

[DOI: 10.20472/EFC.2023.019.027](https://doi.org/10.20472/EFC.2023.019.027)

FENGQI XIE

Tomsk State University, Russian Federation

MARINA RYZHKOVA

Tomsk State University, Russian Federation

THE DEVELOPMENT STATUS OF CBDC: A COMPARATIVE STUDY

Abstract:

In recent years, the concept of central bank digital currency (CBDC) has gained significant attention in the field of monetary economics and finance. CBDC is a digital form of central bank money that can be used by the public and commercial banks for payments and other transactions. This paper provides a comparative study of the development status of CBDC in different countries and regions, including China, Sweden, the United States, and the European Union. The study examines the motivations for developing CBDC, the design features of CBDC, the legal and regulatory frameworks for CBDC, and the potential benefits and risks of CBDC. The findings suggest that while there is no one-size-fits-all approach to CBDC, there are some common themes and challenges that policymakers need to address in designing and implementing CBDC.

Keywords:

Central bank digital currency; Development status; Motivation; Design feature; Legal and regulatory frameworks; Potential benefits and risks

JEL Classification: G32, E58, G28

1 Introduction

Central bank digital currency (CBDC) has become a hot topic in the field of monetary economics and finance in recent years, with many central banks around the world exploring the possibility of issuing their own digital currencies.

Central Bank Digital Currency is a digital currency issued by the central bank named after the national unit of account, which represents the liability of the central bank (Kosse & Mattei, 2022). Like physical cash, CBDCs can also be used for everyday payments and can be exchanged for the same price as the currency of commercial banks (Armelius, 2021). The potential benefits of CBDC include increased efficiency, financial inclusion, and reduce costs associated with physical cash. However, CBDC also poses significant risks, such as the potential for financial instability, money laundering, and operational risk (Kiff, et al., 2020).

The emergence of CBDC has been driven by several factors, including technological advances, changes in consumer behavior, and the need for more efficient and secure payment systems (Xiang & Wang, 2021). According to research by the Bank for International Settlements (BIS), among the 81 central banks participating in the survey, 90% of the central banks are working on some form of CBDC, and 62% are conducting experiments or proofs of concept (Kosse & Mattei, 2022).

Despite the growing interest in CBDC development, there is still much debate and uncertainty surrounding the design and implementation of CBDC. This is because CBDC is a complex and multifaceted issue that requires careful consideration of a wide range of factors, including technical design, legal and regulatory frameworks, and potential risks and benefits.

The objectives of this study are to provide a comparative analysis of the development status of CBDC in different countries, including China, Sweden, the United States, and the European Union (EU). The study aims to examine the motivations for developing CBDC, the design features of CBDC, the legal and regulatory frameworks for CBDC, and the potential benefits and risks of CBDC. By doing so, this study seeks to identify common themes and challenges that policymakers need to address in designing and implementing CBDC.

The significance of this study lies in its potential contribution to the field of monetary economics and finance. As CBDC development continues to evolve, there is a growing need for policymakers and stakeholders to understand the motivations, design features, legal and regulatory frameworks, and potential benefits and risks of CBDC. This study can inform policymakers and stakeholders about the best practices in CBDC design and implementation, as well as the potential impact of CBDC on the payment system, financial stability, and monetary policy.

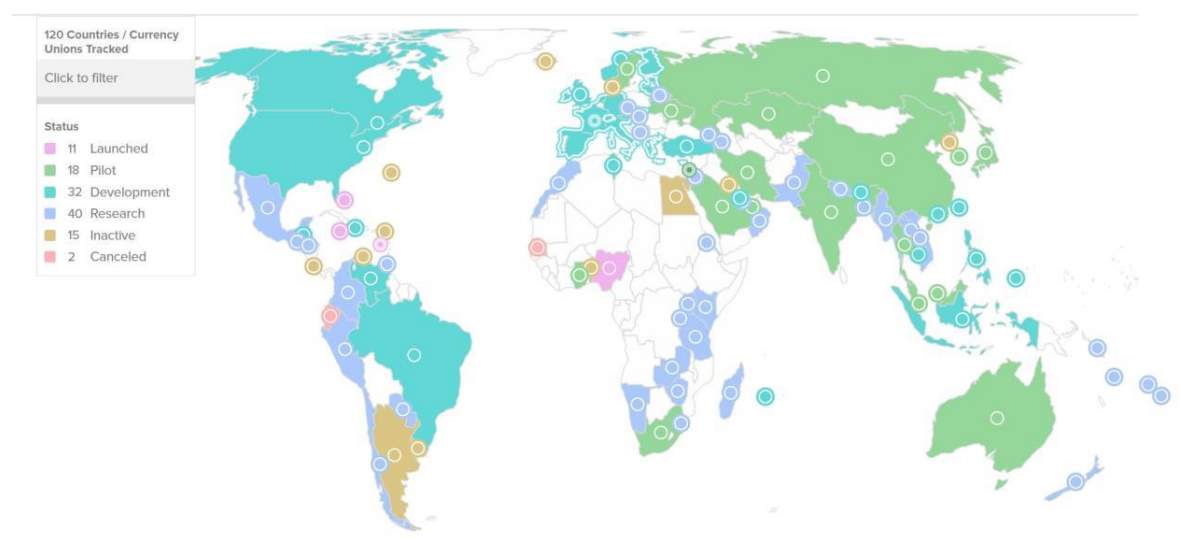
2 Review of Literature

The advancement of communication technology and the rise of cryptocurrencies have promoted the research and development of digital currencies by global central banks (Zhou, 2022), and accelerating the development of central bank digital currencies has become an important option for major central banks around the world to maintain financial stability (Peng & Bao, 2022).

At present, 114 countries, representing over 95% of global GDP (Gross Domestic Product), are exploring CBDCs. Among them, only 11 countries and regions including Nigeria, the Bahamas, and Jamaica have fully launched a central bank digital currency project, and most of the rest

are in the research stage, for example, Mexico, Belarus, etc, accounted for about 33.3%. In addition, 18 countries and regions including China, Russia and Sweden are in the pilot stage. As of December 2022, all G71 economies have now moved into the development stage of a CBDC. 18 of the G20 countries are now in the advanced stage of CBDC development. Of those, 7 countries are already in pilot. Nearly every G20 country has made significant progress and invested new resources in these projects over the past six months. In 2023, over 20 countries will take significant steps towards piloting a CBDC. Australia, Thailand, Brazil, India, South Korea and Russia intend to continue or begin pilot testing in 2023. The European Central Bank (ECB) is also likely to start a pilot next year (Atlantic Council, 2023).

Picture 1 : The state of CBDC around the world in 2023



Source: Atlantic Council. (2023). Central Bank Digital Currency Tracker. Atlantic Council. 2023-05-29. Retrieved May 29th, 2023, from <https://www.atlanticcouncil.org/cbdctracker/>

2.1 Motivations for CBDC Development

Financial stability, monetary policy implementation, financial inclusion, and payment efficiency and security are the main motivations for global central banks to pay attention to CBDC development, but their importance varies according to the economic and financial environment of each country (Zhou, 2022). Developed economies pay more attention to the payment security of CBDCs and the stability of the financial system (Liu & Guo, 2021), while promoting financial inclusion was one of the main motivations for CBDCs in emerging markets and low-income economies (Tan, 2023). In China, CBDC development has been motivated by the need to reduce the dominance of digital payment platforms and increase financial inclusion (Liu, 2020). In Sweden, the motivation for issuing CBDCs is to fill the gap in declining cash flow and maintain the robustness of the monetary system (Zhou, 2022). In the European Union, the motivation for

¹ The G7 is an informal grouping of seven of the world's advanced economies, including Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States, as well as the European Union.

² The Group of Twenty (G20) is an international economic cooperation forum established on September 26, 1999 in Berlin, Germany, comprising the Group of Seven (Canada, United States, United Kingdom, France, Germany, Italy, Japan), the BRICS countries (Brazil, Russia, India, China, South Africa), seven major economies (Mexico, Argentina, Turkey, Saudi Arabia, South Korea, Indonesia, Australia) and the European Union.

issuing CBDCs is to strengthen the payment infrastructure in the euro area and break down mobile payment barriers between member countries (Zhou, 2022). In the United States, the motivation for issuing CBDCs is to promote the stable implementation of fiscal and monetary policies (Zhou, 2022).

2.2 Design Features of CBDC

The motivation of the central bank to issue a CBDC determines the different design options of the CBDC, the design of a CBDC determines the economic impact that a CBDC may have, so it is particularly important for the central bank to choose which design it should choose (Liu & Guo, 2021). Some key design features include the technology used, the degree of anonymity and privacy, and the degree of interoperability. In China, the central bank digital currency is designed as a two-tier operating system³, which is based on blockchain-based distributed ledger technology⁴, because blockchain technology is characterized by anonymity (Chen, 2021). In Sweden, CBDC is designed to prioritize privacy and anonymity, and it employs the underlying technology that is dominated by blockchain (Zhou, 2022). The EU's digital currency research and development attaches great importance to privacy, security, and ease of use, and CBDC is designed to be interoperable (Zhou, 2022).

2.3 Legal and Regulatory Framework for CBDC

The specific design choices of a digital currency will determine the legal basis for its issuance (ECB, 2020). The issuance of a CBDC requires a legal framework that gives the central bank the authority to do so, the proportion of central banks with such legal powers rose to 26%, in addition, about 10% of jurisdictions are currently in the process of amending their laws (Kosse & Mattei, 2022). In China, in order to deal with the security issues and illegal transactions of central bank digital currencies, China has formulated and implemented existing laws and regulations based on physical currency and the constitution (Chen, 2021). In the United States, at present, US law still does not clearly define CBDCs as legal tender, and before issuing CBDCs, it needs to be amended to the Federal Reserve Law to include it in the mission, functions and powers of the Federal Reserve (Zhou, 2022). The EU plans to introduce restrictive measures on the digital euro to combat illegal payments by CBDCs (Zhou, 2022).

2.4 Potential Benefits and Risks of CBDC

Several studies have identified the potential benefits of CBDC, which include improving payment efficiency and enhancing payment flexibility (Liu, 2020), increasing financial inclusion and facilitating cross-border payment settlement (Peng & Bao, 2022), reducing the cost and risk of cash and improving the central bank's ability to regulate and control the economy with precision (Xiang & Wang, 2021), and improving the effectiveness of monetary policy and the precision of financial supervision (Qiao et al., 2018). However, CBDC also poses potential risks,

³ Two-tier operation system: the first layer is the central bank, and the second layer is commercial banks, telecom operators and third-party payment network platform companies, central banks exchange digital currency to commercial banks or other operating institutions, which then exchange them to the public.

⁴ Distributed ledger technology (DLT) is the technological infrastructure and protocols that allow simultaneous access, validation, and record updating across a networked database.

such as the risk of substitution to the national currency (Peng & Bao, 2022), the risk of cyberattacks (Zhou, 2022), the risk of money laundering and terrorism financing (Chen, 2021), and the risk of disintermediation of commercial banks (Song & Xu, 2022). According to a study by the European Central Bank (ECB), the potential benefits and risks of CBDC depend on the design features and the regulatory framework of CBDC (ECB, 2020).

3 Methodology and Data Propositions

3.1 Data Gathering

The data for this study was collected from various sources, including academic journals, reports, and websites. The focus of the data collection was to gather information on the development of CBDC in China, Sweden, the United States, and the European Union, including the motivations, design features, legal and regulatory frameworks, and potential benefits and risks of CBDC.

China, Sweden, the United States, and the European Union were chosen for comparative analysis in this study because they represent different regions of the world and have made significant progress in CBDC development. China is often cited as a leader in CBDC development, with the People's Bank of China having launched pilot programs for its digital yuan since 2020; Sweden is another country that has made significant progress in CBDC development, with the Sveriges Riksbank⁵ having been exploring the development of an e-krona since 2017; The Federal Reserve has been conducting research into the development of a digital dollar, but progress has been slower than in other countries; The European Union is also exploring the development of CBDC, with the European Central Bank having launched a public consultation on the digital euro in 2020. Additionally, these four countries and regions represent a diverse range of economic and political contexts, which will allow for a more comprehensive analysis of CBDC development.

3.2 Data Analysis

This paper used data analysis and comparative analysis to analyze the development status of central bank digital currency (CBDC) in different countries and regions, including China, Sweden, the United States, and the European Union. Data analysis is conducted to analyze quantitative data on the development of CBDC in different countries. Comparative analysis is conducted to compare the development of CBDC in different countries and identify similarities and differences in the motivations, design features, legal and regulatory frameworks, and potential benefits and risks of CBDC.

Then, the data was synthesized into a narrative that provided a coherent and comprehensive overview of the development of CBDC in each country. The narrative was structured around the key categories of the data, and provided insights into the motivations, design features, legal and regulatory frameworks, and potential benefits and risks of CBDC in each country.

4 Results and Discussion

⁵ Sveriges Riksbank, or simply the Riksbank, is the central bank of Sweden. It is the world's oldest central bank and the fourth oldest bank in operation.

Table 1: The development of CBDC in China, Sweden, the United States, and the European Union.

Country	Motivations	Design features	Legal and regulatory frameworks	Potential benefits and risks
China	reduce the dominance of digital payment platforms and increase financial inclusion	two-tier operating system; based on blockchain-based distributed ledger technology; anonymity	the CBDC is subject to strict regulations and is tightly controlled by the central bank	the potential benefits of CBDC include reducing the dominance of digital payment platforms and increasing financial inclusion, while the potential risks include the concentration of power in the central bank and the potential for surveillance
Sweden	fill the gap in declining cash flow and maintain the robustness of the monetary system	prioritize privacy and anonymity; it employs blockchain technology	the regulatory framework for CBDC is designed to ensure that the e-krona is interoperable with existing payment systems and does not pose a threat to financial stability	the potential benefits of CBDC include reducing the use of cash and increasing financial inclusion, while the potential risks include privacy concerns and the risk of disintermediation of commercial banks
The United States	promote the stable implementation of fiscal and monetary policies	the CBDC design is still being developed, but it is likely to be decentralized and interoperable with existing payment systems	the legal and regulatory framework for CBDC is decentralized, with different agencies having different responsibilities for regulating CBDC	the potential benefits of CBDC include improving the efficiency of the payment system and enhancing financial inclusion, while the potential risks include the risk of cyberattacks and the risk of disintermediation of commercial banks
the European Union	strengthen the payment infrastructure	attaches great importance to privacy, security,	the legal and regulatory framework for	the potential benefits of CBDC include enhancing

	in the euro area and break down mobile payment barriers between member countries	and ease of use; designed to be interoperable	CBDC is being developed at the European Union level to ensure that the digital euro is interoperable across different countries and does not pose a threat to financial stability	the resilience of the financial system and ensuring that Europe remains competitive in the global digital economy, while the potential risks include the risk of cyberattacks and the risk of disintermediation of commercial banks
--	--	---	---	---

Source: Own adjustment

The findings suggest that there is no one-size-fits-all approach to CBDC, and each country has its own unique motivations and design features for developing CBDC. For example, China's CBDC, known as the Digital Currency Electronic Payment (DCEP), is primarily aimed at promoting financial inclusion and reducing dependence on cash, while Sweden's CBDC, known as the e-krona, is focused on addressing the decline in cash usage and ensuring the stability of the payment system.

The study also finds that there are some common themes and challenges that policymakers need to address in designing and implementing CBDC. These include the need for a robust legal and regulatory framework to ensure the safety and soundness of the payment system, the need to address privacy and security concerns, and the need to ensure interoperability with existing payment systems.

The limitations of this methodology include the potential for bias in the data gathered. The sample size and representativeness of the data may also be limited, depending on the availability and accessibility of data. Additionally, the methodology is subject to the limitations of the available data and the accuracy of the information provided. The limitations of the methodology can be addressed through efforts to ensure the quality and representativeness of the data and a critical evaluation of the methodology itself.

5 Conclusion

In conclusion, the development of CBDC has significant implications for the future of central banking and monetary policy. While CBDC offers many potential benefits, it also poses significant risks and challenges that policymakers need to address. The comparative study of CBDC in different countries provides insights into the motivations, design features, legal and regulatory frameworks, and potential benefits and risks of CBDC. The findings suggest that policymakers need to carefully consider the unique circumstances of their country and design CBDC in a way that maximizes the benefits while minimizing the risks. As the development of CBDC continues to evolve, further research is needed to evaluate the effectiveness and impact of CBDC on the payment system, financial stability, and monetary policy.

6 References

Kosse, A., & Mattei, I. (2022). Gaining Momentum—Results of the 2021 BIS Survey on Central Bank Digital

Currencies. *BIS Papers*. 2022, No. 125.

ARMELIUS, H., CLAUSSEN, C. A., & HULL, I. (2021). On the possibility of a cash-like CBDC. *Sveriges Riksbank Staff memo*.

KIFF, J.S., ALWAZIR, J., DAVIDOVIC, S., FARIAS, A., KHAN, A., KHIAONARONG, T., MALAIKA, M., MONROE, H., SUGIMOTO, N., TOURPE, H., & ZHOU, P. (2020). A Survey of Research on Retail Central Bank Digital Currency. *Comparative Political Economy: Monetary Policy eJournal*. 2020.

XIANG, K. & WANG, G. B. (2021). Driving Force, Impacts and Suggestions on the Issue of Central Bank Statutory Digital Currency. *Research on Financial and Economic Issues*. 2021, No. 1, s. 64 - 73.

ZHOU, Y. R. (2022). A summary of the Research and Development Progress of International Central Bank Digital Currencies. *Southwest Finance*. 2022, No, 2, s. 3 - 15.

PENG, Y. C., & BAO, H. (2022). Development of Global Central Bank Digital Currencies: Review and Prospect. *Overseas Investment & Export Credits*. 2022, No. 1, s. 9 - 14.

Atlantic Council. (2023). Central Bank Digital Currency Tracker. *Atlantic Council*. 2023-05-29. Retrieved May 29th, 2023, from <https://www.atlanticcouncil.org/cbdctracker/>

LIU, K., & GUO, M. X. (2021). Issuing Motivation and Design of Central Bank Digital Currency and Policy Implications for China. *International Economic Review*. 2021, No, 3, s. 137 - 154.

TAN, B.J. (2023). Central Bank Digital Currency and Financial Inclusion. *SSRN Electronic Journal*.

LIU, D. J. (2020). The necessity of the Issuance of Legal Digital Currency by the Central Bank and the Exploration of the Implementation Mode. *China Journal of Commerce*. 2020, No, 15, s. 42 - 44.

CHEN, L. (2021). The Regulatory Path of the Central Bank Digital Currency. *Journal of Fujian Institute of Financial Administrators*. 2021, No, 1, s. 9 -15.

ECB. (2020). Report on a Digital Euro. *European Central Bank*.

QIAO, H. S., WANG, P., & XIE, S. S. (2018). Digital Legal Tender: Issue Logic and Substitution Effect. *South China Finance*. 2018, No, 3, s. 71 - 77.

SONG, M., & XU R.F. (2022). New Research Progress on Central Bank Digital Currency Innovation. *Economic Perspectives*. 2022, No, 5, s. 143 - 160.