

Exploring Ideas and Discussions on Digital RMB¹

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Abstract: *China's approach to the digital yuan centers on enhancing retail payments to improve efficiency, backup payment systems, and promote inclusive finance. The digital renminbi operates within a two-tier structure, leveraging market institutions like commercial banks for increased effectiveness. The People's Bank of China oversees top-level design and regulatory standards, while the market handles services and resource allocation. The two-tier system preserves the existing money supply and circulation setup, along with the central bank's dual account pattern and creditor-debtor relationships. Specific protective measures, such as transaction limits and a non-interest charging mechanism, have been implemented under this framework.*

I. RELEVANT THEORY OF DIGITAL RMB

1. Background and necessity of R&D

Every change in the form of money in history has been driven by scientific and technological progress and economic development. In China, currencies were first discovered in the Spring and Autumn period (770-476 BC). At present, the main means of payment in China include mobile phone payment, cash, and bank cards. In addition, every form of currency has a corresponding wallet or carrier. How was a wallet made in ancient times? People strung money or made it in a cloth bag or leather bag. Now, e-wallets are much easier to carry and pay for. The development and

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promotion of the digital yuan are also driven by the development of the mobile Internet.

The first step is to identify the digital yuan in theory. The currency has three functions: price, pay, and store value. The renminbi is issued by the People's Bank of China on behalf of the state and has a pricing function. It is denominated in yuan. Currently, almost 7.2 yuan is equal to 1 US dollar. Such a unit of value is relatively modest; in the long run, it's a very stable price. Among the three functions, payment is the foundation of currency. Digital RMB focuses on payment, but the premise of payment is to have a price. For example, everything in our store has a price, and you can pay for it with other things, but it's not as convenient to pay for it with Bitcoin, gold, or other common equivalents as it is to pay for it in renminbi. Another function of currency is value storage, which is expected to be diluted during the discussion and development of digital RMB. If digital RMB becomes a major channel for storing value, this raises a host of other questions.

There are three main aspects of the digital renminbi's focus on payment. First, it can improve the efficiency of the money-issuing and central-bank payment systems. Second, it could provide backups and upgrades to existing electronic payment systems. Now, we have bank card payment, as well as Alipay, WeChat, and other payment platforms. As a universal payment tool, digital RMB can be circulated in all the above payment channels and provide better infrastructure and a better platform. Third, financial inclusion could be promoted to make financial services more accessible to some groups that are not currently served by the banking account system. For example, it can play an active role in serving people living in remote areas and low-income groups, the elderly and those with limited mobility, as well as foreigners who come to China for a short time.

2. Positioning and Principles

As the legal currency of China, like cash, digital RMB's value is based on real rights. The concept of real rights in law is who owns and who owns. One of the most popular terms in international discussion is the tokenized deposit. But tokens are tokens, and their value is based on real rights. But the deposit is the concept of a balance sheet.

The legal attributes of property and deposit vary widely in the process of payment and transaction. The value of real rights can be transferred directly, and the deposit, as a bank liability, must pass through the bank as a third party in the transfer process and can not be transferred directly. Therefore, the specific nature of the tokenized deposit and its implications remain to be further explored. But the nature of digital RMB is clear, that is, currency. Its value is based on real right, real right transfer while automatically realizing value transfer.

Another much-discussed issue is the positioning of digital money. Should it focus on retail payments or wholesale payments? Retail payments can directly serve residents and businesses, while wholesale payments are payments between banks and other financial institutions. A country's payment system by the central bank, under the unified payment system, can achieve the transfer between banks. Europe is now piloting wholesale digital money, focusing first on transfers and settlements between commercial banks, and the Fed's first step in considering digital money is also wholesale payments. China's Digital Yuan consideration focuses on retail payments. A focus on retail would provide the greatest improvement in the three areas just mentioned: increased efficiency, provision of backup of payment systems, and promotion of inclusive finance.

China is a leader in the development of digital currency. In the process of developing and promoting e-CNY, **we adhere to three principles, i.e., people-oriented, market-based, and rule-based.** First, the development will be people-oriented to serve the common people. Secondly, the development will be market-based through a two-tiered framework without disrupting the existing commercial banking landscape to let the market play the decisive role in allocating resources so that the entire e-CNY ecosystem is fully competitive. Third, the development will be rule-based and consider how to protect privacy, guarantee security, and comply with the law.

The Bank for International Settlements(BIS) has also put forward three principles for digital currencies. First, not harm, meaning the release of digital currency should not harm the existing infrastructure and currency issuance system. Second, Coexistence. Digital currency and existing banknotes and cash should co-exist. Third,

Innovation/Efficiency, which emphasizes innovation and efficiency. **The three principles of BIS are consistent with our three principles for e-CNY.**

In addition, **E-CNY also stresses the balance between personal privacy protection and anti-money laundering and counter-terrorist financing.** In terms of anonymity, e-CNY adopts controllable anonymity, meaning that a small amount of transactions is anonymous while a large amount is traceable by the law. The People's Bank of China divides the authorization of digital wallets into four levels. The 4th-level wallet with the lowest authorization is anonymous and can be set up with a cell phone number, which keeps the cell phone number and personal information confidential and does not need any other personal information. If a larger size of wallet is needed, some real-name information is required.

In practice, the People's Bank of China has to protect personal information and meanwhile report suspicious large transactions. The authorization of information is strictly hierarchical and managed internally. It is also important to control the risks of big data analysis and intelligent risk. All these factors need to be thoroughly taken care of, which is theoretically feasible with reasonable costs and good effects in practice.

3. Two-tier Operational Structure

Designing the operational system is the most debated issue in global discussions on digital currencies, and the main focus is whether to adopt a single-tier or two-tier system. In a single-tier system, the central bank issues digital currency directly to the public. **In a two-tier system, the model adopted for e-CNY, the motivation of commercial banks and other market institutions is maximized.** Instead of directly targeting households and enterprises, the PBC issues digital currency through commercial banks such as the Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank, and Bank of Communications, as well as China Mobile and payment platforms, such as Alipay and WeChat, which act as operators to directly serve customers.

Two-tier operation is conducive to fully utilizing the existing resources, talents, and technologies of commercial institutions and promoting innovation and competition through marketization. In terms of business resources, commercial banks and tech companies have more mature IT facilities and a large user base. In terms of human resources, commercial banks and tech companies also have a larger talent pool. The People's Bank of China mainly carries out top-level design and sets up legal norms and regulatory standards. After the top-level structure, legal norms, and regulatory requirements have been established, service provision should still be handed over to the market to enable the market to play a decisive role in allocating resources. The two-tier operation also helps to diversify risks. **The PBC does not preset technology paths and remains open so that different institutions can explore different paths and optimize the system through competition.**

Meanwhile, in terms of management mode, e-CNY sticks to the concept of centralized management. Why centralized management? Because the central bank's digital currency is the central bank's liability to the public, it must ensure and strengthen the central bank's macroprudential and monetary adjustment function, as well as maintain the original monetary policy transmission method. **In the two-tier operational structure, the first tier is centralized management**, meaning that the PBC must know how much cash has been issued and also how much digital currency has been issued. **The transfer and transaction activities among customers are in the second tier.** A large amount of customer information is stored in this tier, i.e., Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank, and Bank of Communications or WeChat, Alipay, etc., which are responsible for privacy protection, anti-money laundering, anti-terrorist financing, etc., and are required to report necessary information to the PBC. In this sense, the centralized management model of PBC and the two-tier operation model are realized.

4. Implications for monetary policy and financial system

A widely discussed concern in the discussion on digital currencies is the so-called financial disintermediation. In other words, the issuance of digital currency by the central bank may have a crowding-out effect on the deposits of commercial banks.

For example, when people are worried about a banking crisis, they may transfer their deposits directly into central bank digital currencies, which are direct liabilities of the central bank and are theoretically the safest. In a single-tier operation system, the central bank directly issues digital currency to the public, posing a greater risk of financial disintermediation and the central bank becoming the only player, which is an undesirable result.

The two-tier operation system can maintain the current system of currency issuance and circulation to the greatest extent possible without changing the dual account pattern (commercial banks open accounts at the central bank while ordinary people and enterprises open accounts at commercial banks) and without changing the debt-credit relationship of the currency in circulation. In addition, to further reduce the risk of financial disintermediation, under the framework of a two-tier operation, **the PBC has adopted some specific measures to safeguard it.** One is the cap on transaction volume; the other is the mechanism of charging as you go; and the third is the non-payment of interest on e-CNY. Moreover, China has a deposit insurance system that provides protection for insured deposits, which improves the safety of commercial bank deposits and also helps to reduce the risk of financial disintermediation.

The concept of the "Narrow bank" is pertinent here. The money multiplier effect hinges on the reserve banking. China's average legal reserve ratio, for instance, stands at 8%. When a bank receives 100 yuan in deposits, 8 yuan is reserved with the People's Bank of China. The fractional reserve banking system allows more credit money to be created from base money, which is the so-called money multiplier effect. Narrow banking necessitates a 100% reserve requirement, compelling commercial banks to maintain all customer deposits with the central bank. In this scenario, the money multiplier is 1, negating money creation.

In practice, China's centralized deposit approach for customer provisions among third-party payment institutions serves as a successful example of the Narrow bank model. Commencing in 2017, the PBOC began regulating customer provisions of payment institutions like Alipay and WeChat. The proportion of centralized deposits gradually increased, with 100% in the central bank by 2019. This approach guarantees

fund safety for payment institutions' customers, safeguarding people and businesses from potential operational failure or bankruptcy.

From an economic perspective, this constitutes a successful Narrow bank instance. As payment institutions' reserve fund scale is comparably minor within the broader monetary banking system, the centralized deposit approach exerts minimal influence on the money creation mechanism and multiplier effect. This success has garnered international affirmation from organizations and central banks globally.

In summary, e-CNY is the digital version of fiat currency issued by the PBOC and operated by authorized operators. It's based on broad accounts and is loosely coupled with bank accounts. The e-CNY is exchanged at a 1:1 ratio with RMB cash, and together, they form a fiat currency system. The e-CNY has intrinsic value with legal tender status, and it supports managed anonymity. The broad accounts system encompasses bank accounts and other tokenized account systems. With just an ID card and a cell phone, the individual and personal property or tokens can be identified, which forms an account system.

Furthermore, the e-CNY system is loosely coupled with bank accounts. The loosely coupled account linkage borrowed from IT enables the e-CNY to either rely on bank accounts or not. When it doesn't rely on a bank account, it's somewhat like a hard wallet or a prepaid card, where the wallet has nothing to do with the account and is loosely coupled with it. The e-CNY retains intrinsic value and legal tender status, and it must be settled upon payment and supports managed anonymity.

II. THE PRACTICAL IMPLEMENTATION OF THE E-CNY SYSTEM

Moving on to practical implementation, the People's Bank of China kicked off research in the field of digital fiat currency in 2014. The PBOC has launched e-CNY pilots in 17 provinces since 2019, which runs smoothly, generally speaking. As of March 2023, the total balance of e-CNY wallets in these pilot areas reached 8.67 billion yuan, with a cumulative transaction volume of 891.86 billion yuan and 750 million transactions, and 100 million personal wallets have been opened via the E-CNY app. Though the e-CNY wallet's balance is a fraction of the overall M0,

which exceeds 10 trillion, its faster circulation rate supports a significant transaction scale.

In terms of products, digital wallets follow a hierarchical management structure based on the strength of customer personal information identification. They can be divided into software and hardware wallets, depending on the carrier. A software wallet provides services through mobile payment apps and a software development kit (SDK). A hardware wallet is supported by an IC card, wearable objects, and the Internet of Things devices. There are also parent wallets and sub-wallets, depending on the authorization. The wallet holder can set the main wallet as the parent wallet and open several sub-wallets under it. **What's more, E-CNY is also applicable for powerless payment scenarios.**

Moreover, the e-CNY smart contract boasts significant capabilities, fostering connections between consumers (C), businesses (B), and the government (G). A functional link is established among these three sectors, enhancing service delivery. For example, the wage payment is connected to both the C end and the B end, and the government subsidy is connected to both the C end and the G end. In terms of scenario construction, the e-CNY optimizes government, customer, and business services. Additionally, **e-CNY promotes green, low-carbon lifestyles**, which can be attested by a series of successful PBOC initiatives.

On the cross-border front, the PBOC explores cross-border payment programs in line with the principle of “no detriment”, “compliance”, and “interconnectivity”. First, no detriment. There should be no disruption to other central bank’s currency sovereignty and their monetary policy independence. Second, compliance. Cross-border payment arrangements should comply with the regulations and laws of the jurisdictions concerned. Third, interconnectivity. The existing infrastructures can be fully tapped into with high interoperability.

The PBOC also pioneers cross-border operations and has joined the Multiple CBDC Bridge (m-CBDC Bridge) led by BIS, with partners like the Hong Kong Monetary Authority, Bank of Thailand, and the Central Bank of the United Arab Emirates. This project empowers cross-border payments utilizing central bank currencies, achieves

modularity, expandability, balance, and interoperability, and offers more convenient and effective services. This arrangement enables the interconnection of digital currencies between multilateral central banks: the central banks first put funds on the bridge on which transactions will be made from one country's digital currency to another. Once the transaction is done, the funds are brought off the bridge, and the digital currency will be converted into the currency that the customer needs.

At the same time, the POBC is also actively promoting bilateral cooperation in digital currency, such as collaboration with the Hong Kong Monetary Authority and so on. Established practices show that digital currencies can positively enhance the efficiency of cross-border payments and cut the cost of cross-border payments.