THE INTRODUCTION OF A CENTRAL BANK DIGITAL CURRENCY: CASE STUDIES AND EXPERIENCES FROM OTHER COUNTRIES

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ABSTRACT

This paper delves into the evolving landscape of Central Bank Digital Currencies (CBDCs) with a focus on the strategies and developments in China, the United States, and Sweden. China emerges as a pioneer, actively implementing its Digital Yuan to enhance payment system efficiency and global competitiveness, emphasizing the potential for financial inclusion. The United States takes a cautious approach, conducting comprehensive research to ensure global financial stability, recognizing the pivotal role of the US Dollar as a world reserve currency. Sweden, propelled by declining cash usage, advances the e-Krona initiative, showing an advanced phase of CBDC development, aiming at modernizing payment systems and fostering financial inclusion. The comparative analysis reveals various facets and regulatory challenges faced by these nations. While China demonstrates the possibilities of CBDCs in advancing financial inclusion and modernizing payments, the United States prioritizes careful consideration of risks and opportunities due to its global financial responsibilities. Sweden illustrates the role of CBDCs in a digitally evolving society. Looking ahead, broader CBDC adoption is anticipated, drawing on insights from pioneer nations. Technological advancements, particularly in blockchain and distributed ledger technology, will play a crucial role. The introduction of CBDCs in major economies may impact the global currency order, influencing currency competition and the role of the US Dollar as a world reserve currency. In conclusion, the world stands at the threshold of a potentially transformative era in currency. CBDCs present promising opportunities alongside significant challenges, making them a key area for continued research, policy formulation, and innovation.

Keywords: Digital Currencies, Central Bank Digital Currencies (CBDCs), Financial Inclusion, Blockchain Technology.

INTRODUCTION

This paper is dedicated to a highly topical and dynamic topic in the field of financial technology: the development and introduction of digital currencies by central banks.

Development of digital currencies

The development of digital currencies, known as Central Bank Digital Currencies (CBDCs), has been a topic of significant interest and change in recent years. Digital currencies have experienced a rapid increase in popularity and acceptance. Initially, digital currencies were viewed primarily as a novel concept with limited practical application. However, with the introduction of Bitcoin in 2009, the digital currency landscape began to change (Boros & Horváth, 2022).

The concept of digital currencies has grown from a niche interest to a global phenomenon, with a wide range of cryptocurrencies now available on the market. The development of digital currencies has been facilitated by advances in computer science and technology, particularly in the areas of blockchain and cryptography.

The use of digital currencies has raised important considerations regarding their regulation and integration into existing financial systems. As digital currencies become more widespread, the need to address issues related to security, privacy and regulatory compliance grows. Additionally, the emergence of central bank digital currencies has further shaped the digital currency landscape, with several countries exploring the possibility of issuing their own digital currencies (Riexinger et al., 2023).

Motivation to introduce a CBDC

The introduction of central bank digital currencies is motivated by several factors. First, CBDCs are seen as a possible tool to promote financial inclusion. It is argued that a well-designed and implemented CBDC can provide a viable solution to the problems of financial inclusion in different regions as it can digitize value chains, improve access to digital financial services, and increase the efficiency of digital payments (Ozili, 2021).

Second, the adoption of CBDCs is motivated by the potential to modernize payment systems and improve the efficiency of financial transactions. CBDCs can offer low transaction costs and can be used offline when there is no internet connection, which can significantly improve the accessibility and efficiency of digital payments (Ozili, 2021). In addition, the digitalization of government and the transition to a "cashless" society are also driving the discussion about CBDCs (Hrytsai, 2023).

Objective & Relevance

The rise of cryptocurrencies has led central banks to explore the potential of issuing their own digital currencies as a means of maintaining monetary sovereignty and managing the risks associated with private digital currencies (Opare & Kim, 2020).

Additionally, potential impacts of CBDCs on monetary policy and financial stability are an important motivating factor for their adoption. CBDCs can influence the transmission of monetary policy, and research has shown that the introduction of a CBDC has no adverse impact on banks' lending activities and can even promote them (Andolfatto, 2018). Furthermore, the introduction of a CBDC allows the central bank to act as an intermediary on a large scale by competing with private financial intermediaries for deposits (Fernández-Villaverde, 2020).

In this work, various relevant countries are examined with regard to the introduction of CBDCs and challenges and opportunities are developed and compared.

Theoretical framework

This chapter explains the theoretical framework for central bank digital currencies, examines differences to traditional currencies and analyzes potential impacts.

Definition and characteristics of CBDC

The definition and characteristics of CBDCs cover several key aspects. CBDCs can be defined as a form of digital or electronic currency that is issued by the central bank and represents a liability

of the central bank, but differs in its attributes from physical cash while performing the same function as cash for payments (Goodell & Nakib, 2021).

This distinction is important because it highlights the unique nature of CBDCs as a digital form of central bank money that is risk-free and represents a liability on the central bank's balance sheet (Goodell & Nakib, 2021).

It is also important to consider the impact of CBDCs on financial inclusion, as they can potentially improve access to digital financial services and increase the efficiency of digital payments, while addressing the challenges posed by private cryptocurrencies and stablecoins. In addition, the development of CBDCs has led central banks to research the optimal countries for their implementation and the impact on open innovation in the payments industry, reflecting global interest and research efforts in this area (Alonso et al., 2021).

Comparison to traditional currencies

In ***Table 1*** The differences between CBDCs and traditional currencies are shown.

Table 1 Comparison of CBDCs and traditional currencies

aspect	CBDCs	Traditional currencies
Form and nature of currency	Digital or electronic form issued and regulated exclusively by the Central Bank	Physical (banknotes and coins) and digital forms, physical form issued by the Central Bank
Technological basis	Based on blockchain or distributed ledger technology	Dependent on centralized banking systems and traditional remittance and settlement systems
Control and output	Directly controlled and issued by the Central Bank	Physical issuance by the central bank, digital form mainly controlled by private banks
Access and Use	Universal access via digital platforms, independent of bank accounts	Access to digital forms usually requires a bank account, physical money generally accessible
Transaction speed and efficiency	Faster and more efficient transactions, especially cross-border	Transactions, especially cross-border, can be slower and more expensive
Data protection and transparency	Allows efficient monitoring and tracking of transactions, raises privacy concerns	Offers a higher level of anonymity, especially in physical form

Source: own representation

In summary, CBDCs represent a significant evolution of the concept of traditional currencies, with the potential to increase efficiency, transparency and inclusion in the financial system, while introducing new challenges in terms of privacy, security and the impact on existing financial institutions and markets.

Potential impact on the financial system

CBDCs have the potential to influence various aspects of the financial system, including monetary policy, financial stability, payment systems, and the banking sector (Cheng, 2022). The introduction of CBDCs could influence the conduct of monetary policy as central banks would need to consider the impact of CBDCs on money supply, interest rates and exchange rates (Mooslechner, 2010). Additionally, the issuance of CBDCs could affect the transmission mechanism of monetary policy and the overall effectiveness of monetary policy instruments (Boros & Horváth, 2022).

Additionally, the introduction of CBDCs could have an impact on financial stability. CBDCs could influence demand for deposits in commercial banks and potentially lead to changes in the structure of the banking sector. This could affect the stability and functioning of financial markets and institutions. Additionally, the potential introduction of CBDCs raises questions about the role of central banks as lenders of last resort and the potential impact on the overall stability of the financial system (Andolfatto, 2018).

Additionally, the implementation of CBDCs could impact payment systems, including cross-border payments, financial inclusion and the efficiency of payment transactions. Integrating CBDCs into existing payment systems could lead to changes in the way transactions are conducted and settled, potentially improving the efficiency and accessibility of digital payments (Huang & Mayer, 2022).

International analysis

The following chapter examines the experiences with CBDCs from various relevant countries. The main focus here is on China, Sweden and the USA.

Methodology

The selective literature research methodology (Heil, 2020) used in this analysis was based on the conscious and targeted selection and evaluation of key publications and sources that are considered particularly relevant to the comparatively new research area of digital central bank digital currencies (CBDCs) (Sandner et al., 2020). This methodological approach was chosen to provide an in-depth understanding of the complex subject matter by focusing on high quality, relevant and timely sources.

The decision to include different types of sources underlines the effort to ensure a comprehensive perspective, despite the limited availability of literature on this specific and relatively new area of research. Academic journals, reports from central banks and international financial institutions, and analyzes from economists were included to gather a wide range of insights to address the challenges of the limited literature available (Heil, 2020).

The use of selective literature research was particularly justified against the background of the dynamics and complexity of this relatively new research area. The limited availability of literature on CBDCs requires a methodological approach that focuses on a focused and targeted selection of information sources (Heil, 2020, Martin, 2023). This not only made it possible to avoid overloading with non-central information, but also ensured that the analysis is based on well-founded and trustworthy information that, despite the still limited literature available, reflects the current status and prospects of CBDCs in the financial landscape.

China

China has been at the forefront of the development and implementation of CBDCs, particularly with the launch of the Digital Yuan (also known as e-CNY or DCEP - Digital Currency Electronic Payment). This advancement positions China at the forefront of global efforts to develop official digital currencies.

Introduction of the digital yuan

The development of the digital yuan reflects China's strategic efforts to promote financial stability, competitiveness and monetary policy effectiveness, in line with the global trend of central banks exploring the introduction of CBDCs (Müller & Kerényi, 2022).

The digital yuan represents a significant step in the development of CBDCs as it demonstrates the practical implementation of a central bank-issued digital currency on a large scale. China's digital yuan initiative has implications for the global digital currency landscape as it sets a precedent for other countries and central banks to consider developing and implementing their own CBDCs.

The development of the digital yuan also reflects China's commitment to using digital technologies to modernize its financial system and increase the efficiency of payment systems (Müller & Kerényi, 2022).

Additionally, the launch of the digital yuan has implications for cross-border payments, financial inclusion, and the overall digitalization of the Chinese economy. The development of the digital yuan is closely intertwined with China's broader economic and technological strategies and reflects the country's efforts to position itself at the forefront of digital currency innovation and adoption. As such, the launch of the digital yuan represents an important milestone in the development of CBDCs, with implications for the global financial system and the future of digital currencies.

Experiences and challenges

One of the key lessons learned from the launch of the digital yuan in China was its role in promoting financial inclusion and innovation in digital payments. The digital yuan has been positioned as a means to improve financial accessibility and efficiency, particularly in the context of China's rapidly advancing digital economy (Chen & Nesterov, 2023). This experience reflects the potential of CBDCs to address financial inclusion challenges and advance the digital transformation of payment systems.

However, the introduction of the digital yuan has also brought with it several challenges. This concerns, for example, the legal and regulatory framework that governs the digital yuan, particularly with regard to the protection of personal information and the regulation of illegal financial activities (Cheng, 2022). This highlights the complex regulatory considerations surrounding CBDCs, particularly with regard to ensuring privacy and security while addressing financial integrity concerns.

Furthermore, the development of the digital yuan has raised geopolitical considerations, with China aiming to gain a key role in international projects and strengthen its position in the global financial fabric (Boros & Horváth, 2022). This experience highlights the geopolitical implications of CBDCs and the potential for competition and collaboration between countries in the digital currency space.

Sweden
Sweden's involvement in digital currencies is particularly relevant as Sweden is one of the countries with the lowest cash usage in the world and therefore provides a natural environment for the introduction of a digital currency.

E-Krona project
The e-Krona project is a significant initiative by Sveriges Riksbank, the central bank of Sweden, to explore the potential for developing and implementing a CBDC (Søilen & Benhayoun, 2021). The e-Krona project aims to address various aspects of digital currency, including monetary policy, payment systems and financial inclusion.

The e-Krona project is part of a broader global trend in which central banks are exploring the potential of CBDCs, with a focus on digitizing the financial system and modernizing payments infrastructure. The project reflects Sweden's efforts to use digital technologies to increase the efficiency and accessibility of payment systems, while taking into account the potential impact on monetary policy and financial stability (Fernández-Villaverde et al., 2020).

Impact on society and the economy
The e-Krona project has significant impacts on society and the economy. The project aims to explore the development and potential implementation of a central bank digital currency, which could have far-reaching implications for various aspects of the digital economy, financial systems and societal well-being (Opare & Kim, 2020).

The e-Krona project could revolutionize the way financial transactions are carried out, potentially leading to increased efficiency, accessibility and security in payment systems. This could have a profound impact on the economy by encouraging innovation, reducing transaction costs and driving financial inclusion. Additionally, the project could contribute to the modernization of financial infrastructure, in line with the global trend of digital transformation in the financial sector (Hrytsai, 2023).

USA
In the US, the topic of central bank digital currencies is also an area of growing interest, although with a different approach and pace compared to countries such as Sweden or China. The Federal Reserve, the central bank of the United States, has looked into the possibility of a US CBDC, but an official decision to launch is still pending (Cheng, 2022).

Discussion about the digital dollar
The discussion surrounding the digital dollar has gained traction in recent years, with reflections on the potential impacts and challenges associated with developing and implementing a digital form of the U.S. dollar. The emergence of discussions about a potential digital US dollar began in 2020, reflecting the growing interest in leveraging digital technologies to modernize the financial system and improve the efficiency of the payments infrastructure (Huang & Mayer, 2022).

One of the key considerations in the digital dollar discussion is the potential impact on the monetary sovereignty and internationalization of the US dollar. The development of a digital dollar could have implications for currency dynamics and global power competition, particularly in the

context of the evolving digital currency landscape and the increasing role of digital technologies in the global economy (Huang & Mayer, 2022).

Political and economic considerations

The discussion about the digital dollar has significant political and economic implications. From a policy perspective, the development of a digital dollar raises considerations of monetary sovereignty, global power competition, and the regulatory framework for digital currencies. The potential introduction of a digital dollar could affect the currency dynamics and internationalization of the US dollar, which would impact global financial systems and geopolitical relations. Additionally, the regulatory and legal framework governing digital currencies would need to be carefully considered to ensure privacy, security and financial integrity (Cheng, 2022).
Economically, the discussion about the digital dollar has implications for financial innovation, digital inclusion and the modernization of payment systems. The development of a digital dollar could promote innovation, reduce transaction costs and advance financial inclusion, potentially transforming the financial landscape and increasing economic efficiency. Additionally, the digital dollar could have an impact on the broader digital transformation of the US economy and fit into the global trend of digitalization in the financial sector (Huang & Mayer, 2022).

Results

The results from the previous analysis are in **Table 2** shown. In summary, developments in these countries show different facets and strategies when dealing with CBDCs. While some countries such as China and Sweden are already actively implementing it, others such as the USA are still in the phase of thorough consideration and research. However, all three countries face common challenges in terms of regulation, maintaining financial stability and integration into their respective financial systems.

country	Development stage and approach	Goals of CBDC introduction	Regulatory and legislative considerations
Sweden	Advanced: driven by the decline in cash use	Modernization of payment systems and financial inclusion	Development of the regulatory framework
China	Pioneer: Focus on improving payment system efficiency and increasing global competitiveness	Modernization of payment systems, financial inclusion, efficiency and global presence	Advanced Regulatory Structures for the Digital Yuan
USA	At the beginning: Comprehensive research and global financial stability	Ensuring the global dominance of the US dollar	Development of the regulatory framework

Table 2 Comparison of CBDCs and traditional currencies

Source: own representation

Conclusions

In the final chapter, appropriate conclusions are drawn and a conclusion is drawn up. Furthermore, an outlook into the future is given.

Conclusion

This paper has taken an in-depth look at the strategies and developments of CBDCs in China, the USA and Sweden. China has established itself as a pioneer in the implementation of the Digital Yuan, with a clear focus on improving the efficiency of payment systems and increasing global competitiveness. The country demonstrates the opportunities that CBDCs offer for increasing

financial inclusion and modernizing payments, while emphasizing the importance of an advanced regulatory framework.

In contrast, the US is taking a more cautious approach to adopting a digital dollar. The comprehensive research and consideration of global financial stability reflects the US dollar's role as a world reserve currency and underscores the importance of carefully considering the risks and opportunities of digital currencies.

Sweden, with its e-krona initiative, illustrates an advanced phase in the development of a CBDC. Driven by the decline in cash use, Sweden is focusing on modernizing its payment system and promoting financial inclusion. The example of Sweden shows how CBDCs can play a role in an increasingly digital society.

Outlook for future developments

Given the experiences and strategies from countries such as China, the USA and Sweden, the following possible developments have been identified:

1. Wider introduction
2. Technological advances
3. Impact on the global monetary order

More countries will explore and pilot CBDCs, leveraging insights and experiences from pioneering countries. This could lead to a more diverse landscape of CBDC models tailored to different national needs and contexts. The development of new technologies, particularly in the area of blockchain and distributed ledger technology, will continue to play a key role in the design of CBDCs. Improvements in security, scalability and interoperability will be crucial. The introduction of CBDCs in major economies such as China and possibly the US could impact the global monetary order, particularly in relation to currency competition and the role of the US dollar as the world reserve currency.

Overall, the world is at the beginning of a potentially transformative era in the world of currencies. CBDCs offer both promising opportunities and significant challenges and will undoubtedly continue to be a key area for research, policymaking and innovation.

REFERENCES

- Alonso, S., Jorge-Vázquez, J., & Forradellas, R. (2021). Central banks digital currency: detection of optimal countries for the implementation of a cbdc and the implication for payment industry open innovation. Journal of Open Innovation Technology Market and Complexity, 7(1), 72.https://doi.org/10.3390/joitmc7010072
- Andolfatto, D. (2018). Assessing the impact of central bank digital currency on private banks. wp, 2018(025).https://doi.org/10.20955/wp.2018.025
- Boros, E. and Horváth, M. (2022). Central bank digital currency: the next money revolution? : central bank digital currencies in the dimension of geopolitics. Pénzügyi Szemle = Public Finance Quarterly, 67(4), 506-521.https://doi.org/10.35551/pfq_2022_4_2

- Chen, J. and Nesterov, I. (2023). Central bank digital currencies: digital yuan and its role in chinese digital economy development. Rudn Journal of Economics, 31(1), 120-133.https://doi.org/10.22363/2313-2329-2023-31-1-120-133
- Cheng, P. (2022). Decoding the rise of central bank digital currency in china: designs, problems, and prospects. Journal of Banking Regulation, 24(2), 156-170.https://doi.org/10.1057/s41261-022-00193-5
- Fernández-Villaverde, J., Sanches, D., Schilling, L., & Uhlig, H. (2020). Central bank digital currency: central banking for all?. Review of Economic Dynamics.https://doi.org/10.1016/j.red.2020.12.004
- Goodell, G. and Nakib, H. (2021). The development of central bank digital currency in china: an analysis..https://doi.org/10.48550/arxiv.2108.05946
- Huang, Y. and Mayer, M. (2022). Digital currencies, monetary sovereignty, and us–china power competition. Policy & Internet, 14(2), 324-347.https://doi.org/10.1002/poi3.302
- Heil, E. (2020). Methode der Systematischen Literaturrecherche. https://www.uni-giessen.de/de/fbz/fb09/institute/VKE/nutr-ecol/lehre/SystematischeLiteraturrecherche.pdf
- Hrytsai, S. (2023). Digitization of government as a global trend of the future: implementation of the "electronic state" policy (on the example of Ukraine). Reality of Politics, 24(2), 45-81.https://doi.org/10.15804/rop2023203
- Martin, J. (2023). Wie digitales Zentralbankgeld unsere Freiheit bedroht, Gruenwald, Deutschland: Nena Celeste Publishing
- Miethlich, B. (2019). Disability as a Blind Spot in Sustainability Frameworks and Standards. International Journal of Recent Technology and Engineering, 8(3S2), 333-337.
- Mooslechner, P. (2010). Special forum on "the current crisis and the role of the state": equity in the financial system: the lessons of the last, the current and the next crisis. European Journal of Economics and Economic Policies Intervention, 7(1), 58-70.https://doi.org/10.4337/ejeep.2010.01.07
- Müller, J. and Kerényi, Á. (2022). The rise of central bank digital currencies. Financial and Economic Review, 21(3), 122-148.https://doi.org/10.33893/fer.21.3.122
- Opare, E. and Kim, K. (2020). A compendium of practices for central bank digital currencies for multinational financial infrastructures. IEEE Access, 8, 110810-110847.https://doi.org/10.1109/access.2020.3001970
- Ozili, P. (2021). Can central bank digital currency increase financial inclusion? arguments for and against. SSRN Electronic Journal.https://doi.org/10.2139/ssrn.3963041
- Riexinger, G., Kaucher, C., Sasalovici, M., & Bauernhansl, T. (2023). Cooperative factory planning with mixed reality/cooperative factory planning based on mixed reality. Wt Workshop Technology Online, 113(04), 135-139.https://doi.org/10.37544/1436-4980-2023-04-35
- Sandner, Philipp/Isabell Welpe/Andranik Tumasjan (2020). Der Blockchain-Faktor: Wie die Blockchain unsere Gesellschaft verändern wird, BoD – Books on Demand.
- Soilen, K. and Benhayoun, L. (2021). Household acceptance of central bank digital currency: the role of institutional trust. The International Journal of Bank Marketing, 40(1), 172-196.https://doi.org/10.1108/ijbm-04-2021-0156