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Yin-Wong Cheung
Louisa Grimm
Frank Westermann

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Osnabrueck University
Institute of Empirical Economic Research
Rolandstr. 8 · 49069 Osnabrück · Germany

School of Business Administration and Economics
Institute of Empirical Economic Research
www.wiwi.uni-osnabrueck.de

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ABSTRACT

We study the evolution of offshore renminbi trading between 2016 and 2019. The diffusion behaviour of offshore renminbi trading during this period is different from the one between 2013 and 2016. The geographical diffusion process displayed in the 2016-2019 period, in addition to the previously reported convergence to the geographical trading pattern of all currencies, is affected by trade intensity, bilateral swap line arrangements, and has a regional bias. Further, it is possibly affected by disputes with China, and is different from the diffusion behaviours of the offshore US dollar, euro, British pound, and Japanese yen trading.

JEL Classifications: C24, F31, F33, G15, G18
Keywords: Global Currency; FX Turnover; Geographical Diffusion; Renminbi Internationalization; Trade Intensity

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Correspondence Addresses:
Cheung – Hung Hing Ying Chair Professor of International Economics, Department of Economics and Finance, City University of Hong Kong, Hong Kong. Email: yicheung@cityu.edu.hk
Grimm – Institute of Empirical Economic Research, Osnabrück University, D-49069 Osnabrück, Germany; E-mail: louisa.grimm@uni-osnabrueck.de
Westermann – Institute of Empirical Economic Research, Osnabrück University, D-49069 Osnabrück, Germany; E-mail: frank.westermann@uni-osnabrueck.de

1. Introduction

The role of the Chinese currency – the renminbi (RMB) – as an international currency has been quickly progressing since China approved the pilot scheme of RMB cross-border trade settlement in 2009.[1] The inclusion of the RMB in the basket of Special Drawing Rights (SDR) currencies in 2016 is lauded as a validation of China's efforts to internationalize the RMB, and the SDR membership is perceived to catapult the RMB's global status.

China has been strategically guiding the use of the RMB overseas; anecdotal evidence suggests that its offshore use has an initial concentration around the Asian region and has then gradually spread to other parts of the world.[2] Eichengreen *et al*. (2016), He *et al. (2016),* He and Yu (2016), Mehl (2017) and Wójcik *et al.* (2017), for example, discuss the economic, political, and technical factors that affect offshore trading of international currencies. The US dollar which is arguably the most predominant global currency illustrates the complementary and supporting roles of offshore markets in popularizing dollar transactions around the world.

In the last ten years, China has introduced strategic policies to establish its network of offshore RMB markets to advance the RMB's global status. These policies include a) the establishment of RMB clearing banks in offshore markets to facilitate settlements of RMB transactions overseas, b) the signing of bilateral RMB currency swap agreements to provide emergency RMB liquidity, and c) the provision of RMB qualified foreign institutional investor (RQFII) quotas that allow investing offshore RMB in China's onshore bond and equity markets. These arrangements encourage the international use of the RMB and facilitate the development of offshore trading in regional, international, and global settings.

The data provided by the Society for Worldwide Interbank Financial Telecommunication (SWIFT) attest that cross-border uses of the RMB have experienced a sharp increase since the early 2010s. For instance, the RMB was the 20th most used world payments currency by value in January 2012 and, in less than four years, it was the fifth ranked currency in December 2014 (SWIFT, 2012; 2015). The stellar performance of the RMB as a world payments currency reflects China's emphasis on trade facilitation and its strong presence in international trade.

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[1] The use of RMB to settle cross-border trade could be traced back to at least 2003 (State Administration of Foreign Exchange, 2003a, 2003b). However, these cross-border settlements in the RMB were adopted to reduce the burden of using hard currencies such as the US dollar and not a policy to internationalize the RMB.

[2] See, for example, Cheung (2015), Ehlers and Packer (2013), Ehlers *et al*. (2016).

The triennial surveys of the global foreign exchange (FX) market conducted by the Bank for International Settlements (BIS) offer information on RMB trading around the world. According to the BIS surveys, the average RMB daily FX turnover in the global market surged from US$ 29.2 billion in 2010 to US$ 285.0 billion in 2019, and its share of global FX trading increased to 4.3% in 2019 from a mere 0.9% in 2010 (Bank for International Settlements, 2010, 2019). The rapid growth in offshore trading contributes to the fast expansion of RMB turnover,[3] and takes place concurrently when the RMB is transiting from a regional role to a global role.

Does the fast growth of offshore RMB markets follow a specific geographical diffusion pattern? For instance, will offshore trading converge to a geographical pattern similar to the established global currencies or global FX trading? Cheung *et al.* (2019) posit that "a currency undergoing internationalization experiences a characteristic evolution of its geographical distribution of trading outside its home jurisdiction." In the case of the RMB, its offshore trading pattern will transit from an initial regional one over time towards the global FX trading pattern. Using data from Bank for International Settlements (2013, 2016), these authors showed that the offshore RMB trading appears to converge to the spatial global FX trading pattern.

Despite the fast penetration, both scope and scale of the RMB role in the global financial system are, arguably, relatively minor compared with the other four SDR currencies; namely, the US dollar, euro, Japanese yen, and British pound. These four SDR currencies are widely traded in the global market, and have their own established statures of an international currency. Further, global RMB trading displayed a growth rate between April 2016 and April 2019 that is slower than that between April 2013 and April 2016, and took place mostly within the Asian region with a wider spread to other regions (Bank for International Settlements, 2016, 2019; Cheung, 2015; Ehlers and Packer, 2013; Ehlers *et al*., 2016). Despite these observations, China's attempts to internationalize the RMB offer a unique opportunity to analysing the process of internationalizing a currency in the presence of binding capital controls and targeted policy-driven initiatives.[4]

Mundell (1961) aptly notes that "[…]currencies are mainly an expression of national sovereignty, so that actual currency reorganization would be feasible only if it were accompanied

[3] While the global FX market between 2010 and 2019 grew by about 70%, the offshore RMB turnover increased by almost eight times.

[4] The diffusion of, say, the other major global currencies took place before reasonably comprehensive BIS surveys of FX turnover were available.

by profound political changes." Being symbolic of a country's economic heft and its predominance in the global economy, the international political environment will influence a currency's internationalization experiences. In recent years, the international geopolitical environment has undergone substantial changes following Donald Trump's entering the White House in the midst of China's expanding foreign policy ambitions under the Xi Jinping regime. Does the change in the global environment have implications for the penetration pattern of offshore RMB markets?

Against this backdrop, we study the evolution in the offshore RMB trading pattern between 2016 and 2019, and assess the determinants of the geographical diffusion process. Cheung *et al.* (2019) assess their geographical distribution hypothesis with three variables that describe the FX turnover initial conditions, gaps between initial shares of RMB and total FX trading volumes, and changes in the share of total FX trading. Given the changing international environment in the last few years, we postulate that the offshore RMB trading pattern is affected by policy-related factors in addition to these three FX market variables. Specifically, in view of debilitating effects of trade disputes and China's emphasis on the facilitation of international trade, we investigate the role of trade relationship, China's policies, other links to China, and the offshore financial center's characteristics in determining the geographical diffusion of RMB shares.

To anticipate results, we find that the offshore RMB trading diffused towards the global FX trading pattern between 2016 and 2019. There is evidence that trade intensity, in addition to the three variables that capture the global FX market initial conditions, has statistical and economic implications for the evolution of offshoring RMB trading. Further, the geographical diffusion of offshore RMB shares tends to be affected by the presence of a bilateral RMB currency swap agreement, and it displays a regional concentration. It is affirmed that the 2016-2019 diffusion dynamics are different from the 2013-2016 one – the latter diffusion process is mostly characterized by the convergence behaviour as reported before.

It is found that engaging in disputes with China can imply a negative impact on the RMB share between 2016 and 2019. Further, the determinants of the geographical diffusion of RMB shares and of the four other SDR currency shares are different. The result is in accordance with the view that the global status of the RMB is not the same as the other four SDR currencies that are established global currencies.

In the next section, we provide a brief overview of RMB internationalization in the last decade, noting the interweaving of policy-driven and market-driven dynamics. Section 3 examines the evolution of the geographical distribution of offshore RMB trading between 2016 and 2019 using the three FX market variables, and evaluates the roles of trade relationship, China's policies, links to China, and the offshore financial center's characteristics. Further, we discuss findings from some additional analyses that include results from the 2013 to 2016 offshore RMB trading data, the possible effects of engaging in disputes with China, and the empirical diffusion processes of the other four SDR currencies. Section 4 offers some concluding remarks.

2. A Brief Overview

Since the 2009 pilot cross-border trade settlement scheme, China has implemented policy initiatives to promote and facilitate the use of the RMB overseas.[5] Indeed, to prepare for cross-border transactions, China stealthily launched its initiative to develop offshore RMB centers in 2003 by authorizing an RMB clearing bank in Hong Kong — the first facility of this kind outside mainland China. The trade settlement scheme was expanded to cover the whole of China in August 2011 from the initial group of five cities that include Shanghai and four cities in Guangdong Province.

Given its unique political and economic characteristics, Hong Kong has been a testing ground for experimenting policies that promote the use of the RMB overseas.[6] The policies for promoting offshore RMB business were typically first introduced in Hong Kong before extending to other regional and international financial centers. Three of these promotional policies - sometimes dubbed the "three gifts" are the appointment of local RMB clearing banks, the setup of bilateral RMB currency swap agreements, and the assignment of RQFII quotas.[7] Other related policy initiatives include stock-connect and bond-connect programs, the issuance

[5] Some studies on RMB internationalization are Cheung *et al.* (2011), Eichengreen (2013), Eichengreen and Kawai (2015), Frankel (2012), and Prasad (2016).

[6] While China has sovereignty over Hong Kong, it considers Hong Kong an "offshore" market for RMB transactions.

[7] On September 10, 2019, China announced the removal of the quota limitation on the RQFII program (State Administration of Foreign Exchange, 2019), which took effect on June 6, 2020.

of dim sum bonds, the issuance of RMB denominated equities in market overseas, and the Belt and Road Initiative.[8]

The policy push, albeit in a measured manner, has put the RMB in the limelight. In the last decade, the global market has witnessed a surge in RMB related business activities that gradually spread from the Asian region to other parts of the world. The rapid global penetration, coupled with China's economic prowess, has prompted the International Monetary Fund to designate the RMB a SDR currency in November 2015.[9]

The growing role of the RMB in the global market is illustrated by its trading in the global FX market. The BIS triennial central bank surveys present a detailed account of RMB turnover in the global FX market. According to the surveys, the average RMB daily FX turnover in the global market surged from 29.2 billion in 2010, 119.6 billion in 2013, 202.1 billion in 2016, to 285.0 in 2019, and its share of global FX trading increased to 4.3% in 2019 from a mere 0.9% in 2010 (Bank for International Settlements, 2010, 2013, 2016, 2019).

Figures 1 and 2 offer two alternative views on the evolving RMB's global role. Figure 1 is based on SWIFT data on currency usage for world payments. In a decade time, the share of world payments accounted for by the RMB increased from 0.29% by the end of 2011 to 1.65% in January 2020, and its rank improved to the 6th from the 20th (SWIFT, 2012, 2020).

Figure 2 plots the Renminbi Globalisation Index compiled by Standard Chartered Bank that tracks the level of RMB internationalization by assessing offshore RMB business activities.[10] The Index started in December 2010 with a base value of 100, reached the height of 2405 in September 2015, and settled at 1974 in October 2019.

Despite that fact that the RMB's global share has increased from less than 1% to 4.3% and improved from being the 17th most traded currency to the eighth most traded one between the 2010 and 2019 BIS triennial surveys, the turnover is still low compared with China's economic size and international trade. Table 1 lists the ratios of daily turnover to gross domestic

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[8] Different countries have different policy stances on internationalizing their currencies. For example, see Eichengreen and Flandreau (2009) for the US policy to support the US dollar's global role, Ministry of Finance, Japan (2003) for the case of Japanese yen, and European Commission (2018) and Juncker (2018) for the international role of the euro. The Bundesbank was perceived reluctant to globalize the Deutsche mark before the euro era (Franke, 1999).

[9] On October 1, 2016, the RMB officially joined the SDR basket with a 10.9% weight. The weights of the other four SDR currencies are the US dollar (41.7%), the euro (30.9%), the Japanese yen (9 %), and the British pound (8.1%).

[10] The Index is designed to measure the overall offshore RMB usage (Standard Chartered Bank, 2019).

product (GDP) and to international trade volume of the top ten most actively traded currencies in the 2019 BIS triennial survey. Note that because two currencies are involved in each FX transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.

The RMB's daily FX turnover to GDP and to international trade ratios are, respectively, 2.09% and 6.17%, and are the smallest among the top ten currencies. Relative to the economic size and international trade volume, the New Zealand dollar is the most heavily traded currency. It is of interest to note that the currency of Hong Kong, which is a China's special administrative region and is 2.6% of China's economy size, ranks the ninth most traded currency, accounts for 3.5% of the global turnover, and has larger FX turnover to GDP and to international trade ratios than the RMB.

The fast ascent of the RMB internationalization process is not monotonic. Both Figures 1 and 2 suggest the RMB internationalization process shows a point of inflection around August 2015.[11] After reaching a high of 2.79% in August 2015, the RMB's share in global payments has drifted down to 1.65% in January 2020 (Figure 1).[12] The Renminbi Globalisation Index, similarly, shows the offshore RMB business has been slowed down since September 2015 (Figure 2). While the RMB FX trading increased in the 2019 BIS triennial survey, the growth of RMB turnover is lower than that of the 2016, and the slower growth has coincided with relatively slower growth of offshore RMB trading (Packer *et al*., 2019; Schrimpf and Sushko, 2019).

The propagation of the RMB in the global market faced different domestic and global conditions in the last few years. For instance, China introduced various capital control measures in response to the market turmoil that followed the August 2015 modification of the RMB central parity formation mechanism. These capital control measures that aimed at reining in capital outflow and capital repatriation discouraged foreigners from committing to RMB businesses.

The trade dispute between China and the US – the two largest countries in the world – under Donald Trump's presidency further impedes the RMB internationalization process.[13] For

[11] On August 11, 2015, China modified its official RMB central parity formation mechanism (People's Bank of China, 2015).

[12] The Hong Kong dollar in January 2020 ranked the eighth and accounted for 1.40% of world payments.

[13] The growing populism and the reversal of globalization also do not favour the globalization of the RMB.

instance, tariffs and the re-revamping of global supply chains triggered by trade disputes affect China's interactions with the rest of the global community. The disrupted global production chain and economic uncertainty affect not only China's trade and economic relationship with the US, but also with its allies. The economic (and the political) discord underlying the dispute further hinders the global use of the RMB.

While the changing environment has not stalled the RMB internationalization process, it can affect the geographical diffusion process of offshoring trading. Cheung *et al.* (2019), motivated by the striking similarity of the global trading patterns of the dollar and the yen, hypothesizes that the geography of offshore RMB trading will over time transit towards the geographical distribution of global FX trading.

They showed that the data from Bank for International Settlements (2013, 2016) are supportive of the hypothesis, and the pattern of RMB shares of offshore financial centers appears to converge to the spatial global FX trading pattern. Given different geopolitical conditions, we anticipate international trade and policy factors can play a role in describing the geographical diffusion of offshoring RMB trading between 2016 and 2019.

In the next section, we follow previous studies and employ data from the *Triennial Central Bank Survey of Foreign Exchange and Derivatives Turnover* conducted by BIS to study the geographical diffusion of offshore RMB trading. Specifically, our analysis focuses on the RMB turnover data from the 2016 and 2019 Surveys. In addition, we briefly present findings pertaining to the 2013 to 2016 offshore RMB trading data, the effect of engaging in disputes with China, and the empirical diffusion processes of the other four SDR currencies.

3. Empirical Analyses

3.1 The Basic Specification

The geographical diffusion of RMB offshoring trading between 2016 and 2019 is investigated using FX turnover data reported in the 2016 and 2019 BIS triennial surveys (Bank for International Settlements, 2016, 2019). Excluding China which has a domestic RMB market, our sample includes central banks and other authorities in 50 jurisdictions reporting RMB trading. For convenience, we use the terms "jurisdiction" and "financial center" interchangeably, without any legal connotations. The basic cross-sectional regression specification is

$$\Delta Y_{i,19} = \alpha + \beta Z_{i,16} + \gamma \Delta X_{i,19} + \delta W_{i,16} + \zeta BT_{i,19} + \lambda BT_{i,19} * Z_{i,16} + \varepsilon_i. \quad (1)$$

The dependent variable $\Delta Y_{i,19} \equiv Y_{i,2019} - Y_{i,2016}$ measures the change in the share of RMB trading experienced by the i-th jurisdiction between 2016 and 2019, where $Y_{i,2019}$ is jurisdiction i's share of offshore RMB trading given by the ratio of its average RMB daily turnover to its average global offshore RMB daily turnover reported in the 2019 BIS triennial survey. Appendix A lists the definitions and sources of the dependent variable and other variables in equation (1), and of those considered in the rest of the current study.

The three variables $Z_{i,16}$, $\Delta X_{i,19}$, and $W_{i,16}$ are the three proxies for FX market information used by Cheung *et al.* (2019) to examine the RMB share convergence behaviour. The two international-trade-related variables $BT_{i,19}$ and $BT_{i,19}*Z_{i,16}$ are introduced to capture the role of trade in view of recent trade disputes.

The change in jurisdiction i's share of global FX trading is given by $\Delta X_{i,19} \equiv X_{i,2019} - X_{i,2016}$, where $X_{i,2019}$ is the jurisdiction i's share of 2019 global currency trading given by the ratio of its average daily FX turnover to the global FX turnover. The variable is included to assess the implication of a jurisdiction's standing in global FX trading for its RMB share.

The convergence towards the global trading pattern is captured by the gap variable $Z_{i,16} \equiv Y_{i,2016} - X_{i,2016}$ that represents the gap between jurisdiction i's share of offshore RMB trading and its share of global FX trading. When the RMB is transiting to be a global currency, one anticipates the process will reduce the gap between an initial geographic trading distribution and the distribution pattern of global FX trading. That is, the β-coefficient is expected to be negative.

The correlation estimate is 0.5357 between the 2016 shares of offshore RMB trading ($Y_{i,2016}$) and of global FX trading ($X_{i,2016}$), and is 0.4940 between $Y_{i,2019}$ and $X_{i,2019}$. The similar correlation estimates in 2016 and 2019 for the other four component currencies of the SDR basket are 0.9996 and 0.9997 for the US dollar, 0.9810 and 0.9888 for the euro, 0.9862 and 0.9867 for the British pound, and 0.9188 and 0.9279 for the Japanese yen. The trading patterns of these four currencies, which are recognized international currencies and the top four most traded currencies in the BIS surveys are remarkably similar to the overall FX trading pattern. Global investors face similar trading opportunities for these global currencies around the world. We anticipate that the RMB, which is undergoing internationalization process, will develop opportunities similar to these international currencies, and migrate to a trading pattern similar to that of all FX trading. That is, the β coefficient is hypothesized to be negative such that, if $Z_{i,16}$ is

positive – the RMB share is larger than the overall FX share, $\Delta Y_{i,19}$ is negative, and the RMB share will shrink.

The variable $W_{i,16}$ gives jurisdiction i's RMB turnover as a share of its total FX turnover, and is included to account for the initial relative importance of RMB trading.

The two variables $BT_{i,19}$ and $BT_{i,19}*Z_{i,16}$ are introduced to capture the bilateral trade effect on the evolution of jurisdiction i's RMB share and its convergence to the global FX turnover pattern. Specifically, $BT_{i,19}$ is, for the jurisdiction i, the sum of its imports from and exports to China normalized by its total international trade volume between April 2018 to March 2019.

China's foreign exchange and trade policies are closely related – the foreign exchange policy is typical devised with trade facilitation in view. For instance, in the early phase of the cross-border trade settlement program, authorities were urged to ensure that offshore RMB transactions are supported by genuine cross-border trades.[14] The role of offshore RMB in facilitating China trade is likely to be gaining weight when China is engaging in trade disputes. In view of the trade-facilitating objective, we expect the trade variable to exhibit a positive effect on the RMB share, and trade intensity will alter the tendency to converge to a jurisdiction's overall FX trading share. The interaction specification presents a setup for assessing trade intensity effect on the stipulated convergence behavior, and we expect the interaction variable $BT_{i,19}*Z_{i,16}$ to have a positive coefficient.

3.2 Empirical Result I

The results of estimating (1) are presented in Table 2. Columns (1) to (3) list the individual roles of the three FX market variables in the presence of two trade-related variables, and column (4) the full specification. The estimated coefficient on the gap between a jurisdiction's RMB share and all-currency share ($Z_{i,16}$) is significantly negative and, thus, indicative of convergence of offshore RMB trading to the global FX trading pattern. A jurisdiction's gain or loss of global FX market share ($\Delta X_{i,19}$) by itself exhibits a significant effect, but the effect becomes insignificant in the presence of other FX market variables (Columns (2) and (4)). The relative importance of RMB trading to jurisdiction i's total FX trading ($W_{i,16}$) has a significantly negative coefficient estimate. This finding suggests a

[14] See, for example, Hong Kong Monetary Authority (2010).

regressive behavior – the RMB share tends to decline in the presence of an initially large share of RMB trading relative to total FX trading, *ceteris paribus*.

The estimated coefficients of both trade-related variables are significantly positive, albeit with different magnitudes, under the full specification (Table 2, Column (4)). As stipulated, the trade variable tends to have a positive effect on the RMB share – a large intensity of trade with China tends to yield a large RMB share. The trade intensity variable $BT_{i,19}$ in the presence of other variables garners a significantly positive effect. An increase in trade with China tends to increase the share of offshore RMB turnover, *ceteris paribus*. The trade-facilitating role of China's RMB policy is also indicated by the significant and positive coefficient estimate of the interaction variable $BT_{i,19}*Z_{i,16}$; that is, trade intensity tends to weaken the convergence behavior indicated by the gap variable $Z_{i,16}$ that measures the gap between a jurisdiction's share of offshore RMB turnover and its share of global FX turnover.

Because of the interaction term, the marginal effect of the gap variable $Z_{i,16}$ depends not only on the coefficient estimate $\hat{\beta}$. In the context of the full specification reported under column (4), the marginal effect of $Z_{i,16}$ and its standard error are, respectively, given by

$$\partial \Delta Y_{i,19} / \partial Z_{i,16|BTi,19} \equiv M_{19|BT} = \beta + \lambda BT_{i,19}, \quad (2)$$

and

$$M_{19|BT,\,se} = [var(\hat{\beta}) + BT_{i,19}^2\ var(\hat{\lambda}) + 2\,BT_{i,19}\,cov(\hat{\beta}, \hat{\lambda})]^{1/2}. \quad (3)$$

That is, the marginal effect of the gap variable depends on both $\hat{\beta}$ and the $\hat{\lambda}$-adjusted trade intensity $BT_{i,19}$. The statistical significance of the marginal effect as inferred from its standard error depends on the variances and covariance of $\hat{\beta}$ and $\hat{\lambda}$, and trade intensity with China.

To gauge a quantitative sense of the effect, we use the estimation results reported under column (4) of Table 2 to generate Figure 3. The estimated marginal effect (the solid line) and its 95% confidence interval (the dotted lines) are plotted against the trade variable $BT_{i,19}$. The marginal effect of $Z_{i,16}$ – the gap between a jurisdiction's RMB share and all-currency share – is significantly negative when $BT_{i,19}$ is less than the value of 0.18. The histogram of $BT_{i,19}$ included near the bottom of the figure indicates that it is mostly in the range in which $Z_{i,16}$ has a

significant effect. Indeed, 80% of the observed $BT_{i,19}$ are less than 0.18; that is, the convergence behavior is a relevant phenomenon for 80% of the sample.[15]

Following a similar procedure, we plot the marginal effect of the trade intensity variable ($BT_{i,19}$) on the RMB share change ($\Delta Y_{i,19}$) in Figure 4. The histogram of $Z_{i,16}$ included near the bottom of the figure indicates that it is quite heavily distributed in the negative range; only three of the observed $Z_{i,16}$'s are larger than zero.[16] Indeed the mode of $Z_{i,16}$ is slightly negative with a corresponding marginal $BT_{i,19}$ effect that is significantly positive. The trade effect is positive (negative) if the gap variable $Z_{i,16}$ is above (below) its mode.

In sum, equation (1) reveals empirical evidence that the geographical diffusion pattern of offshoring RMB trading is affected by, in addition to FX market conditions, trade-related variables. The specification explains 83% of the variation in the geographical distribution (Table 2, Column (4)). In passing, it is noted that the adjusted R^2 estimate drops to 15% when the two trade-related variables are omitted from the estimation; indicating that the marginal explanatory power of these two variables is quite substantial.

3.3 Empirical Result II

In this subsection, we assess the sensitivity of the empirical convergence behaviour to the presence of variables accounting for China's policies, links with China, and the economic attributes of the economy in which the financial center is located. Specifically, we augment equation (1) with these additional variables:

$$\Delta Y_{i,19} = \alpha + \beta Z_{i,16} + \gamma \Delta X_{i,19} + \delta W_{i,16} + \zeta BT_{i,19} + \lambda BT_{i,19} * Z_{i,16} + \tau Q_i + \varepsilon_i, \qquad (4)$$

where Q_i contains the additional explanatory variables. Regression (4) investigates whether these additional variables explain the portion of geographical diffusion not accounted for by the FX market and trade-related variables in (1), and affect the reported convergence and trade intensity effects.

To facilitate the analysis, we classify these additional variables into three categories. The first category comprises the three main policies introduced to promote an offshore RMB center. These policies are the establishments of a) a local RMB clearing bank in the offshore market for

[15] The jurisdictions that display an insignificant effect are Australia, Brazil, Chile, Hong Kong, Indonesia, Japan, Korea, New Zealand, Peru, and the Philippines.

[16] The jurisdictions with $Z_{i,16} > 0$ are Hong Kong, Korea and Singapore.

clearing cross-border RMB transactions, b) a bilateral RMB currency swap agreement for providing a liquidity backdrop in the event of RMB shortage, and c) a RQFII quota for accessing China's onshore capital markets. The main stated functionality of the first two policy measures is the provision of RMB liquidity to offshore markets for supporting trade. The third policy measure enhances the attractiveness of holding offshore RMB. These measures are expected to promote offshore RMB turnover. For the swap line and RQFII policies, we consider the effects of either the presence of such an arrangement or the size of the agreement.

The effects of these policy measures are presented in Table 3. While individual coefficient estimates of these policy variables are mostly positive, only the dummy variable capturing the presence of a swap line arrangement is statistically significant (Columns (1) to (5)). The column (P) presents the parsimonious specification obtained from sequentially dropping insignificant policy variables from the specification that included all the policy variables. Either individually or in the presence of other policy variables, the swap line variable is statistically significant. The swap line effect corroborates its significant effect on RMB offshore trading.[17] Its marginal explanatory power is relatively small – inclusion of the swap line variable improves the adjusted R^2 estimate to 84% from 83%. Further, its presence materially affect neither the magnitude nor the significance of other estimates; that is, the reported convergence and trade variable effects are not sensitive to these policy variables.

The second category comprises control variables that quantify links with China. They include bilateral FDI flows with China normalised by the jurisdiction's total FDI flow, and dummy variables that capture the presence of a free trade agreement with China, the inclusion in the China Foreign Exchange Trade System (CFETS),[18] and the membership of the Belt and Road Initiative. The Belt and Road Initiative membership is included in view of the Initiative's asserted intention to connect China with the global economy and promote trade and investment. In addition, we include the distance from Beijing (China's capital city). The distance variable is included to assess if the offshore market progression has a regional rather than a global favour. The effects of these linkages are presented in Table 4.

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[17] Cheung and Yiu (2017). Garcia-Herrero and Xia (2015), Lin *et al*. (2016) and Eichengreen and Lombardi (2017), for example, study China's swap line policy, and the determinants of the choice of counter-part countries and swap line amounts.

[18] CFETS established in 1994 is an official interbank platform for trading RMB FX in China (http://www.chinamoney.com.cn/english/).

The individual effects of these variables are presented under Columns (1) to (6). Individually, the free trade agreement displays a significant positive effect, while the distance variable a significantly negative effect. A bit surprising is that the Belt and Road Initiative membership, though has a positive coefficient estimate, does not have a significant impact on the evolution of RMB shares. The trade-support nature of a free trade agreement suggests that it complements the promotion of the RMB use overseas. The negative distance effect reflects the RMB's relatively large regional against global role. The parsimonious specification under Column (P) indicates that, in the presence of other variables that quantify the links, both the free trade agreement and distance variables retain their statistical significance; affirming their roles in affecting offshore RMB markets. The presence of these two variables does not substantially alter other coefficient estimates from regression (1).

The third category comprises variables that represent the economic attributes of the economy in which the financial centre is located. We follow Cheung and Yiu (2017) and Cheung *et al*. (2019) and consider the real GDP growth rate, the equity market capitalisation normalised by GDP, the size of the international bond market normalised by GDP, and the stage of financial development. In essence, these variables are meant to capture the economic strength and the financial sector status of an offshore financial centre.

The results in Table 5 show that these economic attributes, individually (Columns (1) to (4)) or jointly (Column (P)), do not offer significant marginal explanatory power. Once the FX market and trade-related variables in equation (1) are considered, the economic size and financial market conditions of a financial centre do not affect the geographical diffusion process of offshore RMB trading – the FX market and trade-related variables incorporate information relevant for the process.[19]

Table 6 offers a synthesis of the empirical effects of these three categories of control variables. To conserve the degree of freedom, we consider only those control variables in Tables 3 to 5 that display a statistically significant effect (Table 6, Columns (1) to (3)). The parsimonious specification presented under column (P) indicates that, among these three categories, the geographic diffusion process is affected by the swap line variable and distance variable, and it yields an adjusted R^2 estimate of 0.88.

[19] The finding of no effect is largely in line with Cheung *et al.* (2019), while Cheung and Yiu (2017) reports the effect of GDP on the early period of offshore RMB trading.

While the swap line variable and distance variable offer marginal explanatory power, their presence does not materially affect the coefficient estimates of the FX market and trade-related variables. That is, the convergence result and the trade-related variables effect are quite robust.

3.4 Additional Discussions

In studying the data from the 2013 and 2016 BIS triennial surveys, Cheung *et al.* (2019) showed that the geographical diffusion process of offshore RMB trading is mostly explained by the three FX market variables; namely $Z_{i,13}$, $\Delta X_{i,16}$, and $W_{i,16.}$ The other economic and policy variables play quite a minor role (Cheung *et al*., 2019; Table 3).

To shed further insight, we estimated equations (1) and (4) using the corresponding 2013 and 2016 data. For brevity, we report these estimation results in Appendix B, and summarize them here. First, for the full specification under equation (1), the estimated coefficient on the gap variable $Z_{i,13}$ is significantly negative, and is comparable to the result in Table 2. The significance of the trade variable $BT_{i,16}$ is marginal (a t-statistic of 1.4) while the interaction variable $BT_{i,16}$*$Z_{i,13}$ has a significantly negative effect. Using expressions similar to (2) and (3), we found that the marginal effect of $Z_{i,13}$ on $\Delta Y_{i,16}$ is statistically significant and that of $BT_{i,16}$ is insignificant for all jurisdictions under consideration.

The relatively important role of the three FX market variables is attested by the result that the two trade-related variables only marginally improve adjusted R^2 estimate to 87% from 85%, which is generated by the three FX market variables (Cheung *et al*., 2019). In sum, the two trade-related variables display effects that are different from those reported in previous subsections and play different roles in these two historical periods.[20]

Second, with the exception of the financial development index, the estimated coefficients on the control variables under the three categories (subsection 3.3) are statistically insignificant. That is, in the presence of the FX market variables, these variables representing China's policies, links with China, and the economic attributes of offshore financial centers do not offer additional information on the offshore RMB geographical process.

[20] The finding, strictly speaking, does not contradict Cheung *et al*. (2019), which included no interactive term.

The difference in results, as noted above, are likely attributable to the relatively volatile geopolitical conditions that altered economic interactions in the global market and brought out the relevance of polices.

On top of trade disputes with the US, China's image and its interactions with the global community are gradually altered by the assertive foreign policy approach adopted by the Xi Jinping's regime. For instance, in the past few years, China engaged in various political rows that triggered some economic consequences with, say, Japan, Korea, Singapore, Australia, and Germany. Even though these confrontational episodes may be short-lived; they affect the goodwill and trust and have implications for commitments of adopting the RMB for international transactions. To assess the possible effect of these disputes on geographic diffusion of offshore RMB trading, we constructed a dispute-dummy variable that includes the US, Japan, Korea, Singapore, Australia, and Germany, and appended it to equation (1).

The results of estimating the dispute effect are presented in Appendix C for brevity. In sum, the estimated coefficient on the dispute dummy variable is small (-0.005) but is statistically significant. That is, engaging in confrontational rows can impair offshore RMB activities. To further assess the empirical dispute effect, we considered the effect of omitting these countries one at a time from the dispute-dummy list. The results indicate that the US, Japan, and Germany are likely the countries that contribute to the reported dispute effect. Indeed, when the dispute dummy variable includes only the US, Japan, and Germany, it yields an estimated coefficient of -0.008 that is significant at the 10% level.[21] Admittedly, the dispute dummy approach is coarse one; the dispute effect warrants further research in future studies.

The RMB is the most traded developing country currency and is the newest member of the SDR basket. Cheung *et al*. (2019) show that some other developing currencies exhibit similar convergence behaviour. Instead of the less frequently traded currencies, it is of interest to see if the other four SDR currencies; namely, the US dollar, the euro, the Japanese yen, and the British pound exhibit similar convergence and trade effects. Recall that these four currencies are recognised global currencies with different degrees of popularity and are the top four most traded

[21] When only the US and Japan are included, the coefficient estimate is -0.014 with a 10% level significance. The inclusion of EU yields an insignificant result. Further, using the change in trade intensity as a proxy for the dispute effect gives insignificant results.

currencies. We thus estimated equation (1) with data on these four SDR currencies and, for brevity, presented the results in Appendix D.

For the regressions on the US dollar share, the euro share, and the Japanese yen share, the explanatory power is mainly from the three FX market variables, and the role of the two trade-related variables is quite marginal. Indeed, the three FX market variables explain a lion's share of variability of changes in these offshore currency trading shares, yielding adjusted R^2 estimates from 86% to 100%. Among the FX market variables, the change in a jurisdiction's share of all currency trading ($\Delta X_{i,19}$) is the main source of the explanatory power. The result seems quite intuitive for the US dollar, which was involved in 88% of FX transactions reported in the 2019 BIS triennial survey (Bank for International Settlements, 2019) – a jurisdiction's share of US dollar trading, on average, is closely associated with its share of all FX trading. A similar role of $\Delta X_{i,19}$ is found for the euro and Japanese yen, which were involved in, respectively, 32%, and 17% of global FX transactions reported in the 2019 BIS triennial survey.

The ability of equation (1) to explain the offshore British pound trading share is the lowest among the SDR currency shares – the largest adjusted R^2 estimate is 58% garnered by the full specification. The results suggest that the change in a jurisdiction's share of all currency trading ($\Delta X_{i,19}$) is likely to be the main source of explanatory power, and the marginal explanatory of the significant convergence behavior ($Z_{i,16}$) is quite small.

In sum, the roles of the three FX market variables and the two trade-related variables in determining the geographical diffusion of RMB shares and of the four other SDR currency shares are different. The RMB displays a different geographical diffusion process of offshore trading. The finding corroborates the view that the RMB is still undergoing its internationalization process, and the other four SDR currencies are established global currencies, albeit of different levels of prominence.

4. Concluding Remarks

In view of the changing global economic and geopolitical environments in the last few years, we study the geographical diffusion of offshore RMB trading between 2016 and 2019. In addition to three FX market variables that are used to evaluate the tendency to narrow the gap between shares of offshore RMB trading and shares of all FX trading between 2013 and 2016, we assess the role of trade intensity in the evolution of offshore RMB trading. It is found that

trade intensity has direct and indirect (via the convergence variable) implications for changes in the offshore RMB share. Further, the bilateral swap line arrangement and the geographical distance from China marginally affect the diffusion process. The results indicate that, under the global conditions between 2016 and 2019, the geographical evolution of offshore RMB trading reflects both the working of market convergence forces and the roles of government policies.

Some additional analyses affirm that, during the 2013 to 2016 period, the geographical evolution behavior is dominated by the market forces represented by the three FX market variables, and the trade intensity effect is rather weak and marginal. Further, disputes with China tend to deter the growth of the offshore RMB share. Compared to existing global currencies such as the US dollar, euro, Japanese yen, and British pound in the SDR basket, the RMB displays a different geographical diffusion process of offshore trading. Likely, the RMB's internationalization is in progress, and the currency is migrating along its path from regional to global trading.

The current exercise attests to the view that the forces that determine the geographical diffusion of the RMB around the world can vary with the changing global economic and geopolitical environments. The international status of a currency has not only implications for its issuing country's economic well-being; it represents its sovereignty and global image. While government policies can give a head start to the RMB internationalization, both economic and geopolitical factors, and the responses of incumbent global currencies affect the path of the RMB to achieve its global currency stature.

Will the RMB enjoy the global stature commensurate with China's economic heft and its international trade strength? Undoubtedly, China's economic prowess and trade strength provide strong support for the RMB in the international monetary system. However, a global currency's status is affected by both economic and political strengthens and credibility percieved by the world. China's latest assertive foreign policy and territorial disputes with neighbouring countries, the confrontation with the US and other countries, and the restructuring of global supply chains can present alternative forces to shape the RMB internationalization experience. The economic and non-economic forces are likely to interact and play their roles in determining the diffusion process of offshore RMB trading. Nevertheless, market forces will determine the ultimate geographical diffusion pattern, which is expected to be similar to the one of all FX trading.

Appendix A: Definition of Variables and their sources

Variables	Definition	Source
$Z_{i,16}$	Deviation of jurisdiction i's RMB share from its FX share	BIS Triennial Survey 2016
$\Delta X_{i,19}$	Change in jurisdiction i's FX share between April 2019 and April 2016	BIS Triennial Survey 2019, 2016
$W_{i,16}$	Jurisdiction i's RMB trading as a share of its total FX trading	BIS Triennial Survey 2016
$BT_{i,19}$	Sum of imports from and exports to China as % of the jurisdiction's total trade (April 2018 to March 2019)	Directions of Trade Statistics, IMF
RQFII 2019	Binary variable for an approved RQFII arrangement as of March 2019	SAFE, Global Capital China
RQFII Size 2019	Approved RQFII quota amount as of March 2019 (ln(RMB, million))	SAFE, Global Capital China
Swap 2019	Binary variable for the presence of a bilateral RMB swap line as of March 2019	People's Bank of China
Swap Size 2019	The size of the bilateral RMB swap line (ln(RMB billion))	People's Bank of China
Clearing Bank 2019	Binary variable for the presence of a local RMB clearing bank as of March 2019	People's Bank of China, news, and various press releases
FDI Share 2018	Sum of FDI to and from China as % of the jurisdiction's total FDI flows in 2018	Coordinated Direct Investment Survey, IMF
FTA 2019	Binary variable for the presence of a bilateral free trade agreement between the jurisdiction and China as of March 2019	Ministry of Commerce, China
CFETS 2019	Binary variable for being included in the CFETS currency basket	CFETS
Log_Distance	The geophysical distance (ln(km)) between the jurisdiction's capital and Beijing, China	OpenStreetMap (https://www.distance.to/)
GDP Growth 2016-18	Log difference of the jurisdiction's GDP between 2016 and 2018	World Development Indicators, World Bank
Equity Mkt/GDP 2018	The capitalization of the jurisdiction's largest equity market as % of GDP in 2018	World Federation of Exchange, NASDAQ
Int. Bond Mkt /GDP 2018	The size of the jurisdiction's foreign bond market as % of GDP in 2018	BIS Debt Securities Database
Fin Dev Index 2018	The Financial Development Index in the Financial Development Report 2018	World Economic Forum

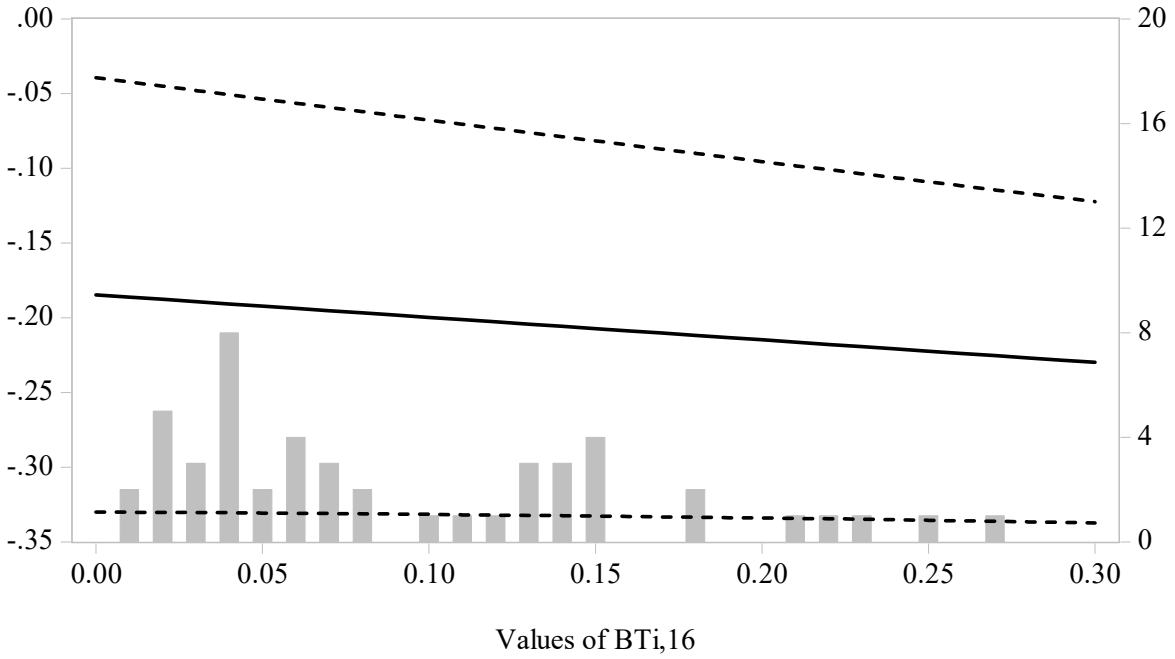
Appendix B: Offshore RMB trading between 2013 and 2016

Table B1. Changes in Shares of Offshore RMB Trading

Variables	(1)	(2)	(3)	(4)
$Z_{i,13}$	0.038			-0.185**
	(0.46)			(2.56)
$\Delta X_{i,16}$		0.709***		1.380***
		(3.82)		(3.93)
$W_{i,16}$			0.206	0.066
			(0.74)	(1.14)
$BT_{i,16}*Z_{i,13}$	-0.396**	-0.410***	-0.475*	-0.151*
	(2.59)	(5.80)	(1.71)	(1.88)
$BT_{i,16}$	0.028*	0.026*	0.022*	0.015
	(1.84)	(1.88)	(1.87)	(1.40)
Constant	-0.002*	-0.001*	-0.002*	-0.002*
	(1.69)	(2.01)	(1.95)	(1.72)
Adjusted R^2	0.54	0.73	0.55	0.87

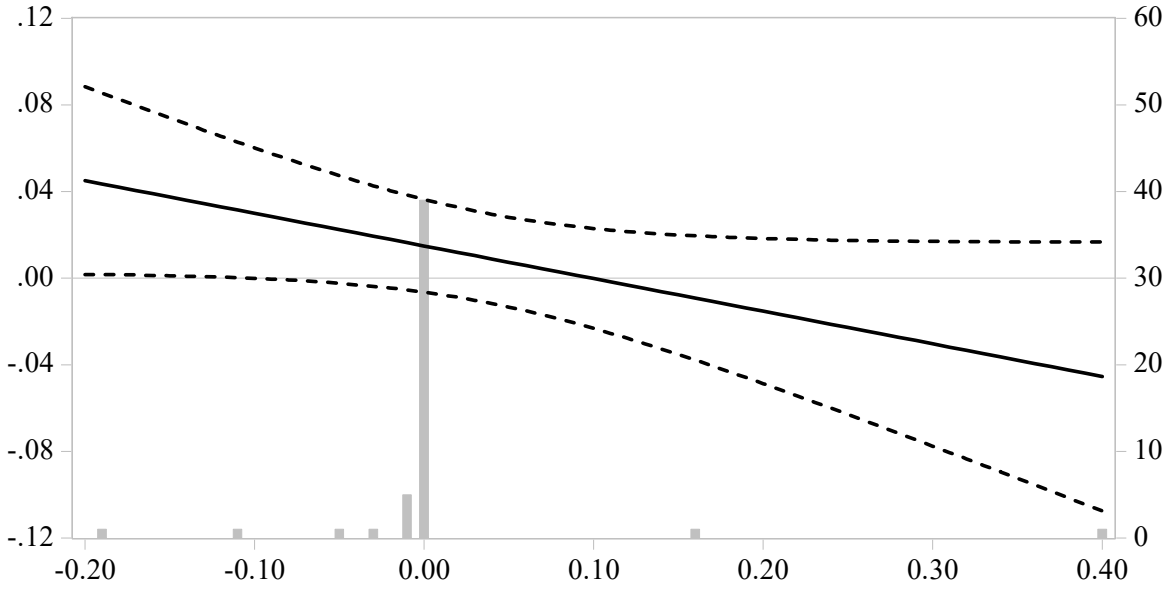
Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Figure B1. The Marginal Effect of $Z_{i,13}$ on $\Delta Y_{i,16}$



Notes: The marginal effect of $Z_{i,13}$ on $\Delta Y_{i,16}$ is based on Column (4) in Table B1. The solid line gives the estimated marginal effect and the dotted lines the corresponding 95% confidence intervals. The histogram of $BT_{i,16}$ is included near the bottom of the figure.

Figure B2. The Marginal Effect of $B_{i,16}$ on $\Delta Y_{i,16}$



Notes: The marginal effect of $B_{i,16}$ on $\Delta Y_{i,16}$ is based on Column (4) in Table B1. The solid line gives the estimated marginal effect and the dotted lines the corresponding 95% confidence intervals. The histogram of $Z_{i,13}$ is included near the bottom of the figure.

Table B2. Changes in Shares of Offshore RMB Trading: China's Policies

Variables	(1)	(2)	(3)	(4)	(5)	(P)
$Z_{i,13}$	-0.187**	0.018	-0.191**	0.043	-0.185**	-0.185**
	(2.58)	(0.12)	(2.64)	(0.61)	(2.60)	(2.56)
$\Delta X_{i,16}$	1.409***	0.517	1.417***	0.343	1.399***	1.380***
	(4.06)	(0.73)	(4.03)	(0.97)	(4.10)	(3.93)
$W_{i,16}$	0.039	-0.161	0.054	-0.085***	0.026	0.066
	(0.45)	(0.85)	(0.92)	(2.88)	(0.37)	(1.14)
$BT_{i,16}*Z_{i,13}$	-0.129	-0.292	-0.134	-0.332***	-0.117	-0.151*
	(1.61)	(1.55)	(1.67)	(5.52)	(1.40)	(1.88)
$BT_{i,16}$	0.015	0.037	0.015	0.017	0.012	0.015
	(1.43)	(0.85)	(1.41)	(1.44)	(1.04)	(1.40)
RQFII 2016	0.001					
	(0.43)					
RQFII Size 2016		0.000				
		(0.13)				
Swap 2016			0.001			
			(1.03)			
Swap Size 2016				0.000		
				(0.50)		
Clearing Bank 2016					0.001	
					(0.87)	
Constant	-0.002*	-0.004	-0.002**	-0.001	-0.002*	-0.002*
	(1.83)	(0.20)	(2.19)	(0.70)	(1.88)	(1.72)
Adjusted R^2	0.86	0.92	0.86	0.93	0.87	0.87

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of China's policy variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table B3. Changes in Shares of Offshore RMB Trading: Links to China

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(P)
$Z_{i,13}$	-0.185**	-0.184**	-0.215***	-0.184**	-0.185**	-0.186**	-0.185**
	(2.56)	(2.48)	(3.00)	(2.52)	(2.56)	(2.56)	(2.56)
$\Delta X_{i,16}$	1.380***	1.377***	1.494***	1.381***	1.382***	1.381***	1.380***
	(3.93)	(3.83)	(4.38)	(3.88)	(3.92)	(3.90)	(3.93)
$W_{i,16}$	0.066	0.067	0.027	0.055	0.068	0.075	0.066
	(1.14)	(1.14)	(0.47)	(0.84)	(0.98)	(1.25)	(1.14)
$BT_{i,16}*Z_{i,13}$	-0.151*	-0.155*	-0.056	-0.145*	-0.152*	-0.160*	-0.151*
	(1.88)	(1.75)	(0.54)	(1.81)	(1.90)	(1.95)	(1.88)
$BT_{i,16}$	0.015	0.014	0.001	0.016	0.015	0.015	0.015
	(1.40)	(1.48)	(0.09)	(1.32)	(1.42)	(1.40)	(1.40)
FDI Share 2016		0.000					
		(0.19)					
FTA 2016			0.004				
			(1.67)				
CFETS 2016				0.000			
				(0.33)			
Log Distance					0.000		
					(0.09)		
Belt & Road 2016						0.001	
						(1.04)	
Constant	-0.002*	-0.002*	-0.001	-0.002	-0.003	-0.002*	-0.002*
	(1.72)	(1.71)	(0.98)	(1.39)	(0.18)	(1.80)	(1.72)
Adjusted R^2	0.87	0.86	0.87	0.86	0.86	0.86	0.87

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of variables capturing links to China. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table B4. Changes in Shares of Offshore RMB Trading: Characteristics of Jurisdictions

Variables	(1)	(2)	(3)	(4)	(P)
$Z_{i,13}$	-0.181**	-0.183**	-0.184**	-0.189**	-0.185**
	(2.49)	(2.47)	(2.52)	(2.60)	(2.55)
$\Delta X_{i,16}$	1.364***	1.373***	1.377***	1.394***	1.376***
	(3.87)	(3.82)	(3.84)	(3.92)	(3.88)
$W_{i,16}$	0.051	0.060	0.068	0.089	0.076
	(0.86)	(0.91)	(1.13)	(1.47)	(1.27)
$BT_{i,16}*Z_{i,13}$	-0.150*	-0.160*	-0.152*	-0.163**	-0.166**
	(1.88)	(1.69)	(1.85)	(2.03)	(2.10)
$BT_{i,16}$	0.017	0.014	0.015	0.016	0.019*
	(1.50)	(1.34)	(1.35)	(1.47)	(1.70)
GDP Growth 2013-2015	0.003				0.004*
	(1.34)				(1.99)
Equity Mkt/GDP 2016		0.000			
		(0.21)			
Int. Bond Mkt /GDP 2016			-0.000		
			(0.61)		
Fin Dev Index 2016				0.000	0.000*
				(1.43)	(1.99)
Constant	-0.001	-0.002	-0.002	-0.003*	-0.003**
	(1.47)	(1.65)	(1.59)	(1.95)	(2.13)
Adjusted R^2	0.87	0.86	0.86	0.87	0.87

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of jurisdiction's characteristics policy variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Appendix C: The Dispute Effect

Table C. Changes in Shares of Offshore RMB Trading: Dispute Effect

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Z_{i,16}$	-0.226***	-0.237***	-0.235***	-0.237***	-0.241***	-0.225***	-0.228***	-0.248***	-0.276***	-0.304***
	(4.44)	(4.42)	(4.51)	(4.42)	(4.56)	(4.39)	(4.53)	(5.75)	(4.60)	(4.75)
$\Delta X_{i,19}$	0.077	0.009	0.016	0.009	-0.008	0.075	0.046	-0.051	-0.068	-0.147
	(0.76)	(0.08)	(0.14)	(0.08)	(0.07)	(0.70)	(0.46)	(0.46)	(0.48)	(0.92)
$W_{i,16}$	-0.307***	-0.223*	-0.230**	-0.223*	-0.202**	-0.301**	-0.252**	-0.187**	-0.252**	-0.232**
	(2.83)	(1.95)	(2.23)	(1.95)	(2.10)	(2.57)	(2.28)	(2.11)	(2.38)	(2.41)
$BT_{i,19}*Z_{i,16}$	0.926***	0.857***	0.857***	0.857***	0.853***	0.918***	0.872***	0.842***	0.979***	1.015***
	(5.15)	(4.94)	(5.30)	(4.94)	(5.26)	(5.01)	(4.71)	(6.86)	(6.07)	(6.99)
$BT_{i,19}$	0.014**	0.015**	0.016**	0.015**	0.012**	0.014**	0.014**	0.015**	0.013**	0.015**
	(2.29)	(2.34)	(2.35)	(2.34)	(2.09)	(2.31)	(2.21)	(2.15)	(2.31)	(2.52)
dispute		-0.005**								
		(2.06)								
dispute (-Ge)			-0.005							
			(1.36)							
dispute (-Si)				-0.005**						
				(2.06)						
dispute (-Au)					-0.006**					
					(2.20)					
dispute (-US)						-0.000				
						(0.16)				
dispute (-Ja)							-0.003			
							(1.28)			
dispute (-Ko)								-0.009**		
								(2.36)		
Dispute (Ge,Ja,US)									-0.008*	
									(1.77)	
Dispute (US, JA)										-0.014*
										(1.73)
Constant	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(1.16)	(1.45)	(1.53)	(1.45)	(1.22)	(1.19)	(1.28)	(1.51)	(1.26)	(1.64)
Adjusted R^2	0.83	0.84	0.83	0.84	0.84	0.83	0.83	0.88	0.85	0.86

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2016 and 2019 in the presence of dispute dummy variables; see the text for details. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Appendix D: Offshore Trading of the US Dollar, euro, Japanese yen, and British pound, 2016-19.

Table D1. Changes in Shares of Offshore US dollar Trading

Variables	(1)	(2)	(3)	(4)	(5)
$Z_{i,16}$	-0.113	-0.547			0.146
	(1.34)	(0.43)			(1.14)
$\Delta X_{i,19}$	1.027***		1.021***		1.022***
	(80.77)		(70.84)		(70.49)
$W_{i,16}$	-0.001**			0.000	-0.000
	(2.36)			(0.16)	(0.59)
$BT_{i,19}*Z_{i,16}$		-22.656**	-1.594***	-27.303**	-2.832**
		(2.21)	(2.91)	(2.36)	(2.57)
$BT_{i,19}$		-0.013**	-0.001**	-0.015	-0.002*
		(2.40)	(2.56)	(1.56)	(1.91)
Constant	0.000**	0.001	0.000	0.001	0.000
	(2.55)	(0.54)	(0.88)	(0.53)	(1.52)
Adjusted R^2	1.00	0.21	1.00	0.21	1.00

Notes: The Table presents results on geographical diffusion of offshore US dollar trading between 2016 and 2019. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table D2. Changes in Shares of Offshore euro Trading

Variables	(1)	(2)	(3)	(4)	(5)
$Z_{i,16}$	-0.048	-0.258*			-0.115
	(1.15)	(1.87)			(1.17)
$\Delta X_{i,19}$	0.645***		0.647***		0.591***
	(8.58)		(6.73)		(5.24)
$W_{i,16}$	-0.003*			-0.013	-0.005
	(1.75)			(1.40)	(1.32)
$BT_{i,19}*Z_{i,16}$		1.274***	-0.093	0.623***	0.232
		(4.01)	(0.80)	(6.98)	(0.76)
$BT_{i,19}$		-0.001	-0.004	0.011	0.004
		(0.15)	(1.26)	(0.94)	(0.79)
Constant	0.001	-0.002	0.001	-0.000	-0.000
	(1.41)	(1.03)	(1.27)	(0.30)	(0.15)
Adjusted R^2	0.86	0.48	0.85	0.45	0.86

Notes: The Table presents results on geographical diffusion of offshore euro trading between 2016 and 2019. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table D3. Changes in Shares of Offshore Japanese yen Trading

Variables	(1)	(2)	(3)	(4)	(5)
$Z_{i,16}$	0.100	-3.336**			0.639
	(0.86)	(2.05)			(1.51)
$\Delta X_{i,19}$	1.479***		1.457***		1.577***
	(17.19)		(16.72)		(12.28)
$W_{i,16}$	-0.001			0.006	-0.001
	(0.68)			(0.67)	(0.56)
$BT_{i,19}*Z_{i,16}$		71.075**	2.025	8.854	-11.203
		(2.18)	(0.90)	(1.18)	(1.32)
$BT_{i,19}$		-0.162**	-0.015	-0.060	0.011
		(2.06)	(1.41)	(1.22)	(0.78)
Constant	0.000	0.008*	0.001	-0.000	-0.000
	(1.29)	(1.87)	(1.60)	(0.09)	(0.37)
Adjusted R^2	0.96	0.35	0.96	0.01	0.96

Notes: The Table presents results on geographical diffusion of offshore Japanese yen trading between 2016 and 2019. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table D4. Changes in Shares of Offshore British pound Trading

Variables	(1)	(2)	(3)	(4)	(5)
$Z_{i,16}$	-0.119***	-0.195			-0.315***
	(7.05)	(1.14)			(3.54)
$\Delta X_{i,19}$	0.506***		0.437***		0.517***
	(5.34)		(4.37)		(4.88)
$W_{i,16}$	-0.001			-0.001	0.000
	(1.22)			(0.88)	(0.16)
$BT_{i,19}*Z_{i,16}$		5.929	-2.480**	-0.427	6.991**
		(1.15)	(2.04)	(0.31)	(2.51)
$BT_{i,19}$		-0.012	0.011	0.011	-0.012
		(0.61)	(0.71)	(0.56)	(0.63)
Constant	0.000	0.000	-0.001	-0.000	0.001
	(1.06)	(0.68)	(1.16)	(0.12)	(0.98)
Adjusted R^2	0.50	0.03	0.36	-0.06	0.58

Notes: The Table presents results on geographical diffusion of offshore British pound trading between 2016 and 2019. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

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Table 1. FX Average Daily Turnover, Economic Size, and International Trade Volume

	Turnover Share (%)	Turnover/GDP (%)	Turnover/Trade (%)
USD	88.30	27.98	138.27
EUR	32.28	15.80	22.13
JPY	16.81	22.42	75.44
GBP	12.79	29.65	72.49
AUD	6.77	31.31	90.11
CAD	5.03	19.51	35.66
CHF	4.96	46.73	56.97
CNY	4.32	2.09	6.17
HKD	3.53	63.67	19.70
NZD	2.07	66.84	163.27

Note: The Table lists the top ten most actively traded currencies in the 2019 BIS triennial survey, and their FX average daily turnover shares, daily turnover to GDP ratios, and daily turnover to international trade ratios. Data on FX turnover are from BIS (2019), and data on GDP and international trade volume from Q2 2018 to Q1 2019 are from, respectively, IFS and IMF DOTS.

Table 2. Changes in Shares of Offshore RMB Trading

	(1)	(2)	(3)	(4)
$Z_{i,16}$	-0.255**			-0.226***
	(2.66)			(4.44)
$\Delta X_{i,19}$		0.352***		0.077
		(7.63)		(0.76)
$W_{i,16}$			-0.335	-0.307***
			(1.23)	(2.83)
$BT_{i,19}*Z_{i,16}$	0.709***	0.106*	0.447*	0.926***
	(3.66)	(1.89)	(1.77)	(5.15)
$BT_{i,19}$	-0.006	0.004	0.019	0.014**
	(1.05)	(0.77)	(1.03)	(2.29)
Constant	-0.001	-0.001	0.000	-0.001
	(1.02)	(0.37)	(0.16)	(1.16)
Adjusted R^2	0.65	0.24	0.29	0.83

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2016 and 2019. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table 3. Changes in Shares of Offshore RMB Trading: China's Policies

	(1)	(2)	(3)	(4)	(5)	(P)
$Z_{i,16}$	-0.217***	-0.201**	-0.226***	-0.293***	-0.224***	-0.226***
	(4.32)	(3.16)	(4.93)	(3.73)	(4.36)	(4.93)
$\Delta X_{i,19}$	0.082	0.130	0.065	-0.121	0.077	0.065
	(0.81)	(0.99)	(0.74)	(0.59)	(0.74)	(0.74)
$W_{i,16}$	-0.345***	-0.414*	-0.336***	-0.269**	-0.314***	-0.336***
	(2.75)	(2.19)	(3.09)	(2.09)	(2.75)	(3.09)
$BT_{i,19}*Z_{i,16}$	0.939***	0.907***	0.944***	1.022***	0.930***	0.944***
	(5.11)	(4.48)	(5.48)	(6.66)	(5.07)	(5.48)
$BT_{i,19}$	0.015**	0.049	0.018**	0.019*	0.014**	0.018**
	(2.46)	(1.39)	(2.66)	(1.91)	(2.16)	(2.66)
RQFII 2019	0.002					
	(1.02)					
RQFII Size 2019		-0.001				
		(0.47)				
Swap 2019			0.002***			0.002***
			(2.71)			(2.71)
Swap Size 2019				0.004		
				(1.13)		
Clearing Bank 2019					0.004	
					(0.39)	
Constant	-0.001*	0.004	-0.002**	-0.002	-0.001	-0.002**
	(1.73)	(0.33)	(2.54)	(1.23)	(1.40)	(2.54)
Adjusted R^2	0.83	0.80	0.84	0.86	0.83	0.84

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of China's policy variables. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively. The coefficient estimates of Swap Size 2019 and Clearing Bank 2019, for presentational considerations, were scaled by a factor of 10.

Table 4. Changes in Shares of Offshore RMB Trading: Links to China

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(P)
$Z_{i,16}$	-0.226***	-0.221***	-0.262***	-0.222***	-0.220***	-0.236***	-0.252***
	(4.44)	(4.59)	(5.04)	(4.31)	(6.31)	(4.31)	(6.65)
$\Delta X_{i,19}$	0.077	0.085	0.010	0.084	0.103	0.063	0.044
	(0.76)	(0.89)	(0.10)	(0.81)	(1.55)	(0.57)	(0.65)
$W_{i,16}$	-0.307***	-0.318***	-0.346***	-0.316***	-0.387***	-0.307***	-0.408***
	(2.83)	(3.11)	(3.20)	(2.85)	(4.91)	(2.89)	(5.18)
$BT_{i,19}*Z_{i,16}$	0.926***	0.900***	1.066***	0.923***	0.958***	0.944***	1.070***
	(5.15)	(5.12)	(5.81)	(5.07)	(7.22)	(5.35)	(7.36)
$BT_{i,19}$	0.014**	0.012**	-0.005	0.016**	0.018***	0.014**	0.002
	(2.29)	(2.28)	(0.59)	(2.46)	(2.96)	(2.28)	(0.17)
FDI Share 2018		0.000					
		(0.80)					
FTA 2019			0.006**				0.005*
			(2.69)				(1.83)
CFETS 2019				0.001			
				(0.82)			
Log_Distance					-0.004**		-0.003*
					(2.23)		(1.84)
Belt & Road 2019						0.001	
						(1.05)	
Constant	-0.001	-0.001	-0.000	-0.001	0.033**	-0.002	0.029*
	(1.16)	(1.22)	(0.04)	(1.62)	(2.23)	(1.14)	(1.87)
Adjusted R^2	0.83	0.83	0.86	0.83	0.86	0.83	0.88

Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of variables capturing links to China. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table 5. Changes in Shares of Offshore RMB Trading: Characteristics of Jurisdictions

Variables	(1)	(2)	(3)	(4)	(P)
$Z_{i,16}$	-0.226***	-0.223***	-0.226***	-0.226***	-0.226***
	(4.45)	(3.72)	(4.39)	(4.21)	(4.44)
$\Delta X_{i,19}$	0.078	0.078	0.077	0.076	0.077
	(0.77)	(0.72)	(0.75)	(0.71)	(0.76)
$W_{i,16}$	-0.310***	-0.310**	-0.307***	-0.306**	-0.307***
	(2.84)	(2.63)	(2.79)	(2.67)	(2.83)
$BT_{i,19}*Z_{i,16}$	0.928***	0.913***	0.927***	0.927***	0.926***
	(5.15)	(3.98)	(5.09)	(5.10)	(5.15)
$BT_{i,19}$	0.015**	0.014*	0.014**	0.014**	0.014**
	(2.26)	(1.90)	(2.24)	(2.27)	(2.29)
GDP Growth 2018-2016	0.003				
	(1.68)				
Equity Mkt/GDP 2018		0.000			
		(0.10)			
Int. Bond Mkt /GDP 2018			-0.000		
			(0.09)		
Fin Dev Index 2018				0.000	
				(0.10)	
Constant	-0.001	-0.001*	-0.001	-0.001	-0.001
	(1.33)	(1.77)	(1.09)	(0.59)	(1.16)
Adjusted R^2	0.83	0.83	0.83	0.83	0.83

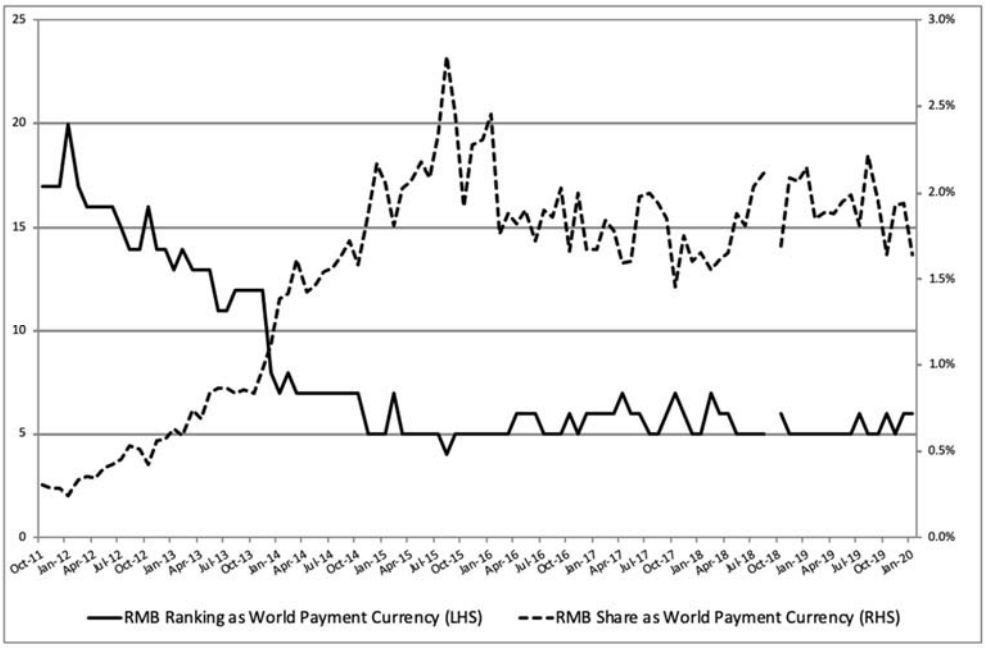
Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of jurisdiction's characteristics. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Table 6. Changes in Shares of Offshore RMB Trading: A Synthetic Formulation

Variables	(1)	(2)	(3)	(4)	(P)
$Z_{i,16}$	-0.226***	-0.262***	-0.220***	-0.247***	-0.220***
	(4.93)	(5.04)	(6.31)	(7.25)	(6.97)
$\Delta X_{i,19}$	0.065	0.010	0.103	0.043	0.091
	(0.74)	(0.10)	(1.55)	(0.74)	(1.49)
$W_{i,16}$	-0.336***	-0.346***	-0.387***	-0.426***	-0.414***
	(3.09)	(3.20)	(4.91)	(5.57)	(5.48)
$BT_{i,19}*Z_{i,16}$	0.944***	1.066***	0.958***	1.067***	0.975***
	(5.48)	(5.81)	(7.22)	(7.66)	(7.81)
$BT_{i,19}$	0.018**	-0.005	0.018***	0.007	0.022***
	(2.66)	(0.59)	(2.96)	(0.53)	(3.15)
Swap 2019	0.002***			0.002**	0.002**
	(2.71)			(2.18)	(2.67)
FTA 2019		0.006**		0.004	
		(2.69)		(1.51)	
Log_Distance			-0.004**	-0.003*	-0.004**
			(2.23)	(1.85)	(2.18)
Constant	-0.002**	-0.000	0.033**	0.028*	0.031**
	(2.54)	(0.04)	(2.23)	(1.84)	(2.12)
Adjusted R^2	0.84	0.86	0.86	0.89	0.88

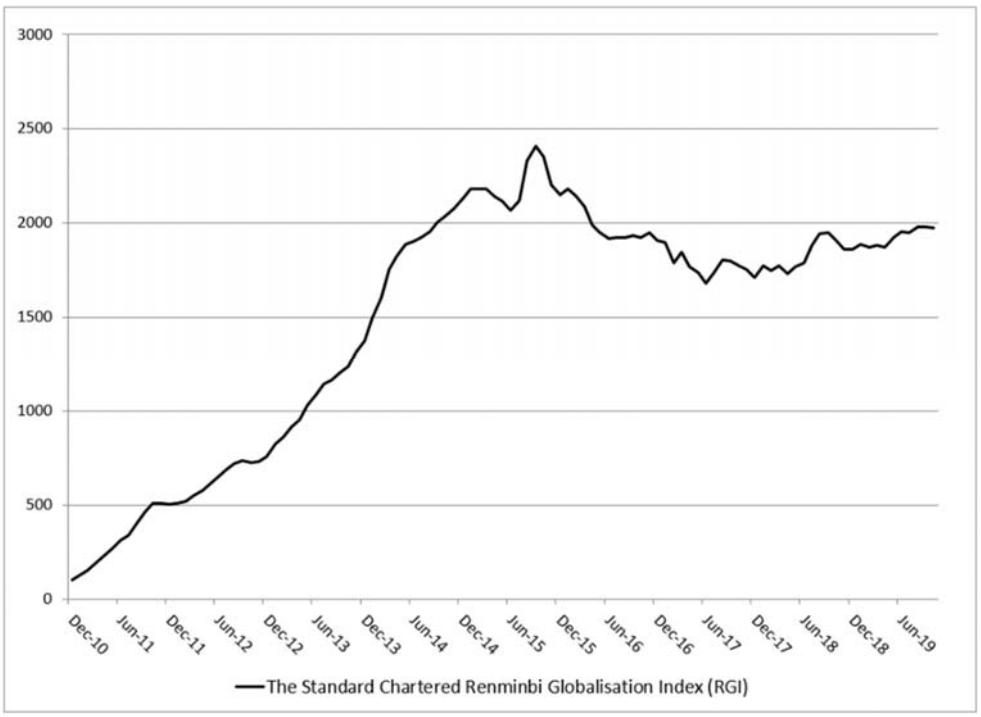
Notes: The Table presents results on geographical diffusion of offshore RMB trading between 2013 and 2016 in the presence of significant control variables from Tables 3 to 5. See the text for definitions of variables. OLS estimates and their robust t-statistics (in parentheses) are reported. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Figure 1. The RMB as a Global Payments Currency



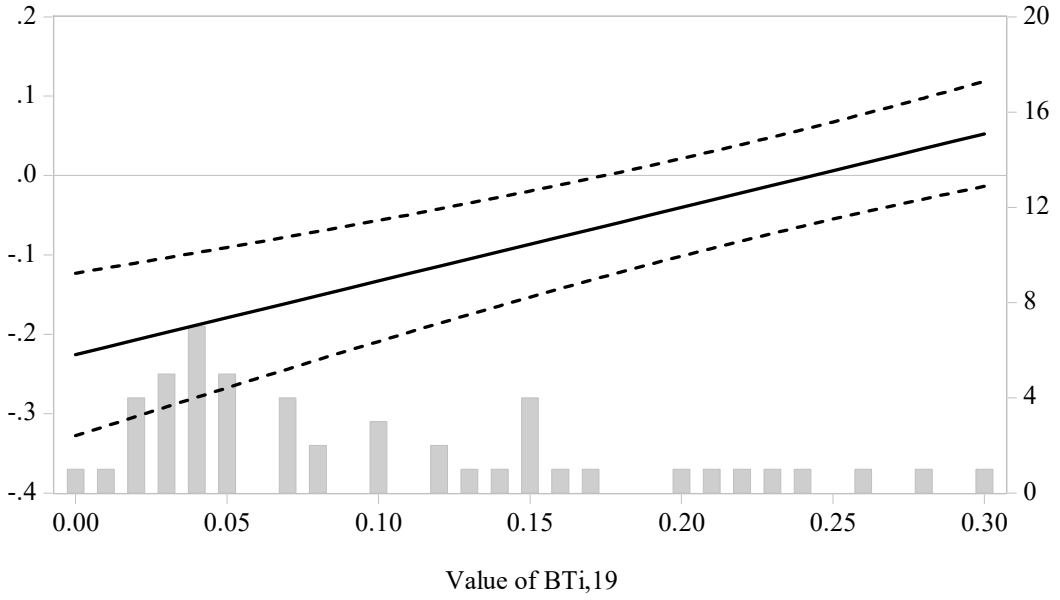
Source: SWIFT RMB Tracker (various issues).

Figure 2. The Standard Chartered Renminbi Globalisation Index



Source: Standard Chartered Bank (2019)

Figure 3. The Marginal Effect of $Z_{i,16}$ on $\Delta Y_{i,19}$



Notes: The figure plots the marginal effect (the solid line) of the gap between the shares of offshore RMB trading and all currency trading ($Z_{i,16}$) on the change in the offshore RMB share ($\Delta Y_{i,19}$), and its 95% confidence interval (the dotted lines). The histogram of $BT_{i,19}$ is included near the bottom of the figure. See equations (2) and (3) in the text and related discussions.

Figure 4. The Marginal Effect of $BT_{i,19}$ on $\Delta Y_{i,19}$

Notes: The figure plots the marginal effect (the solid line) of the trade intensity variable ($BT_{i,19}$) on the change in the offshore RMB share ($\Delta Y_{i,19}$), and its 95% confidence interval (the dotted lines). The histogram of $Z_{i,16}$ is included near the bottom of the figure. See the text for related discussions.