The vegetarian tiger

Privacy concerns surrounding the retail account-based Central Bank Digital Currency of Europe.

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1. Introduction

Digitization in the payment system has brought unprecedented dynamics

Digitization in the payment system has brought unprecedented dynamics. Cash is being used less and less and the corona crisis has given this an extra push.[1] These developments and the increasing number of new digital assets entering the market sounded an alarm bell among central banks to start thinking seriously about the digitization of public money, also known as Central Bank Digital Currency (CBDC).[2] Already 90% of all central banks in the world are now working on this theme.[3] The European Union has also begun to contemplate digital euros and expects to conclude the investigation by autumn of 2023.[4]

However, this type of digital currency can possibly be construed in a privacy-unfriendly way. This paper will critically examine the privacy concerns surrounding Europe's retail account-based CBDC.

2. What is a Central Bank Digital Currency?

CBDC refers to a digital form of fiat public money issued and backed by a central bank

CBDC refers to a digital form of fiat public money issued and backed by a central bank.[5] Depending on the purpose of the issuing entity, the technical definition of CBDC could differ.[6]

2.1. Differentiations

CBDC differs from the digital form of private money. Private money is money held in accounts at commercial banks. This traditional form of money represents a private commercial bank's liabilities in the form of a direct claim against this bank.[7] In contrast, CBDC is a direct claim on a central bank and is issued by a public central bank.[8] By pledging the one-for-one conversion of private money into public money upon demand, similar to withdrawing cash from an ATM, private money is frequently connected to a sovereign currency; however, it is a claim one has on the commercial bank.[9] CBDC, on the other hand, is the central bank's direct liability.[10]

Moreover, CBDC is distinct from stablecoins[11] and crypto-assets[12]. Crypto-assets are not backed by or connected to a sovereign currency,[13] nor are all crypto-assets or stablecoins issued by an identifiable central party. CBDC is both but in a digital form.[14]

2.2. Design Categories

Depending on the purpose, CBDCs can be further classified into multiple categories.[15]

2.2.1. Wholesale vs. Retail

Wholesale CBDCs are designed for the settlement of transactions or large interbank payments and have limited access to banks and other financial institutions.[16] In contrast, retail CBDCs are used when the CBDC is meant to be offered to the general public.[17] Consumers and businesses can access and use retail CBDCs for retail transactions and other broader uses.[18] As such, it presents the general public with a new way to store money and may be intended to displace the existing payment instruments, like cash or debit cards.[19] CBDC is different from cash, as it comes in a digital form unlike physical coins and banknotes.[20]

2.2.2. Account-based vs. Token-based[21]

Account-based CBDCs refer to CBDCs that are connected to an identifying system, such as the European Digital Identity,[22] and require users to log in before they may access it.[23] Therefore, users must pass verification before they may access and use CBDCs. [24] Consequently, in its inability to be transferred anonymously, account-based CBDCs lack the cash-like characteristics.[25] In contrast, token-based CBDCs refer to CBDCs protected by passwords, like digital signatures, that can be accessed pseudonymously.[26] Following, token-based CBDCs resemble cash or Bitcoin as they do not necessarily require identification checks for every user.[27]

Source: created by the author using DALL • E

3. Why would central banks want to issue a Central Bank Digital Currency?

Besides the general global trends, motivations for CBDCs are also driven by country-specific circumstances

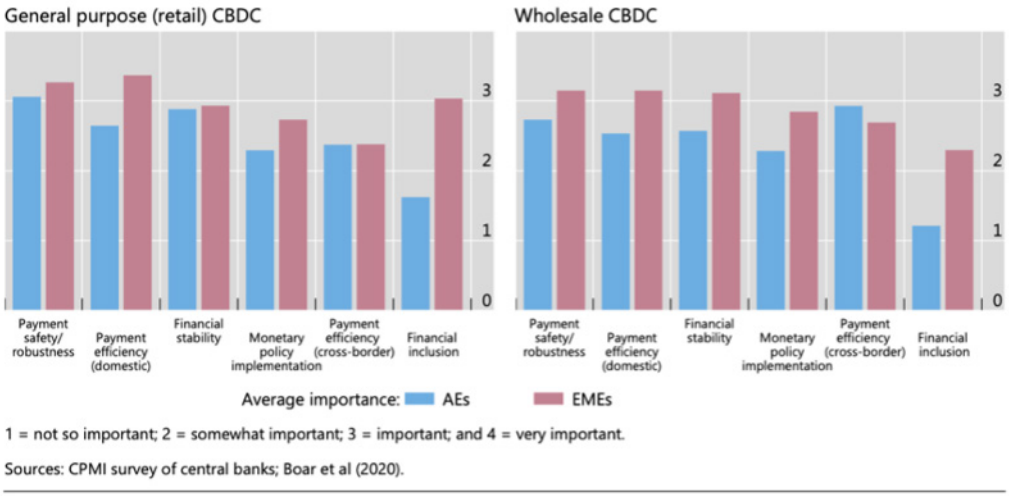
Digitization in the payment system has led to new challenges in the monetary system worldwide. Four developments leading to this disruption can be distinguished.[28] Firstly, the rapid rise in interest in cryptocurrencies that compete with traditional forms of assets.[29] Secondly, the advent of private sector-issued stablecoins.[30] Thirdly, the entry of big tech into payments, and more generally the disruption that platform-based business models and big data bring to the financial system challenging central banks in competition, data privacy and the integrity of the payment system.[31] And lastly, the Covid-19 pandemic has accelerated the adoption of digital payment technologies.[32]

Besides the general global trends, motivations for CBDCs are also driven by country-specific circumstances.[33] A survey of central banks shows that in advanced economies, CBDCs are being studied by central banks to support safety and robustness, or domestic payments efficiency *(see Graph 1)*. In other words, central banks view CBDCs as a chance to address threats to the security of digital payments, to cut costs, and to fulfil central banks' mandates for the efficient operation of retail and wholesale payments. Additionally, financial inclusion is a significant driver, particularly in emerging market economies (EMEs). Many central banks regard CBDCs as a way to increase the unbanked population's access to payment services by providing them with transaction account.[34]

Motivations for issuing a CBDC

Graph 1

Average importance



1 = not so important; 2 = somewhat important; 3 = important; and 4 = very important.

Sources: CPMI survey of central banks; Boar et al (2020).

4. Legal challenges

Regardless of the design of CBDCs, multiple legal challenges arise. [35] Among these legal challenges, the privacy concerns stand out. [36]

4.1 Privacy Concerns

Through the retail account-based CBDC, the issuing central bank may record, observe, and even control the cash flow of their currency.[37] Every transaction is completed and recorded digitally because users must log in to a system that must verify their identity, which violates user privacy.[38]

Thus, the digital euro would have a degree of privacy similar to existing digital payments and not cash payments

4.1.1. Europe

The Eurogroup emphasised that for the digital euro to succeed, it must ensure and maintain users' trust, *"for which privacy is a key dimension and a fundamental right"*.[39] The necessity for privacy, comparable to the privacy of cash today, was stressed by the Digital Euro Association.[40] While the European Central Bank (ECB) generally abides by these principles and prioritises privacy, it adopts a different strategy that offers citizens far less privacy. The ECB states: *"(...), a digital euro would provide a level of privacy equal to that of current private sector digital solutions."* Thus, the digital euro would have a degree of privacy similar to existing digital payments and not cash payments. A CBDC may be more appealing if it offers privacy comparable to cash because there are currently no high-privacy digital payment options.[41]

Theoretically, the ECB may address this privacy concern by maintaining anonymity with their CBDC design. Each transaction would be essentially anonymous if users' identities were not checked when they access services.[42] While this is currently the case for cash, European regulations do not allow anonymity in electronic payments in order to prevent money laundering, terrorist financing, tax fraud, and sanctions evasion.[43]

5. Overarching Problem

The programmability of CBDC presents an even bigger difficulty than the privacy concerns

The programmability of CBDC presents an even bigger difficulty than the privacy concerns. Even though Fabio Panetta recently stated that the digital euro, Europe's CBDC, is being introduced in a form that does not make use of programmability - due to its nature - it may still be possible to adapt this later.[44] The tiger resists eating flesh for a while before giving in and eating a great chunk when he is enticed, similarly, the ECB maintains a privacy-friendly digital currency for a while, but when tempted, they may reprogram the conditions.

This raises the key question of this paper: What is the advantage for citizens of using the digital euro instead of cash if it is programmable by nature and not anonymous?

6. Conclusion

The rise of digitization in payment systems and the decreasing use of cash have prompted central banks to consider the issuance of CBDCs. While CBDCs have the potential to offer benefits such as increased financial inclusion and improved efficiency, there are also legal challenges, particularly around privacy. The design of CBDCs will play a critical role in addressing these challenges. As the EU and other central banks continue to explore the possibilities of CBDCs, it is essential that they prioritise user privacy and maintain the trust of the public.

Any questions?
Please contact **Jorie Corten** of Watsonlaw.

Footnotes

[1] De Nederlandsche Bank. (2020). Central Bank Digital Currency. In Objectives, Preconditions and Design Choices. Retrieved 29 March 2023, from https://www.dnb.nl/media/espadbvb/central-bank-digital-currency.pdf.

[2] Mallekoote, P.M. (2023). Is de digitale euro een aanwinst voor de maatschappij? Tijdschrift voor Financieel Recht, nr. ½, UDH:FR/17563.

[3] For an interactive and dashboard-like track that shows worldwide CBDC status, see CBDC Tracker, https://cbdctracker.org/ (last visited 25 March 2023); Committee on Payments and Market Infrastructures. (2018). Central bank digital currencies. Bank for International Settlements. Retrieved 26 March 2023, from https://www.bis.org/cpmi/publ/d174.html; Todd, R., & Rogers, M. (2020). A global look at central bank digital currencies: From iteration to implementation. The Block Crypto. E-source: https://www.theblockcrypto.com/post/75022/a-global-look-at-central-bank-digitalcurrencies-full-research-report.

[4] Eurogroup. (16 January 2023). Eurogroup Statement on the Digital Euro Project [Press release]. https://www.consilium.europa.eu/en/press/press-releases/2023/01/16/eurogroup-statement-on-the-digital-euro-project-16-january-2023/. (Hereafter: Eurogroup (2023)).

[5] Appendino, M., Bespalova, O., Bhattacharya, R., Clevy, J. F., Geng, N., Komatsuzaki, T., ... & Yakhshilikov, Y. (2023). Crypto Assets and CBDCs in Latin America and the Caribbean: Opportunities and Risks. IMF Working Papers, 2023(037), p. 4. (Hereafter: Appendino et al (2023)).

[6] Lee, Y., Son, B., Park, S., Lee, J., & Jang, H. (2021). A Survey on Security and Privacy in Blockchain-based Central Bank Digital Currencies. J. Internet Serv. Inf. Secur., 11(3), p. 16.

[7] Boar, C., & Wehrli, A. (2021). Ready, steady, go? – Results on the third BIS survey on central bank digital currency. Bank for International Settlements. Retrieved 27 March 2023, from https://www.bis.org/publ/bppdf/bispap114.pdf, p. 4. (Hereafter: Boar & Wehrli (2021)).

[8] Ibid.

[9] Tsang, C. Y., Yang, A. Y. P., & Chen, P. K. (2022). Disciplining Central Banks: Addressing the Privacy Concerns of CBDCs and Central Bank Independence, p. 9. (Hereafter: Tsang et al (2022)).

[10] Ibid.

[11] For example: Tether

[12] For example: Bitcoin and Ether.

[13] Tsang et al (2022), p. 8-9.

[14] Ibid.

[15] It is important to bear in mind that this paper only focuses on wholesale versus retail and account-based versus token-based CBDCs. There are many other design types possibilities with their own privacy issues. Other categories are for instance: centralized versus decentralised, Tier-1 versus Tier 2, direct versus indirect, and interest-bearing versus not interest-bearing. See for instance: Tsang et al (2022), p. 8-13.

[16] Tsang et al (2022), p. 9; (Boar & Wehrli (2021), p. 4; Bech, M, J Hancock, T Rice and A Wadsworth (2020): "On the future of securities settlement", BIS Quarterly Review, March, p. 67–83; Appendino et al (2023), p. 4.

[17] Boar & Wehrli (2021), p. 4; Appendino et al (2023), p. 4; Bossu, W., Itatani, M., Margulis, C., Rossi, A., Weenink, H., & Yoshinaga, A. (2020). Legal aspects of central bank digital currency: Central bank and monetary law considerations, p. 10.

[18] Tsang et al (2022), p. 9; Committee on Payments and Market Infrastructures. (2018). Central bank digital currencies. Bank for International Settlements. Retrieved 26 March 2023, from https://www.bis.org/cpmi/publ/d174.html.

[19] Boar & Wehrli (2021), p. 4; Tsang et al (2022), p. 9.

[20] Boar & Wehrli (2021), p. 4.

[21] Bank for International Settlements. (2021). Annual Economic Report 2021. Retrieved 27 March 2023, from https://www.bis.org/publ/arpdf/ar2021e.pdf, p. 77-80. (Hereafter: BIS (2021)).

[22] The European Digital Identity is still in its research phase, but it is expected to be a condition for the digital euro to work, see for instance: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-digital-identity_en.

[23] BIS (2021), p. 91.

[24] Tsang et al (2022), p. 9.

[25] Didenko, A. N., Zetzsche, D. A., Arner, D. W., & Buckley, R. P. (2020). After Libra, Digital Yuan and COVID-19: Central Bank digital currencies and the new world of money and payment systems, p. 30. (Hereafter: Didenko et al (2020)).

[26] Central banks can further design token-based CBDC into different degrees of pseudonymously, see Committee on Payments and Market Infrastructures. (2018). Central bank digital currencies. Bank for International Settlements. Retrieved 26 March 2023, from https://www.bis.org/cpmi/publ/d174.html, p. 6; Bank for International Settlements. (2021). Annual Economic Report 2021. Retrieved 27 March 2023, from https://www.bis.org/publ/arpdf/ar2021e.pdf, p. 92.

[27] Didenko et al (2020), p. 30.

[28] Auer, R., Frost, J., Gambacorta, L., Monnet, C., Rice, T., & Shin, H. S. (2022). Central bank digital currencies: motives, economic implications, and the research frontier. Annual review of economics, 14, 697-721, p. 6. (Hereafter: Auer et al (2022)).

[29] An important side note is that cryptocurrencies are speculative assets rather than money. They are extremely volatile, making it difficult to use them as a means of payment. Therefore, cryptocurrencies o not necessarily compete with traditional money. See e.g. Carstens, A. (2019): The future of money and payments. Speech held in Dublin, 22 March 2019.

[30] Auer et al (2022), p. 7.

[31] Bank for International Settlements. Annual Economic Report 2020: III. Central banks and payments in the digital era. (2020). Retrieved 27 March 2023, from https://www.bis.org/publ/arpdf/ar2020e3.html; Shin, H. S. (19 June 2021). Central bank digital currencies: an opportunity for the monetary system. In speech on the occasion of the BIS Annual General Meeting, Basel (Vol. 29).

[32] Saka, O., Eichengreen, B., & Aksoy, C. G. (2021). Epidemic exposure, fintech adoption, and the digital divide (No. w29006). National Bureau of Economic Research.

[33] Auer et al (2022), p. 7-8.

[34] Auer et al (2022), p. 7.

[35] For example: the substitution effect on bank deposits which causes safety and stability concerns of the financial system, cybersecurity incidents which causes resilience concerns, and criminal use for money laundering and terrorist finance which raises crime prevention concerns. See e.g. Crawford, J., Menand, L., & Ricks, M. (2021). FedAccounts: Digital Dollars. Geo. Wash. L. Rev., 89, 113; Li, J. (2022, July 21). There are already counterfeit wallets of China's digital yuan. Quartz. https://qz.com/1922648/there-are-already-counterfeit-wallets-of-chinas-digital-yuan; Ledger Insights. (2021, November 15). China catches fraudsters using central bank digital currency for money laundering. Ledger Insights – Blockchain for Enterprise. https://www.ledgerinsights.com/china-catches-fraudsters-central-bank-digital-currency-cbdc-for-money-laundering/; Kosuke Takami, N. (4 June 2021). China's bid for digital-yuan sphere raises red flags at G-7. Nikkei Asia. https://asia.nikkei.com/Spotlight/Cryptocurrencies/China-s-bid-for-digital-yuan-sphere-raises-red-flags-at-G-7.

[36] See, e.g., Privacy Concerns Loom Large as Governments Respond to Crypto. (20 April 2022). World Economic Forum. https://www.weforum.org/agenda/2022/04/privacy-concerns-loom-large-as-governments-respond-to-crypto; Schickler, J. (4 April 2022). Europe's CBDC Designers Wrestle With Privacy Issues, Coindesk. https://www.coindesk.com/policy/2022/04/04/europes-cbdc-designers-wrestle-with-privacy-issues; Middleton, P. (29 April 2022). How Real is the CBDC Threat to Privacy? Official Monetary and Financial Institutions Forum. https://www.omfif.org/2022/04/how-real-is-the-cbdc-threat-to-privacy.

[37] Tsang et al (2022), p. 4-5.

[38] A public consultation by the ECB shows that 43% of the public respondents found that privacy is the most crucial feature in the digital euro. European Central Bank. (2021). Eurosystem report on the public consultation on a digital euro. Retrieved 27 March 2023, from https://www.ecb.europa.eu/pub/pdf/other/Eurosystem_report_on_the_public_consultation_on_a_digital_euro~539fa8cd8d.en.pdf, p. 10-11.

[39] Eurogroup (2023).

[40] Digital Euro Association. (2022). CBDC Manifesto. Retrieved 25 March 2023, from https://cbdcmanifesto.com/wp-content/uploads/2022/10/20221011-CBDC-Manifesto-final.pdf.

[41] Gross, J., Sedlmeir, J., Babel, M., Bechtel, A., & Schellinger, B. (2021). Designing a central bank digital currency with support for cash-like privacy.

[42] Transactions could still be linked to users' identities as a result of ex post investigations, typically by the judicial authorities. Electronic payments leave traces whenever an internet connection is needed for execution. Additional techniques could be used to provide additional confidentiality if necessary. See for example European Central Bank and Bank of Japan, Balancing confidentiality and auditability in a distributed ledger environment (February 2020). Retrieved 27 March 2023, from https://www.ecb.europa.eu/paym/intro/publications/pdf/ecb.miptopical200212.en.pdf.

[43] European Central Bank. (2020). Report on a digital euro. Retrieved 27 March 2023, from https://www.ecb.europa.eu/pub/pdf/other/Report_on_a_digital_euro~4d7268b458.en.pdf, p. 27; Eurogroup (2023), supra note 28; Panetta, F. A digital euro that serves the needs of the public: striking the right balance. Introductory statement at the Committee on Economic and Monetary Affairs of the European Parliament. https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220330_1~f9fa9a6137.en.html.

[44] Panetta, F. A digital euro that serves the needs of the public: striking the right balance. Introductory statement at the Committee on Economic and Monetary Affairs of the European Parliament. https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220330_1~f9fa9a6137.

Questions?

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