

A Study of the Impact of Central Bank Digital Currency on the Financing Constraints of Small and Medium-sized Enterprises

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Abstract: Bank credit is the source of enterprise financing, but also the driving force of enterprise development. It not only fills the funding gap, but also creates more development opportunities for enterprises and occupies a dominant position in China's financing system. However, problems such as segmentation of the credit market and unsound financial supervision have led to the plight of enterprises facing difficult and expensive financing. Compared with traditional legal tender, central bank digital currency is not only a change in form, but also an optimization and upgrading of services and functions. By utilizing digital technologies such as big data, blockchain and smart contract technology, central bank digital currency will effectively reduce the information asymmetry between banks and enterprises, lower financing costs, broaden financing channels and improve financing efficiency. In addition, the "conditional triggering mechanism" of central bank digital currency realizes the precise placement of monetary funds and targeted support for enterprises, providing a good financing environment and technical support for enterprises. Finally, this paper puts forward corresponding suggestions for reference.

Keywords: Central Bank Digital Currency, Financing Constraints, Small and Medium-sized Enterprises

1. Introduction

Small and medium-sized enterprises (SMEs) are an important microfoundation for the healthy and sustainable development of China's real economy, but the problems of difficult and expensive financing are constraining their development and their ability to innovate. Report of the 20th National Congress of the Communist Party of China points out that it is necessary to accelerate the development of the digital economy and promote its deep integration with the real economy. 2023 is the opening year for the comprehensive implementation of the spirit of the 20th National Congress of the Communist Party of China, and finance should increase its support for the development of SMEs and promote the financing of SMEs to realize quantitative growth and qualitative improvement, so as to help SMEs to develop in a high quality manner.

Although the development of digital finance has lowered the threshold of access to financial services to a certain extent and eased the financing constraints of enterprises, the central bank is unable to transparently regulate the flow of funds and the use of information, and third-party payments have transaction restrictions on remote settlements and large-value transactions, which affects the liquidity of enterprise funds. Based on this, the digital RMB launched by the central bank in the context of digitization by taking advantage of information technology such as big data, blockchain and artificial intelligence is a digital legal tender with value characteristics and legal compensation, and its design principles and concepts show a more powerful universal effect, which provides possibilities for further exploring new scenarios, paths and mechanisms to support small, medium and micro-enterprises and helps optimize the financing environment of small and medium-enterprises and improve the universality and accuracy of financing.

Existing research on central bank digital currency (CBDC) mainly focuses on the monetary system, the banking system and economic growth, and less research on small and medium-sized enterprises (SMEs), which is the main service group of central bank digital currency - SMEs. Therefore, this paper focuses on the impact of the circulation and use of central bank digital currency on the financing constraints of small and medium-sized enterprises and puts forward corresponding recommendations to contribute to the promotion of China's real economic development.

2. Literature review

2.1. Research on central bank digital currency

The issuance and circulation of CBDC plays a role in serving the real economy, and the intermediate option of adopting a distributed but "permissioned" architecture will improve the settlement efficiency, which will help reduce the cost of the real economy and promote economic growth (Barrdear&Kumhof [1], 2022). Bingbing Wang [4] (2022) analyzed the impact of CBDC from the perspective of dual friction of consumption and credit, and found that the comprehensive and intelligent application of CBDC reduces consumption friction, eliminates the information asymmetry of banks and enterprises, and thus reduces credit friction, which has a positive impact on the monetary and financial system.

The issuance and circulation of CBDC will have a huge impact on the monetary and financial systems, bringing many new opportunities and challenges to society (Dong Yang and Zheli Chen [5], 2020). On the one hand, CBDC has the function of real-time and accurate monitoring of the full-cycle flow of money, which can be relied upon by the central bank to forecast the demand for money and thus control the money supply based on it, thus enhancing the effectiveness of monetary policy (Xinhong Wu and Ping Pei [12], 2022); and in the context of the issuance of CBDC altering the underlying structure of the currency, it is expected to further enhance the efficiency of monetary policy transmission and reduce the time lag of monetary policy (Mark & Zedong Zhang [8-9], 2022). On the other hand, Bordo & Levin [2] pointed out that CBDC may impact the existing monetary system and reduce the monetary policy transmission efficiency. Specifically, legal digital currencies substitute for commercial bank deposits, which will lead to a decline in the asset size of commercial banks and affect financial stability (Bindseil [3], 2019).

The issuance and circulation of central bank digital currency will help central banks analyze macroeconomic trends and microeconomic needs through big data aggregation, achieve efficient supervision of commercial banks in implementing central policies and legal requirements, and stop malicious use of currencies in a timely manner to prevent violations of the law and violations of the law (Zeng Yuan [14], 2021). The widespread use of CBDC will help to stop tax evasion, money laundering, and other illegal activities, a regulatory feature that is significant for developing economies that use cash transactions for most of their economic activities (Bordo & Levin [2], 2017). The central bank can record and track the full cycle of M0 issuance and use through legal tender, which improves the precision of money placement (Xinhong Wu et al. [12]), and the programmability and traceability of CBDC can effectively prevent funds from bypassing the financial system regulation in the form of trust loans and entrusted loans to flow to policy-restricted industries, which leads to an increase in the financial systematic risk, and improves the transparency of payment, and ensure the effectiveness of regulation and payment security (Liqin Hu et al. [7], 2016). The design of "economic state condition triggering" optimizes the function of traditional fiat currency, helps to solve the difficulties of counter-cyclical regulation and the dilemma of currency "de-realization to virtualization", and reduces the burden and pressure of central bank supervision (Qian Yao [9], 2018). In addition, CBDC can be used in the regulation of international transaction settlement to combat international money laundering and other crimes. The "controllable and anonymous" characteristics of CBDC can protect personal information on the one hand, preventing e-commerce from collecting user information and pushing; on the other hand, it can effectively combat money laundering and terrorist financing and other illegal and criminal behavior (Chen et al. [6], 2021).

2.2. Studies related to financing constraints

In the incomplete capital market, enterprises in the financing process due to information asymmetry and transaction costs and other issues lead to high external financing costs, enterprises are difficult to obtain sufficient funds to carry out normal production and investment activities, thus generating the phenomenon of financing difficulties and expensive financing. Rui Huang et al. [10-11] discussed the reasons for financing constraints from both macro and micro aspects, specifically, the macro perspective is mainly reflected in the imperfections of the financial system, and the micro perspective mainly includes information asymmetry, high financing costs and ownership discrimination. An in-depth analysis of the factors affecting financing constraints from both the micro and macro perspectives is the key to solving credit discrimination.

On the one hand, due to the lack of standardized and digitized financial information on SMEs, there are high information collection and screening costs for commercial banks to assess the creditworthiness

of SMEs. Information asymmetry has led traditional financial institutions, after comprehensively considering the risk-benefit ratio, to tend to flow credit funds to large state-owned enterprises with high efficiency, while SMEs are difficult to meet credit conditions due to the lack of collateral and insufficient disclosure of financial information, etc., and "credit discrimination" has led to serious credit constraints for enterprises, making it difficult for them to raise funds; On the other hand, credit friction is mainly due to information asymmetry, commercial banks cannot understand the enterprise's comprehensive information, there are limitations on the enterprise's risk assessment, thus generating a financing premium, leading to enterprise financing expensive. In addition, China has vigorously exerted the effectiveness of monetary policy tools to support the relief and development of micro, small and medium-sized enterprises (MSMEs), providing a suitable monetary and financial environment for the development of the real economy. Therefore, under the favorable policy environment, SMEs should actively explore ways to solve financing constraints from their own perspectives in order to obtain financial support.

2.3. Central bank digital currency and financing constraints

CBDC will effectively alleviate financing constraints due to its unique design, which is of great significance to China's macroeconomic impact. The distributed ledger and intelligent data processing technology of legal tender solves the principal-agent problem between enterprises and commercial banks under the condition of information asymmetry, and reduces the risk of credit mismatch and credit premium (Xinhong Wu and Ping Pei [12], 2022). The digitized and intelligent "minting", issuance and circulation of CBDC enables the central bank to guide commercial banks to target and precisely invest credit funds on the basis of mastering the entire life cycle of the currency, greatly reducing the cost of enterprise financing and economic operation, thus alleviating its financing constraints (Bingbing Wang [4], 2022). Therefore, the central bank digital currency, with the application of big data, artificial intelligence and other information technology, the problem of information asymmetry between banks and enterprises has been effectively solved, and commercial banks and other financial institutions have increased their loans to enterprises, which have sufficient funds to carry out their production activities, thus greatly alleviating the problem of financing constraints.

3. Mechanism analysis of CBDC to alleviate financing constraints

3.1. Reducing information asymmetry

CBDC mitigates the degree of information asymmetry between banks and enterprises in both the pre- and post-loan dimensions. Before lending, SMEs have limited financial information for commercial banks to assess creditworthiness, thus incurring high information collection and screening costs. The significance of CBDC is to let the currency "leave a trace", which is helpful for banks to recognize the sustainability of enterprises based on the currency information. Taking the application of blockchain technology in the underlying technology of the legal digital currency system as an example, the central bank set up the alliance center to record and analyze the transaction information of the business nodes, and each key node is interoperable with the other nodes, which is convenient for commercial banks to share and supervise the information of the block and study the operation of the currency's "traces" and the law (Qian Yao [9], 2018). Banks carry out credit lines and risk assessment of enterprises through their diversified transaction information, probe corporate behavior from monetary information, grasp the macro in the micro, and broaden the depth and breadth of financial services. It not only effectively breaks the asset information barriers between economic subjects and alleviates the information asymmetry of enterprises in the financing process, but also improves the risk management method to a certain extent and enhances the performance ability of enterprises.

After the loan, the CBDC can realize the whole process of unlimited retrospective management, effectively solving the problem of circumventing post-credit supervision through multiple interbank transfers, cash withdrawals and other forms after the loan is issued, resulting in the flow of loan funds into the field of violation. The use of big data helps commercial banks and other financial institutions to monitor the flow of enterprise credit funds, monitor and analyze the production and investment of enterprises, effectively prevent the misappropriation of funds for private gain, realize transparent supervision, take into account the existing business model, and protect the interests of all parties.

3.2. Reducing financing costs

From the perspective of capital supply, the impact of CBDC on enterprise financing costs is mainly

realized by reducing credit friction and lowering the financing premium (Bingbing Wang [4], 2022). From the above, CBDC as a financial infrastructure solves the problem of information asymmetry and credit friction between banks and enterprises, reduces the information risk management costs entrusted by banks to external institutions, plays a positive role in mitigating "credit discrimination", reduces the actual lending interest rate and the cost of service of banks, and then reduces the financing cost of enterprises.

From the perspective of the demand side of funds, traditional financial institutions need a large amount of human and material capital for financial infrastructure construction to increase the breadth and depth of financial services. The principle of barrier-free and inclusive design of CBDC breaks through the limitations of geographic outlets to meet the diversified payment needs of all kinds of groups, thus establishing an open and secure transaction platform for both the supply and demand sides of funds, meeting the needs of both sides through transaction data, aggregating "long-tailed" customers to maximize the utility of funds, and effectively reducing transaction costs and the cost of heterogeneous borrowing and lending for enterprises. This effectively reduces transaction costs and heterogeneous lending costs of enterprises.

3.3. Broadening of financing channels

CBDC has broadened financing channels and improved the financing efficiency of enterprises while reducing their transaction costs (Yuan Zhang and Huanjie Li [13], 2023). The programmability of CBDC enables the "conditional trigger mechanism" to be realized. For example, before the issuance of CBDC, commercial banks write the main body of currency flow into a standardized smart contract according to the policy conditions in advance, which can only take effect when the transaction conditions are met, so as to realize the precise placement of currency and targeted support for enterprises. Through this setting, it not only improves the efficiency of currency transmission, but also increases the financing channels for enterprises to alleviate financing constraints. At the same time, the automatic execution technology of smart contracts across banks and institutions simplifies the approval process of banking business and the search cost of enterprises, and improves the financing efficiency of enterprises.

3.4. Acceleration of financial flows

Smart contracts are embedded in payment conditions to promote business model innovation. In a safe and compliant trading environment, contract terms are written into online-enabled contracts according to the conditions agreed upon by the participants of the economic activities, and the smart contract automatically verifies the transaction compliance and contract terms, and the business scenarios that comply with the trading rules are automatically run to complete the payment transactions, which reduces the time cost of the movement of the enterprise's employees across the regions, the transaction cost and the limitations of the large-value transactions. "Payment as Settlement" significantly improves the efficiency of capital turnover, which is conducive to improving the efficiency of payment and clearing, and stabilizing the cash flow of enterprises.

The accelerated application of CBDC application scenarios at the B-side will help solve the liquidity problem of SMEs' funds. Currently, in the B-side market, the payment demand between enterprises is still rooted in the bank account system. This is because bank credit can maximize the stability of inter-enterprise payment, and enterprise payment involves large-value payment, the limit of third-party payment may bring inconvenience. The combination of "Digital RMB + Supply Chain Finance" not only realizes real-time and fast arrival of funds and improves the capital turnover rate of SMEs, but also helps financial institutions' risk control with the traceability of the funds issued by Digital RMB. Digital RMB for transaction settlement, through the supply chain upstream and downstream payment process, realizes the organic combination of "information flow + capital flow", enterprises can "one-stop" conveniently use digital RMB to realize the full online services and financial services security output, efficient and fast! Enterprises can use digital RMB to realize all online services and safe output of financial services in a "one-stop" and convenient way, so as to efficiently and effectively carry out various daily businesses, thus maintaining the liquidity of enterprise funds.

4. Summary

Combined with the above analysis of the mechanism of CBDC on enterprise financing constraints, this paper puts forward corresponding recommendations from the government, financial institutions and

enterprises.

4.1. Improve relevant supporting policies to enhance a favorable external financing environment for enterprise development

As a digitized form of fiat currency, CBDC will have a significant impact on the traditional payment and settlement system, so its circulation and issuance cannot be separated from the regulation and guidance of national policies. On the one hand, the government should strengthen the top-level design and improve laws and regulations such as the network security law and data security law. CBDC has natural advantages, but there are also problems such as user privacy leakage and technical difficulties, and any interference that threatens the stability of the system may trigger systemic risks. Therefore, it is necessary to accelerate technological innovation, build a data base institutional system, improve network and data security capabilities, and create a long-term stable development environment for small and medium-sized enterprises; on the other hand, it is necessary to improve the governance system of digitalization development, and escort the innovative development of enterprises. It is necessary to give full play to the information and technological advantages of legal numbers, broaden the breadth and depth of financial services, meet the financial needs of technological innovation for small and medium-sized enterprises and other disadvantaged groups, and give full play to the role of digital technology in leading high-quality development and improving the competitiveness of enterprises.

4.2. Promoting the digital transformation of financial institutions and upgrading the level of digital management

CBDC is a product of the digitalization context, including big data, cloud computing and artificial intelligence. CBDC will lead to accelerated digital transformation among financial institutions and the provision of diversified financial assets and services to enhance competitiveness. Central bank digital currencies reduce the credit friction between banks and enterprises, which leads to lower operating costs for commercial banks, and thus a large number of financial innovation products come into being. Commercial banks provide portfolio decisions for enterprises due to the availability and comprehensiveness of information, which improves the accessibility of resources for business services. For example, commercial banks can improve the transparency of information on big data to not only provide SMEs with low-cost, personalized financial services to meet diversified financing needs and better promote the growth of SMEs, but also to help enterprises to choose financial products and portfolios of financial assets that match their risk-bearing capacity and meet their investment and financing needs.

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