

# The Evolution of Digital Currency and the Exploration of the Operating Mechanism of the Global Digital Currency System

Yang Xuan, Lu Qian, Fan Fengtao

Chengdu University of Technology, Chengdu Sichuan 610059, China

**ABSTRACT.** *With the change of economic form, digital currency is issued in various forms such as private digital currency and central digital currency, However, most of the current currency distribution and circulation system management frameworks have certain defects in credit supervision, technical support and operational mechanism. On the basis of the existing research, we will explore the operating mechanism of the global digital currency system and construct a ternary digital currency model system framework to promote the research of the digital currency system.*

**KEYWORDS:** *Digital currency system; Ternary digital currency; Credit supervision*

## 1. Introduction

Under the development of economic globalization, traditional money cannot meet people's demands for convenient and portable payment, global market trade and currency security. Against this backdrop, digital currencies, which allow users to trade instantly without borders, are gaining popularity around the world. The private digital currency and the legal digital currency of the central bank have serious defects respectively. Therefore, the research and exploration of the issuance and circulation system of digital currency have great influence and significance on the stable development of digital currency, the effective issuance of monetary policies and internationalization strategies of various countries.

## 2. Private digital currency

Private digital currency is issued and controlled by individual developers, but it is not controlled by the central bank and is circulated among members of the online virtual community, such as Bitcoin and ETH.

Today, the currency we use in circulation, cash, is secured by central bank credit. However, due to the global nature of the Internet, I want to create a "cash concept" trading method on the Internet. However, in whoever is the right to issue such

currency, and who will carry out credit guarantees, it has always been difficult to solve.

The skyrocketing decline of Bitcoin and the rapid rise of ETH reflect the huge volatility of the private digital currency market. These digital currencies still have the same fundamental flaws as the private money that existed in history: unstable value, weak credibility, easy to produce large negative externalities, etc.

Private digital currencies have the following three major defects:

- First, private currencies cannot perform monetary functions. In the trading medium, the current daily trading volume of private money is about 200,000 to 300,000, and the average daily transaction volume in China alone is about 70 million, so the private issue of digital currency plays a minor role in the transaction medium. On the scale of value, the value of private digital currency is unstable and cannot be used as a measure of the value of goods. At the same time, private digital currencies cannot perform storage functions due to large fluctuations in prices.
- Second: The excessive price volatility of private digital currencies seriously affects the financial system and the market cannot implement effective supervision. The motivations for people to have privately issued digital currencies are mostly investment motives, and the price of money is extremely unstable, which is likely to cause market panic and financial risks.
- Third: Private digital currency circulation has the characteristics of completely anonymous transactions, unregulated transfer of funds and cross-border movements. It may promote illegal transactions. Criminals use private digital currencies to launder money. Enterprises or individuals use private digital currencies to evade taxes.

### **3. Digital currency issued by the central bank**

Digital currency issued by the central bank, the government credit as guarantee, can effectively solve the disadvantages of private currency exposure, and the country can control the currency, supervise and formulate the currency issuance and circulation system. In addition, it can use its own digital currency to issue and circulate in the international trade market at zero cost and effectively promote the global value chain.

The central bank's digital currency circulation mechanism is a dual system model "central bank-commercial bank". The central bank issues digital currency to the commercial banking business library, and the commercial bank directly provides the currency access and circulation business to the public. The digital currency information flow and the capital flow are highly unified, which can save the market-oriented and management-type transaction costs and improve social efficiency.

Combined with the failure of issuing digital currency in previous countries, we

analyze some defects of central digital currency:

First, because the issuer's credibility is not enough to attract enough users, people can't trust the organization's guarantees and are unwilling to give up the original monetary system.

Second, incompatibility with the current law, such as the euro zone legislation does not allow the use of digital currency.

Third, the violent impact on the existing financial system. It affects the independence of the central bank, the transaction costs are low, it will cause large fluctuations in the market, and there may be problems such as the use of illegal elements.

#### **4. Global Digital Currency System**

In view of the problems exposed by the current two major digital currency issuance and circulation systems at the three levels of technical means, operational mechanism and regulatory regulations, we have thoroughly studied and optimized the existing currency issuance and circulation system management structure, focusing on creating a “the world bank--the central banks--commercial banks” ternary digital currency model system. (Open a department with the nature of the world bank in the United Nations, and issue digital currency to the central Banks of all countries in the world with the world bank as the credit guarantor. Central banks in various countries provide digital currency access and circulation services to commercial banks). The ternary digital currency model system has the characteristics of reducing cost, reducing credit risk, facilitating supervision, connecting the world system, reducing loan interest rate and increasing return yield.

##### ***4.1 Ternary digital currency model system framework***

The United Bank's cloud distribution library creates digital currency and then first signs the world's digital currency, registering the amount of digital currency in the national currency markets. The encryption method was developed by the United World Bank and distributed to each member country. The central bank implements the second signature of the digital currency and anchors the amount of money issued to the commercial bank. After obtaining digital currency, commercial banks directly provide access and circulation services of digital currency to the public. Commercial banks are responsible for the public's digital wallet security and transaction records, which are returned to the central bank. After obtaining digital currency, the public transacts through mobile terminals, such as smart phones and computers.

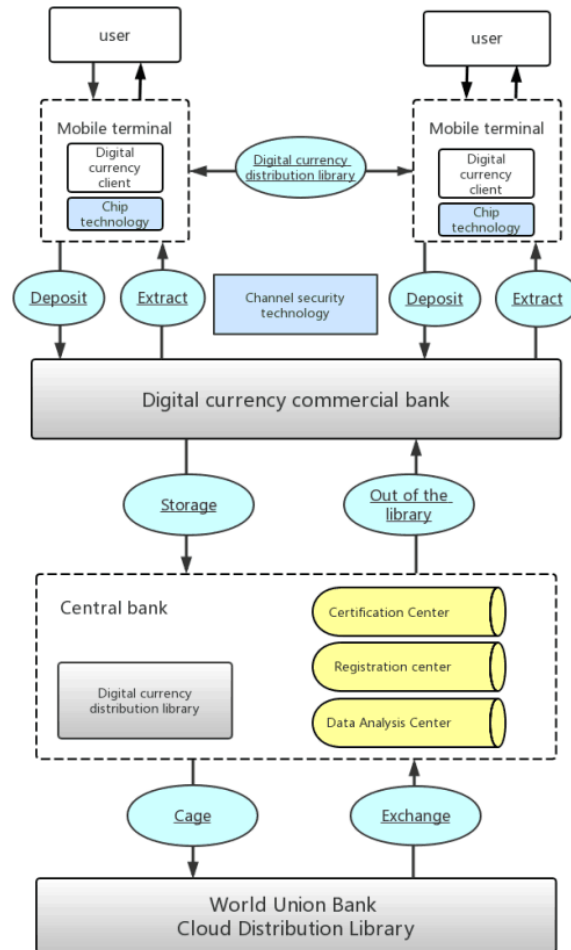


Figure.1 Ternary global digital currency system architecture

The United Bank's cloud distribution library is responsible for the design elements and data structure of the digital currency. In terms of form, the digital currency is an encrypted number string that is created by the United Bank of the United States to represent a specific amount. It is not an electronic currency that only represents the balance of the account, but a cryptocurrency that carries all the information. The digital currency based on the mathematical theory, utilizing the knowledge of cryptography such as symmetry encryption algorithm, asymmetric encryption algorithm and one-way hash function, etc., and digital signature, blind signature and zero knowledge proof technology to realize the monetary features. Security technology guarantees the liquidity, traceability, storability, unforgeability,

controllable anonymity, non-repeatable transactionability and non-repudiation of ternary digital currency.

The central banks of the member states are responsible for the certification center, the registration center and the data analysis center. The certification center is an important part of the central bank of the member states to centrally manage the central bank's digital currency system and user identity information, and control the anonymous design. The registration center can record the digital currency of the central bank of each member state and complete the registration of ownership. It can also record the direction of fund flow and complete the registration of the whole process of the generation, circulation, accounting and destruction of digital currency. The data analysis center is responsible for the analysis of anti-money laundering, payment behavior of large transaction volume and regulatory control.

The digital currency distribution library is the database where central banks store their digital currency issuance funds on the central digital currency private cloud. The Digital Currency Commercial Bank Library is a database of commercial banks that store digital currency, either locally or on a central digital currency private cloud. This cloud space can categorize and store digital currency, which can not only prevent workers from illegally obtaining digital currency, but also resist the deliberate attack of illegal intruders, and can also assume some special application logic.

For end users, there are two legal digital currency systems, wallet based and account based, which can be used in layers or co-exist in the same system. The key in the digital world is the most important for the user, and the secure storage of the key is critical to the security of the terminal transaction. In order to realize the front-to-end transaction security in the digital currency transaction process, the digital currency can utilize the trusted technology in the terminal cloud space, and the front end can utilize the chip technology, and the channel security technology can be utilized in the circulation process.

#### (1) Operating mechanism and incentive policy

Set the symbol of digital money as  $DG$ . Central banks of member countries report the amount of digital currency they need to the United Bank of the World, then, the equivalent value of money is converted through its own central bank.

Take the United States as an example. If the Fed wants to increase  $m DG$  into the US currency market. As the gold that connects the world's financial markets, It is the bridge between the digital currency and the dollar. Now, international market gold price is  $n DG/oz$ , After changing it to equivalent gold, it's  $m/n$  oz gold, At this time, the dollar price is  $\alpha \$/oz$ , Then we can get the value of  $m DG$  as  $(\alpha*m)/n \$$ , At the same time as the release of  $m$  digital currencies, it is also necessary to recover the market  $(\alpha*m)/n \$$ . In this way we have achieved currency price stability in the money market. (we ignore the impact of fixed costs incurred in the coinage process.)

We need to create external stimuli to promote the promotion of digital currencies,

such as:

- The government encourages individuals and enterprises to invest in digital currency. If they get digital currency in the loan, the interest rate of the loan will be lower than that of traditional currency.
- In terms of taxation, if taxpayers pay tax in digital currency, the tax rate will be lower than that in traditional currency. As a result, companies or individuals investing in digital currencies will see their returns rise.
- When using digital currency to pay, people can be attracted to use digital currency by randomly subtracting (refer to Alipay & Wechatpay).

(2) Hierarchical regulatory mechanism

*Level one: United bank*

1) Establish a dual management mechanism, the United Bank and the Central Bank of the member states jointly supervise.

2) The United Bank of America oversees the various digital currency policies of the National Central Bank and prevents member states from arbitrarily manufacturing digital currencies.

3) Joint international anti-terrorism organization, international anti-money laundering organization, strictly monitor the direction of funds, realize world police information sharing, and achieve mutual benefit and win-win.

4) The terminal software customization is jointly dispatched by the United Bank, the Central Bank and the National Security Administration for R&D management and maintenance. Ensure the security of transactions and the uniformity of software terminals.

*Level two: Member States, Central Banks of Member States and Commercial Banks*

1) Each member state formulates a 'digital currency law' that is bound by the "constitution" of each member state and provides protection for the safe and effective circulation of money in the country.

2) Strictly control the conversion process of the original legal currency and digital currency to ensure that the risks in the conversion process are controllable.

3) The Tax Law incorporates regulations that match traditional currencies.

4) In the event of a data anomaly, the Central Bank Big Data Analysis Center will provide an early warning. And temporarily close the large transaction channel of the account.

5) Commercial banks need to implement currency circulation in strict accordance with the plan formulated by the central bank.

6) The holder of the digital currency and historical payment information are recorded using the "distributed accounting method" method.

7) Put me in control to ensure the status of the monetary authorities and prevent excessive regulation and control leading to currency market malformation.

*Level three: Trading platform and users*

1) The trading platform implements full-record supervision to prevent all exploits from exploiting the benefits.

2) Each private account, corporate account, and government account must guarantee the real name of the certification.

3) Ensure the rights of digital currency holders.

**4.2 The merits of the ternary digital currency model system**

1) Improve payment efficiency. Digital currency is not limited by time and space, and no third party clearing is required, reducing the traditional currency trading links.

2) Reduce the cost of currency circulation. In theory, there is no currency breakage or counterfeiting, so the circulation cost is almost zero.

3) Reduce credit risk. The global digital currency system is created by the World Bank's cloud distribution library. The central bank of each member country issues currency and has strong credit guarantees, so the credit risk is extremely low.

4) Information symmetry. Effectively solve the problem of information asymmetry and black-box operation of Internet finance, and ensure that every transaction has traces, which can effectively suppress the existence of the black market.

5) Improve the accuracy of monetary policy. The central bank cannot effectively monitor the circulation of banknotes after they leave the financial system. The global digital currency system uses a private cloud, which makes it more accurate in grasping the money supply, currency multiplier, and circulation speed, and helps to improve the accuracy of monetary policy.

6) Connect the world system. The circulation of ternary digital currencies can greatly promote the development of investment and trade in global value chains. Greatly reduce trade costs and trade barriers, and realize the rapid circulation of domestic and overseas funds at low cost, helping small and medium-sized enterprises, especially small producers in developing countries, to join the global market.

**4.3 The defects of the ternary digital currency model system**

(1) Inadaptability with current laws

The international digital currency convention, such as the NATO Warsaw pact, was developed by the joint bank of Japan to constrain the central Banks of various

countries to some extent. The laws of each country are based on physical currency, such as paper money and coins. Compared with traditional paper money, digital money has essential differences in issuance, circulation and other aspects. Therefore, the current laws on legal tender of the central bank cannot be applied to the supervision of digital money.

Improvements: countries develop laws that suit their national conditions and establish departments to regulate digital currencies. Including unlimited legal compensation, anti - counterfeit money, clear its legal subject status.

#### (2) Difficult to build a circulation environment

The issuance of digital currency is a unified standard of the world bank of the United Nations and distributed by local central banks. The circulation process relies on the support of infrastructure, software and hardware. In the initial stage of the three-way global currency circulation system, the construction of circulation facilities will encounter great resistance.

Meanwhile, in order to adapt to the circulation of digital currency, the cost of traditional banking and financial institutions will increase. Under the ternary global digital currency system structure, the central bank and commercial bank should reform and replace the infrastructure and personnel, and set up special digital currency departments to serve the public, so as to effectively promote the public's adaptation to the process of digital currency deposit and withdrawal. This is a long-term trend, just like when payment software like alipay was born, banks at all levels will add new departments, software, hardware and staff to serve the public.

Smartphones and computers are used as mobile terminals for digital currency transactions. It is still difficult for people in some remote areas to own terminals. The increasing smartphone usage rate is good news. As time goes by, people who don't use smart terminals will only be babies.

#### (3) A shock to the existing financial system

Digital money has the function of traditional money, but it is not limited to traditional money, which will impact the existing financial system. The central bank should bear the responsibility for the theft and illegal tampering of digital currency. As one end of the digital currency opening to the public, commercial banks are faced with the public withdrawing most of their deposits into digital currency, especially in the period of economic fluctuations and falling interest rates. This will reduce the reserve ratio of commercial banks and the money multiplier. In this case, the money multiplier and reserve ratio of digital currency will rise, which is a process of offset.

#### (4) Technical barriers

As legal tender, digital currency needs to represent the national credit, so it is necessary to ensure and have the security of flow, transaction and reserve, which requires a very high requirement for the construction of technical system. The central bank's cloud system requires a high level of security and requires a defense-level encryption method. Transaction processing capacity needs to be



improved to ensure transaction stability.

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