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Renminbi Usage in Cross-Border Payments: Regional Patterns and the Role of Swap Lines and Offshore Clearing Banks

Hector Perez-Saiz and Longmei Zhang

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Renminbi Usage in Cross-Border Payments: Regional Patterns and the Role of Swaps Lines and Offshore Clearing Banks

Prepared by Hector Perez-Saiz and Longmei Zhang*

Authorized for distribution by Martin Čihák
March 2023

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ABSTRACT: The paper examines the usage of the Renminbi (RMB) as an international payment currency. Globally, the use of RMB remains small, accounting for 2 percent of total cross-border transactions. Using country-level transaction data from Swift** for 2010–21, we find significant regional variations in the use of RMB for cross-border payments. While RMB is little used in some regions, it has gained traction in others, and these cross-country differences have widened over the years. Such differences can be partly explained by an economy's geographic distance, political distance, and trade linkages with China. However, it also reflects the impact of policy measures by the People's Bank of China, including establishing bilateral swap lines and offshore clearing banks. Both policy measures helped to address offshore RMB liquidity shortages given China's overall capital account restrictions, with the offshore clearing banks having a quantitatively larger impact. Our analysis contributes to a better understanding of the growing importance of RMB within the international monetary system.

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WORKING PAPERS

Renminbi Usage in Cross-Border Payments: Regional Patterns and the Role of Swap Lines and Offshore Clearing Banks

Prepared by Hector Perez-Saiz and Longmei Zhang¹

¹ The author(s) would like to thank Roshan Iyer for outstanding research assistance, and Helge Berge, Martin Čihák, Dong He, Astrid Thorsen, and Fabián Valencia for very helpful comments.

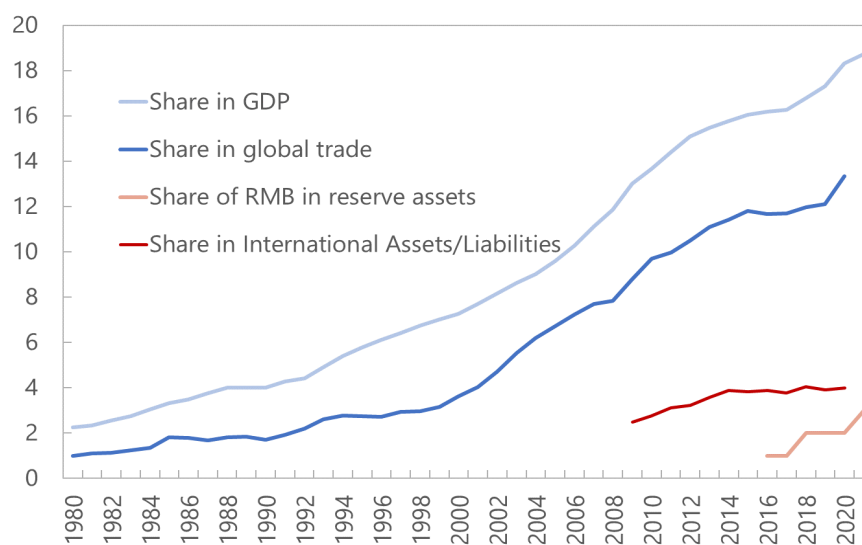
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Introduction

Over the past four decades, rapid economic growth has transformed China from one of the poorest countries in the world to the second largest economy that accounts for one-third of global growth (IMF, 2018). The WTO entry in 2001 has spurred China's rapid trade integration and reshaped global supply chains. However, despite its economic success and close trade ties with the rest of the world, China's financial integration is much more limited. Its international assets and liabilities constitute only four percent of the world external assets and liabilities, compared to 13 percent in global trade¹. In this context, the international use of China's currency RMB is also minimal, accounting for two percent of all global cross-border payments² and 3 percent of central bank reserve assets³ (Figure 1).

Figure 1. China's Rapid Integration vs. Limited Financial Integration



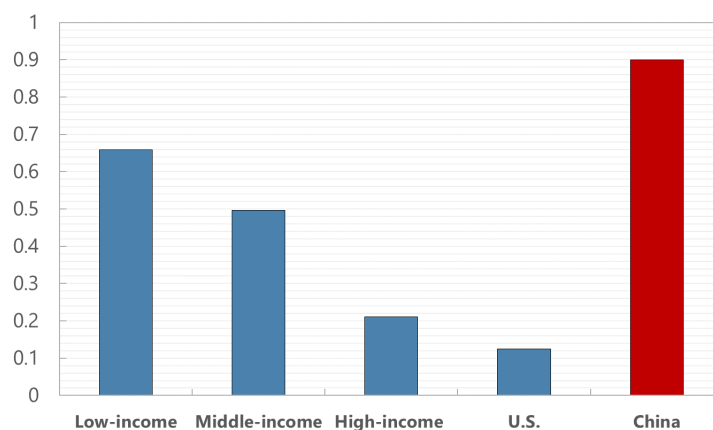
Sources: IMF, Swift and author's calculations.

China's slow financial integration is largely the result of the Chinese government's decision to maintain a closed capital account. Since the fall of the Bretton Woods system in 1973, many countries have switched toward flexible exchange rates and open capital accounts, resulting in an increase in the size and volatility of cross-border financial flows. Today, most advanced economies have fully liberalized their capital accounts, while emerging markets and low-income countries have retained certain restrictions notwithstanding partial liberalization. In comparison, China has maintained strong capital account limits for decades, with a much tighter control on capital mobility than its peers (Figure 2). Zhang (2023) shows that an open capital account could lead to a significant expansion of China's global financial footprints based on cross-country experiences.

¹ Based on IMF World Economic Outlook.

² Based on Swift data.

³ Based on IMF COFFER dataset (<https://data.imf.org/regular.aspx?key=41175>).

Figure 2. Capital Account Openness by Income Level

Source: Klein, Rebucci, Schindler and Uribe (2016) "Capital Control Measures: A New Dataset".
 Note: 1 indicates fully closed, 0 indicates fully open.

Notwithstanding the capital account restrictions, the People's Bank of China (PBC) began promoting RMB internationalization, after the 2008 Global Financial Crisis. Then Governor Zhou Xiaochuan has called for reform of the global financial architecture (Zhou, 2009), which was echoed in a subsequent Group of 20 meeting (G20, 2009). In 2009, the PBC began permitting cross-border settlements in RMB, initially via pilots in selected provinces, and nationwide since 2011. Reflecting the tight control on cross-border capital flows, RMB liquidity outside China is limited. To address this issue, the PBC has introduced bilateral swap lines (annex II) and offshore clearing banks to facilitate the cross-border use of RMB. In 2015, the RMB joined the basket of Special Drawing Rights, a milestone of RMB internationalization. Since 2017, China's financial liberalization has also accelerated, opening up domestic capital markets and the broader financial sector to foreign investors, and RMB bonds have been included in major global indices (Schipke and others p(2019)). If these trends continue, they will help deepen China's financial integration with the rest of the world and reduce barriers to the global use of RMB.

The rise of RMB as an internationalization currency has far-reaching implications for the international monetary system (IMS). Historically, the IMS has undergone profound changes, from the sterling dominance under the gold standard in the pre-war period, to the coequal status of the sterling and the U.S. dollar in the inter-war years, to the dominance of the U.S. dollar, which was institutionalized under the Bretton Woods system and remained deeply entrenched after the Bretton Woods broke down in 1973. Since its birth in 1999, euro has also become an important international currency, though it is used more widely in Europe than globally. With China's increasing footprint in the global economy, some have expressed their view that the role of RMB as a key international currency will grow. Subramanian (2011) even predicted that the RMB could potentially become the dominant reserve currency in the following decade. Prasad and Ye (2012) expected the renminbi to become a reserve currency within a decade, eroding but not displacing the dollar's dominance. Others expressed more caution. For example, Frankel (2012) argued that the internationalization of RMB will take longer reflecting the lack of financial development and mobility of capital flows.

In contrast to the traditional view (Krugman, 1980) that the IMS will always be dominated by a single currency reflecting increasing network returns, Eichengreen (2011, 2012) envisaged the new view of a multi-polar

monetary system in which the RMB, the euro, and US dollar play the role of international currencies. Farhi, Gourinchas, and Rey (2011) highlights structural flaws in the existing (largely)U.S. dollar-based system, which faces the “New Triffin’s Dilemma”, as the U.S. will eventually run out of fiscal capacity to provide global safe assets given its falling share in the world economy. Diversifying reserve currencies, such as including RMB assets, could help address the shortage of safe asset provision.

There is also a large literature on how the U.S. dollar hegemon has implications for global trade, financial, and capital flow cycles, and challenges for macro policy management. (Boz et al., (2018), Gourinchas (2021), Gopinath et al.(2010), Gopinath et al.(2020), among others). Reflecting the dominant role of US dollar in global trade invoicing, the dollar exchange rate has a significant impact on non-U.S. related trade, with a one percent appreciation leading to a 0.6 percent decline in global trade volume outside of the U.S. The higher the share of U.S dollar invoicing, the more sensitive a country’s trade is to the U.S. dollar valuation (Gopinath et al (2020)). As the vehicle currency in global banking, U.S. monetary policy also dominates the global financial cycle and capital flow movement (Agrippino and Rey (2020)). The increasing use of RMB in a country’s transaction with China is likely to reduce the sensitivity of its trade volume to the U.S. dollar exchange rate. A wide adoption of RMB may also imply stronger spillover effect of China’s monetary policy.

In broad terms, an international currency serves three distinct functions: a unit of account, a medium of exchange, and a store of value. More specifically, its use by both the public and the private sectors can be summarized by Table 1, which was introduced by Cohen (1971) and Kenen (1983). The multiple functions of an international currency are often closely interrelated. As shown by Gopinath and Stein (2021), a currency’s role as a unit of account for invoicing decisions is complementary to its role as a safe store of value, and this complementarity can lead to the emergence of a single dominant currency in trade invoicing and global banking, as illustrated by the role of U.S. dollar today.

Table 1. Roles of an International Currency

| Function of Money | Public sector | Private sector |
|---------------------------|---|--|
| Unit of account | Exchange rate pegs / Anchor currency | Trade invoicing / Financial securities pricing |
| Medium of exchange | FX intervention / Lender of last resort | Cross-border payments for trade and financial transactions |
| Store of value | International reserves | Financial securities denomination / cash |

Source: Adapted from Cohen (1971) and Kenen (1983).

There is a large literature on RMB internationalization. Most studies focused on the use of RMB as a store of value for the official sector, based on FX reserve data. Key determinants of the reserve currency share identified in the literature include the size of the economy, size of trade, capital account openness, and financial market depth (Subramanian, 2011; Frankel, 2012). Arslanalp, Eichengreen, and Simpson-Bell (2022) review changes in reserve currency shares and find that the dollar dominance has been eroded by the rise of RMB and currencies of other smaller countries. Euro continues to be the second largest reserve currency, though its share has also declined after the global financial crisis. Another body of literature examines the role of RMB as an exchange rate anchor, and finds that RMB has become an anchor currency, especially in East Asia and

other emerging markets (Subramanian and Kessler 2013; Mora and Nor, 2018). Yu (2012) and Cheun (2019) provides an overview of the RMB internationalization.

In comparison to extensive literature on RMB as a reserve currency, there is scant research on RMB as a payment and pricing currency. Due to data limitations, research on RMB payment and invoicing has only emerged in recent years. Bahaj and Reis (2020) developed a small economy model to illustrate the impact of financial policies on currency usage and found that empirically the PBC swap lines have been effective in jumpstarting the use of RMB in cross-border payment based on Swift data. Lai and Yan (2020) studied the determinants of currency shares in global payments using Swift data and found that China's lack of financial market development and capital account restrictions are the main impediments to RMB cross-border payments. Song and Xia (2020) analyzed the impact of PBC swap lines on cross-border RMB payments using SWIFT data up to 2015. Chey and Hsu (2020) also found a positive impact of PBC swap lines on the RMB share in global FX trading based on BIS tri-annual survey. Georgiadis et al. (2021) studied RMB trade invoicing in selected countries and find that China's trade integration has strengthened U.S. dollar invoicing at the expense of euro, and PBC swap lines had a positive impact on RMB invoicing. Perez-Saiz, Zhang, and Iyer (2023) study currency usage in cross-border payments, finding that currency adoption has a high degree of inertia, and the legal tender status, geographic and political distance play an important role in explaining cross-country variations in currency usage, especially for emerging currencies, such as the RMB.

The paper contributes to the literature by examining the regional patterns of cross-border RMB payments. We present stylized facts about the geographic heterogeneity in RMB usage, and explore the factors behind the variation, such as trade linkages, geographic distance, and importantly policy initiatives, including the bilateral swap lines established between PBC and other central banks, as well as the introduction of offshore RMB clearing banks. Compared to Bahaj and Reis (2020), we focus on the intensive margin of RMB usage (the degree of usage) instead of the extensive margin (from zero to some usage). Our empirical analysis also provides the most up-to-date analysis of RMB payments, as much have changed in the Chinese economy since 2015, such as fluctuation in capital account restrictions, and the introduction of a new exchange rate regime, among others. To our knowledge, this is also the first paper to study the impact of offshore clearing banks on RMB cross-border payment.

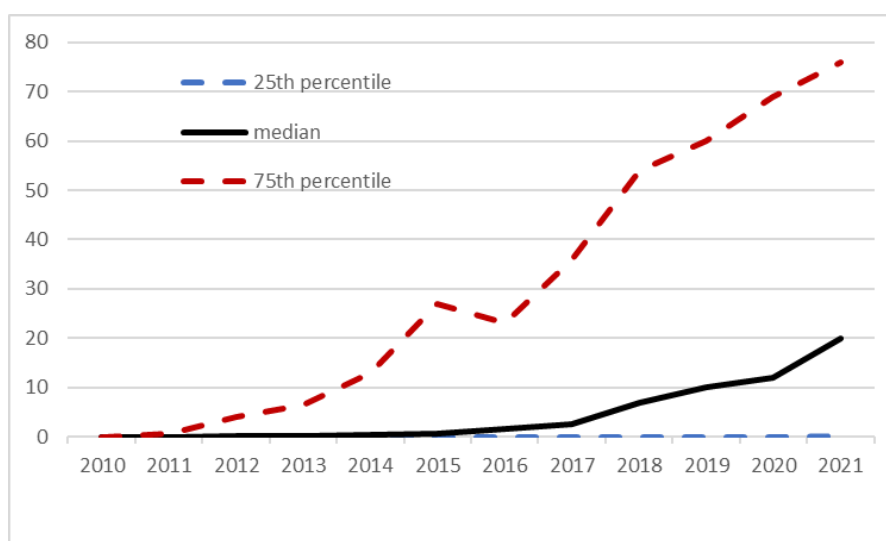
The remainder of the paper is organized as follows. Section 2 describes the regional patterns of RMB use in cross-border payments and their evolution over time. Section 3 discusses the two key policy initiatives in facilitating RMB internationalization: bilateral central bank swap lines and RMB offshore clearing banks. Section 4 studies empirically the contribution of economic fundamental and policy initiatives in driving the RMB usage in cross-border payments. Section 5 concludes.

Regional Patterns of RMB Cross-Border Payments

While global adoption of RMB usage remains at its infancy, it has established itself as an importance reference currency for some emerging economies and is increasingly used for cross-border payments in some regions. This section will explore geographical disparities in RMB usage based on country level Swift transaction data.

Since 2009, the PBC has permitted cross-border settlement in RMB, initially in selected provinces, and then expanded nationwide. Despite a slow start, RMB usage has expanded significantly in recent years. Figure 3 illustrates the evolution of RMB in cross-border payments, measured as the RMB's share in an economy's total payments with China. This is often the first phase of currency internationalization, when the currency is used in transactions where the issuing country is involved. The payment data is based on Swift messaging system that processes the vast majority global banking transactions. The Swift dataset spans most countries and regions and covers cross-border transactions dating back to 2010 in terms of currencies usage. Overall, the median RMB usage in a sample of 125 economies has increased from around 0 in 2014 to 20 percent in 2021, suggesting half of the economies in the sample settle at least 20 percent of their transactions with China in RMB. The 75th percentile has demonstrated significant increase from 0 into 70 percent in 2021, indicating that a quarter of the sample economies transacts with China primarily in RMB. In contrast, the 25th percentile RMB usage has remained close to zero, demonstrating that another quarter of the sample economies barely uses RMB in their transactions with China.

Figure 3. Evolution of RMB Cross-Border Payments
(RMB share in cross-border settlement with China)



Sources: SWIFT Watch, IMF calculations

Note: The distribution is based on a sample of 125 economies.

Figure 4.1 and 4.2 below visualizes the significant geographic disparity in RMB usage as of 2021. Over the past decade, the RMB has gained traction in Asian countries, such as Mongolia, Laos, as well as other emerging market and developing countries, such as Chile, Turkey, and Argentina. Countries that were subject to U.S. dollar sanctions, such as Iran, also increasingly used RMB for transactions with China.

Figure 4. Geographical Distribution of RMB Payments (2021)

Figure 4.1. RMB Share in Total Swift Payments

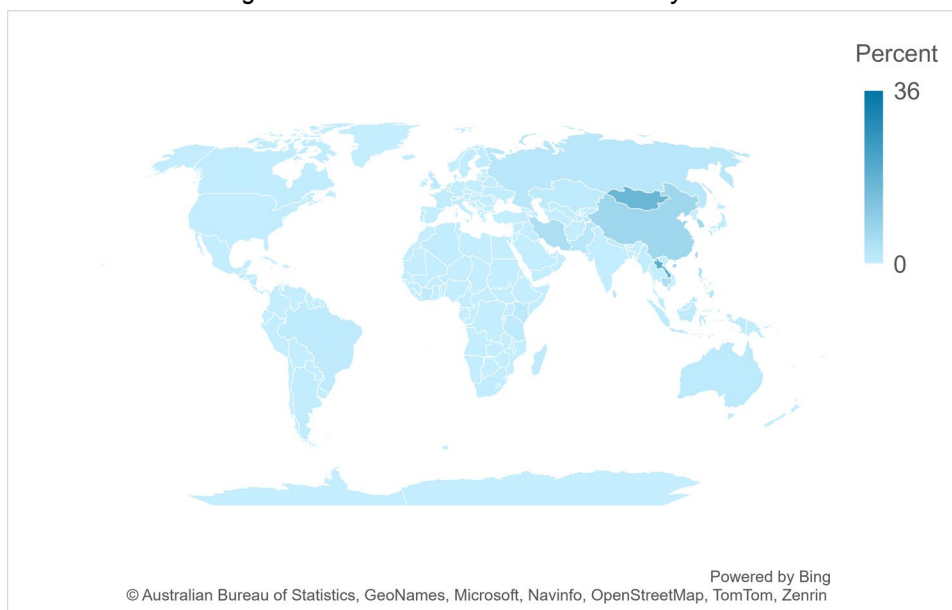
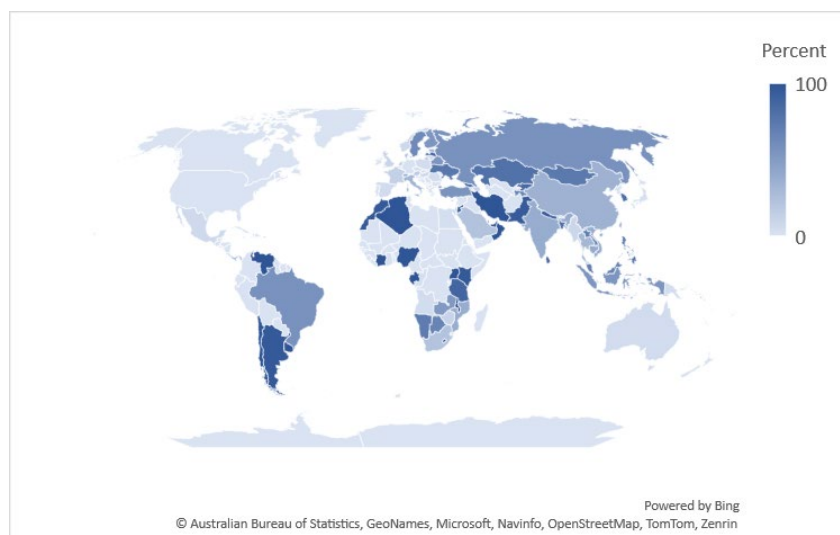


Figure 4.2. RMB share in Swift Payments with China



Sources: Swift and authors' calculations

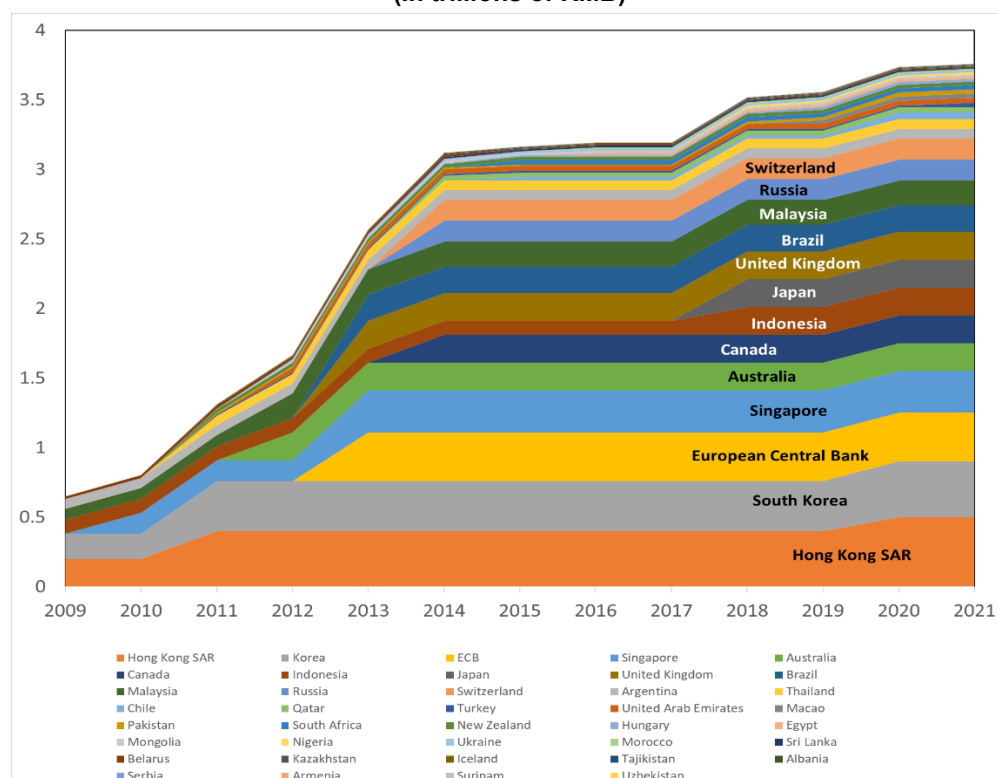
Regional Policies that Facilitate RMB Internationalization

Despite recent liberalizations, China's capital account remains under very tight control, limiting the RMB's availability for global usage. Against such backdrop, the PBC has launched initiatives in some regions in the world to facilitate the cross-border use of RMB, including the establishment of bilateral swap lines with other central banks and the designation of offshore RMB clearing banks.

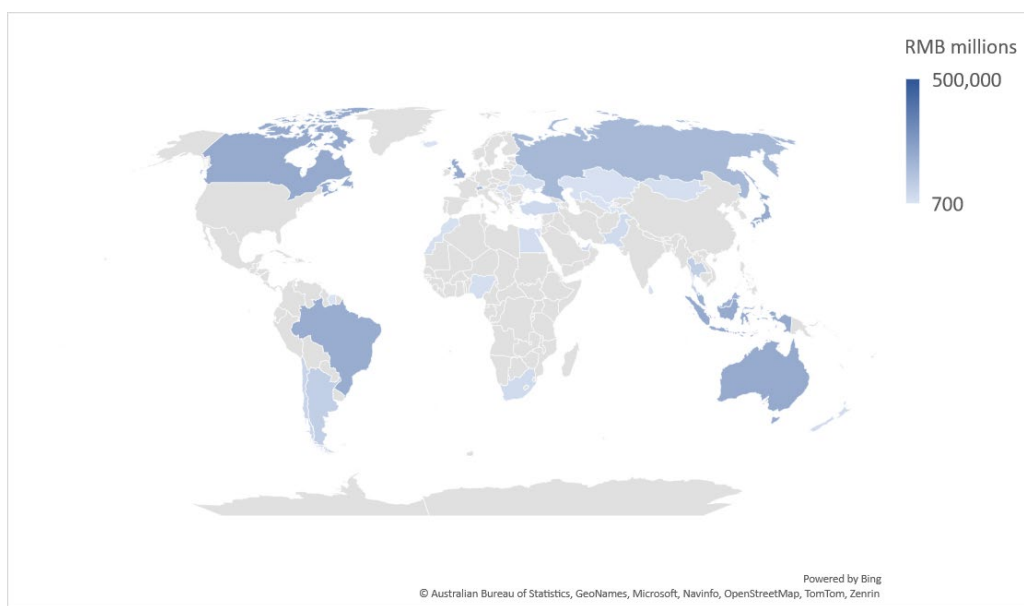
Bilateral Swap Lines

Bilateral swap lines are PBC's signature policies for promoting RMB internationalization (Zhu and others, 2021). Swap lines were initially introduced to facilitate RMB settlement in international trade, reflecting the limited RMB liquidity overseas. The geographic coverage began with neighboring Asian countries and later expanded to include other emerging markets. Later, a few advanced economies, including Canada, the European Central Bank, and the United Kingdom, have signed swap lines with the PBC, primarily to address potential financial stability risks (PBC 2021) (Figure 5). As of 2022, there are 38 bilateral swap lines outstanding, amounting to around 4 trillion RMB (Figure 6).

**Figure 5. Evolution of PBC Swap Lines
(In trillions of RMB)**



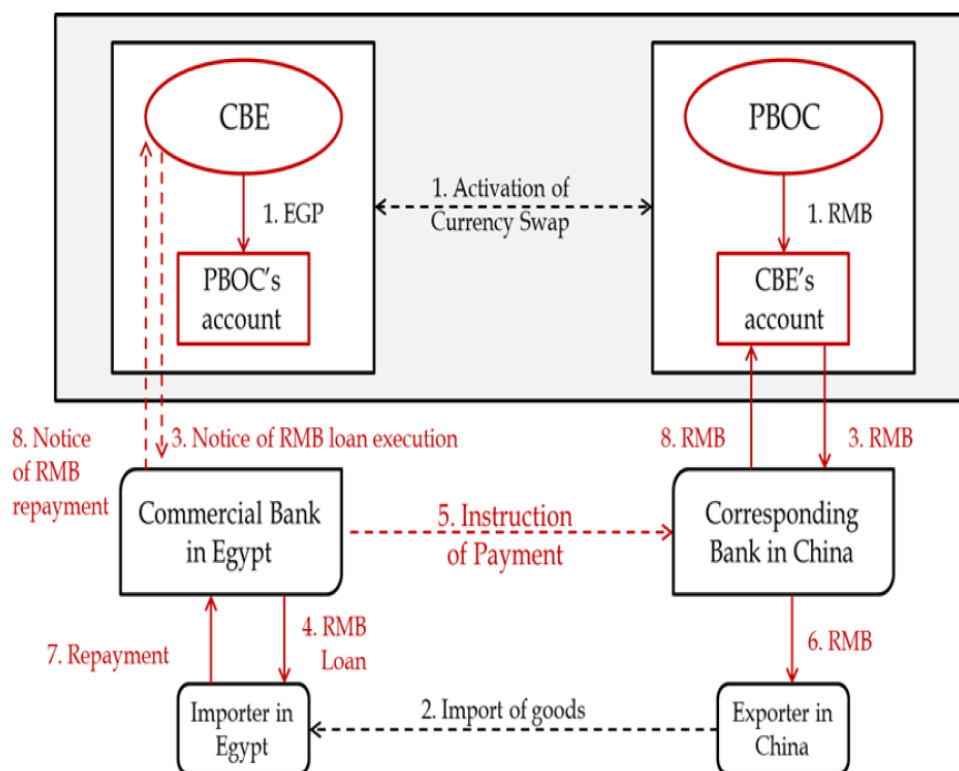
Sources: PBC and authors' compilation

Figure 6. Outstanding Bilateral Swap Lines (2021)

Sources: PBC and authors' compilation

The swap lines are usually signed for a term of three years and often renewed upon maturity. In some regions, the size of the swap lines has been scaled up over time in line with increasing economic ties with China, notably in Hong Kong SAR, Singapore, and South Korea. The Figure 7 below illustrates the function of swap lines from an Egyptian importer's perspective. When the need for RMB liquidity arises for either trade and financial transactions, the foreign central bank can activate the swap line and request the PBC to deposit RMB to its account, which can then be on lend to foreign financial institutions to provide RMB related payment. The foreign central bank will also deposit the equivalent amount of local currency to the PBC account as collateral. At the end of the swap, the foreign central bank will pay back the RMB at a pre-determined interest rate.

Figure 7. Example of Functioning of Central Bank Bilateral Swap Line



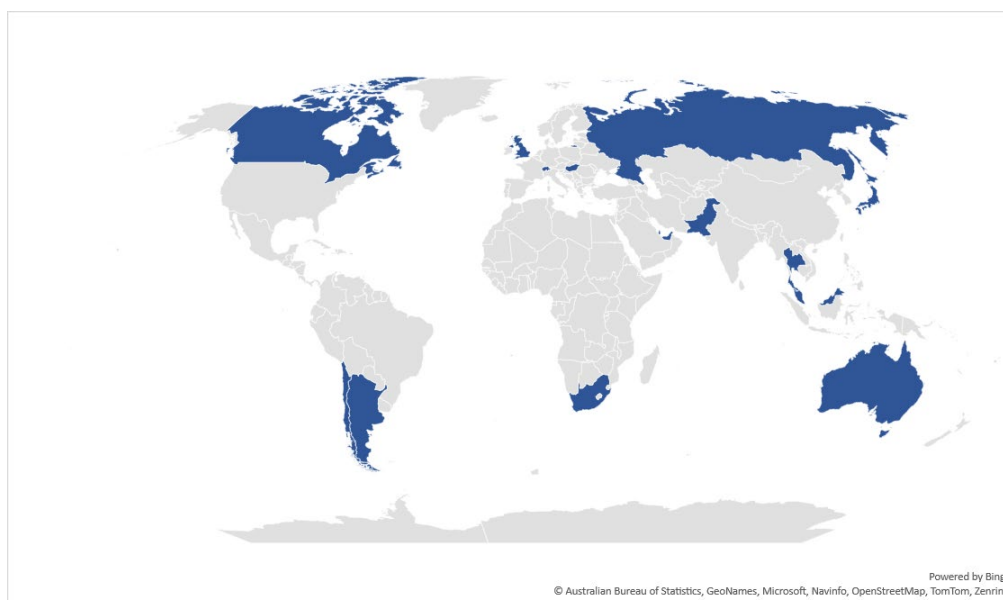
Source: Central Bank of Egypt (2017)

Note: CBE stands for Central Bank of Egypt.

The activation of the RMB swap lines has been limited so far. While the PBC does not regularly disclose the usage of the swap lines, a 2015 report indicates that about 100 billion of the 3 trillion RMB outstanding swaps were used in that year, or less than 1 percent of the total. This stands in contrast to the Federal Reserve swap lines, which have been heavily used during crisis periods. McDowell (2019) also concludes that the bilateral swap lines have been used infrequently, based on a survey of the recipient central banks. This might reflect that the swap lines are meant to be used to address RMB liquidity shortage only in a potential crisis scenario. As Bahaj and Reis (2020) demonstrates in their model that swap lines can reduce the perceived risk distribution of credit in a rising currency and jump start its usage. Therefore, the impact of swap lines extends beyond their actual usage to a broader provision of safety net.

Offshore Clearing Banks

In addition to bilateral swap lines, the PBC has established offshore clearing banks in 25 economies to facilitate RMB payments. In 2003, the first offshore RMB clearing bank was established in Hong Kong SAR. After the global financial crisis, the number of offshore clearing banks have increased dramatically. At first, designated clearing banks are frequently foreign branches of Chinese banks. Since 2018, the PBC has started to grant RMB clearing license to foreign banks, such as JP Morgan in the U.S. and MUFG Bank in Japan. As of 2020, China has established 27 offshore clearing banks in 25 economies, covering the world's major time zones (Figure 8).

Figure 8. Geographic Distribution of RMB Offshore Clearing Banks

Sources: PBC and authors' compilation

The establishment of clearing banks is an important step toward bolstering the financial infrastructure for cross-border RMB payments. As a result of capital account restrictions, foreign banks are required to clear and settle RMB transactions through China's local correspondent bank, which is frequently time consuming and costly, and complicates China's anti-money laundering efforts. With the establishment of offshore clearing banks, overseas financial institutions can now settle RMB directly with the local clearing bank, operating in the same time zone, often using the same language and legal framework, greatly simplifying the transaction. Furthermore, clearing banks also facilitates the development of the offshore RMB market by enabling for the accumulation of RMB liquidity.

CIPS (Cross-Border Interbank Payment System), China's new cross-border payment mechanism, has the potential to reduce the role of offshore clearing banks in the future. China has developed its own infrastructure for RMB cross-border payments, CIPS, similar to CHIPS (Clearing House Interbank Payment System) in the United States. CIPS's first phase was completed in 2015, and the second phase was completed in 2018. In contrast to offshore clearing banks, CIPS is open to all foreign financial institutions regardless of jurisdictions, and participants can gain direct access to China's domestic Large Payment Settlement System for RMB transactions. Thus far, CIPS membership remains limited, with 77 direct participants, and 1283 indirect participants⁴. Going forward, as CIPS becomes more developed, it will likely play a more significant role in RMB settlement and weaken the advantage of offshore clearing banks.

⁴ https://www.cips.com.cn/en/participants/participants_announcement/58789/index.html

Empirical Study

This section conducts an empirical analysis to analyze the drivers of regional disparities in RMB usage for cross-border payments. In line with the literature, we have included macroeconomic fundamentals, such as trade linkages, financial developments, geographic proximity, etc., as potential drivers. In addition, we also introduced geopolitical distance as a control. The main research question is to test the impact of swap lines and offshore clearing banks, i.e., whether they have boosted the RMB usage as intended by the PBC.

The regression is specified as the following:

$$RMB_{i,t} = C_i + \alpha * RMB_{i,t-1} + \beta * Swaplines_{i,t} * G_{i,t} + \gamma * Clearingbank_{i,t} + \theta * trade_{i,t} + \rho * geographic_distance_i + \delta * political_distance_i + \varphi * X_{i,t} + \varepsilon_{i,t}$$

The dependent variable *RMB* takes two alternative measurements: one is the amount of RMB settlement in transactions with China, and the other is a share of RMB payment in total cross-border transactions of economy *i* with China in period *t*. We conduct separate regressions for payments from China and payments to China. The lagged value is included to reflect the high degree of inertia in currency usage and is consistent with the literature. *C* refers to country-fixed effect, The *swapline* is a dummy variable indicating an outstanding swap line with the PBC. The *clearingbank* is a dummy variable, with a value of one if a local RMB clearing bank exists in an economy *i*, and zero otherwise. The variable *trade* indicates the degree of trade integration with China, measured in three alternative measures: China's share in total imports, China's share in total exports, and China's share in total imports and exports. For regression on payments to China, we include China's share of exports, while for regression on payments received from China, we use China's share of imports. Overall trade share is used when the dependent variable is total payments. The variable *geographic_distance* measures both the geographic distance between the capital city of country *i* and China, while the variable *political_distance* measures both the degree of political alliance between country *i* and China as captured in the correlation of UN votes. *X* refers to other controls in the regression, including financial flows, inflation, income level, language, etc. The null hypothesis that swap lines and clearing banks have no impact on currency adoption would imply $\beta = 0$ and $\gamma = 0$, whereas theory predicts that these parameters would have positive value. Bajaj and Reis (2020) show that swap lines could lower the cost of borrowing a currency by reducing tail risks, and hence jump-start its international usage.

The Swift data contains a wide range of cross-border transactions. For our study, we have focused on four types of messages: MT 103 (single customer fund transfers), MT 202 (bank transfers), MT 400 (cash letters advice of payment), MT 700 (confirmations of the issuance of a trade documentary credit). Other Swift messages, such as MT 300, MT 320, MT 540 are related to FX trading and Securities trading, and less relevant for our study on cross-border payment. Total payment is defined as the sum of MT 103 and MT 202. For trade related payment, we use the sum of MT 400 and MT 700.

For the dependent variable, we use the RMB share in transactions with China instead of the share in total cross-border payments, as in Reis (2020)⁵. While the U.S. dollar is widely used in third-party transactions, such

⁵ We also conducted similar regressions for RMB usage among third-party countries, and found that swap lines and offshore clearing banks have very limited impact on boosting RMB usage.

as trade settlement between Korea and Mexico, the international role of the RMB remains at the early state, and mostly show up in transactions with China. The payment dependent variable further distinguishes payments to China and received from China.

Our regression shows that RMB usage tends to display significant inertia, with the coefficient on the lagged dependent variable equal to 0.8. This is in line with the literature that due to network externalities, currency usage tends to be highly persistent. Both swap lines and offshore clearing banks have a significant impact in boosting RMB payment. On average, the establishment of swap lines could boost RMB payment growth by 0.4 percent, and the set-up of offshore clearing banks increases RMB payment growth by 0.5 percent. Such impact cumulated overtime could give a substantial boost to the designated regions compared to other parts of the world. In 2021, the average share of RMB payment in countries with swap lines and offshore clearing banks was 57 percent, compared to 34 percent in other countries. Our findings are in line with previous literature that swap lines could increase the probability of RMB adoption for cross-border payments (Bahaj and Reis (2020)) and clearing banks could boost RMB FX trading (Chey and Hsu (2020)). The empirical results also highlight the importance of geographic and political distance in explaining RMB usage. For two countries that have similar access to swap lines and offshore clearing banks, countries that are close to China are more likely to settle more transactions in RMB. This is in line with the view that RMB may first become a regional currency in Asia before becoming an international currency.

Turning to regression using share of RMB payment. Table 2 below summarizes the regression results based on OLS, fixed-effect and random effect models for transfer payments (messages MT 103 and MT 202). The analysis shows that RMB usage tends to display significant inertia, with the coefficient on the lagged dependent variable ranging between 0.61 and 0.86. This is in line with the literature that due to network externalities, currency usage tends to be highly persistent. Depending on the econometric model, we find that swap lines have increased the RMB's share of payments to and from China between 2.2 and 3.7 percentage points (ppt). Offshore clearing banks have a greater influence, increasing RMB share in payments to China by up to 6.7 percentage points and RMB received from China by up to 3.9 percentage points. Countries with stronger commercial ties to China tend to employ more RMB in their bilateral interactions, but the effect has a weak level of statistical significance. Geographic distance is also found to be significant in influence RMB usage. Countries closer to China tend to adopt RMB more frequently in their transactions. Political proximity tends to have a positive and statistically significant effect on transfers sent to China. Additionally, evidence indicates that countries with less developed financial system settle a greater proportion of their transactions with China in RMB.

We also conduct separate regressions for trade-related payments in Table 3. It is interesting to note that the impact of swap lines and offshore clearing banks is smaller in trade related settlement, boosting the RMB share by 0.5 ppt and 2.5 ppt respectively, while the degree of trade integration becomes important in determining the share of RMB trade settlement. Countries that have closer trade linkages with China also tend to settle a larger portion of trade in RMB.

Table 2. Regressions Results for Transfers (Messages MT 103 and MT 202)

| VARIABLES | (1) | (2) Transfers sent to China | | | (5) | (6) | (7) Transfers received from China | | | (10) |
|---------------------------|----------------------|-----------------------------|----------------------|----------------------|-----------------------|----------------------|-----------------------------------|----------------------|----------------------|-----------------------|
| | OLS | OLS | FE | FE | RE | OLS | OLS | FE | FE | RE |
| lagged RMB payment share | 0.852*** (0.0132) | 0.844*** (0.0137) | 0.642*** (0.0128) | 0.633*** (0.0135) | 0.856*** (0.00895) | 0.849*** (0.0143) | 0.836*** (0.0152) | 0.619*** (0.0141) | 0.610*** (0.0147) | 0.853*** (0.00981) |
| SWAP line indicator | 0.811 (0.641) | 0.673 (0.680) | 2.721*** (1.017) | 2.272** (1.071) | 1.340** (0.639) | 0.989 (0.814) | 0.703 (0.867) | 3.725*** (1.118) | 3.419*** (1.178) | 1.636** (0.734) |
| offshore clearing | 3.095*** (1.117) | 2.655** (1.305) | 6.694*** (1.432) | 6.698*** (1.475) | 3.458*** (1.132) | 0.275 (1.019) | 0.869 (1.224) | 3.406** (1.459) | 3.931*** (1.518) | 1.911 (1.177) |
| Trade share | 0.945* (0.492) | 0.244 (0.531) | 0.777 (1.622) | 1.622 (1.795) | 0.903 (0.566) | -0.248 (0.301) | -0.308 (0.347) | 1.123 (1.025) | 1.292 (1.101) | -0.140 (0.351) |
| Contiguity indicator | -1.523 (0.969) | -2.262** (1.084) | | | -1.693 (1.062) | -1.447 (1.050) | -2.461** (1.198) | | | -1.696 (1.189) |
| Geographic distance (log) | -2.158*** (0.710) | -2.228*** (0.733) | | | -1.660*** (0.644) | -2.830*** (0.792) | -2.969*** (0.812) | | | -2.234*** (0.744) |
| Political proximity (log) | | 17.39*** (4.240) | | -5.901 (13.16) | 11.52*** (4.363) | | 6.795 (5.737) | | -17.69 (14.48) | 1.635 (4.813) |
| Corruption index | | 0.334 (0.295) | | -2.823*** (0.712) | 0.0109 (0.309) | | 0.617* (0.359) | | -3.899*** (0.840) | 0.234 (0.364) |
| Financial development | | 0.0509 (1.972) | | -3.158 (5.767) | 0.923 (2.131) | | -5.454** (2.161) | | -15.89** (6.391) | -3.715 (2.515) |
| Constant | 15.66 (9.763) | -3.686 (12.38) | 209.7*** (34.37) | 178.7*** (37.90) | 0.845 (10.97) | 26.38** (11.29) | 9.769 (18.40) | 158.0*** (37.30) | 154.2*** (41.10) | 24.47* (12.99) |
| Observations | 3,770 | 3,474 | 3,770 | 3,474 | 3,474 | 3,324 | 3,120 | 3,324 | 3,120 | 3,120 |
| R-squared | 0.778 | 0.779 | 0.525 | 0.527 | 0.775 | 0.754 | 0.749 | 0.458 | 0.465 | |
| Other economic variables | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Year-Quarter FE | YES | YES | NO | NO | NO | YES | YES | NO | NO | NO |
| Number of idc | | | 124 | 113 | 113 | | | 111 | 102 | 102 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

One observation is the share of amounts of CNY sent from/to China through Swift to/from other countries in a given quarter. Economic variables considered are: nominal GDP; per capita GDP-M2/GDP ratio; and inflation (all in logs).

For a robustness check, we have included other control variables, including GDP per capita, total GDP, financial depth (M2/GDP ratio), inflation. While the coefficients of some variables are statistically significant, they are quantitatively small and often not stable across specifications. Instead, the policy variables and the geographic distance are very robust to model specifications.⁶

⁶ We have also included portfolio investment and foreign direct bilateral flows information, but we have not obtained robust results.

Table 3. Regressions Results for Trade-related Payments (Messages MT 400 and MT 700)

| VARIABLES | Trade-related transfers sent to China | | | | | Trade-related transfers received from China | | | | |
|---------------------------|---------------------------------------|----------------------|----------------------|----------------------|----------------------|---|----------------------|----------------------|----------------------|----------------------|
| | (1) OLS | (2) OLS | (3) FE | (4) FE | (5) RE | (6) OLS | (7) OLS | (8) FE | (9) FE | (10) RE |
| lagged RMB payment share | 0.740*** (0.0493) | 0.744*** (0.0508) | 0.478*** (0.0142) | 0.471*** (0.0147) | 0.745*** (0.0114) | 0.656*** (0.0616) | 0.570*** (0.0780) | 0.377*** (0.0162) | 0.309*** (0.0169) | 0.327*** (0.0168) |
| SWAP line indicator | 0.193 (0.260) | 0.318 (0.222) | 0.161 (0.337) | 0.235 (0.341) | 0.483** (0.208) | 0.0219 (0.332) | 0.767*** (0.283) | 0.469 (0.404) | 0.861** (0.398) | 0.761* (0.391) |
| offshore clearing | 0.706 (0.534) | 0.614 (0.586) | 2.262*** (0.461) | 2.321*** (0.460) | 0.719** (0.359) | 1.143* (0.634) | -0.480 (0.375) | -1.517*** (0.516) | -1.636*** (0.505) | -1.676*** (0.495) |
| Trade share | 0.375** (0.180) | 0.218 (0.207) | 1.203** (0.502) | 1.346*** (0.520) | 0.375** (0.172) | 0.614*** (0.218) | 0.589** (0.241) | 0.459 (0.383) | 0.199 (0.377) | 0.446 (0.345) |
| Geographic distance (log) | -0.459** (0.226) | -0.407** (0.225) | | | -0.341* (0.188) | -1.102*** (0.308) | -1.102*** (0.298) | | | -3.977** (1.825) |
| Political proximity (log) | | 0.793 (1.036) | | 3.485 (3.812) | -0.329 (1.351) | | 1.790 (1.561) | | 6.880 (4.776) | 7.919* (4.390) |
| Financial development | | -0.393 (0.668) | | -0.673 (1.773) | -0.215 (0.680) | | -0.511 (0.618) | | -3.750* (2.117) | -3.142 (2.022) |
| Constant | -4.775 (3.368) | -7.505** (3.535) | 43.88*** (11.51) | 43.18*** (11.62) | -5.745* (3.475) | -13.45 (8.416) | -11.87 (8.480) | -40.52*** (14.89) | -40.83*** (14.48) | 2.117 (19.12) |
| Observations | 4,099 | 3,878 | 4,099 | 3,878 | 3,878 | 3,369 | 3,242 | 3,369 | 3,242 | 3,242 |
| R-squared | 0.570 | 0.580 | 0.277 | 0.274 | 0.574 | 0.540 | 0.391 | 0.165 | 0.118 | 0.295 |
| Other economic variables | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Year-Quarter FE | YES | YES | NO | NO | NO | YES | YES | NO | NO | NO |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: One observation is the log of the share of trade-related amounts of CNY sent from/to China through SWIFT to/from other countries in a given quarter. Economic variables considered are: nominal GDP; per capita GDP-M2/GDP ratio; and inflation (all in logs)

Conclusion

This paper examines the regional patterns of cross-border RMB payments based on Swift data. We present stylized facts about the geographic heterogeneity in RMB usage, and explore the factors behind the variation, such as trade linkages, geographic distance, political proximity, and importantly policy initiatives, including the bilateral swap lines established between the PBC and foreign central banks, as well as the introduction of offshore RMB clearing banks.

Our findings indicate that both bilateral swap lines and offshore clearing banks have played a positive role in facilitating the use of RMB in cross-border settlement. Reflecting China's overall capital account restrictions, offshore RMB liquidity is often constrained, which hampered the broader use of RMB. Against such a backdrop, the policy measures to boost financial infrastructures have facilitated access to RMB in foreign countries, and hence promoted its international usage. Our analysis also suggests the significant inertia in currency usage for cross-border payments and the importance of other non-economic variables, such as geographic distance and geopolitical proximity. Notably, the RMB is more widely adopted in cross-border payments of Asian countries and its use is also expanding in some parts of Latin America and Africa. These findings will have important implications for the future landscape of the international monetary system. If China continues to grow and becomes more integrated to the global financial system, RMB can be expected to play an increasingly important role. While its adoption at the global level remains at infancy, the RMB might play a more substantial role as a regional currency in the decades to come.

Annex I. Data Sources

SWIFT data

The Swift messaging data is provided by Swift under the 'BI Partnership' framework. We use the following four types of messages, MT_103, MT_202, MT_400, and MT_700. The total payment is defined as the sum of MT_103 and MT_202, which refer to single customer credit transfers and general financial institution transfers, respectively. We use MT 400 and MT 700 for trade related payments. The raw Swift data is at monthly frequency, which is consolidated into quarterly and annual frequency. For country-periods with no information on RMB usage, we have filled them with zero.

Swap lines

We constructed the swap line dataset based on PBC's annual reports on RMB internationalization, which includes all swap agreements signed between the PBC and other central banks.

RMB offshoring clearing banks

We constructed the dataset based on PBC's annual reports on RMB internationalization.

Trade data

Trade data are from the IMF direction of trade statistics, which measure bilateral goods trade between countries at both quarterly and annual frequency. Exports are measured as goods value free on board. Imports include the cost of insurance. The value of exports and imports are denominated in USD using prevailing market exchange rates.

GDP per capita

Quarterly and annual data from the International Financial Statistics.

Political distance

The political proximity indicator uses United Nations voting patterns from the Harvard Dataverse. It provides the degree of correlation between countries' voting patterns in the United Nations to provide an indicator of political proximity.

Geographic distance

Geographic distance indicators are obtained from the GeoDist database of the Centre d'Études Prospectives et d'Informations Internationales (CEPII).

Annex II. List of Swap Lines

Outstanding PBC Swap Lines (as of 2021)

| Counterpart | Latest sign date | Amount (in bn RMB) |
|----------------------|------------------|--------------------|
| Albania | Apr 2018 | 2 |
| Argentina | Aug 2020 | 130 |
| Australia | July 2021 | 200 |
| Belarus | May 2018 | 7 |
| Canada | Jan 2021 | 200 |
| Chile | Aug 2021 | 50 |
| Egypt | Feb 2020 | 18 |
| Euro Area | Oct 2019 | 350 |
| Hong Kong SAR, China | Nov 2020 | 500 |
| Hungary | Dec 2019 | 60 |
| Iceland | Oct 2020 | 3.5 |
| Indonesia | Nov 2018 | 200 |
| Japan | Oct 2018 | 200 |
| Kazakhstan | May 2018 | 7 |
| Korea | Oct 2020 | 400 |
| Lao P.D.R. | May 2020 | 6 |
| Macao SAR, China | Dec 2019 | 30 |
| Malaysia | Nov 2021 | 180 |
| Mongolia | Jul 2020 | 15 |
| New Zealand | Aug 2020 | 25 |
| Nigeria | Jun 2021 | 15 |
| Pakistan | Jul 2021 | 30 |
| Qatar | Jan 2021 | 35 |
| Russia | Oct 2020 | 150 |
| Singapore 1/ | May 2019 | 300 |
| South Africa | Apr 2018 | 30 |
| Sri Lanka | Jun 2021 | 10 |
| Suriname | Feb 2019 | 1 |
| Switzerland | Jul 2020 | 150 |
| Thailand | Dec 2020 | 70 |
| Turkey | Jun 2021 | 35 |
| United Kingdom | Oct 2018 | 350 |
| Ukraine | Dec 2018 | 15 |

Source: People's Bank of China.

1/ The swap lines with Singapore was extended in July 2022.

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