ISSN 2616-5902 Vol. 5, Issue 26: 179-183, DOI: 10.25236/AJBM.2023.052627

Central Bank Digital Currency and Commercial Bank Soundness

Ying Li[1,*]

[1]*Department of Finance, Nanjing Normal University, Nanjing, 210033, China*
[*]*Corresponding author: 2516836505@qq.com*

Abstract: *This paper mainly studies the possible impact on the operational soundness of commercial banks after the issuance of central bank digital currency in China. Through the analysis of the design characteristics and operation mode of domestic central bank digital currency, it is found that after the issuance of central bank digital currency, it affects the sound operation of commercial banks by affecting their credit rationing, liquidity maturity mismatch and balance sheet structure respectively. In the short term, the issuance of central bank digital currency may have a negative impact on the soundness of commercial banks, while in the long run, it can increase the soundness of commercial banks.*

Keywords: *Central bank digital currency, Commercial bank soundness, Credit rationing, Liquidity maturity mismatch*

1. Introduction

In recent years, with the rise and development of private digital currencies such as Bitcoin, Libra, and even super-sovereign currencies, the monetary and payment systems are facing unprecedented challenges; coupled with the continued rise in the level of global e-payments since the outbreak of the New Crown Epidemic, the advancement of central bank digital currency (CBDC) is imminent. According to the Bank for International Settlements (BIS) of the world's 81 central banks to the central bank digital currency work involved in the survey, 90% of the monetary authorities are on the central bank digital currency research, more than 50% of the central bank is in the research and development or pilot, which more than 70% of the central bank engaged in the central bank digital currency R & D Central banks working on central bank digital currencies are considering two-tier operations, leaving the retail business to commercial banks; and in China's white paper released by the People's Bank of China in 2021, it is also clearly stated that the digital RMB will adopt a two-tier operational structure, which will not only change the existing currency and payment system, but will also certainly bring a series of impacts to the banking system.

China's research layout for the legal digital currency has begun since 2014; from 2016 to 2020, it will promote the pilot program in batches one after another; in 2021, through the relevant white paper, it formally announced for the first time to the outside world the design idea of China's digital RMB, the operation system, etc.; in 2022, China's legal digital currency announced the third batch of pilot cities, and up to now, the pilot area has been expanded to 15 23 areas in 15 provinces and cities.

The research and development of China's legal tender is in full swing, and at the same time, the changes and uncertainties it brings have been attracting the attention of the academic community. Undoubtedly, the issuance of legal tender will increase the speed of currency circulation and transaction efficiency, reduce currency leakage and consumption, and reduce the regulatory cost, transaction cost and operating cost of banks, which may have a positive impact on currency payment and the banking system; however, it is undeniable that the issuance of legal tender may also lead to a reduction in public demand for cash and demand deposits, causing the asset structure of commercial banks to be reshaped and perhaps bringing some impact on the traditional business of commercial banks, affecting the asset structure of commercial banks.

ISSN 2616-5902 Vol. 5, Issue 26: 179-183, DOI: 10.25236/AJBM.2023.052627

2. Mechanisms for the operation of central bank digital currencies

2.1. Classification of central bank digital currencies

Central bank digital currencies currencies can be categorized into retail-type central bank digital currencies currencies and wholesale-type central bank digital currencies currencies, depending on the subject of the transaction. Retail-type central bank digital currencies can be regarded as a substitute currency for physical cash and third-party electronic money, and is mainly used to satisfy the public's daily payment behavior, with a broader scope of application. On the other hand, wholesale central bank digital currencies is not open to the public, and is oriented towards commercial banks and other institutional entities, and is only used for large-value settlements and clearances between banks and financial institutions. What China has chosen to develop and pilot is a retail-type digital currency, which is mainly used to meet domestic daily retail payment needs. The aim is to promote the modernization and updating of the domestic payment system more quickly, fully enhance the public's payment efficiency and reduce payment costs.

2.2. Technical means of central bank digital currencies

There are three types of data storage architectures for central bank digital currencies: public chains based on blockchain technology, permissioned chains, and fully centralized databases. The public chain is completely decentralized, not controlled by the central bank, outside of regulation, has high operating costs, is irrecoverable after suffering a loss, and is the means of storage currently used by many private cryptocurrencies. Licensed chains are subject to public oversight, and to some extent can achieve security, verifiability, and privacy guarantees, and can be compensated through the central bank after suffering losses. Overall, it seems that permissioned chains are more advantageous compared to public chains, however, the reality is that the performance of distributed ledger technology is still deficient and scalable, which is why several central banks, including the Bank of England, have expressed their opposition to digital currencies that use distributed ledger technology. Currently, China adopts a hybrid technology architecture that integrates and develops centralized and distributed architectures.

The existence of fiat digital currencies can take the form of "account-based" and "value-based", with account-based fiat digital currencies associating the currency itself with the user's identity, and requiring a physical account to be opened in the event of a transaction, while value-based fiat currencies do not need to be tied to a user's account and, like cash, can be used in a way that satisfies the need for "offline" and "anonymity". There are advantages and disadvantages to both. The account-based central bank digital currencies is more capable of helping the central bank to monitor every transaction in real time, thus achieving anti-money laundering and anti-fraud protection and reducing tax evasion and leakage, but it may reduce the motivation of the users; while the value-based central bank digital currencies is easier to promote and be accepted. Currently, China has adopted three forms of existence: "account-based", "quasi-account-based" and "value-based".

2.3. Scenarios for the use of central bank digital currencies

Academics' current consideration of research scenarios for central bank digital currencies generally starts from three scenarios, cash-like central bank digital currencies, deposit-like central bank digital currencies, and both. There are differences in the impact of different usage scenarios on the banking system as well as money creation[1], for example, Xie Xing et al. (2020) point out that a legal digital currency that replaces cash will only have an impact on the real money balance[2], Shi Jianxun et al. (2022) find that a legal digital currency that replaces cash will weaken the demand for money, and a legal digital currency that replaces deposits will have a more far-reaching impact on the macroeconomy[3]. Williamson found through the establishment of a bank panic model that cashlike fiat digital currency will cause bank panic, but will bring higher social and economic welfare[4][5]. Meanwhile, whether or not to charge interest is also a hotspot of concern and discussion for many scholars, and most views believe that interest-bearing central bank digital currencies may lead to bank disintermediation, triggering financial system shocks, while providing a possibility for the realization of negative interest rate policy.

2.4. Payment functions of central bank digital currencies

China's legal digital currency adheres to the M0 positioning, minimizes the crowding-out effect on bank deposits, avoids arbitrage and pro-cyclical effects through non-interest-bearing methods, and at the

ISSN 2616-5902 Vol. 5, Issue 26: 179-183, DOI: 10.25236/AJBM.2023.052627

same time adopts a hierarchical and classified design of the wallet, setting the upper limit of the transaction amount and the balance through the principle of "anonymity for small amounts, and legally traceability for large amounts". The positioning of M0 and the design of non-interest-bearing are conducive to the realization of optimal social welfare, and the characteristic of "controllable anonymity" can effectively realize the ability to control the use of the special funds, which can provide sensitive help for the supervision of informal financial activities. At the same time, the programmability of central bank digital currencies can shorten the time lag of fiscal policy, which is conducive to the transmission of fiscal and monetary policy.

3. The Path of Central bank digital currency Affecting the Soundness of Commercial Banks

3.1. Path analysis through bank credit rationing

The central bank digital currencies issued in China is now a non-interest-paying digital currency positioned at M0, and in the short term, because of the low-cost, high-efficiency, convenient and quick characteristics of central bank digital currencies as compared with deposits, after its issuance, people may be inclined to exchange their account deposits for central bank digital currencies to be held, resulting in the crowding out of deposits by commercial banks. The decline in the number of deposits of commercial banks means a decrease in their loanable funds, and bank deposits are the main source of credit supply for commercial banks, thus causing a decrease in the scale of credit rationing for commercial banks; in this case, commercial banks must expand the scale of deposits by increasing deposit interest rates, which in turn leads to an increase in the cost of financing for commercial banks; loan proceeds are the main source of income for most traditional commercial banks, and the scale of credit rationing decreases, resulting in a decrease in the scale of credit rationing for commercial banks. The decrease in the scale of credit rationing and the increase in the cost of financing for commercial banks will lead to a decrease in the profitability of commercial banks, which is not conducive to the soundness of commercial bank operations.

In the long term, the exchange ratio of central bank digital currencies and bank deposits and cash tends to stabilize, and the deposit substitution effect gradually disappears. At this time, considering the controllable and anonymous characteristics of China's central bank digital currencies, and under the condition that "large amounts can be traced according to the law", the popularization of the use of the digital RMB has helped commercial banks to establish dynamic "enterprise credit information base". Under the condition of "large-value legal traceability", the popularization and use of digital RMB helps commercial banks to establish a dynamic "enterprise credit information base", which reduces the information asymmetry between the credit parties and lowers the cost of supervision by commercial banks; the adverse selection and moral hazard faced by commercial banks can also be circumvented, which further improves the efficiency of commercial banks' credit rationing and the quality of their loans, which is conducive to the reduction of their risk-taking and the enhancement of their soundness. Soundness.

3.2. Path analysis through bank liquidity maturity mismatch

This further lengthens the average loan maturity of banks' assets and builds up risks, exacerbating the problem of liquidity maturity mismatch in commercial banks and increasing their risk-taking, which is not conducive to the soundness of their operations.

Considering from another perspective, the advantages of central bank digital currencies's low-cost nature and convenience are mainly compared to demand account deposits, so the deposit squeeze out of central bank digital currencies on commercial banks is mainly manifested in the squeeze out of demand deposits, and in the long run, the changes in demand deposit accounts of commercial banks caused by central bank digital currencies actually optimize the structure of commercial banks' deposit accounts, filtering out long-term deposits for the banks. deposit accounts, which is further reflected on the liability side of banks in the lengthening of the average maturity of deposits, and the lengthening of the maturity of deposits on the liability side helps to alleviate the liquidity maturity mismatch of banks and reduces the risk-taking of banks, and therefore contributes to the soundness of commercial banks.

3.3. Path analysis by regulating the balance sheet structure of commercial banks

In China, the "hidden debt" problem of local governments borrowing through state-owned enterprises

ISSN 2616-5902 Vol. 5, Issue 26: 179-183, DOI: 10.25236/AJBM.2023.052627

has always existed, and local financing platforms are involved in financial projects such as infrastructure construction, expanding the capital chain to local state-owned enterprises and even private enterprises in the form of credit guarantees and capital injections, which has greatly increased the "hidden debt" problem faced by commercial banks due to the debt burden brought by off-balance-sheet entities such as local government financing platforms and local state-owned enterprises. This kind of debt burden brought by off-balance-sheet entities such as local government financing platforms and local state-owned enterprises greatly increases the "hidden debt" problem faced by commercial banks, and transfers the risk from government departments directly to local state-owned enterprises and ultimately to commercial banks, which will have a negative impact on the quality of bank assets once it develops into non-performing loans. At the same time, China has also been the financing difficulties of small and medium-sized enterprises (SMEs), although supporting the development of SMEs has always been an important goal of financial inclusion, due to the high cost of supervision and high risk of commercial banks, the lack of scale effect and other issues, it has been deterred by small and medium-sized enterprises, and as a result, the shadow banking problem has been endless. Legalized digital currencies may provide new ideas for solving these problems.

First, consider the programmability characteristics of the central bank digital currencies digital currency issued by China. The digital RMB can be programmable by loading smart contracts that do not affect the function of the currency, and under the conditions of security and compliance. Considering the direction of the flow of currency issuance, the central bank can realize the precise investment of funds to small and medium-sized micro-enterprises, as well as local governments and state-owned enterprises by means of the digital RMB through the implementation of the programming of smart contracts for the digital RMB issued to the commercial banks and the setting of triggering conditions of the digital RMB, so as to "manifest" the "hidden debts" of commercial banks and "internalize" off-balance-sheet assets. The "hidden debt" of commercial banks will be made "visible", and off-balance sheet assets will be "on-balance sheet", thus achieving the effect of optimizing and reshaping the asset structure of commercial banks; in the long run, the controlled and anonymous characteristics of digital RMB will make it possible to optimize the asset structure of commercial banks, and in the long run, the digital RMB will be able to provide the best service. In the long run, the controllable and anonymous characteristics of RMB help commercial banks to understand the flow and use of funds after financing, grasp the business risks and credit of enterprises, effectively reduce the information barriers between commercial banks and small and micro-enterprises, reduce the moral risks faced by commercial banks, and greatly reduce the cost of supervision of commercial banks, so it is more conducive to alleviating the financing constraints of small and micro-enterprises and realizing financial inclusion. Overall, the "explicit" transformation of "hidden debt" and the internalization of off-balance-sheet assets of commercial banks can help standardize the balance sheet structure of commercial banks, help commercial banks realize asset remodeling, thus reducing the risk bearing of commercial banks and enhancing their soundness.

4. Prospects for Commercial Banks' Application of Central bank digital currency

The issuance of central bank digital currency has completely disrupted the existing payment pattern, and at the same time caused great uncertainty to the sound operation of the banking system. Based on the above analysis, central bank digital currencies is likely to have a certain negative impact on the sound operation of commercial banks in the short term, but in the long term, it will enhance the soundness of the overall operation and management of commercial banks. We must actively explore the impact of central bank digital currencies under the principle of prudence and caution, and promote the work of central bank digital currencies in a phased and extended manner from the pilot stage in order to cope with the impact of central bank digital currencies.

5. Conclusions

First of all, commercial banks should conduct further research based on the design framework of China's central bank digital currencies and the characteristics of their own systems. Although there are many existing researches, due to the different social background and economic system of each country, the real guiding effect of its work on China's central bank digital currencies may be greatly reduced, in this context, based on the actual analysis of China's central bank digital currencies on its own banking system may have an important significance for the real society, and for the development of the bank itself also has a very important role.

It has cooperated with third-party platform companies and financial technology companies to utilize

ISSN 2616-5902 Vol. 5, Issue 26: 179-183, DOI: 10.25236/AJBM.2023.052627

the technological advantages brought about by legal digital currencies to realize the diversion of SME customers, and has made joint efforts to strengthen the research and development of digital technology. It will also fully explore and publicize the value of central bank digital currencies for MSMEs, such as reducing financial costs, saving manpower and improving efficiency through automatic reconciliation and cancellation of accounts.

Commercial banks should make every effort to develop new application scenarios for legal digital currencies, including comprehensive exploration of public and private scenarios, such as transportation and travel, governmental convenience, payment of provident funds, enterprise and governmental payroll, social medical care, premium payment, personal credit issuance, and prepaid, credit-type business development, such as inclusive loans for small and micro-enterprises.

Commercial banks should continue to increase investment in research and development in digital finance, focus on building a digital RMB ecosystem for key industries, create an ecosystem in industrial clusters or industrial parks, precipitate digital information on business operations through the information integration of central bank digital currencies, break the degree of information asymmetry, activate innovation in the credit and credit-granting segments of the transaction and realize intelligent risk control through the digital characteristics of the post-loan period. We will continue to enrich the application scenarios of digital RMB, provide more complete and convenient various financial services for small and micro enterprises and real economic entities, and strive to promote financial inclusion and digital RMB ecological coverage.

References

[1] Heng ZHAO, Yan ZHOU. Research on the effect of central bank digital currency on monetary structure and economic growth[J]. International Financial Studies,2022(6):32-43.
[2] Xing Xie, Sixian Feng. Analysis of the influence mechanism of fiat digital currency on the macro-economy: Based on the research of different pilot stages in China [J]. Modern Economic Research, 2020(11):82-88.
[3] Jianxun SHI, Hong Jiang. Research on the Impact of Digital RMB on the Profit of Commercial Banks-Analysis Based on DSGE Model[J]. Exploration of Economic Issues, 2022(8):166-181.
[4] Stephen D. Williamson. Central Bank Digital Currency and Flight to Safety[J]. Journal of Economic Dynamics and Control,2022:104146.
[5] Stephen Williamson. Central Bank Digital Currency: Welfare and Policy Implications[Z].2021.