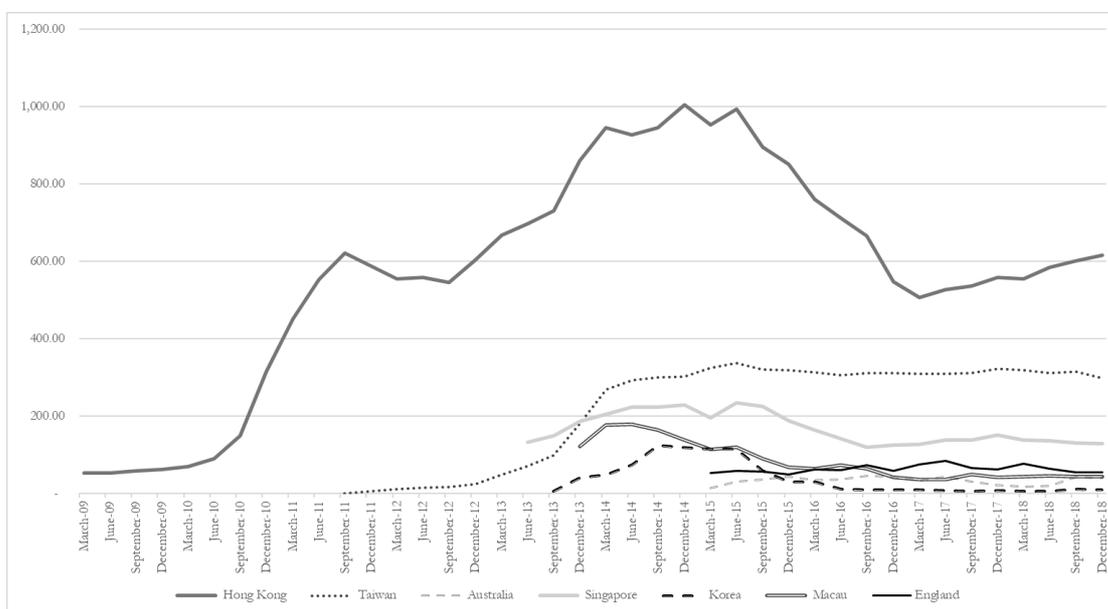
⁶⁷ Shanghai, November 2018.

⁶⁸ Beijing, October 2019.

close to China, are financial centers, and have RQFII quotas, have an adequate environment to provide renminbi cross-border circulation. This assures demand for renminbi 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” renminbi funds, besides using RQFII quotas to invest in mainland China. One of these is maintaining renminbi assets in deposits overseas or purchasing a negotiated certificate of deposits from a Chinese bank overseas. Although there is no integrated information about total renminbi deposits and certificates of deposits abroad, figure 3 provides data for regions that disclose it.

Figure 3: Overseas Renminbi deposits and certificates of deposits held by residents and non-residents of selected countries, Quarterly, March 2009- December 2018 (RMB billion)



Source: own elaboration based on data from Hong Kong Monetary Authority; Central Bank of the Republic of China; Central Bank of Australia; Monetary Authority of Singapore; The Bank of Korea; Monetary Authority of Macau; Bank of England; China Foreign Exchange Trading Center.

Another way to “recycle” renminbi offshore funds is to invest in renminbi bonds and shares in offshore financial centers. This opportunity is still restricted to only a few regions, such as Hong Kong (Hong Kong Monetary Authority, 2016), Germany (CEINEX, 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 renminbi offshore funds (Shen, 2019). Thus, we expected that, for the next BIS survey, only the factors of being economically close to China and being an offshore center could be sufficient to have high renminbi trading activity.

b. Swap agreements and foreign exchange markets

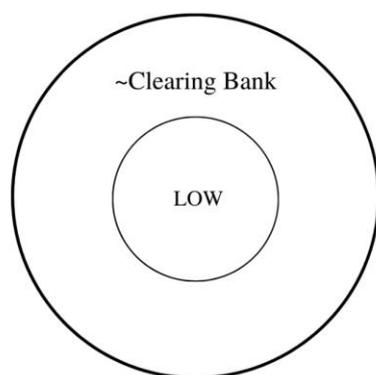
Although our most parsimonious solution did not indicate the presence of swap agreements as part of a sufficient condition for high renminbi trading, yet, in the intermediate solution, swap agreements are present, as part 1 of the appendix shows. We believe that swaps do play an indirect role in the 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* [...] telling the markets that [...] it does not matter how much your demand is, I have this line of credit from the PBOC and they can provide us with RMB” (own emphasis). 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 since they generate confidence that renminbi liquidity will be provided if necessary.

c. Low use of renminbi offshore trading

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

Figure 4: Venn diagram for “low” necessity solution



Source: the authors. Obs: “~” represents absence of condition.

The fact that the absence of clearing banks is the only necessary condition for low regimes demonstrates that clearing banks are the *core* arrangement for renminbi 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 renminbi accounts to firms and financial institutions abroad, clearing banks enable economic agents to adopt the renminbi. Additionally, they serve as liquidity providers in normal times (market makers), and, given their proximity to the Chinese central bank, also in 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 renminbi recycling mechanisms (similarly to the role of RQFII quotas). In sum, clearing banks encompass the functions of other policies, suggesting they form a fundamentally important arrangement for renminbi adoption overseas.

Moreover, regarding the sufficient analysis of renminbi low trading activity, we found three solution terms: all paths involve the absence of clearing banks, combined with 1) absence of renminbi direct trading with host market’s local currency, or, 2) absence of economic proximity, or 3) absence of swap agreements. Table 3 shows the solution table (the cases covered by each path can be found in part 1 of the appendix).

Table 6 – Most parsimonious solution for low regime of renminbi 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	0.950	0.944
Raw PRI	0.923	0.941	0.934
Raw Coverage	0.774	0.777	0.808
Unique Coverage	0.022	0.060	0.014
Solution Consistency		0.924	
PRI		0.913	
Solution Coverage		0.914	

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.
Source: the authors

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 renminbi 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. The second path—which combines the absence of a clearing bank with the

absence of economic proximity—brings to light the importance of market demand for currency high 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. Finally, the third solution—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. Contrary to situation, and even with the high barriers for new entrants to become international currencies, the renminbi has climbed from the 35th to the 5th most adopted currency.

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

For these purposes, we use the Triennial Central Bank Survey by the Bank for International Settlements (BIS), and adopt a novel methodology in the field of currency internationalization, namely, a fuzzy set qualitative comparative analysis (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 renminbi 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 renminbi trading in offshore markets for countries economically close to China: 1) having a renminbi clearing bank in the host market and direct quotation between the renminbi and local currency, or 2) 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 renminbi liquidity to those markets. The second solution can be interpreted as the creation of channels that allow renminbi funds abroad to be recycled, in other words, to return as investments to mainland China. We also find that, among all policies, renminbi offshore clearing banks play a key role in renminbi overseas adoption. They not only play a role in high trading activity but also its absence is a necessary condition for low renminbi trading. Although clearing banks have received little attention in the literature of currency internationalization, we show they play key functions for the international adoption of currencies, such as offering renminbi accounts to overseas actors, providing liquidity, and contributing to the recycling mechanisms of renminbi overseas circulation.

This article speaks to the debate about the role of policies in currency internationalization, as we show empirically that the toolkit for central banks willing to promote currency internationalization is larger than previously demonstrated, and that policies in association can reduce the barriers to emerging market currencies international use. Our findings also provide insights into the ongoing debate about the

structure of the global monetary system. Although it is widely claimed that there is only room for one international currency, our article shows that the adoption of a currency in international markets is also connected to market institutional settings. Therefore, institutional innovations may enhance the conditions for currencies from emerging market economies to play a larger role in the international monetary system.

VI. Appendix

Part 1. Main tests

Table 1- Truth table for outcome “high”

	Swap agreement	Clearing Bank	Investment Quotas	Direct trading renminbi-local currency	Financial Center	Economic proximity	Outcome	n	Consistency	PRI
62	1	1	1	1	0	1	1	2	0.992	0.965
32	0	1	1	1	1	1	1	1	0.991	0.862
64	1	1	1	1	1	1	1	8	0.989	0.958
56	1	1	0	1	1	1	1	1	0.976	0.888
54	1	1	0	1	0	1	1	1	0.961	0.807
60	1	1	1	0	1	1	1	2	0.954	0.711
58	1	1	1	0	0	1	0	2	0.922	0.534
61	1	1	1	1	0	0	0	2	0.919	0.648
59	1	1	1	0	1	0	0	1	0.919	0.51
57	1	1	1	0	0	0	0	1	0.917	0.5
63	1	1	1	1	1	0	0	12	0.906	0.66
29	0	1	1	1	0	0	0	1	0.903	0.228
53	1	1	0	1	0	0	0	1	0.891	0.537
38	1	0	0	1	0	1	0	2	0.855	0.324
49	1	1	0	0	0	0	0	4	0.833	0.368
8	0	0	0	1	1	1	0	3	0.785	0.159
34	1	0	0	0	0	1	0	3	0.746	0.191
36	1	0	0	0	1	1	0	3	0.737	0.15
39	1	0	0	1	1	0	0	7	0.644	0.106
33	1	0	0	0	0	0	0	7	0.607	0.149
7	0	0	0	1	1	0	0	3	0.591	0.067
37	1	0	0	1	0	0	0	19	0.579	0.09
4	0	0	0	0	1	1	0	2	0.504	0.033
5	0	0	0	1	0	0	0	7	0.496	0.035

Table 1 (cont.)

	Swap agreement	Clearing Bank	Investment Quotas	Direct trading renminbi-local currency	Financial Center	Economic proximity	Outcome	n	Consistency	PRI
2	0	0	0	0	0	1	0	11	0.443	0.031
3	0	0	0	0	1	0	0	25	0.312	0.019
1	0	0	0	0	0	0	0	70	0.223	0.014
6	0	0	0	1	0	1	?	0	-	-
9	0	0	1	0	0	0	?	0	-	-
10	0	0	1	0	0	1	?	0	-	-
11	0	0	1	0	1	0	?	0	-	-
12	0	0	1	0	1	1	?	0	-	-
13	0	0	1	1	0	0	?	0	-	-
14	0	0	1	1	0	1	?	0	-	-
15	0	0	1	1	1	0	?	0	-	-
16	0	0	1	1	1	1	?	0	-	-
17	0	1	0	0	0	0	?	0	-	-
18	0	1	0	0	0	1	?	0	-	-
19	0	1	0	0	1	0	?	0	-	-
20	0	1	0	0	1	1	?	0	-	-
21	0	1	0	1	0	0	?	0	-	-
22	0	1	0	1	0	1	?	0	-	-
23	0	1	0	1	1	0	?	0	-	-
24	0	1	0	1	1	1	?	0	-	-
25	0	1	1	0	0	0	?	0	-	-
26	0	1	1	0	0	1	?	0	-	-
27	0	1	1	0	1	0	?	0	-	-
28	0	1	1	0	1	1	?	0	-	-
30	0	1	1	1	0	1	?	0	-	-

Table 1. (Cont.)

	Swap agreement	Clearing bank	Investment quotas	Direct trading renminbi-local currency	Financial center	Economic proximity	Outcome	n	Consistency	PRI
31	0	1	1	1	1	0	?	0	-	-
35	1	0	0	0	1	0	?	0	-	-
40	1	0	0	1	1	1	?	0	-	-
41	1	0	1	0	0	0	?	0	-	-
42	1	0	1	0	0	1	?	0	-	-
43	1	0	1	0	1	0	?	0	-	-
44	1	0	1	0	1	1	?	0	-	-
45	1	0	1	1	0	0	?	0	-	-
46	1	0	1	1	0	1	?	0	-	-
47	1	0	1	1	1	0	?	0	-	-
48	1	0	1	1	1	1	?	0	-	-
50	1	1	0	0	0	1	?	0	-	-
51	1	1	0	0	1	0	?	0	-	-
52	1	1	0	0	1	1	?	0	-	-
55	1	1	0	1	1	0	?	0	-	-

Table 2- Truth table for outcome “low”

	Swap Agreement	Clearing bank	Investment quota	Direct trading renminbi-local currency	Financial center	Economic proximity	Outcome	n	Consistency	PRI
1	0	0	0	0	0	0	1	70	0.985	0.981
4	0	0	0	0	1	1	1	2	0.983	0.967
2	0	0	0	0	0	1	1	11	0.982	0.969
5	0	0	0	1	0	0	1	7	0.982	0.965
3	0	0	0	0	1	0	1	25	0.973	0.962
29	0	1	1	1	0	0	0	1	0.971	0.772
7	0	0	0	1	1	0	1	3	0.971	0.933
37	1	0	0	1	0	0	1	19	0.959	0.91
8	0	0	0	1	1	1	1	3	0.957	0.831
39	1	0	0	1	1	0	1	7	0.954	0.884
36	1	0	0	0	1	1	1	3	0.954	0.85
32	0	1	1	1	1	1	0	1	0.942	0.138
34	1	0	0	0	0	1	1	3	0.94	0.809
33	1	0	0	0	0	0	1	7	0.931	0.851
38	1	0	0	1	0	1	0	2	0.93	0.676
57	1	1	1	0	0	0	0	1	0.917	0.5
59	1	1	1	0	1	0	0	1	0.915	0.49
58	1	1	1	0	0	1	0	2	0.911	0.466
49	1	1	0	0	0	0	0	4	0.903	0.632
60	1	1	1	0	1	1	0	2	0.887	0.289
53	1	1	0	1	0	0	0	1	0.874	0.463
61	1	1	1	1	0	0	0	2	0.852	0.352
54	1	1	0	1	0	1	0	1	0.836	0.193
63	1	1	1	1	1	0	0	12	0.815	0.331
56	1	1	0	1	1	1	0	1	0.809	0.112
62	1	1	1	1	0	1	0	2	0.79	0.035

Table 2 (cont.)

	Swap agreement	Clearing bank	Investment Quota	Direct trading renminbi-local currency	Financial center	Economic proximity	Outcome	n	Consistency	PRI
64	1	1	1	1	1	1	0	8	0.737	0.033
6	0	0	0	1	0	1	?	0	-	-
9	0	0	1	0	0	0	?	0	-	-
10	0	0	1	0	0	1	?	0	-	-
11	0	0	1	0	1	0	?	0	-	-
12	0	0	1	0	1	1	?	0	-	-
13	0	0	1	1	0	0	?	0	-	-
14	0	0	1	1	0	1	?	0	-	-
15	0	0	1	1	1	0	?	0	-	-
16	0	0	1	1	1	1	?	0	-	-
17	0	1	0	0	0	0	0	0	-	-
18	0	1	0	0	0	1	0	0	-	-
19	0	1	0	0	1	0	0	0	-	-
20	0	1	0	0	1	1	0	0	-	-
21	0	1	0	1	0	0	0	0	-	-
22	0	1	0	1	0	1	0	0	-	-
23	0	1	0	1	1	0	0	0	-	-
24	0	1	0	1	1	1	0	0	-	-
25	0	1	1	0	0	0	0	0	-	-
26	0	1	1	0	0	1	0	0	-	-
27	0	1	1	0	1	0	0	0	-	-
28	0	1	1	0	1	1	0	0	-	-
30	0	1	1	1	0	1	0	0	-	-
31	0	1	1	1	1	0	0	0	-	-
35	1	0	0	0	1	0	?	0	-	-

Table 2 (cont.)

	Swap agreement	Clearing bank	Investment Quota	Direct trading renminbi-local currency	Financial center	Economic proximity	Outcome	n	Consistency	PRI
40	1	0	0	1	1	1	?	0	-	-
41	1	0	1	0	0	0	?	0	-	-
42	1	0	1	0	0	1	?	0	-	-
43	1	0	1	0	1	0	?	0	-	-
44	1	0	1	0	1	1	?	0	-	-
45	1	0	1	1	0	0	?	0	-	-
46	1	0	1	1	0	1	?	0	-	-
47	1	0	1	1	1	0	?	0	-	-
48	1	0	1	1	1	1	?	0	-	-
50	1	1	0	0	0	1	0	0	-	-
51	1	1	0	0	1	0	0	0	-	-
52	1	1	0	0	1	1	0	0	-	-
55	1	1	0	1	1	0	0	0	-	-

Table 3: Intermediary solution table for “high” renminbi regime

	Solution 1	Solution 2	Solution 3
Clearing Bank	●	●	●
Direct trading renminbi-local currency	●		●
Investment quotas		●	●
Swap	●	●	
Financial center		●	●
Economic proximity	●	●	●
Raw Consistency	0.962	0.961	0.989
Raw PRI	0.894	0.874	0.961
Raw Coverage	0.482	0.454	0.439
Unique Coverage	0.057	0.029	0.014
Solution Consistency		0.942	
PRI		0.849	
Solution Coverage		0.525	

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent. Large symbols show core conditions (parsimonious solution).

Source: the authors

Table 4: Intermediary solution table for “low” renminbi regime

	Solution 1	Solution 2	Solution 3
Clearing Bank	○	○	○
Direct trading renminbi-local currency	○		
Investment quotas	○	○	○
Swap			○
Financial center			
Economic proximity		○	
Raw Consistency	0.934	0.950	0.944
Raw PRI	0.923	0.941	0.934
Raw Coverage	0.774	0.774	0.807
Unique Coverage	0.022	0.059	0.014
Solution Consistency		0.924	
PRI		0.913	
Solution Coverage		0.912	

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent. Large symbols show core conditions (parsimonious solution).

Source: the authors

Table 5: Necessity Analysis

Condition	High			Low		
	Consistency	Coverage	RoN	Consistency	Coverage	RoN
Investment quotas	0.572	0.839	0.975	0.118	0.682	0.952
Currency direct trading	0.719	0.492	0.824	0.277	0.749	0.905
Clearing bank	0.667	0.703	0.934	0.151	0.629	0.919
Swap agreement	0.784	0.542	0.841	0.262	0.716	0.895
Financial center	0.816	0.379	0.676	0.458	0.84	0.89
Economic proximity	0.706	0.509	0.839	0.292	0.831	0.938
~ Investment quotas	0.783	0.184	0.164	0.972	0.9	0.614
~ Currency direct trading	0.633	0.182	0.339	0.812	0.919	0.839
~Clearing bank	0.647	0.162	0.221	0.929	0.917	0.74
~Swap agreement	0.589	0.168	0.332	0.832	0.938	0.87
~Financial center	0.655	0.235	0.502	0.661	0.934	0.921
~Economic proximity	0.765	0.215	0.332	0.828	0.917	0.825

Source: the authors. Obs: “~” condition absent.

Table 7: Typical case for “low’ regime.

Solution 2: absence of clearing bank and absence of currency direct trading

Argentina 2010	Canada 2013	Greece 2010	Korea 2013	Peru 2016	South Africa 2013
Argentina 2013	Chile 2010	Greece 2013	Latvia 2010	Peru 2019	Spain 2010
Australia 2010	Chile 2013	Hungary 2010	Latvia 2013	Philippines 2010	Spain 2013
Australia 2013	Colombia 2010	Hungary 2013	Lithuania 2010	Philippines 2013	Sweden 2010
Austria 2010	Colombia 2013	India 2010	Lithuania 2013	Poland 2010	Sweden 2013
Austria 2013	Colombia 2016	India 2013	Luxembourg 2010	Poland 2013	Sweden 2016
Bahrain 2010	Colombia 2019	India 2016	Luxembourg 2013	Poland 2016	Switzerland 2010
Bahrain 2013	Czech Republic 2010	India 2019	Malaysia 2010	Portugal 2010	Switzerland 2013
Bahrain 2016	Czech Republic 2013	Indonesia 2010	Mexico 2010	Portugal 2013	Thailand 2010
Bahrain 2019	Czech Republic 2016	Indonesia 2013	Mexico 2013	Romania 2010	Turkey 2010
Belgium 2010	Czech Republic 2019	Ireland 2010	Mexico 2016	Romania 2013	Turkey 2013
Belgium 2013	Denmark 2010	Ireland 2013	Netherlands 2010	Romania 2016	Turkey 2016
Brazil 2010	Denmark 2013	Israel 2010	Netherlands 2013	Romania 2019	United Kingdom 2010
Brazil 2013	Denmark 2016	Israel 2013	New Zealand 2010	Russia 2010	
Brazil 2016	Finland 2010	Israel 2016	New Zealand 2013	Saudi Arabia 2010	
Brazil 2019	Finland 2013	Israel 2019	Norway 2010	Saudi Arabia 2013	
Bulgaria 2010	France 2010	Italy 2010	Norway 2013	Saudi Arabia 2016	
Bulgaria 2013	France 2013	Italy 2013	Norway 2016	Slovakia 2010	
Bulgaria 2016	Germany 2010	Japan 2010	Peru 2010	Slovakia 2013	
Bulgaria 2019	Germany 2013	Korea 2010	Peru 2013	South Africa 2010	

Table 7 (cont.)

Solution 2: absence of clearing bank and absence of economic proximity

Argentina 2010	Colombia 2010	Greece 2016	Italy 2019	Norway 2010	Russia 2013	Switzerland 2010
Argentina 2013	Colombia 2013	Greece 2019	Latvia 2010	Norway 2013	Russia 2016	Switzerland 2013
Austria 2010	Czech Republic 2010	Hungary 2010	Latvia 2013	Norway 2016	Saudi Arabia 2010	Thailand 2010
Austria 2013	Czech Republic 2013	Hungary 2013	Latvia 2016	Norway 2019	Saudi Arabia 2013	Turkey 2010
Austria 2016	Czech Republic 2016	India 2010	Latvia 2019	Peru 2010	Saudi Arabia 2016	Turkey 2013
Austria 2019	Czech Republic 2019	India 2013	Lithuania 2010	Philippines 2010	Saudi Arabia 2019	Turkey 2016
Bahrain 2010	Denmark 2010	India 2019	Lithuania 2013	Philippines 2013	Slovakia 2010	Turkey 2019
Bahrain 2013	Denmark 2013	Indonesia 2010	Lithuania 2016	Poland 2010	Slovakia 2013	United Kingdom 2010
Bahrain 2016	Denmark 2016	Indonesia 2013	Lithuania 2019	Poland 2013	Slovakia 2016	United States 2010
Bahrain 2019	Denmark 2019	Ireland 2010	Luxembourg 2010	Poland 2016	Slovakia 2019	United States 2013
Belgium 2010	Finland 2010	Ireland 2013	Luxembourg 2013	Poland 2019	South Africa 2010	
Belgium 2013	Finland 2013	Ireland 2016	Malaysia 2010	Portugal 2010	South Africa 2013	
Belgium 2016	Finland 2016	Ireland 2019	Mexico 2010	Portugal 2013	Spain 2010	
Belgium 2019	Finland 2019	Israel 2010	Mexico 2013	Portugal 2016	Spain 2013	
Brazil 2010	France 2010	Israel 2013	Mexico 2016	Portugal 2019	Spain 2016	
Bulgaria 2010	France 2013	Israel 2016	Mexico 2019	Romania 2010	Spain 2019	
Bulgaria 2013	Germany 2010	Israel 2019	Netherlands 2010	Romania 2013	Sweden 2010	
Bulgaria 2016	Germany 2013	Italy 2010	Netherlands 2013	Romania 2016	Sweden 2013	
Bulgaria 2019	Greece 2010	Italy 2013	Netherlands 2016	Romania 2019	Sweden 2016	
Canada 2013	Greece 2013	Italy 2016	New Zealand 2010	Russia 2010	Sweden 2019	

Table 7 (cont.)

Solution 3: absence of clearing bank and absence of swap agreement.

Argentina 2013	Colombia 2010	Hungary 2010	Lithuania 2010	Philippines 2013	South Africa 2010
Australia 2010	Colombia 2013	Hungary 2013	Lithuania 2013	Philippines 2016	South Africa 2013
Austria 2010	Colombia 2016	India 2010	Luxembourg 2010	Poland 2010	Spain 2010
Austria 2013	Colombia 2019	India 2013	Luxembourg 2013	Poland 2013	Spain 2013
Bahrain 2010	Czech Republic 2010	India 2016	Mexico 2010	Poland 2016	Sweden 2010
Bahrain 2013	Czech Republic 2013	India 2019	Mexico 2013	Poland 2019	Sweden 2013
Bahrain 2016	Czech Republic 2016	Indonesia 2013	Mexico 2016	Portugal 2010	Sweden 2016
Bahrain 2019	Czech Republic 2019	Ireland 2010	Mexico 2019	Portugal 2013	Sweden 2019
Belgium 2010	Denmark 2010	Ireland 2013	Netherlands 2010	Romania 2010	Switzerland 2010
Belgium 2013	Denmark 2013	Israel 2010	Netherlands 2013	Romania 2013	Switzerland 2013
Brazil 2010	Denmark 2016	Israel 2013	New Zealand 2010	Romania 2016	Thailand 2010
Brazil 2016	Denmark 2019	Israel 2016	Norway 2010	Romania 2019	Turkey 2010
Brazil 2019	Finland 2010	Israel 2019	Norway 2013	Russia 2010	Turkey 2019
Bulgaria 2010	Finland 2013	Italy 2010	Norway 2016	Russia 2013	United Kingdom 2010
Bulgaria 2013	France 2010	Italy 2013	Norway 2019	Saudi Arabia 2010	United States 2010
Bulgaria 2016	France 2013	Japan 2010	Peru 2010	Saudi Arabia 2013	United States 2013
Bulgaria 2019	Germany 2010	Japan 2013	Peru 2013	Saudi Arabia 2016	
Canada 2013	Germany 2013	Japan 2016	Peru 2016	Saudi Arabia 2019	
Chile 2010	Greece 2010	Latvia 2010	Peru 2019	Slovakia 2010	
Chile 2013	Greece 2013	Latvia 2013	Philippines 2010	Slovakia 2013	

Source: the authors.

Part 2. Robustness Checks

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 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.

	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

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

2. Outcome Cross-Over Anchor (moving to 1%)

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

	(1)	(2)
Clearing Bank	●	
Currency direct trading	●	
Investment quotas		●
Swap		
Financial center		●
Economic proximity	●	●
Raw Consistency	0.950	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		0.550

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

3. Without 2010 cases

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

	(1)	(2)
Clearing Bank	●	
Currency direct trading	●	
Investment quotas		●
Swap		
Financial center		●
Economic proximity	●	●
Raw Consistency	0.957	0.951
Raw PRI	0.890	0.863
Raw Coverage	0.491	0.474
Unique Coverage	0.051	0.034
Solution Consistency		0.910
PRI		0.795
Solution Coverage		0.535

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

Part 3. Renminbi trading in advanced economies and emerging market economies

Using the same conditions, outcomes, and thresholds of the main fsQCA of this article, we performed two additional analyses by separating emerging market economies from advanced economies, according to IMF’s classification. The goal of this supplementary exercise is to check whether the countries with different degrees of economic development required different kinds of policies to culminate in high renminbi trading levels. The result tables can be found below (tables 8 and 9).

Table 8: Parsimonious solution for advanced economies “high” regime

	Solution 1
Clearing Bank	●
Currency direct trading	
Investment quotas	
Swap	
Financial center	
Economic proximity	
Raw Consistency	0.815
Raw PRI	0.693
Raw Coverage	0.693

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

Table 9: Parsimonious solution for emerging market economies “high” regime

	Solution 1
Clearing Bank	●
Currency direct trading	●
Investment quotas	●
Swap	●
Financial center	
Economic proximity	●
Raw Consistency	0.992
Raw PRI	0.944
Raw Coverage	0.465

Obs: ● Core condition present. ○ Core condition negated. Blank cells represent “don’t care” situation, where the condition may be either present or absent.

Source: the authors

Our results show that the presence of clearing banks alone is a sufficient condition for

renminbi high trading in advanced economies. For emerging market economies, however, it is fundamentally important to be economically close to China and all policy conditions must be present—clearing bank, swap, quotas, currency direct trading—to result in high renminbi trading activity. Table 10 sets out the cases for high regime among those analysed.

Table 10: typical cases for advanced economies and emerging market economies

“high” regime

Country’s classification	Cases
Emerging Economies	Malaysia 2016, Malaysia 2019, Thailand 2019
Advanced Economy	Australia 2016, Australia 2019, Canada 2016, Canada 2019, France 2016, France 2019, Germany 2016, Germany 2019, Hong Kong SAR 2010, Hong Kong SAR 2013, Hong Kong SAR 2016, Hong Kong SAR 2019, Japan 2019, Korea 2016, Korea 2019, Luxembourg 2016, Luxembourg 2019, Singapore 2013, Singapore 2016, Singapore 2019, Switzerland 2016, Switzerland 2019, United Kingdom 2016, United Kingdom 2019, United States 2019

Source: the authors

This exercise provides two main insights. First and foremost, to a certain degree, Chinese policies in combination can supplement market functions that are present in advanced economies and absent in emerging market economies. Additionally, it reinforces once more that clearing banks are the key enabling arrangement for renminbi offshore adoption.

Bibliography

- Accuity (2017). *Accuity research shows 25% drop in global correspondent banking relationships linked to de-risking* [Press release] 8 May. Available at: <https://accuity.com/press-room/accuity-research-shows-25-drop-global-correspondent-banking-relationships-linked-de-risking/> (Accessed: 15 September 2020)
- Amiti, M. and Weinstein, D.E. (2011). Exports and financial shocks. *Quarterly Journal of Economics*, Vol. 126 (4), 1841–1877. <https://doi.org/10.1093/qje/qjr033>.
- Argus (2021). ‘Chinas INE completes first overseas VLSFO delivery’. 22 January. Available at: <https://www.argusmedia.com/en/news/2179598-chinas-ine-completes-first-overseas-vlsfo-delivery> (Accessed: 26 April 2021)
- Armijo, L.E. and Katada, S.N. (2015). Theorizing the financial statecraft of emerging powers. *New Political Economy*, vol. 20 (1), 42–62. <https://doi.org/10.1080/13563467.2013.866082>.
- Armijo, L.E., Mühlich, L. and Tirone, D.C. (2014). The systemic financial importance of emerging powers. *Journal of Policy Modeling*, vol 36, S67-S88 <https://doi.org/10.1016/j.jpolmod.2013.10.009>
- Auboin, M. (2009). *Boosting the availability of trade finance in the current crisis: Background analysis for a substantial G20 package*. CEPR Policy Insight No. 35
- Auboin, M. (2012). *Use of currencies in international trade: Any changes in the picture?* WTO Staff Working Paper ERSD-2012-10
- Aziz, J. and Wescott, R., (1997). *Policy complementarities and the Washington consensus*. IMF working papers. Available at: <https://www.imf.org/en/Publications/WP/Issues/2016/12/30/Policy-Complementarities-and-the-Washington-Consensus-2330> (Accessed: 19 April 2021)
- Bahaj, S. and Reis, R.A. (2020). *Jumpstarting an international currency*. Bank of England Working Paper No. 874.
- Bank of Korea (2020). *Structure of the market*. <https://www.bok.or.kr/eng/main/contents.do?menuNo=400184> (Accessed: 20 April 2021)
- Bank of Kunlun (2010). *U.S. imposing sanctions on Bank of Kunlun severely violated the principles of international relations*. Available at: <http://www.klb.cn/eklbank/921141/922614/922636/index.html> (Accessed: 06 March 2021)
- Bank of Russia (2018). *Annual Report*. Available at: https://www.cbr.ru/Collection/Collection/File/24037/ar_2018_e.pdf (Accessed 08 November 2020)
- Baumgartner, M. (2015). Parsimony and causality. *Quality & Quantity*, vol. 49 (2), 839–856. <https://doi.org/10.1007/s11135-014-0026-7>
- Bech, M. and Hancock, J. (2020). Innovations in payments. *BIS Quarterly Review* March Available at: https://www.bis.org/publ/qtrpdf/r_qt2003f.htm (Accessed 19 April 2021)
- Belfrage, C., Jäger, J. and Kaltenbrunner A. (2016) *Analyzing the integration of Brazilian financial markets*. Brasilia: British Embassy.
- Bernards, N. and Campbell-Verduyn, M. (2019). Understanding technological change in global finance through infrastructures. *Review of International Political Economy*, vol. 26, no. 5, 773–89. <https://doi.org/10.1080/09692290.2019.1625420>
- BIS (2020). *Annual Economic Report*. Available at: <https://www.bis.org/publ/arpdf/ar2020e.htm> (Accessed: 07 December 2020)
- Black, S.W. (1991). Transaction cost and vehicle currencies. *Journal of International Money and Finance*, vol. 10 (4), 512–526
- Board of Governors of the Federal Reserve System (2020). *Central bank liquidity swaps*. Available at: https://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm (Accessed 6 March 2021).

- Bordo, M. D. (1993). The Bretton Woods international monetary system: A historical overview. In Bordo, M. D. and Eichengreen, B. (Eds.), *A Retrospective on the Bretton Woods System: Lessons for International Monetary Reform*. Chicago: University of Chicago Press.
- Bordo, M.D. and McCauley, R.N. (2018). *Triffin: Dilemma or Myth?* BIS working paper (No 684)
- Borio, C. (2012). *The financial cycle and macroeconomics: What have we learnt?* BIS working papers (No 395)
- Bowles, P. and Wang, B. (2013). Renminbi internationalization: A journey to where? *Development and Change*, vol. 44 (6), 1363–1385. <https://doi.org/10.1111/dech.12058>.
- Brunnermeier, M.K., Sockin, M. and Xiong, W. (2017). China's gradualist economic approach and financial markets. *American Economic Review*, vol. 107 (5), 608–613. <https://doi.org/10.1257/aer.p20171035>
- CEINEX (2015). *Shanghai stock exchange, Deutsche Börse and China Financial Futures Exchange jointly establish CEINEX*. Available at: <https://www.ceinex.com/information/press-release/shanghai-stock-exchange-deutsche-boerse-and-china-financial-futures>. (Accessed: 20 April 2021)
- Central Government Portal (2009). *Muqian yi you duo ge sheng shi shangbao kaizhan kua jing maoyi renminbi jiesuan shidian qingshi* [Currently, many provinces and municipalities report the pilot program of RMB settlement for cross-border trade]. Available at: http://www.gov.cn/zxft/ft185/content_1400056.htm (Accessed: 06 March 2021)
- CFETS (2018). *Public announcement of China foreign exchange trade system on launching the direct trading between RMB and Thai baht*. Available at: <http://www.chinamoney.com.cn/english/svcnrl/20180202/2302.html> (Accessed: 10 February 2021)
- CFETS (2021). *RMB market members*. Available at: <http://www.chinamoney.com.cn/english/mdtmmbrmm/>. (Accessed: 20 April 2021)
- Chauffour, J.P. and Farole, T. (2009). *Trade finance in crisis: market adjustment or market failure?* Policy Research Working Paper 5003
- Cheung, Y.W. (2012). *The role of offshore financial centers in the process of renminbi internationalization*. Asia Development Bank Institute Working Paper Series No. 472
- Cheung, Y.W. and Yiu, M.S. (2017). Offshore renminbi trading: Findings from the 2013 Triennial Central Bank Survey. *International Economics*, vol.152, 9–20 <https://doi.org/10.1016/j.inteco.2017.09.001>.
- Cheung, Y.W., McCauley, R. and Shu, C. (2019). Geographic spread of currency trading: the renminbi and other emerging market currencies. *China and World Economy*, vol. 25 (5), 25–36
- Chey, H. (2012). Theories of international currencies and the future of the world monetary order. *International Studies Review*, vol. 14, no. 1, 51–77
- Chey, H. and Hsu, M. (2020). The impacts of policy infrastructures on the international use of the Chinese renminbi. *Asian Survey*, vol. 60 (2), 221–244 <https://doi.org/10.1525/as.2020.60.2.221>
- China Daily* (2015). ‘Chronicle of China's reforms in yuan exchange rate’, 14 August. Available at: http://www.chinadaily.com.cn/business/2015-08/13/content_21585363.htm (Accessed: 19 April 2021)
- CHIPS (2020). *The Clearing House Payment Company*. Available at: <https://www.theclearinghouse.org> (Accessed: 07 March 2021)
- CIPS (2021). *About the System*. Available at: <http://www.cips.com.cn/cipsen/7052/7057/index.html>. (Accessed: 07 March 2021)
- Clark, J.J. (2014). *Trade finance: developments and issues*. Committee on the Global Financial System Papers (No. 50)
- Cohen, B. J. (2000). *The Geography of Money*. Ithaca: Cornell University Press.

- Cohen, B. J. (2015). *Currency Power: Understanding Monetary Rivalry*. Princeton: Princeton University Press
- Cohen, B.J. (1971). *The Future of Sterling as an International Currency*. New York: St. Martin's Press
- Cohen, B.J. (2012). The benefits and costs of an international currency: Getting the calculus right. *Open Economies Review*, vol 23 (1), 13–31. <https://doi.org/10.1007/s11079-011-9216-2>.
- Cohen, B.J. (2019). *Currency Statecraft: Monetary Rivalry and Geopolitical Ambition*. Chicago: The University of Chicago Press
- Cohen, B.J., and Benney, T.M. (2014). What does the international currency system really look like? *Review of International Political Economy*, vol. 21 (5), 1017–1041 <https://doi.org/10.1080/09692290.2013.830980>
- Commerzbank (2019). *New Commerzbank survey: geopolitics has a noticeable impact on the use of the Chinese RMB as a trading currency* [Press release]. 25 June. Available at: https://www.commerzbank.de/en/hauptnavigation/presse/pressemitteilungen/archiv1/2019/quarteral_19_02/presse_archiv_detail_19_02_81674.html (Accessed: 19 April 2021)
- Coulibaly, B., Sapriza, H. and Zlate, A. (2013). Financial frictions, trade credit, and the 2008–09 global financial crisis. *International Review of Economics & Finance*, vol. 26, 25–38. <https://doi.org/10.1016/j.iref.2012.08.006>.
- CPMI-BIS (2003). *The role of central bank money in payment systems*. CPMI papers (No. 55). Available at: <https://www.bis.org/cpmi/publ/d55.htm> (Accessed: 19 April 2021)
- CPMI-BIS (2016). *Correspondent banking*. CPMI papers (No. 147). Available at: <https://www.bis.org/cpmi/publ/d147.htm> (Accessed: 18 April 2021)
- Creswell, J.W. and Poth, C.N. (2018). *Qualitative Inquiry and Research Design*. 5th edn. London: SAGE Publications.
- Cunliff, J. (2017). *Global pipes: challenges for systemic financial infrastructure*. Bank of England. Available at: <https://www.bankofengland.co.uk/speech/2017/global-pipes-challenges-for-systemic-financial-infrastructure> (Accessed: 18 April 2021)
- Das, S. (2019). *China's evolving exchange rate regime*. IMF Working Papers 19/50
- Davies, G. (2002). *A History of Money: From Ancient Times to the Present Day*. 3rd edn. Cardiff: University of Wales Press
- de Goede, M. (2020). Finance/security infrastructures. *Review of International Political Economy*, vol. 28, no. 2, 351–68. <https://doi.org/10.1080/09692290.2020.1830832>.
- de Paula, L.F., Fritz, B. and Daniela, P. (2017). Keynes at the periphery: Currency hierarchy and challenges for economic policy in emerging economies. *Journal of Post Keynesian Economics*, vol. 40, no. 2, 183–202. <https://doi.org/10.1080/01603477.2016.1252267>
- Destais, C. (2016). Central bank currency swaps and the international monetary system. *Emerging Markets Finance and Trade*, vol. 52 (10), 2253–2266 <https://doi.org/10.1080/1540496X.2016.1185710>
- Deutsche Welle (2019). ‘Can an enhanced INSTEX really work for Iran?’. 12 July. Available at: <https://www.dw.com/en/can-an-enhanced-instex-really-work-for-iran/a-49554580> (accessed 6 March 2021).
- Devereux, M.B. and Shi, S. (2013). Vehicle currency. *International Economic Review*, vol. 54 (N.1), 97–133
- Drezner, D.W. (2015). Targeted sanctions in a world of global finance. *International Interactions*, vol. 41 (4), 755–764. <https://doi.org/10.1080/03050629.2015.1041297>.
- Drezner, D.W. (2019). Economic statecraft in the age of Trump. *The Washington Quarterly*, vol. 42 (3), 7–24. <https://doi.org/10.1080/0163660X.2019.1663072>.
- ECB (2019). The international role of the euro. *European Central Bank 19th Annual Review*. Available at: <https://www.ecb.europa.eu/pub/ire/html/ecb.ire201906~f0da2b823e.en.html> (Accessed: 26 April 2021)

- Eichengreen, B. (2008). *Globalizing Capital: A History of The International Monetary System*. 2nd ed. Princeton: Princeton University Press.
- Eichengreen, B. (2011). *Exorbitant Privilege: The Rise and Fall of the Dollar and the Future of the International Monetary System*. Oxford: Oxford University Press.
- Eichengreen, B. (2015). *Sequencing RMB internationalization*. CIGI Papers 69. Available at: https://www.cigionline.org/publications/sequencing-rmb-internationalization?utm_source=Newsletter&utm_medium=Web%20Archive&utm_campaign=CIGI%20WorldWide. (Accessed: 20 April 2021)
- Eichengreen, B. and Flandreau, M. (2012) The Federal Reserve, the Bank of England, and the rise of the dollar as an international currency, 1914–1939. *Open Economies Review*, vol. 23 (1), 57–87. <https://doi.org/10.1007/s11079-011-9217-1>.
- Eichengreen, B. and Kawai, M. (2014). *Issues for renminbi internationalization: an overview*. Asian Development Bank Institute Working Paper Series 454
- Eichengreen, B., Hausmann, R. and Panizza, U. (2005). ‘The mystery of original sin’. in Eichengreen, B. and Hausmann, R. (Eds.) *Other People’s Money: Debt Denomination and Financial Instability in Emerging Market Economies*. Chicago: University of Chicago, 233–265
- Eichengreen, B., Mehl, A. and Chitu, L. (2018). *How Global Currencies Work: Past, Present and Future*. Princeton: Princeton University Press
- Evans, D. (2018). ‘Shanghai shakes up global oil trading’. 17 October. *Asian Review*. Available at: <https://asia.nikkei.com/Business/Markets/Commodities/Shanghai-shakes-up-global-oil-trading>. (Accessed: 21 May 2019)
- Farrell, H.J. and Newman, A.L. (2018). ‘The wrong way to punish Iran’. 1st November. *The New York Times*. Available at: <https://www.nytimes.com/2018/11/01/opinion/swift-iran-sanctions.html> (Accessed: 19 April 2021)
- Farrell, H.J. and Newman, A.L. (2019). Weaponized interdependence: How global economic networks shape state coercion. *International Security* Vol.44, 42–79.
- Faudot, A. (2018). The US dollar and its payments system: architecture and political implications. *Review of Keynesian Economics*, vol. 6, 83–95 <https://doi.org/10.4337/roke.2018.01.05>
- Federal Reserve Bank of New York (2002). *CHIPS*. Available at: <https://www.newyorkfed.org/aboutthefed/fedpoint/fed36.html> (Accessed: 19 April 2021)
- Finch, J.H. (2002). The role of grounded theory in developing economic theory. *Journal of Economic Methodology*, vol. 9 (2), 213–234. <https://doi.org/10.1080/13501780210137119>.
- Frankel, A. B. (1975). International banking: Part I. *Business Condition (Federal Reserve Bank of Chicago)*, September, 3–9. Available at: <https://fraser.stlouisfed.org/title/5562/item/540351/toc/521011>
- Frankel, A. B. and Marquardt, J. C. (1987). ‘International payments and EFT links’ in Solomon E. H. (Ed.) *Electronic Funds Transfers and Payments: The Public Policy Issues*. Dordrecht: Springer Netherlands
- Fritz, B. (2016). ‘Macroeconomic policy regime: A heuristic approach to grasping national policy space within global asymmetries’. In Truger, A., Hein, E., Heine M. and Hoffer F. (Eds.), *Monetary macroeconomics, labour markets and development*. Marburg: Metropolis-Verlag.
- Fritz, B. (2018). *Statecraft in emerging markets in the context of global financial asymmetries: lessons from south-south monetary regionalism*. Unpublished Manuscript
- Fritz, B., Biancareli, A. and Muehlich, L. (2012). *Regional payment systems: a comparative perspective on Europe and the developing world*. Free University Berlin Discussion Paper No. 2012/10
- George, A. L. and Bennett, A. (2005). *Case Studies and Theory Development in the Social Sciences*. Cambridge Massachusetts: MIT Press

- Gilbert, A. M., Hunt, D. and Winch, K. C. (1997). Creating an integrated payment system: The evolution of Fedwire. *Federal Reserve Bank of New York, Economic Policy Review*, vol. 32.2, 1–7 Available at: <https://www.newyorkfed.org/medialibrary/media/research/epr/97v03n2/9707gilb.pdf> (Accessed: 19 April 2021)
- Girardi, A. (2019). ‘INSTEX, A new channel to bypass U.S. sanctions and trade with Iran’. 9 April. *Forbes*. Available at: <https://www.forbes.com/sites/annalisagirardi/2019/04/09/instex-a-new-channel-to-bypass-u-s-sanctions-and-trade-with-iran/?sh=79e9dda8270f> (Accessed: 19 April 2021)
- Glaser, B.G. and Strauss, A.L. (2017). *The Discovery of Grounded Theory*. New York: Routledge.
- Global Capital* (2012). ‘America Movil CFO chews over dim sum bond’. 10 February. Available at: <https://www.globalcapital.com/article/k3syyw3frmjp/américa-móvil-cfo-chews-over-dim-sum-bond> (Accessed 06 March 2021)
- Global Capital* (2013). ‘15% of RMB payments get lost in translation’. 19 June. Available at: <https://www.globalcapital.com/article/jby5gzfc2z9y/15-of-rmb-payments-get-lost-in-translation> (Accessed 06 March 2021)
- Gloystein, H. (2018). ‘China’s flawed futures contract pushes oil trade to record high in 2018’. 12 December. *Reuters*. Available at: <https://www.reuters.com/article/us-crude-oil-futures-china-analysis-idUSKBN1OB0K7> (Accessed: 26 April 2021)
- Goldberg, L. S. (2010). Is the international role of the dollar changing? *Current Issues in Economics and Finance*, vol. 16, no. 1
- Gopinath, G. (2015). *The international price system*. NBER Working Paper Series 21646
- Hafezi, P. (2019). ‘Sanctions-hit Iran props up economy with bartering, secret deals’. 25 September. *Reuters*. Available at: <https://www.reuters.com/article/us-iran-usa-economy-sanctions-idINKBN1WA13M> (Accessed: 19 April 2021)
- He, G. (2014). *Zuo hao qingsuan xing fuwu tuidong renminbi kua jing yewu de kuaisu fazhan* [Doing clearing bank services, promoting the rapid development of RMB cross-border business]. People's Bank of China. Available at: <http://www.pbc.gov.cn/huobizhengceersi/214481/214511/3406535/2808710/index.html>. (Accessed: 19 April 2021)
- Helleiner, E. (2008). Political determinants of international currencies: What future for the US dollar? *Review of International Political Economy*, vol. 15 (3), 354–378. <https://doi.org/10.1080/09692290801928731>.
- Helleiner, E. and Kirshner, J. (Eds.) (2009). *The Future of the Dollar*. Ithaca: Cornell University Press
- Hong Kong Monetary Authority (2016). *Hong Kong: The global offshore renminbi business hub*. Available at: <https://www.hkma.gov.hk/media/eng/doc/key-functions/monetary-stability/rmb-business-in-hong-kong/hkma-rmb-booklet.pdf>. (Accessed: 20 April 2021)
- Houpt, J. V. (1999). International activities of U.S. banks and in U.S. banking markets. *Federal Reserve Bulletin*. vol. 85 September, 599–615 Available at: <https://www.federalreserve.gov/pubs/bulletin/1999/0999lead.pdf> (Accessed: 19 April 2021)
- Iancu, A., Anderson, G., Ando, S., Boswell, E., Gamba, A., Hakobyan, S., Lusinyan, L., Meads, N. and Wu, Y. (2020). *Reserve currencies in an evolving international monetary system*. IMF Departmental Paper No. 2020/002
- IMF (2016). *Financial integration in Latin America*, International Monetary Fund Staff report. Available at: <https://www.imf.org/external/np/pp/eng/2016/030416.pdf> (Accessed: 19 April 2021)
- IMF (2017). *Recent trends in correspondent banking relationships: Further considerations*. IMF Policy Papers. Available at: <https://www.imf.org/en/Publications/Policy->

- Papers/Issues/2017/04/21/recent-trends-in-correspondent-banking-relationships-further-considerations (Accessed: 19 April 2021)
- Ito, T., Koibuchi, S., Sato, K., and Shimizu, J. (2010). *Why has the yen failed to become a dominant invoicing currency in Asia? A firm-level analysis of Japanese exporters' invoicing behavior*. National Bureau of Economic Research Working Paper 16231
- Ivashina, V. and Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, vol. 97 (3), 319–338.
<https://doi.org/10.1016/j.jfineco.2009.12.001>.
- Kahn, C. M. and Roberds, W. (2009). Why pay? An introduction to payments economics. *Journal of Financial Intermediation*, vol. 18, no. 1, 1–23
- Kaltenbrunner, A. and J. P. Paineira (2015). Developing countries' changing nature of financial integration and new forms of external vulnerability: the Brazilian experience. *Cambridge Journal of Economics*, vol. 39(5): 1281-1306.
- Katada, S.N. and Roberts, C., Armijo, L.E. (2017). The varieties of collective financial statecraft: The BRICS and China. *Political Science Quarterly*, vol. 132 (3), 403–433.
<https://doi.org/10.1002/polq.12656>.
- Kindleberger, C. P. (1967). *The Politics of International Money and World Language. Essays in International Finance* No. 61, Princeton: Princeton University Press
- Kindleberger, C.P. (1973). *The formation of financial centers: A study in comparative economic history*. Massachusetts Institute of Technology, Working Paper Department of Economics No. 114
- Kindleberger, C.P. (1978). *Manias, Panics, and Crashes: A History of Financial Crises*. London: Palgrave Macmillan
- Kirshner, J. (1995). *Currency and Coercion: The Political Economy of International Monetary Power*. Princeton: Princeton University Press
- Kring, W.N., Mühlich, L., Fritz, B., Gallagher, K.P., Pitts, J.D., Zucker-Marques, M. and Gaitan, N., 2021. *Global Financial Safety Net Tracker*. Available at <https://gfsntracker.com>. (Accessed: 19 April 2021)
- Krugman, P. (1984). 'The international role of the dollar: Theory and prospect'. In Bilson, J.F.O. and Marston, R.C. (Eds.) *Exchange Rate Theory and Practice*. Chicago: University of Chicago Press
- Lacker, J. M. and Weinberg, J. A. (2003). Payment economics: studying the mechanics of exchange. *Journal of Monetary Economics*, vol. 50, no. 2, 381–387
- Lardy, N.R. and Huang, T. (2020). *China's financial opening accelerates*. Peterson Institute for International Economics, Policy Brief 20-17. Available at:
<https://www.piie.com/research/piie-charts/rising-foreign-investment-chinas-onshore-stocks-and-bonds-shows-accelerating> (Accessed: 20 April 2020)
- Lee, F.S. (2005). Grounded theory and heterodox economics. *The Grounded Theory Review*, Vol. 4 (2), 95-116
- Lee, R. (2011). *Running the World's Markets: The Governance of Financial Infrastructure*, Princeton: Princeton University Press
- Liang, J. (2017). *Ren min bi guo ji hua 'da dong mai: Guo ji huo bi zhi fu ji chu she shi gou jian* [Pipeline of RMB Internationalization]. Beijing: Economics and Business Publishing House
- Liangyu (2018). 'China announces 3-year tax exemption on interest gains for overseas investors'. 22 November. *Xinhua Net*. Available at:
http://www.xinhuanet.com/english/2018-11/22/c_137624679.htm (Accessed: 19 April 2021)
- Listfield, R. and Montes-Negret, F. (1994). *Modernizing payment systems in emerging economies*. World Bank Policy Research Working Paper, 1336
- London Stock Exchange Group (2021). *Renminbi bonds*. Available at:
<https://www.lseg.com/renminbi>. (Accessed: 20 April 2020)

- Luxembourg for Finance (2021). *Renminbi Business*. Available at: <https://www.luxembourgforfinance.com/en/financial-centre/renminbi-business/>. (Accessed: 20 April 2020)
- Mallard, G., Sabet, F., and Sun, J. (2020). The humanitarian gap in the global sanctions regime. *Global Governance*, Vol. 26 (1), 121–153. <https://doi.org/10.1163/19426720-02601003>.
- Malouche, M. (2009). *Trade and trade finance developments in 14 developing countries*. World Bank Policy Research Working Paper 5138.
- Matsuyama, K., Kiyotaki, N. and Matsui, A. (1993). Toward a theory of international currency. *Review of Economic Studies* (60), 283-307
- Maziad, S., Farahmand, P., Wang, S., Segal, S., and Ahmed, F. (2011). *Internationalization of emerging market currencies: A balance between risks and rewards*. International Monetary Fund Staff Discussion note No. 17
- McCauley, R. and Scatigna, M. (2011). Foreign exchange trading in emerging currencies: more financial, more offshore. *BIS Quarterly Review*, March.
- McCauley, R.N. (2011). Renminbi internationalisation and China's financial development. *BIS Quarterly Review*, December. Available at: https://www.bis.org/publ/qtrpdf/r_qt1112f.pdf (Accessed: 19 April 2021)
- McCauley, R.N. and McGuire, P. (2009). Dollar appreciation in 2008: Safe haven, carry trades, dollar shortage and overhedging. *BIS Quarterly Review*, December.
- McCauley, R.N. and Schenk, C.R. (2020). *Central bank swaps then and now: swaps and dollar liquidity in the 1960s*. BIS Working Papers No 851
- McDowell, D. (2020). Financial sanctions and political risk in the international currency system. *Review of International Political Economy*, vol. 1–27. <https://doi.org/10.1080/09692290.2020.1736126>.
- McKinnon, R. and Schnabl, G. (2009). The case for stabilizing china's exchange rate: Setting the stage for fiscal expansion. *China and World Economy*, vol. 17, no. 1, 1–32.
- Miao, Y. and Deng, T. (2020). 'China's capital account liberalization'. In Amstad, M., Sun, G., Xiong, W. and Duffie, D. (Eds.) *The Handbook of China's Financial System*. Princeton: Princeton University Press.
- Minsky, H.P. (2016). *Can "It" Happen Again?: Essays on Instability and Finance*. London: Routledge
- NDRC (2011). *The 12th five years plan for economic and social development of the People's Republic of China (2011-2015)*. Available at: <https://www.ndrc.gov.cn>. (Accessed: 19 April 2021)
- NDRC (2016). *The 13th five years plan for economic and social development of the People's Republic of China (2016-2020)*. Available at: <https://www.ndrc.gov.cn>. (Accessed: 19 April 2021)
- NDRC (2021). *The 14th five years plan for economic and social development of the People's Republic of China (2021-2025)*. Available at: <https://www.ndrc.gov.cn>. (Accessed: 19 April 2021)
- Norrlöf, C., (2014). Dollar hegemony: A power analysis. *Review of International Political Economy*, vol. 21 (5), 1042–1070. <https://doi.org/10.1080/09692290.2014.895773>.
- North, D.C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press
- Nozahie, N. and Ibrahim, A. (2017). *The treatment of currency swaps between central banks: Egypt experience*. IMF discussion paper. Available at: <https://www.imf.org/external/pubs/ft/bop/2017/pdf/17-25a.pdf> (Accessed: 20 April 2021)
- Ocampo, J. A. (2017). *Resetting the International Monetary (Non)System*: Oxford: Oxford University Press.
- Ocampo, J.A. (2001). *International asymmetries and the design of the international financial system*. ECLAC Temas de Coyuntura Series No. 15

- Orsi, B. (2019). *Currency Internationalization and Currency Hierarchy in Emerging Economies: The Role of the Brazilian Real*. Doctoral thesis. Leeds: The University of Leeds.
- Osterberg, W. P. and Thomson, J. B. (1999). Banking consolidation and correspondent banking. *Federal Reserve Bank of Cleveland, Economic Review*, vol.35.1, 9-20
- Panza, L. and Merrett, D. (2019). Hidden in plain sight: Correspondent banking in the 1930s. *Business History*, vol. 61, no. 8, 1300–25
- Papaioannou, E. and Portes, R., (2008). *Costs and benefits of running an international currency*. European Commission Economic Paper 348
- Park, Y.S. and Essayad, M. (Eds.) (1989). *International Banking and Financial Centers*. Boston Massachusetts: Kluwer Academic
- PBOC (2010). *Jingwai renminbi qi Jingwai renminbi qingsuan xing deng san lei jigou yunyong renminbi touzi yinhang jian zhaiquan shichang shidian youguan shiyi de tongzhi [Notice on the pilot program for three types of institutions including overseas RMB clearing banks to use RMB to invest in the interbank bond market]*. Available at: <http://www.pbc.gov.cn/redianzhuanti/118742/3824714/3824727/3824796/index.html> (Accessed: 20 April 2021)
- PBOC (2014). *Kua jing renminbi yewu wu zhounian zuotan hui zaijing zhaokai [The 5th Anniversary Symposium on Cross-border RMB Business]*. Available at: <http://www.pbc.gov.cn/huobizhengceersi/214481/214511/3406535/2808710/index.html> (Accessed: 19 April 2021)
- PBOC (2015). *Renminbi Internationalization report 2015*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC (2016). *Renminbi Internationalization report 2016*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC (2017). *Renminbi Internationalization report 2017*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC (2018a). *Renminbi Internationalization report 2018*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC (2018b). *Renmin yinhang youguan fuze ren jiu renminbi kua jing zhifu xitong (er qi) da jizhe wen [PBC Official Answered Press Questions on Phase 2 of RMB Cross-Border Interbank Payment System]*. Available at: <http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3531173/index.html> (Accessed: 9 September 2021)
- PBOC (2019). *Renminbi Internationalization report 2019*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC (2020). *Renminbi Internationalization report 2020*. Available at: <http://www.pbc.gov.cn/en/3688241/3688636/3828468/3982952/index.html> (Accessed: 19 April 2021)
- PBOC et. al (2009). *Kua jing maoyi renminbi jiesuan shidian guanli banfa [Pilot Program of Renminbi Settlement of Cross-border Trade Transactions]*. Available at: http://www.gov.cn/zwggk/2009-07/02/content_1355475.htm (Accessed: 19 April 2021)
- PBOC et. al (2012). *Jingnei yinhang ye jinrong jigou jingwai xiangmu renminbi daikuan de zhidao. [Guidance on RMB loans for overseas projects of domestic banking financial institutions]* Available at: <http://www.pbc.gov.cn/huobizhengceersi/214481/214511/3406535/2859353/index.html> (Accessed: 19 April 2021)

- PBOC et. al (2013). Jianhua kua jing renminbi yewu liucheng he wanshan youguan zhengce de tongzhi [Notice on simplification of cross-border RMB business process and improvement of relevant policies]. Available at:
<http://www.pbc.gov.cn/huobizhengceersi/214481/214511/3406535/2883682/index.html>
- Poon, J.P. (2003). Hierarchical tendencies of capital markets among international financial Centers. *Growth and Change*, vol. 34 (2), 135–156. <https://doi.org/10.1111/1468-2257.00211>
- Prasad, E.S., (2017). *Gaining Currency: The Rise of the Renminbi*. New York: Oxford University Press
- Prates, D. (2020). Beyond modern money theory: a post-keynesian approach to the currency hierarchy, monetary sovereignty, and policy space. *Review of Keynesian Economics*, vol. 8(4), 494–511. doi: <https://doi.org/10.4337/roke.2020.04.03>
- Ragin, C.C. (2008). *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago: The University of Chicago Press
- Rambure, D. and Nacamuli, A. (2008). *Payment Systems*. London: Palgrave Macmillan
- Rey, H. (2001). International trade and currency exchange. *Review of Economic Studies*, vol. (68), 443–464
- Rhee, C. and Sumulong, L. (2014). *Regional settlement infrastructure and currency internationalization: The case of Asia and the renminbi*. Asia Development Bank Institute Working Paper No. 457
- Rochet, J.-C. and Tirole, J. (2006). Two-sided markets: A progress report. *The RAND Journal of Economics*, vol. 37, no. 3, 645–67. DOI: 10.1111/j.1756-2171.2006.tb00036.x
- Rubinson, C., Gerrits, L., Rutten, R. and Greckhamer, T. (2019). *Avoiding common errors in QCA: a short guide for new practitioners*. Compass Working Paper Series. Available at: <https://compass.org/working-papers-series/> (Accessed: 20 April 2021)
- Schneider, C.Q. and Wagemann, C. (2012). *Set-theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis*. New York: Cambridge University Press
- Scott, S. V. and Zachariadis, M. (2013). *The Society for Worldwide Interbank Financial Telecommunication (SWIFT): Cooperative Governance for Network Innovation, Standards, and Community*. London: Routledge, Taylor & Francis Group
- Shen, S. (2019). ‘China to scrap quotas on QFII, RQFII foreign investment schemes’. 10 September. *Reuters*. Available at: <https://www.reuters.com/article/us-china-economy-investment-idUSKCN1VV0WJ> (Accessed: 20 April 2021)
- Shen, T. (2020). *In depth: China’s recovery from coronavirus epidemic better than expected, PBOC chief says*. 2 May. Caixin Global. Available at: <https://www.caixinglobal.com/2020-05-02/chinas-recovery-from-coronavirus-epidemic-better-than-expected-pboc-chief-says-101549408.html> (Accessed: 9 September 2020)
- Shenzhen Stock Exchange (2018). *Comparing stock connect with QFII/RQFII*. Available at: <http://www.szse.cn/enSzhk/introduction/cscqr/> (Accessed: 20 April 2021)
- Shy, O. (2004). *The Economics of Network Industries*. Cambridge: Cambridge University Press
- Sina Finance (2018). ‘Yanghang fu xing zhang yin yong: Bu ying gai yi renminbi de paiming zuwei guoji hua de mubiao’ [Yin Yong, Deputy Governor of the Central Bank: The ranking of the RMB should not be used as the goal of internationalization]. 14 January. Available at: <http://finance.sina.com.cn/roll/2018-01-14/doc-ifyqptqv9345223.shtml> (Accessed: 05 March 2021)
- Skaaning, S.E. (2011). Assessing the robustness of crisp-set and fuzzy-set QCA results. *Sociological Methods & Research*, vol. 40 (2), 391–408
<https://doi.org/10.1177/0049124111404818>
- Song, K. and Xia, L. (2020). *Bilateral swap agreement and renminbi settlement in cross-border trade*. IMI Working Paper (No. 2013)
- Strange, S. (1971). The politics of international currencies. *World Politics*, vol. 23.2, 215-231

- Subacchi, P. (2016). *The People's Money: How China is Building a Global Currency*. New York: Columbia University Press
- Sun, G. (2020). 'Banking institutions and banking regulations'. In Amstad, M., Sun, G., Xiong, W., Duffie, D. (eds) *The Handbook of China's Financial System*. Princeton: Princeton University Press
- Svirydzenka, K. (2016). *Introducing a new broad-based index of financial development*. IMF Working Papers No. 16/05
- SWIFT (2011). *Trend or hiccup: could the internationalisation of the RMB be stalling?* 25 November. SWIFT RMB Tracker. Available at: <https://www.swift.com/our-solutions/compliance-and-shared-services/business-intelligence/renminbi/rmb-tracker/rmb-tracker-document-centre> (Accessed: 19 April 2021)
- SWIFT (2020). *Monthly reporting and statistics on renminbi (RMB) progress towards becoming an international currency*. SWIFT RMB Tracker. Available at: <https://www.swift.com/our-solutions/compliance-and-shared-services/business-intelligence/renminbi/rmb-tracker/rmb-tracker-document-centre> (Accessed: 19 April 2021)
- Tavlas, G. S. (1990). *On the international use of currencies: the case of the deutsche mark*. IMF Working Paper 90/ 3
- Tenreyro, S. (2021). *Dominant currency and the impact of monetary policy*. [online lecture]. 27 November. Paris School of Economics. Available at: <https://www.parisschoolofeconomics.eu/en/news/november-27-lecture-by-silvana-tenreyro-dominant-currency-and-the-impact-of-monetary-policy/> (Accessed: 26 April 2021)
- Triffin, R. (1960). *Gold and the Dollar Crisis: The Future of Convertibility*. New Haven: Yale University Press, New Haven.
- U.S. Department of the Treasury (2018). *Re-imposition of the sanctions on Iran that had been lifted or waived under the JCPOA*. 4 November. Available at: <https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/iran-sanctions/re-imposition-of-the-sanctions-on-iran-that-had-been-lifted-or-waived-under-the-jcpoa> (Accessed: 04 March 2021)
- Ugolini, S. (2017). *The Evolution of Central Banking: Theory and History*, London: Palgrave Macmillan
- Walter, A. (2006). 'Domestic sources of international monetary leadership'. In Andrews, D.M. (Ed.) *International Monetary Power*. Ithaca: Cornell University Press
- Wolfsberg Group. (2014). *Wolfsberg Anti-Money Laundering Principles for Correspondent Banking*. Available at: <https://www.wolfsberg-principles.com/sites/default/files/wb/Wolfsberg-Correspondent-Banking-Principles-2014.pdf> (Accessed: 19 April 2021)
- Yu, W. (2012). *Renminbi guoji hua yu xianggang lian renminbi yewu zhongxin fazhan* [Press release] [Internationalization and the development of Hong Kong's offshore RMB Business Center]. 28 June. Available at: https://www.hkma.gov.hk/gb_chi/news-and-media/speeches/2012/06/20120628-1/ (Accessed: 19 April 2021)
- Yu, Y. (2014). *How Far Can Renminbi Internationalization Go?* Asia Development Bank Institute Working Paper No. 461.
- Zhang, L. and Tao, K. (2014). *The benefits and costs of renminbi internationalization*. Asia Development Bank Institute Working Paper No. 481

Appendix

Abstract

The international use of domestic currencies is highly path dependent and hierarchical. Nonetheless, between 2010 and 2019, the renminbi climbed from the world's 35th to the 5th most used payment currency. This cumulative dissertation, which consists of three independent articles, investigates the drivers behind the renminbi internationalization process. The first paper, “Financial statecraft and transaction costs: the case of renminbi internationalization”, focuses on actors’ decision-making regarding currency used. I draw on interviews with Chinese senior officials from the PBOC and the Ministry of Commerce, manufacturing companies, and bank staff, and inductively develop a model that explains the mechanisms which push firms and banks away from the incumbent international currency to a new entrant. The model highlights that changes in currency transaction costs, influenced by changes in domestic and international conditions, impel economic agents to increase their use of currencies with relatively lower transaction costs. Empirically, this article shows that RMB usage has been boosted not only by Chinese statecraft but also by economic actors’ recent difficulties in using the dollar. American financial sanctions against Chinese trade partners, the cyclical instability of international finance, as well as peripheral countries' low inflows of dollars have encouraged firms and banks to use the renminbi as an alternative to the dollar. By acknowledging the intertwined nature of the international monetary system, this article contribution consists of systematically identifying economic and political drivers that lead to currency competition. The second article, “The Chinese highways: building up payment infrastructures for RMB internationalization”, sheds light on the specific channels supporting the circulation of international currencies. Using interviews

conducted with Chinese banking sector representatives, including the central bank, and by comparing the dollar's and the renminbi's institutional context, this article shows that—regardless of their different historical backgrounds and contrasting public sector participation—the creation of payment infrastructures is a necessary condition in both cases for currency internationalization. Moreover, I show that new entrants to the selective group of international currencies must “catch-up” with extant payment infrastructures. This article contributes to the debate by showing that, apart from the economic and political characteristics of the issuing countries, the design of payment systems with international reach is an essential pre-condition that new entrant currencies must meet. The third study, “The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets”, assesses the reasons for the different levels of renminbi acceptability across countries. Specifically, we check whether geographically-targeted policies for renminbi internationalization (swap agreements, clearing banks, investment quotas, direct trading between renminbi and non-USD currencies), alone or in combination, explain different use patterns of renminbi trading in offshore markets. Utilising a fuzzy set Qualitative Comparative Analysis (fsQCA) and BIS cross-country data of renminbi trading in foreign exchange markets for 2010, 2013, 2016, and 2019, this paper finds that institution building has lowered the barriers for renminbi international adoption by enabling access to the renminbi payment system, providing renminbi liquidity in offshore markets, and opening the channels to “recycle” offshore funds to mainland China. This article contributes not only to the debate on currency internationalization, by empirically showing the impact of policies, but also offers insights on the ongoing debate about the global monetary system structure since it demonstrates that institutional innovation can open space for emerging market currencies to be used in overseas markets.

Zusammenfassung

Die internationale Verwendung inländischer Währungen ist stark pfadabhängig und hierarchisch strukturiert. Dennoch stieg der chinesische Renminbi (RMB) zwischen 2010 und 2019 vom 35. auf den 5. Platz der am häufigsten verwendeten Zahlungsmittel der Welt. Die vorliegende kumulative Dissertation, die aus drei voneinander unabhängigen wissenschaftlichen Artikeln besteht, untersucht die Treiber des Renminbi-Internationalisierungsprozesses. Der erste Artikel, „Financial statecraft and transaction costs: the case of renminbi internationalization“ („Staatliches Handeln im Finanzsektor und Transaktionskosten: der Fall der Renminbi-Internationalisierung“), konzentriert sich auf die Entscheidungsfindung von Akteuren in Bezug auf bevorzugt verwendete Währungen. Ich stütze meine Analyse auf Interviews mit hochrangigen chinesischen Vertretern der PBOC und des Handelsministeriums, produzierender Unternehmen und mit Bankmitarbeitern und entwickle induktiv ein Modell, das die Mechanismen erklärt, die dazu führen, dass Unternehmen und Banken sich von einer etablierten internationalen Währung ab- und einer anderen zuwenden. Das Modell stellt heraus, dass Änderungen der Währungstransaktionskosten, die durch Änderungen nationaler und internationaler Bedingungen beeinflusst werden, die Wirtschaftsakteure dazu veranlassen, verstärkt Währungen mit relativ geringeren Transaktionskosten zu verwenden. Empirisch zeigt dieser Artikel, dass die vermehrte Verwendung von RMB nicht nur durch chinesisches Staatshandeln, sondern auch durch die jüngsten Schwierigkeiten von Wirtschaftsakteuren bei der Verwendung des Dollars gefördert wurde. Die amerikanischen Finanzsanktionen gegen chinesische Handelspartner, die zyklische Instabilität der internationalen Finanzen sowie die geringen Dollarzuflüsse aus Peripherieländern haben Unternehmen und Banken dazu ermutigt, den Renminbi als Alternative zum Dollar zu verwenden. Dieser Artikel zeigt die Verflechtung des

internationalen Währungssysteme auf und trägt dazu bei, systematisch wirtschaftliche und politische Treiber zu identifizieren, die zu einem Währungswettbewerb führen. Der zweite Artikel, „The Chinese highways: building up payment infrastructures for RMB internationalization“ („Die chinesischen Autobahnen: Aufbau von Zahlungsinfrastrukturen für die Internationalisierung des RMB“), beleuchtet die spezifischen Kanäle, die den Umlauf internationaler Währungen unterstützen. Anhand von Interviews mit Vertretern des chinesischen Bankensektors, einschließlich der Zentralbank, und durch einen Vergleich des institutionellen Kontexts des Dollars und des Renminbi zeigt dieser Artikel, dass die Schaffung von Zahlungsinfrastrukturen unabhängig vom jeweiligen historischen Hintergrund und der unterschiedlichen Beteiligung des öffentlichen Sektors in beiden Fällen eine notwendige Voraussetzung für die Internationalisierung der jeweiligen Währungen ist. Darüber hinaus zeige ich, dass Neueinsteiger in die selektive Gruppe internationaler Währungen das Niveau der bereits vorhandenen Zahlungsinfrastrukturen „einholen“ müssen. Dieser Artikel trägt zur akademischen Debatte in diesem Bereich bei, indem er zeigt, dass neben den wirtschaftlichen und politischen Umständen in den Ausgabeländern die Gestaltung von Zahlungssystemen mit internationaler Reichweite eine wesentliche Voraussetzung ist, welche von neuen internationalen Währungen erfüllt werden muss. In der dritten Studie „The role of institutions: a cross-country analysis of renminbi trading in foreign exchange markets“ („Die Rolle von Institutionen: eine länderübergreifende Analyse des Renminbi-Handels auf Devisenmärkten“) wird den Gründen für die unterschiedliche Akzeptanz des Renminbi in verschiedenen Ländern nachgegangen. Wir untersuchen insbesondere, ob auf bestimmte Länder ausgerichtete Richtlinien für die Internationalisierung von Renminbi (Swap-Vereinbarungen, Clearing-Banken, Investitionsquoten, direkter Handel zwischen Renminbi-Währungen und Nicht-USD-

Währungen) allein oder in Kombination unterschiedliche Verwendungsmuster des Renminbi-Handels auf Offshore-Märkten erklären. Unter Verwendung der Fuzzy-Set-Variante der Qualitative Comparative Analysis (fsQCA) und der länderübergreifenden Daten von BIS zum Renminbi-Handel auf den Devisenmärkten für 2010, 2013, 2016 und 2019 zeigt diese Studie, dass der Aufbau von Institutionen die Hindernisse für die internationale Akzeptanz von Renminbi verringert hat, und zwar durch Ermöglichung des Zugangs zum Renminbi-Zahlungssystem, durch die Bereitstellung von Renminbi-Liquidität auf Offshore-Märkten und indem der Weg für das „Recycling“ von Offshore-Geldern in Richtung der Volksrepublik China freigemacht wurde. Dieser Artikel trägt nicht nur zum wissenschaftlichen Diskurs über die Internationalisierung von Währungen bei, indem er empirisch die Rolle bestimmter Policy-Maßnahmen aufzeigt, sondern bietet auch Einblicke in die laufende Debatte über die Struktur des globalen Währungssystems. Der Artikel zeigt, dass institutionelle Innovationen Möglichkeitsräume für die Verwendung von Währungen aus Schwellenländern in internationalen Märkten eröffnen können.

Prior publication

Marques, Z. M. (2021). Financial statecraft and transaction costs: the case of renminbi internationalization. Freie Universität Berlin, School of Business & Economics Discussion Paper No. 2021/09. Available at: <https://refubium.fu-berlin.de/handle/fub188/30516>

Declaration of doctoral regulation

Statement in accordance with Sec. 4 (2)

I hereby state that I have not undergone any doctoral procedure or applied for admission to any such procedure, and that the dissertation has not been presented for review, in the same version or another version, revised or not, to another department or school, examining board, or departmental representative at another higher education institution.

Campinas, May 1st, 2021

Signature

Statement in accordance with Sec. 10 (3)

I hereby state that I have used the following aids and materials for the dissertation:

Economic literature, Excel, R program, as well as interviews with policymakers, firms, and bank staff.

I have written the paper myself on this basis.

Campinas, May 1st, 2021

Signature