



Central Bank Digital Currencies-Embrace the Future

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Abstract. In the 21st century, digital currency has attracted much attention in financial technology (Fintech). Currently being seriously explored by most of the world's major central banks, electronic money, the innovative product of the digital economy, may have a significant impact on the macro-financial pattern and financial stability. This paper breaks through geographical restrictions to study electronic currency in major countries and explores the motives and risks of launching electronic currency in China.

Keywords: component · digital currency · central bank · opportunity · risk

1 Introduction

Human society has entered the digital age, and “digitizing everything” has become the general trend. Digital money meets people’s desire for a better life thanks to its convenience. Yao (2018) concluded that digital fiat currency is a credit-based currency in terms of value, a crypto-currency from a technical perspective, an algorithm-based currency considering implementation and an intelligent currency in the application. [1] Kim(2020)discussed the importance of CBDC and the characteristics of China’s CBDC. [2]The central bank’s digital currency will have a far-reaching impact on the global monetary and financial structure. This paper provides thematic research about the origin, motives and challenges of CBDC.

2 How Does Digital Currency Arise

2.1 Digital Currency is Born Out of the Digital Economy

The term “digital economy” first appeared in the 1990s. In 1995, the Organization for Economic Cooperation and Development (OECD) elaborated on the possible development trend of the digital economy and believed that the Internet revolution is driving human development from the atomic to the information age. [3] In 1998, the US Department of Commerce proposed the development trend from the industrial economy to the digital economy driven by the diffusion and penetration of IT technology. [4] A digital economy can be described as a specific economic form in which goods and services are traded in the form of data.

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The digital economy is the main economic form after the agricultural and industrial economy. It is a new form taking data resources as the critical element, modern information network as the primary carrier, information and communication technology integration application and factor digital transformation as the essential driving force to promote more unified fairness and efficiency. In the digital age, computing power is an important infrastructure for national economic development. As the digital economy gradually penetrates all areas of the economy and society, the demand for computing power in the community is expected to increase.

The digital revolution has an overall and deep-seated impact on productivity and production relations and is disruptive to future reconstruction. Since the outbreak of COVID-19, digital technology and the digital economy have played an essential role in supporting the fight against COVID-19 and restoring production and life. We should have a deeper understanding of the evolution trend and digital economy's internal laws, a higher position and a longer-term vision to promote the development of the digital economy.

2.2 The Development of Digital Currency

Digital currency is the product of the digitalization of global financial and economic activities. Suppose information technology can turn the function of storing and exchanging much information in computer bytes into reality. In that case, the currency used as the transaction medium will no longer be entities such as stones, feathers, tobacco leaves, shells, silver, gold and even paper money but can be strings of bytes stored in the computer.

Science and technology provide a background condition for the realization of digital currency. The origin of the birth of digital currency can be traced back to the Bretton Woods system's collapse in 1971. Although the dollar was no longer anchored to gold, it was linked to oil to control the energy lifeline, resulting in the further strengthening of the world's "dollar hegemony" and accelerating the United States to continue plundering wealth worldwide. Over time, all other countries have the idea of creating a payment method by passing the US dollar to break the monopoly of the US dollar. In addition, because the currency no longer has an anchor, some adverse consequences could happen, such as the imbalance of international payments, frequent financial crises and so on.

Hayek, a western economist, put forward the concept of "private banks can issue competitive currencies" and discussed the possibility of "decentralized" currencies in this disturbing economic environment. [5] The combination of "decentralization" and modern information technology - "decentralized digital currency" really swept the world at the beginning when the concept of "Bitcoin" was put forward by a mysterious man who called himself "Nakamoto Cong" in 2008. His paper on "Bitcoin" aroused thousands of waves and nearly reshaped people's views on currency worldwide.

Since then, many institutions (or individuals) have successively issued various private electronic currencies, such as Lite coin, Dogecoin, Percoin, etc. However, due to their decentralized nature, these private digital currencies realize the nature of money based on the principle of cryptography. In essence, they do not have national credit endorsement and the essential attributes of legal currency (mandatory and legal compensation).

Table 1. Design features of CBDC PROJECTS

	Carry Interest or Not	Quantitative Restrictions	Anonymity	Offline	Cross-Boarder Payments
Bahamas	No	Yes	For lower tier	Yes/exploring	Future project
Canada	Undecided	Undecided	Undecided	Exploring	International collaboration
China	No	Yes	For lower tier	Yes	Experimenting/international collaboration
ECCU	No	Yes	For lower tier	No	Future project
Sweden	Undecided	Exploring	Undecided	Exploring	International collaboration
Uruguay	No	Yes	Yes, but traceble	No	Possible future project

[6] source: Gabriel Soderberg, International Money Fund(2022). Behind the Scenes of Central Bank Digital Currency

Table Credit: Original

Although private crypto-currency has brought about capital outflow, tax evasion and other problems for countries worldwide, its positive impact on improving efficiency, reducing payment costs and protecting users' privacy cannot be ignored due to its outstanding characteristics such as trans-region, anonymity, low cost and high efficiency. Many countries have seen the great potential of "digital currency with government credit endorsement", and set up research groups to explore the possibility of it landing in their own countries.

Nowadays, the first-tier countries that research and develop central bank digital currencies (CBDC), such as the Bahamas and Nigeria, have implemented their own CBDC, while China and some countries such as Thailand, Singapore and South Korea are in the second tier of "digital currency pilot", and the United States, Japan, the European Union and other countries or organizations are in the third tier of research and development. Although China is not the first country to implement the legal digital currency CBDC, it is ahead of most developed countries and at the forefront of the trend of currency digitization. According to Atlantic Council's data, as of June 2022, there were 45 retail CBDC projects, 7 wholesale CBDC projects, and 52 hybrid or unspecified CBDC projects in the world (Table 1).

3 Why We Need Central Bank Digital Money

The reasons and motives for issuing digital currency vary in different countries. For the central banks of all countries, especially the major central banks, the digital reform of money is very important. For CNY, there is also its internationalization path. Digitalization is a necessity of the times. CBDC is one of them, not all of them. Digitalization has

Table 2. Top 10 countries/regions in retail CBDC index

Ranking	Country or Region	Retail CBDC Index
1	Nigeria	95
2	Bahamas(the)	92
3	Mainland China	87
4	Jamaica	81
5	Eastern Caribbean	80
6	Uruguay	71
7	Ukraine	71
8	Thailand	69
9	Korea(the republic of)	61
10	Sweden	61

[7] source: Haydn Jones, PwC’s 2022 CBDC Global Index 1st Edition the people’s Bank of China(2021). The white paper Table/Photo Credit: Original.

many meanings, making transactions more convenient and fast. Cross currency transactions and transfers should also improve interoperability while ensuring legality and security.

PwC’s 2022 global central bank digital currency index (1st Edition) ranks the maturity of retail central bank digital currency development projects. China ranks third with a score of 75 points, ranking behind Nigeria and the Bahamas.

At present, the CBDC projects that have been officially launched include Jam-Dex in Jamaica, E-Naira in Nigeria, Sand Dollar in the Bahamas, and Dcash in the Eastern Caribbean (including 7 regions). It can be seen that small economies and developing countries are more flexible and radical in the development of CBDC, while developed countries and large economies are relatively cautious and slow in the development of CBDC (Table 2).

The white paper published by the people’s Bank of China (referred to as PBOC) implied that the goal of the Chinese DFC is to contribute to mores table value, more secure data, more effective regulation, more vital empowerment of individuals in payment activities and more intelligent applications. Designated operating institutions operate it. Based on the broad account system, it supports the loose coupling function of bank accounts. It is equivalent to physical CNY and has value characteristics and legal compensations [8].

3.1 Motivesforissuing CBDC

Play an Important Role in Currency Internationalization. ZhouXiaoChuan, at the 10th Caixin Summit in 2019, proposed that addressing the weakness of cross-border payment is an essential original intention of the central bank’s digital currency. Hoover Institution(2022)concluded that the digital CNY launched by the Central Bank of China

has the potential to play a significant role in CNY internationalization and changing the geo-economic pattern.[8] The Ministry of Finance sanctions review pointed out that technological innovations such as digital currencies, alternative payment platforms, and new ways of hiding cross-border transactions all potentially reduce the efficiency of American sanctions. [9] Currently, the global cross-border clearing system still highly depends on US swift and chips. The United States can impose financial sanctions on other countries at any time through the swift network, threatening China's financial security.

In terms of the cross-border payment “mbridge” project jointly tested recently by the digital Institute of the Central Bank of China, the Bank of Thailand, Dubai and the Hong Kong Monetary Authority, in theory, the currencies of the four regions can be settled in real time through CBDC. If this plan can be put into practice, it will greatly increase the efficiency of trade among the four regions. But the problem also arises. Who makes the laws and regulations, who reviews them, and who provides the flow pool (funds) of transactions in the four regions? In response to this series of problems, CBDC has a long way to go, both for business and retail.

Reduce Reliance on Online Payment and the Threat of Crypto-Currency.

According to Hoover Institution(2022), We Chat and Alipay, the two major mobile payment platforms, account for 94% of online transactions in China, with a value of \$16 trillion. [8] The emergence of private digital currency threatens the status of sovereign currency, central bank, and even the stability of financial markets. Firstly, several functions of sovereign currency have been replaced by private digital currency, which not only challenges the status of sovereign currency and central bank, but also reduces the effectiveness of the monetary policy. Secondly, risk overflow may occur due to the high-value fluctuation and strong speculative attributes of private digital currency. Therefore, the Central Bank in China must launch the same or more advanced digital currency to deal with it.

Better Monetary Control. Using big data, the central bank can analyze the issuance, circulation and storage of its digital currency, understand the operation law of its digital currency, and escort the issuance, circulation and monitoring of its digital currency. The massive volume of global transaction data provides an ideal scenario for applying artificial intelligence technology. Using tools such as machine learning, the central bank can visualize digital currency data and help make better and more efficient decisions.

Finance Inclusion. “Finance Inclusion” is a new concept promoted by the United Nations system during the International Year of Microcredit in 2005, which means that responsible and sustainable financial services are available to the public equally. The cost of developing digital currency in the whole society is almost zero. Daily behaviors and norms can be found entirely through a digital currency with big data. Digital currency may significantly impact the current monetary regulation and supervision. The future financial services maybe flat, and its circulation radius may become shorter and shorter. Then the so-called Inclusive Finance, the problem of difficult loans and expensive services can be addressed in mobile payment or electronic money.

3.2 Risks and Challenges of Central Bank Digital Money

The Issuance, Circulation and Governance of Digital Currency Lack Legal Support

An adequate set of relatively mature management laws is lacking. Before issuing e-CNY officially, it is necessary to establish and improve unique legal systems, policies and measures, strengthen supervision and risk prevention and control over the whole life cycle of e-CNY. On October 23, 2020, the central bank issued the law of the People’s Republic of China on the people’s Bank of China (revised draft for comments) and solicited public comments. Article 19 in Chapter III stipulates that “CNY includes physical form and digital form”, providing a legal basis for issuing digital currency. But the definition and specific form of e-RMB is unclear.

Underlying Technology Immature

The white paper implies that digital CNY adopts centralized management and two-tier operation. It is a hybrid system whose core is based on centralized technology, fully compatible with DLT or other technologies that intermediaries choose to use. CBDC must develop strong concurrent processing ability and efficiency to become the mainstream transaction currency. This approach requires more internal capacity and resources from the central bank but offers greater control over the development process.

Security

Perhaps the biggest concern is security, especially network security. The PBOC pointed out that cyber-attacking risks are substantial if the e-CNY becomes a primary payment system. Security vulnerabilities may be more frequent and possibly more localized in the current system, where multiple banks are responsible for their own security. Therefore, if hackers attack the central bank, the entire system may be fatally damaged. However, the actual risk may be reduced because the central bank can use its government’s network expertise (Table 3).

Table 3. DESIGN FEATURES OF CBDC PROJECTS

	Carry interest or Not	Offline
Bahams	No	Yes/exploring
Canada	Undecided	Exploring
China	No	Yes
ECCU	No	No
Sweden	Undecided	Exploring
Uruguay	No	No

[6] source:International Money Fund(2022). Behind the Scenes of Central Bank Digital Currency Table/Photo Credit:Original

Financial Disintermediation

The Federal Reserve Bank of Philadelphia (2020) argued that the central bank's digital currency might bring a "disintermediation" effect to the commercial banking system. [10] According to the design scheme of DCEP, a two-tier operation system is adopted. The central bank first converts the digital currency to banks or other operating institutions, and then these institutions convert it to the public. Commercial banks or other operating institutions pay 100% of the reserves to the central bank, meaning they cannot derive loans based on the central bank's digital currency. Therefore, commercial banks' credit granting and credit currency creation ability may be negatively affected by the loss of their deposits to the central bank's digital currency account. It may reduce the bank's credit support to the real economy, resulting in a "disintermediation" effect on the commercial banking system. Some researcher shave studied the "disintermediation" effect of commercial banks through theoretical modeling. The Hoover institution pointed out that the e-CNY has the potential to serve many of the approximately two hundred million Chinese unbanked consumers, 39 expanding access to the payment system beyond the current boundaries of banks, Alipay, and WeChat Pay [8].

4 Conclusions

CBDC exploration is still in an early stage, and not all country experiences can be easily transferred overseas. Digital currency redefined currency and even completely redefined finance. Digital currency maybe used to build a new financial system, but it is still debatable whether such reform is a cost or a prize. The author considers that they only emphasize innovation costs but do not highlight on more important layer. Thesereform sand innovations make it favorable to use financial technology to establish the new financial system as quickly as possible. Sooner or later, it will also pay the price if we do not embrace the future. We expect the following problem will be solved: How could a CBDC affect financial stability? What innovations could affect design and policy related to CBDC with technology advances? Will CBDC completely replace paper money in the future? Will CBDC shake the status of dollar in the future? This article represents an early contribution on this CBDC exploration.

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