

Research on Digital Currency Electronic Payment and RMB Internationalization

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Abstract: *Against the backdrop of a wave of global digitalization, the introduction of a digital currency electronic payment in China brings new opportunities for the internationalization of RMB in response to challenges such as the US dollar-centric world hegemony, insignificant network externalities of RMB, and the relatively underdeveloped financial markets. This paper starts from the definition and characteristics of digital currency electronic payment in China, analyzing the mechanisms through which implementation of digital currency in China influences RMB internationalization. Specific research indicates that digital currency promotes RMB internationalization by enhancing network externalities of RMB, stabilizing its value, and fostering financial development. Based on these conclusions, the paper proposes relevant suggestions aimed at accelerating the process of RMB internationalization.*

Keywords: *digital currency electronic payment; RMB internationalization; central bank digital currency*

1. Introduction

To counter the immense risks posed by the US dollar-centric world hegemony to the stable operation of the international economy, RMB internationalization has been prioritized. Since China initiated pilot cross-border trade settlement in RMB in 2009, its internationalization has developed rapidly. In 2016, the IMF officially included the RMB in the SDR currency basket, marking a new development of RMB internationalization. Particularly since the COVID-19 pandemic in 2020, the widening interest rate differential between China and foreign countries has led to an increase in foreign securities capital inflows, and international monetary and financial cooperation has also strengthened, ushering RMB internationalization into a relatively faster development stage. The 20th National Congress of the Communist Party of China report proposes to advance the internationalization of the RMB in an orderly manner. From "steady and cautious advancement" to "orderly advancement," the internationalization of the RMB is entering a new stage of orderly development in terms of institutional design and action. According to the 2022 Report on RMB Internationalization, the RMB has surpassed the Japanese yen to become the fourth largest payment currency globally.

Overall, over the past decade, RMB internationalization has progressed significantly from scratch amidst fluctuations. However, as an emerging international currency, the internationalization level of RMB is still low compared to the US dollar and the euro. Under the current circumstances, there are still a series of internal and external constraints, including inadequate international currency functions, low foreign exchange reserve share, limited openness of financial markets, inconvenient investment and trade, the dollar hegemony, and insufficient usage of the RMB in markets. There is still a long way to go for the RMB to become a significant international currency.

Against the backdrop of the new global digital economy development and continuous financial technological advancements, the introduction of legal digital currencies by central banks worldwide represents a general trend. Legal digital currencies can bring new opportunities for the internationalization of the RMB. The People's Bank of China established a professional team to research digital currencies in 2014, and in January 2018, China successfully piloted a digital ticket trading platform, marking China's leading position in the research of legal digital currencies globally. By the end of 2019, The People's Bank of China promoted the pilot use of digital RMB in various regions. In December 2020, the Hong Kong Monetary Authority announced that it was studying technical tests with the Digital Currency Research Institute of the PBoC to use digital RMB for cross-border payments. The digital currency issued by The People's Bank of China can not only meet

the daily retail and payment needs of consumers and merchants, reducing the cost of retail and payment throughout society and enhancing payment efficiency, but also effectively address the defects of traditional cross-border payments, helping to alleviate the dilemma of the inability of the RMB to convert or being dominated by the US dollar.

Under the current international situation, China's foreign trade and investment face various restrictions and pressures, and the cross-border flow of the RMB has been significantly impacted. We must attach great importance to the impact of legal digital currencies on the internationalization of the RMB and seize the opportunities presented by digital currencies to achieve new breakthroughs in the internationalization of the RMB.

2. Literature Review

Chinn and Frankel(2006) defined international currencies from the perspective of currency functions and compiled a list of international currency functions^[1]. They believed that an international currency can provide value storage, transaction medium, and unit of account functions for residents or non-residents. This international currency can be used not only for currency substitution, investment valuation, and trade and financial transactions for private use, but also as a carrier currency for official reserves, foreign exchange intervention, and an anchor currency for pegged exchange rates. Haihong Gao and Yongding Yu(2010) defined the meaning of RMB internationalization based on the theoretical framework of the above functions, arguing that RMB internationalization is not only about the scope of RMB's use in the international or regional context, but more importantly about the ability of RMB to serve as an international reserve currency^[2].

Since China launched the pilot program of cross-border trade settlement in RMB in 2009, the internationalization of RMB has developed rapidly. However, Chen and Hu(2013) compiled an RMB internationalization index from six aspects such as international trade settlement, and the results showed that the degree of RMB internationalization is still very low^[3]. Xiaonan ji (2021) summarized that under the current complex international situation, the internationalization of the RMB faces many challenges from both internal and external factors, mainly including the persistence of the world hegemony system of the US dollar, the lack of significant network externalities of the RMB, and the imperfection of China's financial market^[4].

In the context of the global digitalization wave and the continuous development of China's digital technology, Yu Shao and Dafei Chen first proposed in 2019 that digital yuan may be a feasible way to promote the internationalization of the RMB^[5]. Xing Xie and Sixian Feng(2019) also pointed out that the first launch of the digital RMB will help China seize the preemptive right to reshape the current international monetary system, attract relevant international market players with strong national credit and low transaction costs, and expand the international use of the RMB^[6]. Jianyun Bao(2020) believes that Central bank digital currencies can become a means of international trade, transnational capital flow, payment and settlement^[7]. The issuance, circulation and internationalization of sovereign digital currencies represented by digital RMB are conducive to making up for the defects and deficiencies of the international monetary system dominated by a few Western currencies represented by the US dollar, and promoting the construction and improvement of a fair, just and efficient new international monetary system. The research of Sixian Feng and Yuqi Zhang in 2022 shows that the digital currency electronic payment being piloted in China has a promoting effect on the internationalization of the RMB^[8]. Ling Liu et al.(2022) proposed using digital technology to solve the problems and challenges encountered in cross-border transactions, cross-border investment and financing, mechanisms, and technical infrastructure in the process of RMB internationalization, and systematically summarized the application scenarios where digital RMB and digital technologies represented by artificial intelligence, blockchain, cloud computing, and big data can help RMB internationalization^[9]. The above studies all indicate that the legal digital currency can to some extent cope with the challenges faced by the internationalization of the RMB under the new situation.

There are two main types of research on RMB internationalization in China: One is the factors that affect the internationalization of the RMB. Second is that the path selection for promoting the internationalization of RMB. Research on the impact of digital currency electronic payment on the internationalization of the RMB is relatively short, with a small number of literature. The role of digital RMB in promoting the internationalization of the RMB needs to be improved and explored. This article will specifically analyze the promotion channels and impact mechanisms of legal digital currency on the internationalization of the RMB.

3. The Definition and Characteristics of Digital Currency Electronic Payment

3.1. Basic Definition

Digital currency electronic payment is also called central digital currency. It is a sovereign currency issued by a central bank of a country with the help of modern digital technology. As China's legal digital currency, the digital yuan is a legal tender issued by the People's Bank of China, operated by designated operators, endorsed by the national credit, and has the ability to pay legal debts. The digital yuan is based on a generalized account system, supports the loosely coupled function of bank accounts, and is equivalent to paper money and coins. It is a controllable and anonymous payment tool.

3.2. Characteristics

Compared with traditional digital currency, digital currency electronic payment is a legal tender currency issued by the central bank, which has the same status as sovereign currency. Its credit foundation is the credit of the country. Therefore, in terms of circulation scope, it can not only circulate freely in the country, but also be accepted without barriers in international trade. In addition, the legal and paid nature of the legal digital currency determines that its currency value is relatively stable and will not fluctuate violently in the short term due to the impact of market factors.

Current digital currency electronic payment in China, the digital RMB, is based on a generalized account system and supports the loosely coupled function of bank accounts, which means that digital yuan can be used without a bank account. This provides convenient digital currency services for those who cannot or are not convenient to hold bank accounts, such as those with weak financial infrastructure, remote areas, or overseas visitors to China, so as to achieve inclusive finance.

Digital RMB adopts a centralized management and a two-tier operation model. The right to issue digital RMB belongs to country, and the People's Bank of China is in a central position in the digital RMB operation system, responsible for issuing digital RMB to commercial banks as designated operators and managing it throughout its life cycle. Designated operators and related commercial institutions are responsible for providing digital RMB exchange and circulation services to the public.

Digital currency electronic payment combines controllability and anonymity organically. Traditional digital currencies such as Bitcoin and Ethereum are private currencies, and the profit-seeking mentality of their holders can easily place private interests above collective interests. Moreover, these traditional digital currencies have complete anonymity, which facilitates the occurrence of criminal activities, especially transnational crimes, in the process of payment and settlement. Digital currency electronic payment combines controllability and anonymity, protecting the privacy of users during the transaction process, while the issuing institution can track user transaction information and supervise their behavior.

The digital RMB is a kind of retail-oriented digital currency issued by central bank, mainly used to meet domestic retail payment needs, supplement or replace cash in circulation (M_0), and does not pay interest. Digital currency electronic payment can be divided into two categories based on users and uses. One is wholesale central bank digital currencies, which are mainly issued to institutional entities such as commercial banks and are mostly used for large-value settlements; The other is retail central bank digital currency, which is issued to the public and used for daily transactions. The key points of research and development of central bank digital currency in major countries or economies are different, some focus on wholesale transactions, and some focus on improving the efficiency of retail systems. The digital yuan is a retail-oriented central bank digital currency issued to the public. Its launch will be based on the modernization of domestic payment systems, fully meet the daily payment needs of the public, further improve the efficiency of retail payment systems, and reduce the retail payment costs of the whole society.

4. Mechanism of How Digital Currency Electronic Payment Influence RMB Internationalization

At present, the internationalization level of RMB is still very low, and there are still a series of internal and external factors that restrict the internationalization of RMB under the current situation. However, the legal digital currency has the characteristics of stable currency value, centralized issuance management, support for bank account loosely coupled functions, controllable anonymity, and can to some extent cope with the challenges faced by the internationalization of RMB under the new situation.

4.1. Improve the Externality of RMB

From the perspective of cost, international currencies have network externalities due to extremely high conversion costs and information costs^[10]. The use value of an international currency is directly proportional to its size. The more people hold a certain currency, the more it can reduce costs and improve utility as a whole. Yanjun Bi and Xiaolu Li(2020) pointed out that the network externalities of the US dollar constitute an invisible barrier, making it difficult for other world currencies to enter the monetary power center^[11]. Network externalities have become a key factor in promoting the internationalization of a country's currency^[12].

Digital currency electronic payment can effectively alleviate network externalities. Firstly, although the cost of early research on digital RMB is high, once it is issued, there is no need for too much cost in the later stage. The People's Bank of China does not charge designated operators for exchange and circulation services, and designated operators do not charge individual customers for digital RMB exchange and return services. There is also an economies of scale effect, as the number of issuances increases, the issuance cost of digital RMB is lower compared to traditional digital currencies.

Modern technologies such as blockchain technology and cloud computing provide hardware foundation and digital technology guarantee for the circulation of digital RMB in the international market and the expansion of mobile payment overseas, improving the circulation efficiency of RMB and reducing the cost of use. Under the conditions permitted by law, the central bank can track user transaction information through the digital yuan back-end system, so as to more transparently and safely supervise illegal transactions and achieve the security and stability of national finance. This is an advantage of digital yuan compared to other sovereign currencies, which can attract more traditional trade entities to use digital RMB.

Furthermore, digital RMB can help to build a safe and convenient cross-border payment and settlement system, which not only has the advantages of high efficiency, low cost, and no time and distance restrictions, but also can protect both parties of trade from economic surveillance to a certain extent, providing a relatively independent and efficient channel for international settlement. At present, the international system commonly used is the SWIFT international settlement system controlled by the United States, which has slow clearing speed and expensive transaction fees. The digital yuan can provide a faster and cheaper alternative to SWIFT. The digital yuan can not only improve the clearing speed through modern information technology, but also significantly reduce the clearing cost, which will encourage more and more market entities to switch from using US dollars to using RMB, thereby greatly expanding the circulation scale of yuan and improving the network externality of RMB.

Lastly, China's ongoing efforts in opening up, such as the reform of domestic free trade zones and international energy cooperation, can also facilitate the internationalization of the RMB. Specifically, by adopting the RMB as the settlement currency for major transactions, it will help further expand the demand for the RMB among foreign entities for trade or investment, thereby enhancing the level of internationalization of the RMB.

4.2. Stabilize the Value of RMB

From the internationalization experience and lessons of currencies such as the pound, dollar, yen, and euro, it can be seen that the key to the success of currency internationalization is the stability of value under the premise of the healthy development of the real economy. Only in this way can the international community's expectations be stabilized, and it will help countries accept the currency as an international payment, settlement, investment, and reserve currency.

Firstly, the emergence of legal digital currency can inhibit the increase in the money supply, achieve the goal of reducing domestic prices and maintaining the stability of the RMB value. Specifically, the legal digital currency has the characteristics of convenience and security, so it will replace most bank current deposits, affect the quantity of high-energy currency, and thus reduce the total money supply. According to the Fisher equation, the money supply has a decisive impact on prices. When the amount of money in circulation decreases, prices will fall, which helps to curb inflation and achieve the goal of stabilizing the value of the RMB.

Secondly, each fund in the form of legal digital currency has a unique code and can be traced. The central bank can implement more transparent supervision on transactions, which can not only grasp the circulation quantity, circulation speed and circulation structure of RMB in real time, but also develop

an early warning system for RMB exchange rate risk based on these data, and formulate response plans in advance to address factors affecting the stability of RMB value.

Finally, China's current legal digital currency, the digital RMB, is based on a generalized account system and supports the loosely coupled function of bank accounts. This facilitates the use of the RMB for payment and settlement by overseas market entities, making the RMB more liquid internationally and minimizing the possibility of exchange rate crises. According to the theory of purchasing power parity, the stability of the value of the RMB is conducive to reducing the exchange rate fluctuation risk of RMB holders and increasing their returns on RMB holdings in the long run.

4.3. Promote Financial Development

One of the important conditions for currency internationalization is that the domestic financial market has a certain depth, liquidity and breadth, which is conducive to discovering the price of funds and the free flow of capital. The dollar has become a dominant international reserve currency because the United States has an open, liquid and mature financial market. However, the development of China's financial market is not mature enough, the degree of openness is not enough, and the level of internationalization is low. The emergence of digital yuan will provide new impetus for China's financial development.

Firstly, digital currency electronic payment assigns a unique code to the currency, which can accurately trace important information such as the flow of currency transactions. On the one hand, it helps the People's Bank of China to improve the domestic credit structure, effectively supervise domestic excessive speculation or illegal investment, and prevent financial market risks; On the other hand, from the perspective of previous international financial crises, driven by profit-seeking capital, global financial openness and financial security cannot be reasonably balanced. The strong detection capabilities of the digital currency system can not only effectively prevent money laundering and other criminal activities, but also help countries to jointly strengthen cross-border capital flow management, promote international capital flows, and enhance the international community's trust and acceptance of the RMB.

Secondly, the digital currency electronic payment supports peer-to-peer payments, and digital RMB can be used without a bank account, which reduces the importance of bank clearing and payment systems, helps promote bank innovation, and drives the development of China's financial market.

Finally, the convenience of digital currency will make users constantly switch between current deposits and digital currency. In order to ensure security, banks will increase excess reserves and reduce the amount of lending, which will affect the profitability of banks. This will prompt banks to carry out financial innovation to cope with the impact of digital currency. As a result, China's financial market will become more complete and efficient, attracting more foreign investors to purchase Chinese financial products, improving the acceptance of the RMB in the international market, and promoting the internationalization process of the RMB.

5. Conclusions

The digital currency electronic payment is the product of the integration of paper currency and electronic payment, which combines the peer-to-peer value transfer of paper currency and the timeless circulation advantages of electronic payment, and has the potential to become a high-quality international currency symbol. The emergence of digital currency electronic payment is to meet the needs of the development of the times, and will surely drive the development of the digital economy and the RMB internationalization. Digital currency electronic payment has the characteristics of legal tender currency, stable currency value, the ability to use without a bank account, centralized management, dual-layer operation mode, controllable anonymity, complementary or alternative to cash in circulation, and no interest payment.

To sum up, this study found that digital currency electronic payment has a promoting effect on RMB internationalization, which is manifested in the following three aspects: First, by reducing the cost of use for holders and increasing returns, it can expand the scale of RMB circulation, thereby enhancing the network externalities of the RMB and promoting its internationalization; Second, it can maintain the stability of the RMB value, reduce the risk of exchange rate fluctuations, and promote the internationalization of the RMB; Third, by stimulating bank innovation, it provides new impetus for China's financial development, helps to form a financial market with certain depth, breadth and

liquidity, attracts more foreign investors to purchase Chinese financial products, improves the acceptance of RMB in the international market, and promotes the internationalization process of the RMB.

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