

Research on Digital Currency System Framework of Bank of China Based on Monetary Theory

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Abstract: Digital currency, also known as “digital cryptocurrency”, according to the general theory of academic circles, digital currency refers to electronic currency which is based on cryptography and peer-to-peer network technology, generated by computer programming, and distributed and circulated in virtual environments such as the Internet. The central bank digital currency (CBDC) can change many aspects of the monetary policy system, and improve the system and transparency of monetary policy. The implementation of CBDC will inevitably lead to major changes in the way of currency issuance and payment. If it is further extended to the entire financial system, it will also pose a challenge to the existing monetary system and lead to the deconstruction and reconstruction of a country's entire economic system and national and social governance system to a certain extent. Under the background of the increasingly developed private digital currency, the monetary authorities of various countries also need to respond positively for the sake of maintaining monetary sovereignty and financial stability and maintaining the competitiveness of central banks' monetary and payment systems. Based on Marx's monetary theory, this paper analyzes the possible impact of issuing CBDC and puts forward relevant suggestions.

1. Introduction

With the increasing role of finance in the economic system, the flexibility of currency issuance becomes more important. In order to meet the needs of the expanding transaction scale, commodity currency gradually evolved into credit currency in the 20th century, and people's trust in the government and the central bank is the basis for the existence of credit currency[1]. Money is widely used in daily life, but it is quite difficult to give a precise definition of money. The history of currency development shows that with the integration of the market, various dispersed currencies gradually tend to be centralized[2]. Digital currency, also known as “digital cryptocurrency”, according to the general theory of academic circles, digital currency refers to the electronic currency based on cryptography and peer-to-peer network technology, which is generated by computer programming and distributed and circulated in virtual environments such as the Internet[3]. According to different issuers, digital currency can be divided into private digital currency and legal digital currency. In recent years, the monetary authorities in many countries around the world have begun to pay attention to digital cryptocurrency, actively study and demonstrate the necessity and feasibility of issuing CBDC, and some countries have begun to build legal infrastructure in digital currency and start technical system testing[4]. As a new monetary form, CBDC is bound to have an important impact on the transmission process and mechanism of a country or economy from using monetary policy tools to influencing intermediate goals and then achieving the ultimate goals.

At present, China's economy is turning to a high-quality development stage, and the digital economy is the general trend. CBDC is the blood to promote the development of digital economy and the new carrier of RMB internationalization. The prosperity of private encryption in digital currency, on the one hand, accelerated the application and practice of decentralized digital currency technology, and enriched people's theoretical understanding of digital currency; On the other hand,

because the private encryption digital currency represented by Bitcoin has no stable value support and is completely anonymous and decentralized, not only the price fluctuates violently, but also it poses a potential threat to financial stability[5]. The implementation of CBDC will inevitably lead to major changes in the way of currency issuance and payment. If it is further extended to the entire financial system, it will also pose a challenge to the existing monetary system and lead to the deconstruction and reconstruction of a country's entire economic system and national and social governance system to a certain extent[6]. Marx's monetary theory includes the origin and essence of money, the law of money circulation, the endogenous credit mechanism of money, social reproduction and many other aspects[7]. Based on Marx's monetary theory, this paper analyzes the possible impact of issuing CBDC and puts forward relevant suggestions.

2. Overview of Monetary Theory

The development history of money is a history in which the form of money evolves from low level to high level. From the point of view of facilitating commodity exchange, commodities used as money need to be of high value and easy to be divided, preserved and carried. Before studying the essence of virtual currency, we should first make clear the motivation of the emergence and development of virtual currency in theory, that is, the progress of productivity and the development of market economy are the fundamental motivation of the emergence of virtual currency, while the expansion of labor category promotes the development of virtual currency. The embryonic form of modern paper money is bank note, which is a paper currency first circulated in Europe with the development of capitalist banks. The issuer guarantees that gold coins and silver coins can be redeemed at any time according to denomination. It has no value in itself, and its circulation depends on the issuer's credit, which is the main form of credit currency. In daily life, money can be used as a highly liquid asset because it has unlimited purchasing power for goods [8]. With the development of social economy, the external form of money has changed greatly, and it has gone through physical currency, metal currency, paper money, virtual currency and other forms. Under this background, it is particularly important to deeply analyze the fundamental motivation of virtual currency by using Marx's monetary theory.



Fig.1 Concept of Digital Currency

With the application of computers and the development of electronic technology, as well as the advent of the digital age, the public's demand for payment tools is increasingly diversified, and the form of money has developed from tangible to intangible, gradually producing electronic money, digital currency and other forms of money (Figure 1). Marx believes that commodities must be exchanged with other commodities in an equivalent way to realize their value, and the birth of money is also the result of the intensified contradiction between private labor and social labor. The fundamental reason for this contradiction is that the labor value condensed on commodities must be converted into exchange value through market transactions. The legal digital currency has a

valuable anchor and can effectively play its monetary function. Compared with the function of transaction medium, the function of money as a means of pricing is the first, and as a function of pricing, the stability of money value is very important. This is especially true for the value storage function of money. Money needs to be anchored with value in order to play its function effectively. Looking back at history, all kinds of currency forms have value anchoring.

3. Natural Advantages of CBDC Design

With the rapid improvement of productivity and the rapid development of economy and society, the demand for money continues to rise, which leads to a serious shortage of production and supply of metal money, which in turn leads to the increasing contradiction between its own value and social value, and finally leads to the separation between money itself as a carrier of social undifferentiated labor and specific value forms. As a medium of exchange with almost no cost, CBDC will greatly improve the efficiency of payment system. CBDC is especially beneficial to low-income families and small businesses, because these families often rely heavily on cash, while small businesses have to pay a lot of transaction costs when handling cash or making payments through debit cards and credit cards. Socialized division of labor can improve production efficiency, but it will also produce contradictions with the diversity of people's consumption demand under the progress of productive forces. In the commodity economy, people's expanding material demand promotes the popularization of commodity trading activities.

Bitcoin, as the first and most important virtual currency in the world, adopts the blockchain technology with distributed ledger as the core, which has many advantages such as decentralization, traceability and non-tampering. Although decentralized virtual currencies have developed rapidly, the huge network effect and leader advantage of legal tender will make it difficult for these emerging virtual currencies to become market leaders[9]. At present, paper money poses a major constraint on the central bank's ability to cut policy interest rates in response to serious adverse shocks. When the nominal interest rate is negative, the cash interest rate is zero, so it becomes more attractive as a hedge. In contrast, virtual currency is also the product of social productivity progress and market development, which is still within Marx's monetary theory. With the further improvement of technical level and the sustained development of market economy, the form of goods has gradually developed from the original single physical form to the virtual form, and the space for commodity trading has gradually changed into a virtual Internet trading platform, on which virtual currency is needed as the support for commodity trading.

The distribution cost in digital currency is much lower than that in paper money, and digital currency will not be damaged, so there is no need for recycling. After the issuance of digital currency, the improvement of convenience may increase the total transaction volume, thus improving the liquidity of the whole economic system and reducing transaction costs. The widespread use of CBDC and the withdrawal of paper money will help to crack down on tax evasion, money laundering and other illegal activities. This benefit is of great significance not only to developed economies, but also to developing economies, because a large part of economic activities in developing economies are carried out in cash, so the incidence of tax evasion is high.

4. Monetary Policy Framework under CBDC Conditions

Digital currency, as legal tender, must be issued by the central bank. Its issuance, circulation and trading should follow the idea of integration of traditional currency and digital currency, implement the management of the same principle, and especially obey the needs of the central bank's macro-control. The launch of CBDC provides a milestone opportunity to improve the transparency of the central bank's monetary policy framework, including its nominal anchoring, tools and operations, and policy strategies. For CBDC, network security issues have a greater impact and impact on it. Once criminals break through the security system, they may transfer a large number of digital currency instantly, causing huge losses. Therefore, the financial supervision department should prudently establish and improve the slow release methods and early warning mechanism for

network security risks, strengthen the security preparedness of CBDC system, and improve the credibility of the system.

Like the inflation targeting system, the price level target needs to be specified according to a specific price index, and the target index will not be modified at will unless there are convincing technical reasons. In order to improve transparency, the index should be composed of open final commodity prices and use an open method that can be replicated. In addition, in order to ensure the continuity of duration, the index will use chain weighting instead of relying on any particular base year. In the actual operation of issuing digital currency by the central bank, not only the blockchain technology is used, but also the innovative technologies in the fields of big data analysis system, account system, cloud computing and security authentication that have emerged in recent years can be used for reference. In order to promote policy transparency and public accountability, CBDC's interest rate will become the main tool of monetary policy, and decision makers can push the market interest rate below zero to cope with serious adverse shocks. In particular, the central bank will generally hold the same amount of short-term government bonds as digital currency, and its operating procedures will become more transparent accordingly. It will only buy and sell in short-term government bonds, so the supply of CBDC will change with the change of CBDC demand. The analysis process of bank customer data under digital currency policy is shown in Figure 2.

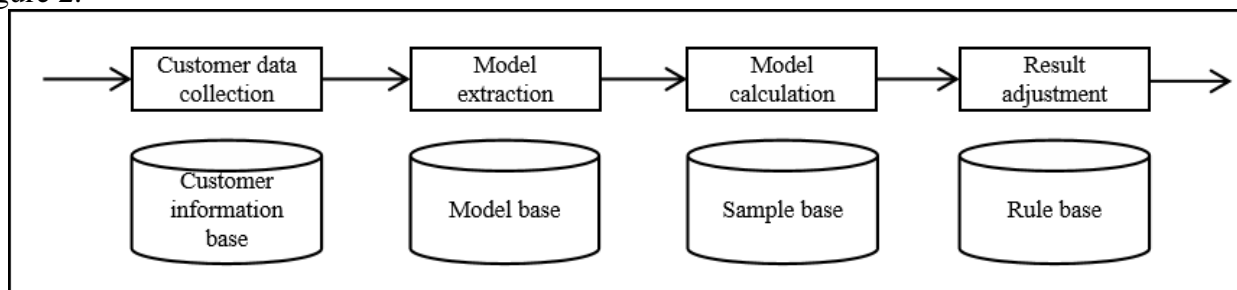


Fig.2 Bank Customer Data Analysis Process

In practical application, considering that digital currency needs to rely on specific network infrastructure for circulation, it may be impossible to receive CBDC due to technical factors, which will adversely affect the “legal compensation” of currency. A feasible monetary policy strategy based on CBDC is to specify a price level target rule. Such a rule can be expressed by the deviation of the price level from the target and the deviation of economic activities from its sustainable long-term path, but the rule will not explicitly involve CBDC interest rate. In fact, the target rule represents an ideal control strategy, and then the balance is made between maintaining price stability and other aspects of macroeconomic stability, that is, the dynamic relationship between the setting of policy interest rate and price behavior and actual economic activities.

5. Conclusions

Before money came into being, transactions between people were conducted by barter, which was carried out without any intermediary at all. The conclusion of the transaction requires that the needs of both parties coincide in time and quantity. This double coincidence transaction is extremely inefficient, which limits the further development of human economic activities. The benefits of digital commerce's rapid development will eventually make it unstoppable, and it is very important to stay ahead of competitors rather than trying to catch up at the last minute. Whether as a form of currency conversion or a commodity, virtual currency ultimately reflects the relationship between production, distribution, exchange and consumption at a certain level of productivity development. Marx's logic about the emergence of money from commodity circulation determines that CBDC is an important helper and “slave” of digital economy and real economy. Its ultimate goal is to return to the real economy and improve people's living standards, which is the significance of CBDC as a specific historical existence. If the account books can be stored in different areas or the data can be compressed more effectively, the requirements for the storage

capacity of the equipment can be reduced and the distributed account books become more feasible.

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