



## A DATA-DRIVEN ANALYSIS OF THE IMPACT OF THE DIGITAL RENMINBI ON MULTILATERAL CURRENCY SWAP AGREEMENTS WITH COUNTRIES IN THE ISLAMIC WORLD

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### Abstract

*China was once among the world's poorest countries, but during the past forty years, it has turned into an economic powerhouse. Bilateral exchange lines are one of PBC's patented methods of promoting RMB internationalization. Swap lines were initially created to assist with RMB settlement in international trade due to the limited RMB liquidity overseas. Prior to eventually expanding to other rising economies, the first geographic reach concentrated on Asian neighbors. Swap lines can boost a loan's usage and reduce the apparent risk distribution of a loan in a rising currency. Swap lines have an impact that extends beyond their core usage in order to create a larger safety net. The PBC has established bilateral swap lines in addition to offshore clearing institutions in 25 markets to facilitate RMB payments. The e-CNY was created by the PBC for four main reasons. The general public's accessibility to digital money is the initial objective of the e-CNY. Additionally, it aspires to promote efficient, secure, and equitable retail payment systems. Third, the e-CNY will improve the efficiency of international payments. The fourth is that financial inclusion should be benefited. The empirical analysis underlined the crucial hopes that the e-CNY may promote bilateral currency exchanges between Islamic nations and China and may serve as a big economic boost for those nations.*

**Keywords:** *Islamic Finance, Multilateral Currency Swaps, Digital Renminbi, Data-Driven Analysis*

## INTRODUCTION

China was once one of the world's poorest nations but has transformed within the last four decades into an economic powerhouse. It has seen remarkable economic expansion, become the second-largest economy and contributing to one-third of global growth. China's quick trade integration and the transformation of global supply networks have been fueled by its WTO admission in 2001. China's financial integration, however, is far less extensive despite its economic success and tight commercial relations with the rest of the globe. Only 4% of the world's external

assets and liabilities and 13% of global commerce are made up of its foreign assets and liabilities. In this perspective, the RMB, which represents 2% of all international cross-border payments and 3% of total reserve assets held by central banks, is likewise used to a limited extent internationally (Destais, 2016).

Given that the Chinese government keeps tight currency controls, this makes the integration into the wider global financial system a challenge. This is primarily due to the inability of investors and governments to exchange the currency freely without any additional restrictions. Cross-border financial flows have grown in scale and volatility ever since the Bretton Woods system collapsed in 1973 as a result of many nations moving toward flexible exchange rates and open capital accounts. While developing markets and low-income nations have partially liberalized their capital accounts, the majority of industrialized economies today have fully liberalized their capital accounts. Comparatively, China has always upheld strict capital account rules with a significantly stricter constraint on capital mobility than other countries (Hao & Han, 2022).

After the 2008 Global Financial Crisis, the People's Bank of China (PBC) started encouraging RMB internationalization despite the capital account constraints. This has led to the encouragement of the reform of the architecture of the global financial system, in order to achieve stronger stability against financial shocks. The PBC started allowing cross-border settlements in RMB in 2009, at first through test projects in a few regions and then nationally starting in 2011. RMB liquidity outside of China is constrained, which reflects the strict regulation of international capital movements. The PBC has developed offshore clearing banks and bilateral swap lines to overcome this issue and make it easier to utilize RMB internationally. The RMB reached a major milestone in its internationalization in 2015 when it was included to the pool of Special Drawing Rights (Fung & Yau, 2012).

RMB bonds have been included to significant global indexes, and China's financial liberalization has intensified since 2017, opening up local capital markets and the broader financial sector to international investors. If these patterns persist, the expectation is that it will lead to lower barriers to RMB use throughout the world and further China's financial integration with the rest of the world. The international monetary system (IMS) is significantly impacted by the RMB's development as an internationalization currency. The IMS has historically undergone significant changes, from the pre-war dominance of the pound sterling under the gold standard to the post-war coequal status of the pound sterling and the dollar to the dominance of the dollar, which was institutionalized under the Bretton Woods system and remained firmly entrenched after the Bretton Woods system collapsed in 1973 (Lin, Zhan, & Cheung, 2016).

Although it is used more frequently in Europe than anywhere else, the euro has grown to be a significant international currency since its introduction in 1999. Some have voiced the opinion that the RMB's position as a significant international currency will increase as China's influence grows on the global economy.

There are several ideas connected to the establishment of a multi-polar monetary system in which the RMB, the euro, and the US dollar play the role as international currencies. This is in contrast to the old belief that the IMS will always be controlled by a single currency reflecting rising network returns. The current problem of the IMS is its strong reliance on the US dollar, and the occurrence potentially of the New Triffin Dilemma. This dilemma arises from reduction in the ability to supply sufficient secure assets due to the declining economic share of its economy in the world. Alternative assets such as the RMB may address this dilemma (Yelery, 2016).

Digital currencies play another critical role in the modern Chinese financial system and its engagement with other economies. The People's Bank of China has been at the forefront of the utilization of the e-CNY (digital yuan), which represents one of the first digital currencies in the world. With respect to digital currencies, there are various views amongst scholars and experts in terms of their impact, but generally they are seen as a massive transformer for the financial systems. While some of these hypotheses are plausible, there may be potentially some exaggerations about the potential effects of digital currency (Muawanah & Imronudin, 2021). Important questions arise in terms of how these digital currencies affect multilateral currency swap agreements and lead to an encouragement of greater utilization. The article will provide a data-driven empirical research analysis of the expected impact of the e-CNY in terms of multilateral currency swap agreements, in addition to the challenges. The focus will be specifically on countries in the Islamic world, covering primarily the Middle East and North Africa, as well as South Asia (Nam, Bi, & Kim, 2022).

## **LITERATURE REVIEW**

The People's Republic of China has an extensive payment system where UnionPay is the largest provider. UnionPay was launched by the PBC State Council in 2002 and standardized the business protocols and technical standards for interbank bank card transactions, which is similar to payment processors such as Visa or Mastercard. It manages the interbank clearing system and offers services for exchanging interbank bank card data. The expectation is that UnionPay accounted for 151 billion purchase transactions on worldwide general-purpose card brands, which is second to only Visa. UnionPay is a trusted payment system in the PRC, however third-party mobile payment services are generally widely available (Fang & Zhu, 2019). When investigating

the Chinese payment environment, then mobile payments made up 66% of all transactions, surpassing cash and credit cards, which made up 23% and 7%, respectively. By value, mobile payments made up 59% of all transactions, compared to 16% and 23% for cash and cards, respectively. Additionally, more than 46% of respondents had not used recently cash for purchases. Specifically, the 851 million smartphone owners in 2019, 86% of people in the PRC utilized mobile payments to make transactions in 2019. In terms of overall statistics, around RMB 347.1 trillion (\$51.8 trillion) in mobile payments were made in the PRC in 2019, which is a more than 3,000 % increase from RMB 11.7 trillion (\$1.9 trillion) in 2013 (Liu, Chang, Wang, & Zhao, 2021).

Digital finance refers to the availability of financial services and products to retail customers via digital platforms. This includes consumer credit, small- to medium-sized loans, and investment services. Users can access such digital platforms through computers or mobile devices. Ant Group and Tencent have been the major corporations in the PRC's digital finance market in addition to offering digital payment systems. Due to the near universal use of both companies, by providing financial services in addition to payment processing, they are able to considerably increase financial inclusion. Nevertheless, recent legislations that require these enterprises to divest may play an important role to bring additional players into the market (Li, Wu, & Xiao, 2020).

For example, customers could previously access consumer credit, small loans, and investment services using the Alipay app. They could only use Alibaba's consumer credit service, Huabei, which works like a credit card, to make purchases on platforms run by Alibaba, such as Taobao, the largest online retailer in the PRC, and Ele.me, a popular food delivery service. The consumer credit limit in Huabei varies from 500 RMB to 50,000 RMB. The normal user's cap is about RMB 10,000, and the credit limits of users are determined by their online shopping history, and those who have a history of making bigger and more frequent purchases are given greater limitations (Lai, Yan, Yi, & Zhang, 2020). Users may also access Jiebei using the Alipay app, which provides little unsecured loans from RMB1,000 to RMB300,000. A set daily interest rate of 0.045% is applied to all loans. Users can take out loans anytime they want and repay them whenever they want within 12 months of the loan's issue. The abundance of online financial services that are enabled by these corporations have the requirement that the corporation in charge has access to all these financial resources and acts as a digital provider. In order to enable this a more integrated scale, a digital currency is needed in order to enhance cross-platform financial transaction efficiency and market inclusion of other providers (Hasan, Yajuan, & Khan, 2022).

The US dollar has been of critical importance for world trade, banking and the flow of capital across the world. Additionally, it has had major effects on the management of macroeconomic

policies with a single percent increase in the value of the dollar, cause around a 0.6 percent decrease in the international commerce outside of the United States (Katterbauer, Syed, Genc, & Cleenewerck, 2023). This outlines to a considerable extent the predominance of the US dollar for global trade invoicing, and the more US dollar invoicing is conducted, the greater is the impact of fluctuations in the value of the US dollar.

The U.S. monetary policy has a major control over the global financial cycle and capital flow movement in addition to being the primary currency in international banking. The more countries diversify their trade volume away from the US dollar, the less sensitive the impact on trade will be if the trading currency is different from the US dollar. Given the massive trade between countries and China, the shift of the trading currency from the US dollar to the RMB may be less affected by changes in the value of the US dollar. Additionally, a more widespread RMB adoption may cause a greater impact of the monetary policy of China onto the global economy (Fantacci & Gobbi, 2021).

International currencies play an important role and encompass three different tasks. These are the aspects of the currency acting as a unit of account, being a medium of exchange and storing value. The utilization of an international currency is both by public and commercial sectors. For its role as a unit of account, this permits it to be easily utilized for invoicing decisions and also may be in agreement with the storage of value. This complementarity can result in the emergence of a single dominant currency in trade invoicing and international banking, as is the case with the U.S. dollar today (Brown & Simonnot, 2020).

Table 1. Functionalities of an international currency.

| Money Functionalities | Public Sector                         | Private Sector   |
|-----------------------|---------------------------------------|--|
| Account Unit          | Exchange rate pegs or anchor currency | Trade invoicing / Financial securities pricing             |
| Exchange medium       | FX intervention and lending           | Cross-border payments for trade and financial transactions |
| Value storage         | International reserves                | Financial securities denomination / cash                   |

On the internationalization of the RMB, there have been extensive studies. Based on FX reserve statistics, the majority of research concentrates on the official sector's use of the RMB as a store of value. The size of the economy, the volume of commerce, the openness of the capital account, and the depth of the financial markets are among the major factors that influence the reserve currency. When analyzing changes in reserve currency shares, there has been extensive

focus on the fact that the dollar's hegemony may be gradually undermined by the emergence of the RMB and other emerging market currencies as reserve currencies.

Although its proportion has also decreased since the global financial crisis, the euro remains the second-largest reserve currency. Another body of research looks at the RMB's function as an anchor currency for exchange rates and concludes that it has done so, particularly in East Asia and other developing economies. There is little study on RMB as a payment and pricing currency in contrast to the considerable literature on RMB as a reserve currency. Research on RMB payment and invoicing has just recently become available due to lack of sufficient data. There have been several modeling approaches in order to investigate the financial policies and the effect on the usage of the currency. In a recent small economy model approach, the PBC swap lines have been successful in reviving the use of RMB in cross-border payments based on an empirical approach (Liang, 2020).

Using Swift data, there were recent investigations looking at the factors influencing currency participation in international payments and discovered that capital account limitations and China's underdeveloped financial industry are the biggest obstacles to RMB cross-border payments. Using SWIFT data, there were the effects of PBC swap lines on cross-border RMB transfers examined and have observed a favorable effect of PBC swap lines on the RMB share in global foreign exchange trading.

Further research analyzed the RMB trade invoicing in a few countries and discovered that PBC swap lines had a favorable effect on RMB invoicing and that China's trade integration had increased U.S. dollar invoicing at the expense of euro invoicing. In a study of currency use in cross-border payments, it was discovered that currency adoption has a high degree of inertia and that factors such as legal tender status, geographic location, and political distance are crucial in explaining cross-country variations in currency usage, particularly for emerging currencies like the RMB (Cui, Liu, & Peng, 2022).

## **METHODOLOGY**

For the analysis of the impact of the digital renminbi on multilateral currency swap agreements, an empirical research approach integrating both qualitative and quantitative techniques. Any knowledge obtained from experimentation, observation, or experience is said to as empirical. One of the fundamental principles of science is that evidence must be empirical, or based on data that can be observed with the five senses. Empiricism is a philosophical approach that emphasizes direct experience and observation over pure logic or reason (or rationality) as a means of learning (Wu, Yang, & Hu, 2022). The phrase refers to the use of hypotheses that may



be tested via observation and experimentation in the scientific paradigm. Or to put it another way, it is the structured application of experience. Experimental and observational data, which might be quantitative or qualitative, are created. Observation is the starting point for empirical study, but it extends much beyond. Observations on their own are just that—observations. The capacity of the scientist to explicitly operationalize such observations using testable research questions is what is referred to as empirical research (Alnsour, 2019).

Observations about the natural world are incorporated into a specific study topic or hypothesis in well-conducted research. The observer can make sense of this data by keeping quantitative or qualitative records of the outcomes. Depending on the subject, the setting, and the goal of the study, several techniques will be used. For many social science problems, for instance, qualitative approaches are preferable, but quantitative methods are preferable in fields like physics or medicine. The endeavor to make observations and then answer specific questions by accepting or rejecting a hypothesis in light of those findings, however, is at the heart of all empirical inquiry.

Empirical research may be viewed as a more organized method of posing and testing a question. Speculation, opinion, logical argument, and anything from the metaphysical or abstract domain are all acceptable forms of knowledge. However, empiricism is based on the "real world" data provided by our senses. Empiricism, as well as economic research in general, aims to create a body of knowledge on global economic trends. Empiricism's rules are in place to lessen any risks to the reliability of the conclusions drawn from empirical trials. For instance, scientists make considerable effort to exclude prejudice, expectation, and opinion from the subject at hand and concentrate solely on what can be substantiated by actual data. Science increases our understanding of the world one tested hypothesis at a time by consistently establishing the foundation of all inquiry in what can be repeatedly supported by evidence. Empirical research is cumulative and self-correcting over time due to the norms of falsifiability and repeatability (Gholami & Abdul-Rahman, 2022).

However, empirical study is not the only approach to learn about the world. Empiricism is merely one of many tools in a scientist's toolbox, despite the misconception that "empirical scientific methods" and "science" are essentially the same thing among many science students. In reality, it is usual to blend empirical and non-empirical approaches, and the combination of qualitative and quantitative methods results in data that is richer. The phases of the scientific process can be conceived of as a cycle, starting with: Collecting and arranging empirical data is a part of observation. A hypothesis is then developed through induction. It is the process of coming to a decision by evaluating whether a group of more general premises supports a particular claim. Deduction is the process of drawing particular conclusions from broad premises using logic and

reason. The inherent logic of his experimental design may be crafted by deduction. Test the hypothesis requires going back to empirical techniques to verify or refute the hypothesis. Reflecting on and evaluating the research process is a frequently overlooked stage. Here, explanations are provided, and the outcomes are placed in a larger framework. The limits of their study should be taken into account, and economists should recommend ways for others to continue where they left off (Lu, et al., 2022).

For this article, both a survey study with more than 120 participants, and data analysis of published RMB usage data were analyzed and evaluated to determine the potential impact of the digital yuan on the multilateral currency swap agreements. The focus of the study is to investigate the effects of the currency swap agreements and its impact on the potential stimulation of Islamic finance services between the countries.

## **RESULT AND DISCUSSION**

While RMB usage is still relatively new globally, it has become a significant reference currency for several emerging countries and is increasingly utilized for cross-border transactions in particular areas. Since 2009, the PBC has allowed cross-border settlement in RMB, at first in a few regions and later all over the country. Despite a sluggish beginning, RMB usage has substantially increased lately. The evolution of RMB in cross-border payments, calculated as the RMB's percentage of all payments made by an economy to China, has significantly increased. When the currency is utilized in transactions where the issuing country is involved, this is frequently the initial stage of currency internationalization. The Swift messaging system, which handles the vast majority of international financial transactions, is the foundation for most of the payment data (Chey, Kim, & Lee, 2019).

The Swift dataset comprises cross-border transactions from most nations and regions and dates as far back as 2010 in terms of currency usage. In a sample of 125 economies, the median RMB usage climbed from 0% in 2014 to 20% in 2021, indicating that 50% of the economies in the study settle at least 20% of their transactions with China in RMB. The 75th percentile showed a sharp rise from 0 to 70% in 2021, showing that a quarter of the sample economies conducts most of its business with China in RMB. The 25th percentile RMB usage, however, has stayed relatively constant, showing that just a quarter of the sample economies utilize RMB in their trade with China.



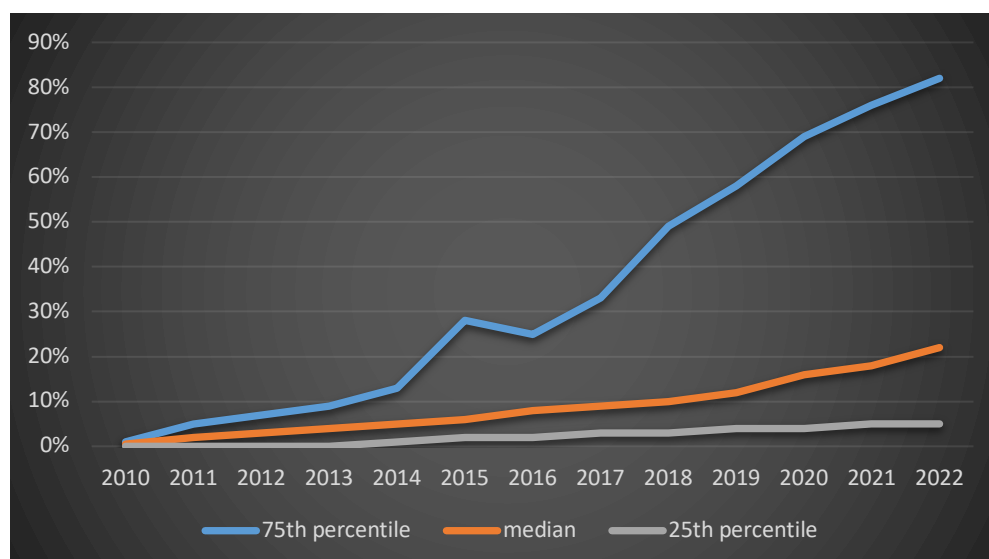


Figure 1. Evolution of RMB Cross-Border Payments (Source: IMF).

The availability of the RMB for international use is constrained because, notwithstanding recent liberalizations, China's capital account is still subject to strict controls. In light of this, the PBC has started steps in various parts of the world to make it easier for people to utilize RMB across international borders. These initiatives include the creation of bilateral swap lines with foreign central banks and the designation of offshore RMB clearing institutions.

PBC's trademark strategies for encouraging RMB internationalization include bilateral swap lines. Due to the restricted RMB liquidity abroad, swap lines were first developed to help with RMB settlement in international commerce. The first geographic reach focused on Asian neighbors before eventually extending to other emerging economies. Later, a few developed nations, such as the European Central Bank, Canada, and the United Kingdom, negotiated swap lines with the PBC, particularly to address possible concerns to financial stability. 38 bilateral swap lines totaling around 4 trillion RMB are expected to mature in 2022.

The swap lines are typically signed for three years, and they are frequently extended at maturity. The size of the exchange lines has grown over time in some areas in accordance with increasing commercial relations with China, particularly in Hong Kong Special Administrative Region (SAR), Singapore, and South Korea. The exchange line has a specific process and typically starts as follows. The foreign central bank can activate the swap line and ask the PBC to deposit RMB into its account when the need for RMB liquidity for trade or financial operations arises. The PBC can then lend the RMB to foreign financial institutions to cover RMB-related payments. The corresponding amount in local currency will also be deposited by the foreign central bank into the PBC account as security. The foreign central bank will return the RMB at the conclusion of the swap at an interest rate that has been predetermined (Kamel & Wang, 2019).

The RMB exchange lines have just recently begun to activate. Although the PBC does not frequently provide information on the utilization of the swap lines, data from 2015 shows that fewer than 1% of the 3 trillion RMB worth of outstanding swaps, or around 100 billion RMB, were used in that year. The Federal Reserve swap lines, in contrast, have been frequently utilized during crisis situations. This corresponds to a similar study that draws the conclusion that the bilateral swap lines have not been utilized regularly. This may indicate that the swap lines are only intended to be utilized in the event of a crisis to solve a shortfall of RMB liquidity.

Swap lines can lessen the perceived risk distribution of loan in a rising currency and increase its utilization. In order to provide a wider safety net, swap lines have an influence that goes beyond their primary use. In order to make RMB payments easier, the PBC has created offshore clearing banks in 25 economies in addition to bilateral swap lines. In Hong Kong SAR, the first offshore RMB clearing bank was founded in 2003. Since the global financial crisis, there are significantly more offshore clearing banks. Initial authorized clearing institutions are typically overseas subsidiaries of Chinese banks. The PBC has begun to give RMB clearing licenses to overseas banks from 2018. Such examples include JP Morgan in the United States and MUFG Bank in Japan. In order to cover the world's major time zones as of 2020, China constructed 27 offshore clearance banks in 25 different economies.

Establishing clearing banks is a critical first step in strengthening the financial foundation for cross-border RMB payments. Due to capital account constraints, international banks must clear and settle RMB transactions through a local correspondent bank in China. This hampers China's anti-money laundering operations and is usually time-consuming and expensive. With the creation of offshore clearing banks, foreign financial institutions may now settle RMB with a local clearing bank directly, substantially simplifying the procedure and allowing for similar operation hours, language, and legal systems. Furthermore, by allowing for the buildup of RMB liquidity, clearing banks also aids in the growth of the offshore RMB market.

The future role of offshore clearing banks may be diminished because to China's new cross-border payment system, CIPS (Cross-Border Interbank Payment System). Similar to CHIPS (Clearing House Interbank Payment System) in the US, China has created its own cross-border RMB payment infrastructure called CIPS. The first stage of CIPS was finished in 2015, and the second stage was finished in 2018. For RMB transactions, members in CIPS have direct access to China's domestic Large Payment Settlement System, in contrast to offshore clearing banks, which are only available to international financial institutions from certain countries. With 77 direct participants and 1283 indirect participants as of now, CIPS membership is still small. As CIPS

develops, it will probably play a bigger part in RMB settlement going future and lessen the benefit of offshore clearing institutions.

Central bank digital currencies (CBDCs), in accordance with the United States Federal Reserve, are a digital representation of a country's currency that utilizes an electronic record or digital token. CBDCs can be either retail, which is available to both people and businesses, or wholesale, which only applies to inter-bank transactions.

The PBC developed the e-CNY for four key reasons. The first goal of the e-CNY is to make digital currency available to the general population. It also aims to support fair competition, efficiency, and safety of retail payment services. Third, the e-CNY will make cross-border payments more effective. The fourth is that it ought to benefit financial inclusion.

The PBC claims that the e-CNY is the legacy yuan's digital equivalent. It has legal tender status, same as the legacy yuan. The e-CNY is a credit-based currency from a value perspective, an encrypted currency from a technical perspective, an algorithm-based currency when it comes to implementation, and a smart currency when it is applied in various scenarios.

The Digital Currency/Electronic Payment (DC/EP) project, which examined how the PRC would issue and circulate a potential CBDC, how this CBDC would work with both domestic and foreign businesses, and what technologies would make up its infrastructure, marked the start of the PRC's research into central bank digital currencies (CBDCs). The PBC started working on the e-CNY in 2017 and appointed Yao Qian as its director of the Digital Currency Research Institute.

The PBC declared in 2018 that it will centralize the e-CNY and use a two-tier distribution strategy. Its claimed objective was to replace current forms of currency. But it's crucial to remember that the PBC made it clear that e-CNY and physical RMB will be issued in parallel by the PBC. The PBC will continue to provide actual RMB as long as there is a need for it and will not replace it with an administrative order. In order to prevent over-issuance after the e-CNY's first release, Mu Changchun, then deputy governor of the Payment and Settlement Department of the PBC, said in 2019 that commercial banks would have to retain it at a 100% reserve ratio.

Mu further said that the e-CNY will be accepted throughout the nation as unlimited legal money and that the e-CNY's technological infrastructure would remain adaptable to allow it to meet changing market demands and new technology advancements. The governor of the PBC, Yi Gang, predicted that e-CNY will replace some of the PRC's current currency in circulation in 2019. Some components of the country's money supply, such as bank deposits and private payment systems, won't be impacted by this, though.

One of the most advanced CBDCs in the world, the PRC's e-CNY is ready for countrywide adoption. The main features for widespread adoption are accessibility, anonymity, and intermediation. Furthermore, settlement and remuneration are key parts.

In terms of accessibility, the question arises whether CBDC ownership is restricted to certain individuals or available to everybody. In terms of anonymity, the question is whether the CBDC provides the user with complete anonymity, quasi-anonymity, or is completely traceable. A quasi-anonymous CBDC permits anonymity with regard to some parties, but not others, such trade partners, middlemen, or central banks.

Direct systems enable the central bank to offer payment services to end users. The end-user services in synthetic systems are provided by intermediaries, but the CBDC is backed by central bank reserves, and the central bank manages wholesale payments between intermediaries. In hybrid systems, end users have a direct claim on the central bank, while payment services are handled by intermediaries. Settlement plays an essential role, and the transactions are recorded and settled via infrastructure, whether it be centralized or decentralized. Furthermore, the remuneration is another critical point. The CBDC's level of compensation, including whether it is interest-bearing, non-remunerative, or subject to tiers of compensation, such as interest dependent on the amount of the holding.

Additionally, validation in terms of whether the processing of the transaction relies on the reliability of an account, such as a traditional bank account or a digital payment account, or the reliability of a token, such as cash. Additionally, the e-CNY provides an all-inclusive access. There is currently no indication that any limitations will be placed on who is allowed to carry an e-CNY.

Peer-to-peer (P2P) transactions are semi-anonymous whereas e-CNY transactions are completely traceable for intermediaries and the PBC since only the traded tokens must be verified, not the counterparts' accounts. Furthermore, it is noteworthy that the PBC has publicly declared its commitment to data privacy: "e-CNY follows the idea of 'anonymity for little value and traceability for big value,' and pays considerable priority to preserving personal information and privacy... Unless specifically prohibited by laws and regulations, the e-CNY system gathers less transaction information than a standard electronic payment method and does not divulge data to other parties or other governmental organizations.

Internally, the PBC establishes a firewall for e-CNY-related data and strictly adheres to information security and privacy protocols, such as designating special staff to manage data, isolating e-CNY from other businesses, implementing a tiered authorization system, establishing checks and balances, and carrying out internal audits. Any inappropriate demands for or uses of information are forbidden.

Intermediaries are in charge of creating and managing end-users' digital wallets as well as issuing the e-CNY. Despite the fact that the e-CNY acts as a direct claim on the PBC, end users will mostly deal with middlemen. However, as of right now, the PBC is in charge of the ultimate clearance of transactions, and intermediaries are required to retain 100% of their reserves there. This system is a "two-tier operation, where the PBC is responsible for issuance and disposal, inter-institution connection, and wallet ecosystem management," according to the PBC. Under the centralized control of the PBC, other commercial banks and institutions are free to use their creativity while providing services for the circulation of e-CNY.

In particular, the authorized operators open various types of digital wallets for consumers under the quota control of the PBC based on the strength of customer personal information identification and offer e-CNY exchange services. Authorized operators and associated commercial institutions jointly offer e-CNY circulation services and retail management. This includes innovation in product design of payment products, development of new systems, expansion of additional scenarios. Furthermore, marketing, business processing, as well as operation and maintenance are important components in the interim to enable secure and effective operation. Additionally, because commercial banks are how most people access financial services, the two-tier approach may help e-CNY gain more public support.

The PBC manages the centralized-permissioned Distributed Ledger Technology (DLT), which produces a record of and clears all transactions. This platform powers the e-CNY. Systems of this type of technology, according to the Bank of International Settlements, draw ideas from decentralized cryptocurrencies but limit validation to a network of verified or authorized validators. This indicates that the government has complete access to transaction data and that, when it considers it necessary, it may cancel or reverse transactions.

When it comes to interest, then e-CNY does not pay interest in the current stage and represents primarily a transaction only currency. Furthermore, transactions are carried out by transferring tokens between digital wallets. Although transactions handle tokens, it is crucial to remember that digital wallets themselves have a connection to an account that the PBC can recognize.

The e-CNY uses a two-tier distribution mechanism. The PBC will issue and redeem the e-CNY to commercial banks and other approved organizations, such as Ant Group and Tencent, starting with the top tier. These accredited organizations will provide the e-CNY to the general public from the second layer. One significant distinction between the e-CNY and other conventional currencies is that the PBC retains the sole ability to clear transactions, whereas with more conventional fiat currencies, second-tier companies are in charge of fulfilling that function.

By leaving user interactions to commercial banks or other companies, this approach prevents the financial system from being disintermediated. It also lessens the central bank's obligations and risk exposure.

The PBC has also made a significant quantity of information on digital wallets public. First, each wallet has a unique set of "strengths" that determine the daily and per-transaction restrictions for transaction values as well as the maximum balance. Customers can access the most restricted wallets anonymously and then upgrade them after presenting valid identification. Second, users may modify wallets to provide features according to their requirements. Third, there appear to be three main dimensions for digital wallets:

Since the PRC recognizes the e-CNY as legal money, all private businesses there are required by law to accept it as payment, despite the fact that some may now refuse to take AliPay or WeChat Pay. e-CNY wallets may exchange money by employing phones as a hardware middleman. While current digital payment systems require an online connection, transactions with these wallets may happen offline if the two phones are physically close to one another and do not require a relationship with a bank account. Due to the fact that transactions now happen between two wallets rather than going via an internet banking system, partial anonymity is created.

Uncertainty exists over the specifics of how offline transactions will be received by the PBC. The PBC can still deactivate wallets and reverse transactions, though, because it has said that it will have access to all transaction data.

When evaluating the responses of the survey data, then there is generally a strong conviction that the e-CNY will act as a stimulus for the multilateral trade between the associated countries (Figure 2). More than 50 percent of the respondents strongly agree with that the e-CNY will support enhancing trading between China and the Islamic trading countries. This outlines the growing perceived impact of the e-CNY on encouraging trade and commerce between the countries, as well as enabling greater investment into China as well as these countries.



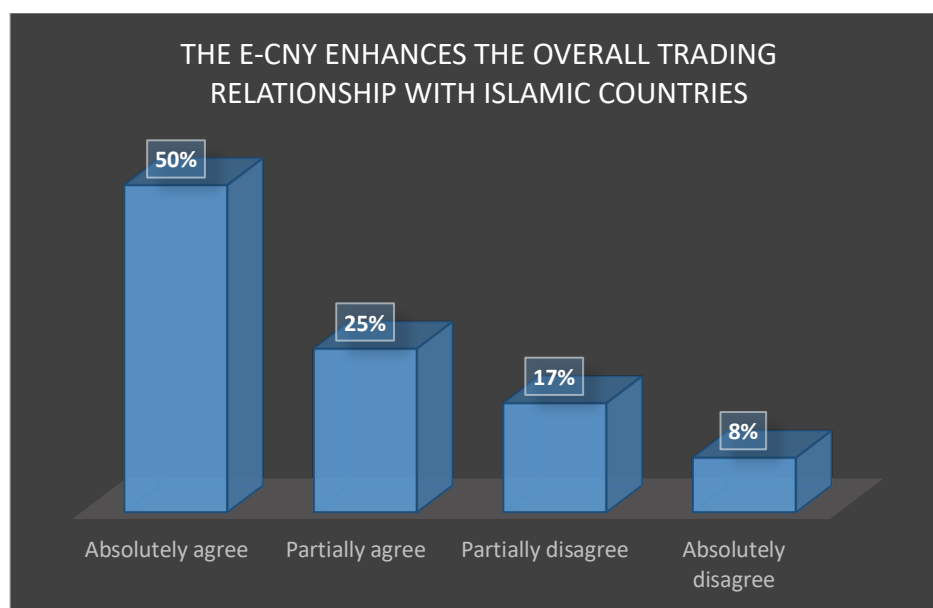


Figure 2. Representation of survey statistics regarding the viewpoint towards the e-CNY promoting trade.

Another important survey question and results are the preference of currency for multilateral currency swaps, outlining that the US Dollar and RMB are the majorly preferred currencies (Figure 3). The survey indicated this strong preference for the RMB usage and in particular the e-CNY.

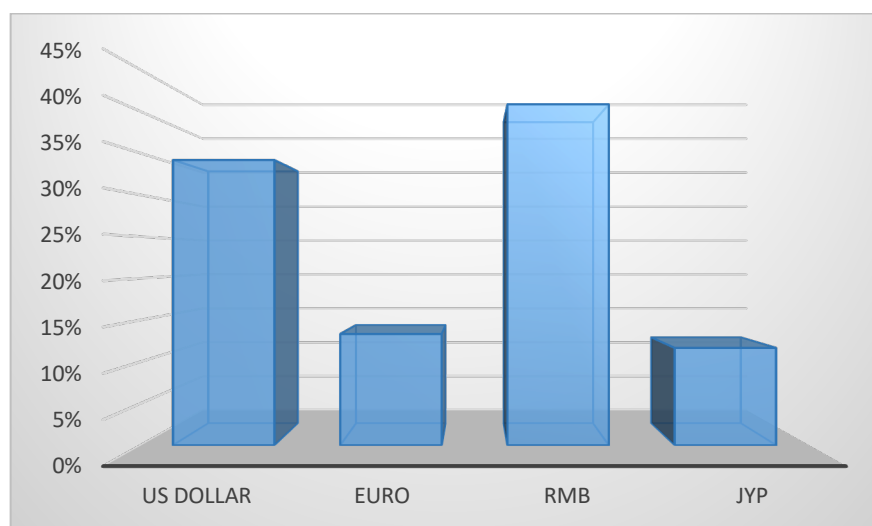


Figure 3. Currency preference for multilateral currency swaps with China and Islamic countries.

Another major question is which region will be most engaged in a multilateral currency swap agreement. As outlined in Figure 4, the Middle East and South Asia are expected by the participants to be the major multilateral currency swap regions and the main beneficiaries of the e-CNY.

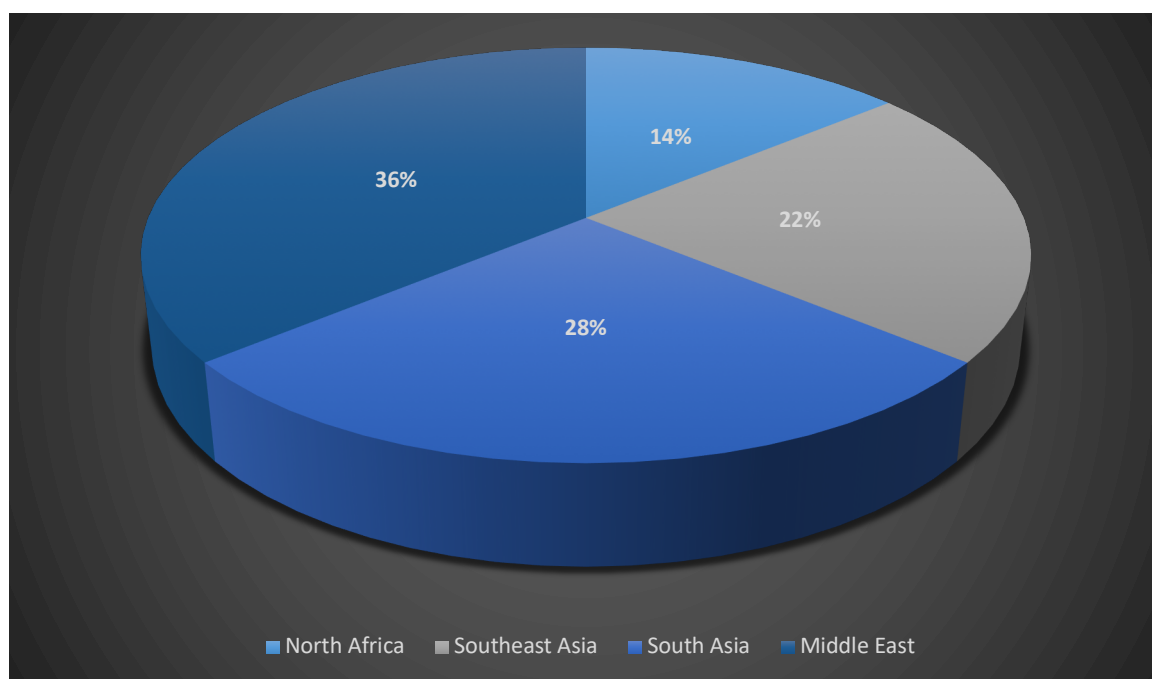


Figure 4. Most important multilateral currency swap Islamic regions with China. Each survey respondent was permitted to choose one region that they consider to have the biggest impact of the e-CNY on the multilateral currency swap agreements.

The new e-CNY represents significant opportunities for bilateral currency swaps with the Islamic world, representing to enhance bilateral trade via enabling more efficient international transactions and reducing overall transaction costs. Furthermore, the absence of interest and focus of the e-CNY on enabling transactions and being a medium of exchange only, represents a critical structure to support the Islamic compliant financing of bilateral trade and exchanges.

## CONCLUSION

China was once among the world's poorest countries, but during the past forty years, it has turned into an economic powerhouse. Bilateral exchange lines are one of PBC's patented methods of promoting RMB internationalization. Swap lines were initially created to assist with RMB settlement in international trade due to the limited RMB liquidity overseas. Prior to eventually expanding to other rising economies, the first geographic reach concentrated on Asian neighbors. Swap lines can boost a loan's usage and reduce the apparent risk distribution of a loan in a rising currency. Swap lines have an impact that extends beyond their core usage in order to create a larger safety net.

The PBC has established bilateral swap lines in addition to offshore clearing institutions in 25 markets to facilitate RMB payments. The e-CNY was created by the PBC for four main reasons. The general public's accessibility to digital money is the initial objective of the e-CNY. Additionally, it aspires to promote efficient, secure, and equitable retail payment systems. Third, the e-CNY will

improve the efficiency of international payments. The fourth is that financial inclusion should be benefited. The empirical analysis underlined the crucial hopes that the e-CNY may promote bilateral currency exchanges between Islamic nations and China and may serve as a big economic boost for those nations.

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